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| Curtin University   | Universidad de Chile   |
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| <p align="center"><b>Graduate Program<br/>in<br/>Mineral Economics</b></p>        | <p align="center"><b>Programa<br/>en<br/>Economía de Minerales</b></p>             |

## Natural Resource Economics

# UnitOutline

Professor Daniel J. Packey, PhD

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# 1. Introduction

## Unit Overview

This unit applies standard economic concepts, theories and analysis to the understanding of natural resources. An emphasis is placed on understanding why natural resources pose particular analytical and policy problems, and on illustrating the contribution that economic analysis can make to the solution of these problems.

## Aims and Objectives

The aim of this unit is to equip students with the special insights and analytical methods that economics can provide for the understanding of the use of natural resources, and government policy towards the use of natural resources.

## Unit Lecturer

The lecturer for this unit is Dr Daniel J. Packey

## Class Timetable

Formal classes are held 9:00 am to 13:00 and 14:00 to 18:00 pm and will include tests, and lecture/seminar style presentation of the unit content as well as group work.

## Unit Organisation

This unit will examine the following topics with readings indicated. It is not expected that the students will read everything on the list. The Notes and articles supplied are to help students by presenting the same or similar material in clearer or more applied areas.

### Topic 1 -The Study of Mineral Economics

- Definitions of Economics and the Economic Way of Thinking
- Economics and mineral economics
- The focus of mineral economics

### Topic 2 – Demand, supply and market: a review

- Demand and supply functions
- The market
- Elasticity

### Topic 3 -Minerals and Economic development -foundations

- Economic growth and development
- Periods of history and minerals
- Minerals and economic development -the traditional view

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- Mineral consumption -recent trends
  - The intensity of use
  - Complicating factors with mineral production and consumption

#### **Topic 4 - Mineral resources – Course or blessing?**

- Resources booms and Dutch disease
- The Resource Curse thesis
- Empirical evidence
- Minerals in Chile
- Minerals Australia
- Minerals in Africa -Curse or blessing?

#### **Topic 5 – Non-renewable Natural Resources**

- Natural resources
- Analytical concepts in Mineral Markets
- The mineral supply function and output constraint
- Mineral markets and price cycles
- Demand and supply responses

#### **Topic 6 – Renewable Natural Resources**

- Renewable Energy Technologies
- Rets
- Renewable Energy Technologies Characteristics
- Placement Principles
- Quality of Resource
- Integration of Resource
- Value of Resource
- Uses and Limits

#### **Topic 7 – Market failure**

- Market failure
- Property rights and externalities
- Lags and capital markets
- Information and uncertainty
- The Economics of Pollution
- Externalities
- Pigovian taxes and subsidies
- Tradable pollution permits and other policy measures
- Valuation of Natural Resources

#### **Topic 8 – Mineral Taxation and Royalties**

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- Concept of Economic Rent / Royalties
  - Tax Types
  - Design Principles
  - Australian mineral taxation
  - Super Profit Tax

### **Topic 9 – Mineral Policy**

- The aims and Practice of Economic Policy
- The Context of Mineral Policy
- Mineral Policy in Practice

### **Unit Materials**

To study in this unit, you will need:

- This Study Guide
- The additional Notes supplied
- Additional Reading supplied

## Some Internet Resources for Natural Resource Economics

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| <p><b>Topic 1: The Study of Mineral Economics</b></p>                  | <p><b>Recommended Reading</b> Eggert, Rod, 2008, "Trends in mineral economics: Editorial retrospective, 1989 – 2006," <i>Resources Policy</i>, 33(1), 1 -3. Gordon, Richard, and Tilton, John, 2008, "Mineral Economics: Overview of a Discipline," <i>Resources Policy</i>, 33(1), 4 – 11. Maxwell, P. &amp; Guj. P. (eds.), 2006. <i>Australian Mineral Economics: A Survey of Important Issues</i>, Monograph 24, Melbourne: Australian Institute of Mining and Metallurgy. Chapter 1, 1 -4 Mackenzie, B. W., 1987, "Mineral Economics: Definition and Application", in <i>Mineral Economics: Decision-Making Methods and the Mineral Industry</i>, Adelaide: Australian Mineral Foundation, 2-9.</p>  |
| <p><b>Topic 2: Demand, supply and markets: a review</b></p>            | <p><b>Recommended Reading</b> The core reading for this topic is an online microeconomics text book. The site also contains other links to useful for enhancing an appreciation of modern economic thought. The web address is:<br/> <a href="http://economics.about.com/od/microeconomics/a/micro_text.htm">http://economics.about.com/od/microeconomics/a/micro_text.htm</a> Another useful online reading appears at:<br/> <a href="http://www.intute.ac.uk/socialsciences/economics/">http://www.intute.ac.uk/socialsciences/economics/</a></p>   |
|  | <p><b>Other Reading</b> You may find it useful to consult with an introductory microeconomics text book. Additional material will be provided during class.</p>   |
| <p><b>Topic 3: Minerals and economic development – foundations</b></p> | <p><b>Recommended Reading</b> Maxwell, P. &amp; P. Guj. (eds.), 2006. <i>Australian Mineral Economics: A Survey of Important Issues</i>, Monograph 24, Melbourne: Australian Institute of Mining and Metallurgy. Chapter 2. <b>Other readings</b> Tilton, John, 1989, "The New View of Minerals and Economic Growth", <i>The Economic Record</i>, 65 (190), 265-278. Tilton, John ed., 1992, <i>Mineral wealth and economic development</i>, Washington: Resources for the Future. Tilton, John, 2003, <i>On Borrowed Time? Assessing the Threat of Resource Depletion</i>, Washington: Resources for the Future. <b>Websites</b> <a href="http://www.abs.gov.au">http://www.abs.gov.au</a><br/> <a href="http://www.abareconomics.com/">http://www.abareconomics.com/</a><br/> <a href="http://www.readyed.com.au/Sites/minehist.htm">http://www.readyed.com.au/Sites/minehist.htm</a></p> |
| <p><b>Topic 4: Mineral resources – Curse or blessing?</b></p>          | <p><b>Recommended Reading</b> Maxwell, Philip, 2006, "Minerals and the Developing Nations," Chapter 3 in <i>Australian Mineral Economics</i>, Melbourne: AusIMM, 17–25.</p>   |

