Australian Graduate School of Management

5306 STRATEGIC GAME THEORY FOR MANAGERS

Mngt 5306 Term 3, 2009 R.E. Marks
Lectures: in Boral on Wed, Fri @ 11:00 Ext. 19271, Room AGSM 118
www.agsm.edu.au/bobm/teaching/SGTM.html bobm@agsm.edu.au

Reading/Reference List & Course Outline

Game theory provides a simple, but rich, framework for analysing once-off and repeated interplay between people or firms, where the manner in which each reacts depends upon the other's reaction: strategic interaction. These interactions occur in markets, in organisations, and in the household. This course—through lectures, experiential learning, and computer simulations—will attempt to provide students with understanding of many interactions they may encounter as managers, including price wars, wars of attrition, the value of cooperation interactions, and the value of information.

Outline of course:

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction and General principles</td>
</tr>
<tr>
<td>2,3</td>
<td>Simultaneous-Move Games I</td>
</tr>
<tr>
<td>4</td>
<td>Games with Sequential Moves</td>
</tr>
<tr>
<td>5</td>
<td>Simultaneous-Move Games II</td>
</tr>
<tr>
<td>6</td>
<td>Combining Sequential and Simultaneous</td>
</tr>
<tr>
<td>7–10</td>
<td>Decision Analysis: Games Against Nature</td>
</tr>
<tr>
<td>11</td>
<td>Mixed Strategies and Unpredictability</td>
</tr>
<tr>
<td>12, 13</td>
<td>Uncertainty and Information</td>
</tr>
<tr>
<td></td>
<td>In-class midterm exam. (Oct. 30)</td>
</tr>
<tr>
<td>14</td>
<td>Strategic Moves, Credibility, and Commitment</td>
</tr>
<tr>
<td>15, 16</td>
<td>The Prisoner's Dilemma and Repetition</td>
</tr>
<tr>
<td>17</td>
<td>Bargaining</td>
</tr>
<tr>
<td>18</td>
<td>Bidding and Auction Design</td>
</tr>
<tr>
<td>19</td>
<td>Contracting — Employing, Financing, Franchising</td>
</tr>
<tr>
<td>20,21</td>
<td>Choosing the Right Game: Co-opetition</td>
</tr>
<tr>
<td>22,23</td>
<td>Student presentations</td>
</tr>
</tbody>
</table>

Recommended text:

Buy this for the exercises and the elucidation of theory from the lectures.
As well, the following books might be found useful:


Bierman H.S. & Fernandez L., *Game Theory with Economic Applications*, Addison-Wesley, 2nd ed., 1998. 330.015193/4 This is highly recommended. It has good sections on games against nature (decision analysis), Nash equilibrium, subgame perfection, and mixed strategies.

Additional readings will be found below. Recommended readings are marked with an asterisk (*). A **Package** of course notes is available. Readings in the **Package** are marked with a **P**.

I have listed the readings for each topic under three headings: **A:** Light Background Readings (can be read before the lecture), **B:** Lecture Follow-Ups, and **C:** Deep (more technical) Background Readings.

**Lecture 1: Introduction and General Principles**

Dixit & Skeath, Chapters 1 and 2, Basic ideas and examples, How to think about strategic games.

McMillan J., Ch3 Understanding cooperation and conflict.

**Light Background Readings—**

* AGSM SGTM students Rod Chisholm and Mike Lindren, Beautiful game theory, *AFR*, 19 June 2006, **P.1**

* Wylie I., Mars wins the shipping game, *FastCompany*, **P.2**

* Singh S., The greatest game theorist of all, *New Stateman*. **P.3**

**Deep Background Readings—**


**Lectures 2 to 6: Concepts and Techniques**

**Lectures 2 and 3: Simultaneous-Move Games I**

Dixit & Skeath, Chapter 4, Simultaneous-Move Games


**Lecture 4: Games with Sequential Moves**

Dixit & Skeath, Chapter 3, Sequential-Move Games

**Lecture 5: Simultaneous-Move Games II**

Dixit & Skeath, Chapter 5, Simultaneous Moves with Continuous Strategies
Lecture 6: Combining Sequential and Simultaneous
Dixit & Skeath, Chapter 6, Combined Games

Light Background Readings—

* Oster C., Can the risk of terrorism be calculated by insurers? Game theory might do it. Wall Street Journal Online, 8 April 2002. P.5


Smith R., Business as war game: a report from the battlefront, at www.business2.com/articles/mag/0,1640,1570,FF.html

Lecture Follow-Ups—

* Garicano, L., Game theory: how to make it pay, Financial Times, P.8


Deep Background Readings—


Lectures 7 to 10: Decision Analysis — Games Against Nature

Dixit & Skeath, Appendix Ch. 7: Probability and Expected Utility, pp. 222–231; Appendix Ch. 9: Inferring probabilities, pp. 300–303.

