Economic Theories of International Environmental Cooperation

£arsten Helm

2

Otto-von-Guericke University Magdeburg, Germany



NEW HORIZONS IN ENVIRONMENTAL ECONOMICS

Edward Elgar Cheltenham, UK • Northampton, MA, USA

Contents

;

List of Figures List of Tables Preface			ix xi xiii
1	Intr	oduction	1
Ι	Inte	rnational Policy in the Fairness Mode	
$\overline{2}$	An .	Axiomatic Approach To Fair Burden Sharing	9
	2.1	Introduction	9
	2.2	Fair Division Theory and	
		Environmental Problems	13
	2.3	The Model and Notation	17
	2.4	Upper and Lower Bounds for the Fair	
		Division of Common Resources	19
	2.5	The Walrasian Mechanism with the	
		Stand-Alone Upper Bound	24
	2.6	The No-Envy Criterion	26
	2.7	The WESA Mechanism and the	
		Monotonicity Axioms	32
	2.8	The WESA Mechanism and Burden	
		Sharing in the Climate Change Regime	39
	2.9	Concluding Remarks	44
	2.10	Appendix: Comparative Statics	46
3	A Welfarist Approach to Fair Burden Sharing		49
	3.1	-	49
	3.2	Social Welfare Functions and Value	_0
		Judgments	50
	3.3	Social Welfare Functions and Fairness	
		Concerns in Climate Change	56
	3.4	Concluding Remarks	60

II International Policy in the Cooperative Mode

ç

4	Environmental Cooperation as a Coalitional Game		65
	4.1	Introduction	65
	4.2	Coalition Formation and the Role of	
		Blocking Rules	67
	4.3	The Core of a Transboundary	
		Pollution Game	70
	4.4	Choosing an Allocation from the Core	
		of a Transboundary Pollution Game	75
	4.5	Concluding Remarks	86
	4.6	Appendix: Convexity of the	
		Transboundary Pollution Game	87

- III International Policy in the Non-Cooperative Mode

5	International Emissions Trading and the			
	Choice of Allowances			
	5.1	Introduction	93	
	5.2	Transboundary Pollution as a		
		Non-Cooperative Game	96	
	5.3	The Choice of Emission Allowances –		
		Diagrammatic Approach	99	
	5.4	The Choice of Emission Allowances –		
		Analytic Approach	102	
	5.5	Welfare Effects of Emissions Trading	107	
	5.6	Imperfect Competition on the		
		Permit Market	113	
	5.7	Concluding Remarks	119	
6	Cooperation Behind the Veil of Scientific Uncertainty		121	
	6.1	Introduction	121	
	6.2	Scientific Uncertainty and International		
		Environmental Negotiations	122	
	6.3	Model Uncertainty and Distributional		
		Interests – Game-Theoretic Approach	125	
	6.4	Repeated Interaction between Emission		
		Exporting and Importing Countries	127	

		Contents	vii
	6.5	Repeated Interaction and	
		Scientific Uncertainty	130
	6.6	Scientific Uncertainty and Negotiations	
		on Acid Rain – Quantitative Analysis	132
	6.7	Scientific Uncertainty and Negotiations	
		on Acid Rain – Qualitative Analysis	136
	6.8	Concluding Remarks	140
7	Dynamic Aspects and Threshold Effects		143
	7.1	Introduction	143
	7.2	Threshold Effects in Natural Systems	144
	7.3	······································	
		Transboundary Pollution Game	147
	7.4		
		Transboundary Pollution Game	149
	7.5		
~		Transboundary Pollution Game	157
	7.6	Concluding Remarks	158
	7.7	Appendix: Stability Analysis	160
8	Out	tlook	163
Bibliography			167
Index			185

;