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 subject—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. It follows on from the Strategy section of Term 1 Economic & Strategic Thinking.

Outline of subject:

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1. Strategic Decision Making</td>
</tr>
<tr>
<td>2.</td>
<td>Firms Behaving Badly.</td>
</tr>
<tr>
<td>3.</td>
<td>Duopoly Behaviour</td>
</tr>
<tr>
<td>5.</td>
<td>2. Decision Analysis: Games Against Nature</td>
</tr>
<tr>
<td>7.</td>
<td>Gaining Insight.</td>
</tr>
<tr>
<td>8.</td>
<td>Utility.</td>
</tr>
<tr>
<td>9.</td>
<td>6. Unpredictability</td>
</tr>
<tr>
<td>10.</td>
<td>7. Bargaining</td>
</tr>
<tr>
<td>11.</td>
<td>8. Using Information Strategically Screening</td>
</tr>
<tr>
<td>12.</td>
<td>Signalling and Countersignalling.</td>
</tr>
<tr>
<td>13.</td>
<td>9. Bidding and Auction Design</td>
</tr>
<tr>
<td>15.</td>
<td>10. Contracting, or the Rules of the Game</td>
</tr>
<tr>
<td>17.</td>
<td>11. Choosing the Right Game: Coopetition</td>
</tr>
<tr>
<td>18.</td>
<td>Concluded.</td>
</tr>
<tr>
<td>19.</td>
<td>Student presentations</td>
</tr>
<tr>
<td>20.</td>
<td>Concluded.</td>
</tr>
</tbody>
</table>
Recommended texts:

Bierman H.S. & Fernandez L., Game Theory with Economic Applications, Addison-Wesley, 2nd ed., 1998. 330.015193/4 (On reserve) This is highly recommended, if not required. It has good sections on games against nature (decision analysis), Nash equilibrium, subgame perfection, and mixed strategies.


As well, the following books might be found useful:


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.

1. Strategic Decision Making

1A: Light Background Readings—

* Wylie I., Mars wins the shipping game, FastCompany, P-1
* Singh S., The greatest game theorist of all, New Stateman. P-2
* The Economist, Preying on theory, 1999. P-23
* Oster C., Can the risk of terrorism be calculated by insurers? Game theory might do it. Wall Street Journal Online, 8 April 2002. P-4
1B: Lecture Follow-Ups—
* Rothschild R., Ten simple lessons in strategy from the games firms play, Management Today, P-6
* Dixit & Skeath, Ch3 Games with sequential moves, Ch4 Games with simultaneous moves


Gintis, Ch 1 A basic lexicon for strategic management, Ch 2 Leading from strength: eliminating dominated strategies, Ch 3 Playing it straight: pure strategy Nash equilibria.

McMillan J., Ch3 Understanding cooperation and conflict.

Gardner, Ch1 Introduction, Ch3 Two-person games, Ch8 Repeated games, Ch16 Voting games.

Rasmusen, Ch1 The rules of the game.


1C: Deep Background Readings—

2. Decision Analysis — Games Against Nature

2A: Light Background Reading—
* Apocalypse maybe, An insurer’s worst nightmare, and Getting the goat. The Economist, 1995/96/99 P-12
2B: Lecture Follow-Ups—


  www.treeage.com/demos/manual.html


Gardner, Ch 2 Games of chance.
Gintis, Ch 16 Probability and decision theory.
Bierman & Fernandez, Ch 10.5–10.7

2C: Deep Background Reading—

6. Unpredictability

6B: Lecture Follow-Ups—
* Dixit & Skeath, Ch5 Simultaneous-move games with mixed strategies

* Bierman & Fernandez, Ch10.4
  Gintis, Ch 4 Catching ‘em off guard: mixed strategy Nash equilibria.
  Gardner, Ch 4 Mixed strategies.
  Rasmussen, Ch 3 Mixed and continuous strategies.

7. Bargaining

7B: Lecture Follow-Ups—
* Bierman & Fernandez, Ch7 Bargaining.

* Dixit & Skeath, Ch16 Bargaining

- 4 -
8. Using Information Strategically

8A: Light Background Readings—

8B: Lecture Follow-Ups—
* Dixit & Skeath, Ch12 Uncertainty and information
* Rasmusen, Ch2 Information

Gintis, Ch 12 Learning who your friends are: Bayes’ Rule and private information, Ch 13 When it pays to be truthful: signaling in games with friends, adversaries, and kin.
Rasmusen, Ch 11 Signalling.
McMillan, Ch6 Using information strategically
Gardner, Ch10 Signaling, screening and sequential equilibria.

8C: Deep Background Readings—
Bierman & Fernandez, Ch13 Bayesian Nash equilibrium, Ch15 Perfect Bayesian equilibrium, Ch18 Adverse selection and credit rationing

9. Bidding and Auction Design

9A: Light Background Readings—
9B: Lecture Follow-Ups—
* Bierman & Fernandez, Ch14 Auctions
* Dixit & Skeath, Ch15 Bidding and auction design
* McMillan, Ch11 Bidding in competition
* Gardner, Ch12 Auctions.

