

# VU Research Portal

## Essays on Resource Management: Ownership, Market Structures and Exhaustability

Halsema, A.N.

2011

### **document version**

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

### **citation for published version (APA)**

Halsema, A. N. (2011). *Essays on Resource Management: Ownership, Market Structures and Exhaustability*. Tinbergen Institute/Thela Thesis.

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

### **Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

### **E-mail address:**

[vuresearchportal.ub@vu.nl](mailto:vuresearchportal.ub@vu.nl)

# Contents

<b>Acknowledgments</b>	<b>v</b>
<b>Contents</b>	<b>vii</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Background . . . . .	1
1.2 Why resource management is necessary . . . . .	1
1.2.1 Exhaustible versus renewable resources . . . . .	2
1.2.2 Types of ownership . . . . .	4
1.2.3 Market structures . . . . .	4
1.3 Important contributions to be considered . . . . .	5
1.4 Research questions and outline . . . . .	6
<b>I Exhaustible Resources</b>	<b>11</b>
<b>2 On nonrenewable resource oligopolies</b>	<b>13</b>
2.1 Introduction . . . . .	13
2.2 The model . . . . .	15
2.3 Open-loop Nash equilibrium . . . . .	16
2.4 The order of extraction and welfare effects . . . . .	25
2.5 Conclusions . . . . .	29
2.6 Appendix 2.A: <i>Proof of lemma 4</i> . . . . .	31
2.7 Appendix 2.B . . . . .	33
<b>3 When additional resource stocks reduce welfare</b>	<b>35</b>
3.1 Introduction . . . . .	35
3.1.1 Model and equilibrium . . . . .	38
3.2 Welfare analysis . . . . .	40

3.3	Conclusion . . . . .	44
3.4	Appendix 3.A . . . . .	45
<b>4</b>	<b>Numerics of exhaustible resource models</b>	<b>49</b>
4.1	Introduction . . . . .	49
4.2	The model . . . . .	52
4.2.1	Perfect competition and monopoly . . . . .	53
4.2.2	Cartel-versus-fringe . . . . .	54
4.3	Numerical exercises . . . . .	61
4.3.1	Cost Increases . . . . .	63
4.3.2	Change in choke price . . . . .	67
4.3.3	Stock changes . . . . .	70
4.4	The world and future model developments . . . . .	73
4.5	Conclusion . . . . .	75
4.6	Appendix 4.A . . . . .	75
<b>II</b>	<b>Renewable resources</b>	<b>77</b>
<b>5</b>	<b>Managing multiple fishery pools</b>	<b>79</b>
5.1	Introduction . . . . .	79
5.2	The model . . . . .	81
5.3	Autarky . . . . .	83
5.3.1	Open access . . . . .	83
5.3.2	Private ownership . . . . .	85
5.4	Common market . . . . .	88
5.4.1	Open access . . . . .	88
5.4.2	Mixed regime . . . . .	91
5.4.3	Private owners . . . . .	96
5.5	Cooperation . . . . .	99
5.6	Conclusion . . . . .	100
<b>6</b>	<b>Tax competition leading to strict policy</b>	<b>103</b>
6.1	Introduction . . . . .	103
6.2	Competition . . . . .	105
6.2.1	Model outline . . . . .	105
6.2.2	No transboundary pollution . . . . .	107

6.2.3	Transboundary pollution . . . . .	108
6.3	The tax game . . . . .	111
6.3.1	Model outline . . . . .	111
6.3.2	Optimal non-distortionary taxes . . . . .	113
6.3.3	Distortionary taxes only . . . . .	114
6.4	Endogenous capital . . . . .	115
6.4.1	The model . . . . .	115
6.4.2	Equilibrium . . . . .	117
6.4.3	Second period equilibrium . . . . .	118
6.4.4	Endogenous savings . . . . .	121
6.5	Conclusion . . . . .	123
6.6	Appendix 6.A: <i>Competition</i> . . . . .	124
6.7	Appendix 6.B: <i>The Ogawa/Wildasin result</i> . . . . .	126
6.8	Appendix 6.C: <i>The tax game with no distortionary taxation</i> . . . . .	128
6.9	Appendix 6.D: <i>The tax game with only distortionary taxes</i> . . . . .	131
6.10	Appendix 6.E: <i>Second period non-cooperative equilibrium</i> . . . . .	136
<b>7</b>	<b>Summary and conclusions</b>	<b>143</b>
7.1	Summary . . . . .	143
7.2	Relevance for research and policy . . . . .	145
7.3	Further research . . . . .	146
	<b>Samenvatting (Summary in Dutch)</b>	<b>149</b>
	<b>Bibliography</b>	<b>155</b>