Kreps D.M., Microeconomics for Managers, NY: Norton, 2004, Ch 15 Risk aversion and expected utility, Ch 16 Expected utility as a normative decision aid. AGSM 338.5024658/16


Light Background Reading—


**Lecture Follow-Ups—**

* The Ayres, Seeing significance: is the 95% probability range easier to perceive? *Chance*, 10(1), 2007. P.16

Bierman & Fernandez, Ch 10.5–10.7

**Deep Background Reading—**


**Lectures 11 to 16: Broad Classes of Games and Strategies**

**Lecture 11: Mixed Strategies and Unpredictability**

Dixit & Skeath, Chapter 7 and 8

**Lecture Follow-Ups—**

* Dixit & Nalebuff 2008, Ch 5 Choice and chance.
* Hartford, T., World Cup game theory, *Slate* June 2006. P.23

Bierman & Fernandez, Ch10.4

**Lectures 12 and 13: Using Information Strategically**

* Dixit & Skeath, Ch 9 Uncertainty and Information
* McMillan, Ch6 Using information strategically

**Light Background Readings—**

* Gans, J. et al., Gifts as signals. 2004. P.27


**Deep Background Readings—**
Bierman & Fernandez, Ch13 Bayesian Nash equilibrium, Ch15 Perfect Bayesian equilibrium, Ch18 Adverse selection and credit rationing

**Lecture 14: Strategic Moves, Commitment, and Credibility**
Dixit & Nalebuff, Ch 5 and 6, Strategic Moves, and Credible commitments.
Dixit & Skeath, Chapter 10, Strategic Moves

**Lectures 15 and 16: Solving the Prisoner’s Dilemma, and Applications**
Dixit & Skeath, Chapter 11, The Prisoner’s Dilemma and Repeated Games
* Fels, A. & Brenchley F. Wholesale change a way to sharpen grocery rivalries, The Age, Aug 9, 2008 P-30

**Lecture Follow-Ups—**
* Dixit & Nalebuff, Ch 4, Resolving the Prisoner’s Dilemma

**Deep Background Reading—**

**Lectures 17 to 22: Applications**

**Lecture 17: Bargaining**
Dixit & Skeath, Chapter 17, Bargaining
McMillan, Ch5 Gaining bargaining power

**Lecture Follow-Ups—**
Dixit & Nalebuff, Ch 11 Bargaining
* Bierman & Fernandez, Ch7 Bargaining.


**Deep Background Reading—**
Lecture 18: Bidding and Auction Design

Dixit & Skeath, Ch 16, Bidding Strategy and Auction Design
McMillan, Ch11 Bidding in competition

Light Background Readings—


Lecture Follow-Ups—

* Bierman & Fernandez, Ch14 Auctions
* Klarreich E., The bidding game, U.S.P.N.A.S. P.38

Milgrom P., Putting Auction Theory to Work, CUP, 2004. AGSM 381.17/2

Deep Background Readings—

* R. Marks, Efficient, competitive, and informed markets: Australian Corporations Law and auctions, 2000, at


Brams S.J. & A.D. Taylor, Fair division by auctions, Ch. 9 in their Fair Division: From Cake-Cutting to Dispute Resolution, Cambridge: CUP, 1996. AGSM 303.69/4

Lecture 19: Contracting

* Dixit & Nalebuff, Ch12 Incentives.
  McMillan, Ch8 Creating incentives; Ch9 Designing contracts; Ch10 Setting executives’ salaries.

Lecture Follow-Ups—

* Bierman & Fernandez, Ch12 Moral hazard and involuntary unemployment.