**General Discussions:** Auty, Richard M, 1993, *Sustaining Development in Mineral Economies*, London: Routledge, 13-28. Auty, Richard, 1998, "Mining as a generator of wealth: potential conflicts and solutions", *Resources Policy*, 13(2), 4-12. "The Natural Resources Myth: Ungenerous endowments," *The Economist*, December 24, 1995 -January 5, 1996, 87-89. Davis, Graham A and Tilton, John E, 2005, "The resource curse," *Natural Resources Forum*, 29, 233–242. Gylfason, Thorvaldur, 2007, "The International Economics of Natural Resources and Growth" *Minerals and Energy*, 22(1), 7 – 17. Maxwell, Philip and al Rawashdeh, Rami, 2005, "Are minerals a blessing or a curse? Some reflections on the recent debate," *The Journal of Resources, Energy and Development*, 2(2), 107-123. Weber-Fahr, Monika, 2002, *Treasure or Trouble? Mining in Developing Countries*, Washington: World Bank and International Finance Corporation Wright, Gavin and Czelusta, Jesse, 2003, "Mineral Resources and Economic Development," Stanford Center for International Development, November. **Empirical evidence** Atkinson, Giles, and Hamilton, Kirk, 2003, "Savings, Growth and the Resource Curse Hypothesis," *World Development*, 31 (11), 1793-1807. Davis, Graham, 1995, "Learning to Love the Dutch Disease: Evidence from the Mineral Economies", *World Development*, 23 (10) 1765-99.

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|   | <p>Gylfason, Thorvaldur, 2001, "Natural resources, education and economic development," <i>European Economic Review</i>, 45, 847-859. Lederman, Daniel and William Maloney, 2002, "Open Questions about the Link Between Natural Resources and Economic Growth: Sachs and Warner Revisited," Natural Resources and Growth Conference, Bank of Chile, January. (<a href="http://www.bcentral.cl/eng/studiesandpublications/studies/workingpaper/141.htm">www.bcentral.cl/eng/studiesandpublications/studies/workingpaper/141.htm</a>) Ross, Michael, 2001, <i>Extractive Sectors and the Poor</i>, Oxfam America Report Sachs, Jeffrey, and Warner, Andrew, 1995, "Natural Resource Abundance and Economic Growth" Development Discussion Paper No. 517a, Harvard Institute for International Development. (<a href="http://www.cid.harvard.edu/hiid/517.pdf">http://www.cid.harvard.edu/hiid/517.pdf</a>)</p> <p><b>Some economic history</b> McKay, B., Lambert, I &amp; S. Miyazaki, 2000, "Special Article-The Australian Mining Industry: From Settlement to 2000." <a href="http://www.abs.gov.au">http://www.abs.gov.au</a> Blainey, Geoffrey, 2003, <i>The Rush that Never Ended 5th ed</i>, Melbourne University Press, Melbourne. Maponga, Oliver and Maxwell, Philip, 2001. "The Fall and Rise of African Mining", <i>Minerals and Energy: Raw Materials Report</i>, 16 (3), 9 –26. Maxwell, Philip, 2004, "Chile's recent copper-driven prosperity: Does it provide lessons for other mineral rich developing nations?" <i>Minerals and Energy</i>, 19 (1), March, 16 – 31. O'Brien, Juan, 1994, "Undoing a Myth: Chile's debt to Copper and Mining", Ottawa: International Council on Metals and the Environment, 2 -19. Shaw, A.G.L., <i>The Economic Development of Australia</i> 5th edition, 65-73, 113-116. Sinclair, W.A., 1976, <i>The Process of Economic Development in Australia</i>, Longman Cheshire, Melbourne. 78-119, 153-160.</p> |
| <p><b>Topic 5: Nonrenewable Natural Resources</b></p> | <p><b>Recommended Reading</b> The online text provides a chapter on Capital and Natural Resource Markets and Uncertainty and Information. Additional material will be provided in class. See: <a href="http://economics.about.com/od/microeconomics/a/micro_text.htm">http://economics.about.com/od/microeconomics/a/micro_text.htm</a> <b>Recommended Reading</b></p>  |
|   | <p>Field, Barry C. <i>Natural Resource Economics</i> Section 5 Chapter 10: Mineral Economics. New York: McGraw Hill 172-198. Minnitt, R.C.A., 2007. <i>Frontiers of Usefulness: The Economics of Exhaustible</i></p>  |