9C: Deep Background Readings—

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

Rasmusen, Ch13 Auctions.

10. Contracting

10B: Lecture Follow-Ups—

* Kay, Ch4 Relationships and contracts.

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

Gintis, Ch 14 Bosses and workers, landlords and peasants, and other principal–agent models.

McMillan, Ch8 Creating incentives; Ch9 Designing contracts; Ch10 Setting executives’ salaries.

Gardner, Ch11 Games between a principal and an agent.

10C: Deep Background Reading—
11. Choosing the Right Game: Co-opetition

11A: Light Background Readings—
   * R. Koselka, Businessman's dilemma, and Evolutionary economics: nice guys
don't finish last, Forbes, October 11, 1993. P-9

11B: Lecture Follow-Ups—
   * Brandenburger A.M. & B.J. Nalebuff, The right game: using Game Theory to
   Look at this Web page:
   mayet.som.yale.edu/coopetition/index2.html

11C: Deep Background Readings—
that combines competition and cooperation; 2. The Game Theory Strategy
that's changing the game of business. NY: Currency Doubleday, 1996. (On
reserve)
   Brandenburger A.M. & Harborne W.S.Jr., Value-based business strategy, J of

12. 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 since Old Testament times, point your browser at the
following URL:
   www.econ.canterbury.ac.nz/hist.htm

For further surfing on the 'Net about game theory, start at the following URL:
   www.harvard.edu/~alroth/alroth.html

And the Game Theory Society at
   www.gametheorysociety.org
Assessment

There will be three assignments and a short term project.

1. The first assignment will be handed out on Thursday, July 24th, and is due two weeks later, on Thursday, August 7th, by 4 pm. This assignment is worth 15% of the final grade.

2. The second assignment will be handed out on Monday, August 11th, and is due on Thursday, August 21st, by 4 pm. This assignment is worth 15% of the final grade.

3. The third assignment will be handed out on Monday, August 25th, and is due on Thursday, September 4th, by 4 pm. This assignment is worth 15% of the final grade.

4. Your project is due by 4 pm on Wednesday, September 24th, and is worth 55% of the final grade. It may be done in groups of one, two, or three students. Please hand in a one- or two-page outline of the project topic by August 7th. 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.

5. 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. I shall hand out a list of possible (but not exclusive) topics in class, but you might like to look at some projects from previous years. Do not believe that an influence diagram is sufficient for a good project: I'd like decision trees, game trees, and/or payoff matrices. Look for issues with strategic interactions between players, whether simultaneous or sequential.

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

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

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

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

Blumberg .. The ARL versus Super League Rugby
B/S: Was the tussle a PD? Could much anguish and money have been saved? Analysing the battle for control of rugby league.

Buckley ..... A Few Good Men, the movie
M: A courtroom showdown is the finale to many strategic interactions in an inside conflict.

Bugg ........... The natural-gas-pipeline game
B: BHP v. AGL for NSW−Victoria interconnection.

Carlin .......... Home loan wars
B: Two types of player in the highly rivalrous oligopoly of mortgage lending in 1996 NSW.

Carter ......... House of Games, the movie
M: David Mamet’s classic movie of games within games and deception
Chan ........ Bargaining in the H.K. property market
B: Behaviour, from a seller’s perspective, on the rolling Hong Kong property market.

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

Cheung ...... The Hong Kong IDD price war.
B: CTI v. HKT and the resulting price war for phone calls.

Cheung ...... Wahid’s downfall
P: Gus Durr’s fall in Jakarta.

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

Dehne ........ Co-operation in the Supply Chain software market.
B: CTI v. HKT and the resulting price war for phone calls.

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

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

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

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

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?

Foong ......... The Whitlam dismissal
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.

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

Germes ...... Designing “interesting games”
Theory: Dixit & Nalebuff’s strategic-voting example corrected.

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.

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

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

Killeen ...... The Northern Ireland Troubles
P: Sinn Féin, the IRA, the Ulstermen, Catholics, and the
British government.

Koh ..........  Waterloo
W: Napoleon v. Wellington and von Blücher.

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.

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

Lim ..........  Ransom — the movie: strategic interactions in kidnapping
M/N: Should extortionists be paid? Watch Mel Gibson turn the tables.
Analyzes three interactions in the movie.

Loncar ......  Croatia's strategies in the fall of Yugoslavia
W: David v. Goliath: Croatia's political and military
strategies during the fall of Yugoslavia.

Low ..........  R.J.R. Nabisco: the world's richest auction
B: Barbarians at the Gate 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.

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.

Mutesigensi The fate of student strikes
P: An analysis of a Ugandan student strike in which two students were
killed: a "lose–lose" outcome, which might have been avoided.

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.

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

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

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.

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

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.

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.

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

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.

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

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

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