Deep Background Reading—

Lectures 20 and 21: Choosing the Right Game: Co-opetition


and this Web page:

http://mayet.som.yale.edu/coopetition/index2.html

Light Background Readings—


Deep Background Readings—


And Beyond …

For topical readings from the media (ideas for term projects, for instance), on-line games, and other goodies, see:

www.gametheory.net

For a history of game theory (by Paul Walker) since Old Testament times, point your browser at the following URL:

www.econ.canterbury.ac.nz/personal_pages/paul_walker/gt/hist.htm

For further surfing on the 'Net about game theory, start at the following URL:

http://kuznets.fas.harvard.edu/~aroth/aroth.html

And the Game Theory Society at

www.gametheorysociety.org
Assessment

There will be three individual assignments, a one-hour in-class midterm exam, and a short term project (which may be done in groups). All assessments must be submitted.

1. The first assignment will be handed out on Friday, Sept. 25, and is due two weeks later, on Friday, Oct. 9, by 4 pm. This assignment is worth 10% of the final grade, and must be done individually, although students may talk (but not copy others’ work).

2. The second individual assignment will be handed out on Wednesday, Oct. 14, and is due on Friday, Oct. 23, by 4 pm. This assignment is worth 10% of the final grade.

3. The third individual assignment will be handed out on Friday, Nov. 6, and is due on Friday, Nov. 20, by 4 pm. This assignment is worth 10% of the final grade.

4. The in-class midterm exam will be held in the last class (Oct. 30) of Week 7 and will be worth 25% of the final grade. It will be closed-book, save for an A4 summary sheet of yours.

5. Your project is due by 4 pm on Tuesday, Dec. 8, and is worth 45% of the final grade. It may be done in groups of from one to four students. Please hand in a one- or two-page outline of the project topic by Friday, Oct. 9, outlining the issue, the players, your data sources, and how you intend analysing it. (This outline will not be assessed.) I expect applications of the framework described in class, not further theory. Groups will present brief outlines of their work on the last week of class.

6. You should start thinking about a project as soon as possible. Please come and talk to me about (a) possible topics of application, and (b) if you want to form a team to do it. You might like to look at some projects from previous years. I’d like decision trees, game trees, and/or payoff matrices. Look for issues with strategic interactions between players, whether simultaneous or sequential. (But avoid movies especially with (1) extensive chases, (2) more than one person shot dead with revolver or pistol.)

Previous projects available from Bob for perusal:
(M/N = movie or novel, S = sport, W = war, B = business, P = politics)

<table>
<thead>
<tr>
<th>Project</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blumberg</td>
<td>The ARL versus Super League Rugby</td>
</tr>
<tr>
<td></td>
<td>B/S: Was the tussle a PD? Could much anguish and money have been saved?</td>
</tr>
<tr>
<td></td>
<td>Analysing the battle for control of rugby league.</td>
</tr>
<tr>
<td>Boyd</td>
<td>Rupert Murdoch, Game Player</td>
</tr>
<tr>
<td></td>
<td>B/P: Rupert conquers the world from Adelaide, doh.</td>
</tr>
<tr>
<td>Bugg</td>
<td>The natural-gas-pipeline game</td>
</tr>
<tr>
<td></td>
<td>B: BHP v. AGL for NSW–Victoria interconnection.</td>
</tr>
<tr>
<td>Carlin</td>
<td>Home loan wars</td>
</tr>
<tr>
<td></td>
<td>B: Two types of player in the highly rivalrous oligopoly of mortgage</td>
</tr>
<tr>
<td></td>
<td>lending in 1996 NSW.</td>
</tr>
<tr>
<td>Chan</td>
<td>Bargaining in the H.K. property market</td>
</tr>
<tr>
<td></td>
<td>B: Behaviour, from a seller's perspective, on the roiling Hong</td>
</tr>
<tr>
<td></td>
<td>Kong property market.</td>
</tr>
<tr>
<td>Cheung</td>
<td>The Hong Kong IDD price war.</td>
</tr>
<tr>
<td></td>
<td>B: CTI v. HKT and the resulting price war for phone calls.</td>
</tr>
<tr>
<td>Chisholm</td>
<td>Telstra versus the Government.</td>
</tr>
<tr>
<td></td>
<td>B/P: In the lead up to T3, Sol y son amigos threaten the</td>
</tr>
</tbody>
</table>
Government with a low Telstra price or freedom from the ACCC.

Collins ..................... Australian discount variety sector price wars.
B: The $2 stores fight it out.

Coristine .................. Canadian beer wars
B: Molson and Labatt ignore the micros, sell out, and then descend to a price war, eh?