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|  | Resources. <i>The Journal of the South African Institute of Mining and Metallurgy</i> , Vol 107, 539—555. This reading provides a good overview of the theory of exhaustible resources and its usefulness to mineral economics. <b>Websites</b><br><a href="http://www.intute.ac.uk/socialsciences/economics/">http://www.intute.ac.uk/socialsciences/economics/</a>  |
| <b>Topic 6: Renewable Natural Resources</b>                        | <b>Recommended Reading</b> Most environmental economics or resource economics textbooks cover this relevant material for this topic. Materials will be provided in class. Field, Barry C. <i>Natural Resource Economics</i> Section 5 Chapter 10: Mineral Economics. New York: McGraw Hill 172-198. This website has some useful PowerPoint slides that can be downloaded for free. <b>Websites</b><br><a href="http://www.humboldt.edu/~envecon/econ_423/423outlines.html">http://www.humboldt.edu/~envecon/econ_423/423outlines.html</a><br><a href="http://www.intute.ac.uk/socialsciences/economics/">http://www.intute.ac.uk/socialsciences/economics/</a> |
| <b>Topic 7: Mineral Policy</b>                                     | <b>Recommended Reading</b> Maxwell, P. & Guj. P. (eds.), 2006. <i>Australian Mineral Economics: A Survey of Important Issues</i> , Monograph 24, Melbourne: Australian Institute of Mining and Metallurgy. Chapter 13 Andrews, C.B., 1998, “Emerging trends in mining industry partnerships,” <i>Natural Resources Forum</i> , 22(2), 199-126. Crowson, Phillip, 2002, “Pandora’s Box: Economic Policy Issues for the Mining Industry,” <i>Minerals and Energy: Raw Materials Report</i> , 17(1), 3-9.  |
|  | Otto, James, and Cordes, John, 2002, <i>The Regulation of Mineral Enterprises: A Global Perspective on Economics, Law and Policy</i> , Denver: Rocky Mountain Mineral Law Foundation, Chapter 2. Shinya WM, 1998, “Canada’s new minerals and metals policy: advancing the concept of sustainable development in the minerals and metals industry”, <i>Resources Policy</i> , 23 (4), 95 – 104. Tilton, John, 2000, “Mining and public policy: an alternative view”, <i>Natural</i>  |
| <b>Topic 8: Mineral Taxation and Royalties</b>                     | <b>Recommended Reading</b> Maxwell, P. & P. Guj. (eds.), 2006. <i>Australian Mineral Economics: A Survey of Important Issues</i> , Monograph 24, Melbourne: Australian Institute of Mining and Metallurgy,. Chapter 15 (by Frank Harman and Pietro Guj)   |
| <b>Chile’s mineral royalty system-Media comment</b>                | <a href="http://www.bcn.cl/pags/home_page/muestra_tema_prensa.php?id=21">http://www.bcn.cl/pags/home_page/muestra_tema_prensa.php?id=21</a>   |
| <b>Topic 9: Mining, Sustainability and Sustainable Development</b> | <b>Recommended Reading</b> Eggert, Rod, ‘Mining and Sustainable Development,’ Chapter 16 in Maxwell, P. & Guj. P (eds.), 2006. <i>Australian Mineral Economics: A Survey of Important Issues</i> , Monograph 24, Melbourne: Australian Institute of Mining and Metallurgy.  |



## 2. Assessment

### Brief Description

There are three pieces of assessment for this unit:

1. Midterm Examination
2. Final Examination and
3. An Scholarly Paper/Presentation.

### Assessment weighting

| Assignment          | Mark |
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| Midterm Examination | 30%  |
| Final Examination   | 30%  |
| Paper/Presentation  | 40%  |

### Assessment details

#### The Examinations

The two examinations are designed to provide you with an opportunity to consolidate what you have learned in this unit. Students will be asked to answer four questions from a set of six questions in two hours.

#### Paper/Presentation

A current topic relevant to mineral economics will be selected for each paper. The student will present their findings to the class. The paper and presentation are worth 20% each.