Davis ....................... The shifting sands: OPEC
B: A game-theory analysis of the development, formation, and demise of OPEC.

Dehne ..................... Co-opetition in the Supply Chain software market.
B: SAP vies with i2 and others: what is the right game?

den Hollander .......... Google changes the rules
B: Google changes the rules of search, online payments, and internet communication.

El-Rakshy ................. Granada v. Forte
B: the ins and outs of a hostile takeover.

Falandysz .............. NASDAQ v. the LSE
B: An analysis of a takeover attempt.

Field ....................... Video-game console wars

Germanos ................. A subsidy war between Regional Aircraft manufacturers
B/P: Canada's Aerospace-Bombardier v. Brazil's Embraer.

Guo .......................... The 3G auction in the UK
B: Expensive lessons for the winner

Hicks ........................ The World Series Cricket Revolution
B/S: Kerry Packer v. the Australian Cricket Board.

Hui ........................... QANTAS in the post-deregulation world
B: and Compass, Virgin, Ansett, SIA, ANZ.

Karanjia ..................... The war of the browsers
B: Microsoft v. the US Justice Dept., with focus on the battle between Netscape and Explorer. Uses a Coopetition perspective.

Kelly ......................... Shopping for Safeway (UK)—4 supermarkets & a regulator
B: Five bidders vie for Safeway UK in 2003. Who will win?

Koo ........................... The battle for AFL first and last rights
B/S: Sport is big business. The bidding battle for AFL TV rights among Network Seven, The Nine Network, the AFL, and the rest of us.

Leong ....................... KKR, the company
B: the leveraged buyout LBO battles.

Li ............................. The TV price war in China
B: the evolving technology and market among the nine (three major) TV manufacturers in China.

Lin ........................... Tamasek Holdings v. Wee Cho Yaw
B: Unlocking the value of Singapore's United Overseas Land.

Lioe .......................... Boeing v. Airbus
B: Boeing and Airbus (and the US and the EU) scrap over subsidies

Low .......................... R.J.R. Nabisco: the world's richest auction
B: Barbarians at the Gate helps answer two questions:
  • can game theory explain the protagonists’ action in the L.B.O.?
  • would a game theorist have acted differently?

Lui ............................ Cathay Pacific v. its pilots' union
B: both sides learn from three successive industrial disputes between management and the pilots.
McDonald ............... S.E. Asian Telecoms battle for growth 1999–2000
B: SingTel, PCCW, Telstra, and Optus.

Pandey ..................... Winning the Sydney 2000 Olympics
B/S: “The Bid” — Australia’s strategy in winning the Olympics.

Quan ........................ Rivalry in China’s petroleum duopoly
B: The two largest players compete for sales and sites.

Riordan .................... Coles v. Woolworths
B: The two rivals compete.

Rivlin ....................... The Israeli & Canadian cellular markets
B: A comparison of the evolution of two markets for mobiles.

Schorn ..................... The iPhone launch
B: Apple introduces the iPhone: a strategic analysis

Shergold ................... Australian pay-TV
B: Game theory applied to three key interactions:
1. Optus and Telecom’s cable rollouts
2. (S) Murdoch v. Packer over Rugby League

Sommer ..................... Intel v. AMD
B: non-price rivalries between the two chip manufacturers

Strudwick .................... Celluloid games: Cannes Film Festival
B: Selling cinematic rights for independently produced motion pictures on the Riviera analysed.

Wang ......................... Hainan Airlines against the world.
B: A small airline in China grows and takes on the bureaucracy and the larger airlines.

West ......................... David Jones v. Myer
B: Australia’s premium department store chains in combat.

Whitten ..................... Entering the ERP software industry
B: Should Innovit enter the industry? Is it a zero-sum game?
An analysis suggests that Innovit’s perspective was limited.

Williams .................... The Battle for AFL TV Rights
B/S: Nine versus Seven, with Ten and Foxtel as well, in 2005/6.

Yan .......................... Hong Kong Chinese newspaper price war
B: The entrance of the “Apple Daily” and the following price wars.

Beale ........................ The America’s Cup, 1983
S: An analysis of the strategic interactions of the winning campaign of Australia II.

Basnayake .................. The Hunt for Red October, the movie
M/N: Game theory applications in naval warfare.

Carter ........................ House of Games, the movie
M: David Mamet’s classic movie of games within games and deception within deception.

Chaney ........................ Survivor: a game theory analysis
TV: how to win at Survivor; how to keep your audience coming for more.

Flynn ........................ Wall Street, the movie
M/N: Applying the rules and core concepts of game theory to the world of Wall Street and the actions of Bud Fox, of the movie.

Fogarty ........................ Sexual politics in Disclosure, the novel & movie
M/N: Sexual harassment — a strategic weapon in the game of office politics?

French ......................... Playing Diplomacy and its appeal.
Game: A board game with much greater freedom: to diplome, to
threaten, to promise, to ally, to stab, to die, to conquer — how and why?

Koestoer ..................... The Good, the Bad, and the Ugly, the movie
M/N: The classic road movie, many 2- and 3-person interactions.

Sayers ......................... The Bonfire of the Vanities
M/N: Master of the Universe or Master of the Game. McCoy falls.
Analysis of three interactions in the novel.

Siamack ........................ Strategic Game Theory in Polo
S: Mixed strategies win the field in polo.

Smith ......................... Conrad's Nostromo, the novel
M/N: By modelling three games embedded in the novel’s storyline,
shows how game theory can help in the analysis of the plot.

Sun ............................ Other People’s Money, the movie
M/N: a corporate takeover battle.

Beaver ......................... The Gulf War I, 1990–91
W: Trying to unravel the misunderstandings and motives and strategies of
the two sides which resulted in war and death.

Fahey .......................... Waterloo, the battle, 1815
W: Napoleon v. Wellington and von Blücher.

Fahy ............................ Midway, the battle, 1942
W: Yamamoto’s attack on the island failed: it relied on faulty
logic, a non-credible threat, and was known of in advance.

Hing ............................ Russia v. Georgia, 2008
W: The conflict between Russia and Georgia over South Ossetia.

Loncar .......................... Croatia’s strategies in the fall of Yugoslavia, 1991–92
W: David v. Goliath: Croatia’s political and military
strategies during the fall of Yugoslavia.

Mazlin .......................... The Pacific War: Nippon v. the USA, 1941–45
W: Bushido against Western rationalism. Misunderstandings and war.

Mckay .......................... The Pacific War 1941–45: its beginning and end
W: Was the war inevitable? Why did the negotiations to end it fail?
Analysis of the Japanese and US diplomatic and military strategies.

von Stieglitz .................. Lies in the Desert, 1973
W: Events leading up to the Yom Kippur War, 1973

Bruns .......................... North Korea’s nuclear games
P: Should the Dear Leader continue to develop a nuclear arsenal?

Cheung .......................... Wahid’s downfall (with Tjia), 2001
P: Gus Durr’s fall in Jakarta.

Eggleton ........................ Soeharto’s Resignation, 1998
P: Soeharto’s decisions and influence diagrams.

Foong ........................... The Whitlam dismissal, 1975
P: The framework of game theory enlightens Gough’s and
Malcolm’s deliberations in 1975.

Frith ............................ Rats in the Ranks, the famous documentary film
P: Analyses the interactions of the candidates for Mayor of Leichhardt.
The movie records the words, actions, and musings as they happened.

Jackson ......................... Thirteen Days, the movie

Joullié ........................... Signals of war before the Falklands conflict, 1982
P: How to misread your adversary.

Killeen .......................... The Northern Ireland Troubles
P: Sinn Féin, the IRA, the Ulstermen, Catholics, and the
British government.
Krishnakumar .......... Iran v. the IAEA
P: Iran games the West over its nuclear program

Richard ................. The (eastern) enlargement of the E.U.
P: the countries playing, their payoffs, and their strategies to do better.

Salvador ................ The Marcos ouster, 1986
P: In 75 hours a small group of soldiers toppled the President.
Credible commitments and asymmetric information in the coup.

Shah ...................... Machiavelli's The Prince, Composite Principalities
P: How to hold a conquered country. (Listen up, George.)

Tziolis .................... The Tampa crisis, 2001

Viney ...................... Mahathir–Keating: recalcitrant duo? 1993
P: Malaysia v. Australia: A three-week spat analysed.

Wong ....................... Taiwan's 2000 Presidential Election
P: From Taipei mayor to beating the KMT candidate.

Germes ..................... Designing "interesting games"
Theory: Dixit & Nalebuff's strategic-voting example corrected.

Email Bob (bobm@agsm.edu.au) for copies of any of these.