Beyond basic structures in game theory

Von der Wirtschaftswissenschaftlichen Fakultät
der Universität Leipzig
genehmigte
HABILITATIONSSCHRIFT
zur Erlangung des akademischen Grades
Doctor rerum politicarum habilitatus
Dr. rer. pol. habil.
vorgelegt

von Dr. André Casajus
geboren am 19. April 1965 in Lieberose

Contents

List of Figures vii
List of Tables ix
List of Symbols x

Chapter I. Introduction 1
1. Game theoretic structures and related solution concepts 1
1.1. Extensive games and its derivatives 2
1.2. TU games, coalition structures, and cooperation structures 7
2. Isomorphism of extensive games 12
2.1. Weak isomorphism of extensive games 13
2.2. Super weak isomorphism of extensive games 15
2.3. Strong agent normal form isomorphism 16
3. Outside options and communication restrictions in TU games 16
3.1. Outside options, component efficiency, and stability 17
3.2. Outside options in TU games with a cooperation structure 18
3.3. An efficient value for TU games with a cooperation structure 19
3.4. On a relation between the Myerson value and the position value 21
4. Technicalities 22
5. Acknowledgments 22
References 22

Part 1. Isomorphism of extensive games 24

Chapter II. Weak isomorphism of extensive games 25
1. Introduction 26
2. Basic definitions and notation 29
2.1. Strategic games 29
2.2. Extensive games 29
2.3. Representations 31
2.4. Genericity 31
3. Weak isomorphism 31
3.1. Conditions ISA and PL 32
3.2. Preservation of the structure of the chance mechanism 33
3.3. Preservation of unordered terminal histories 34
3.4. Preservation of preferences 35
3.5. Invariance under weak isomorphism 35
4. Equivalence 35
4.1. Oh histories 35
4.2. Reduced normal form 36
4.3. Normal form 38
4.4. Agent normal form 39
5. Invariance of equilibria under weak isomorphism 41
6. Conclusion 42
Acknowledgements 43
Appendix A 43
References 49

Chapter III. Super weak isomorphism of extensive games 51
1. Introduction 52
2. Basic definitions and notation 52
3. Super weak isomorphism 53
3.1. Definitions 53
3.2. Condition sPTH 54
3.3. SWI vs. weak isomorphism 54
3.4. SWI vs. ANF isomorphism 55
3.5. Invariance under SWI 56
4. Concluding remarks 56
Acknowledgement 57
Appendix A 57
References 61
CONTENTS

Chapter IV. Strong agent normal form isomorphism 62
1. Introduction 63
2. Notation 64
3. Strong agent normal form isomorphism 65
4. Concluding remarks 67
Appendix 67
References 69

Part 2. Outside options and communication restrictions in TU games 71

Chapter V. Outside options, component efficiency, and stability 72
1. Introduction 73
2. Basic definitions and notation 75
3. Axioms for CS-values 75
4. The $\chi$-value 78
5. Relation to the Wiese value 80
6. Stability 81
7. Examples 82
7.1. Simple monotonic non-contradictory games 82
7.2. The gloves game 84
8. Conclusion 85
Acknowledgements 86
References 87

Chapter VI. Outside options in TU games with a cooperation structure 89
1. Introduction 90
2. Basic definitions and notation 91
3. Axioms for CO-values 92
4. A $\chi$-value for cooperation structure games 96
5. Properties 99
5.1. Relation to the $\chi$-value 99
5.2. Outside options—an example 100
5.3. Link monotonicity and improvement 101
5.4. Stable networks 103
# CONTENTS

6. Conclusion
References

Chapter VII. An efficient value for TU games with a cooperation structure
1. Introduction
2. Basic definitions and notation
3. Axioms for CO-values
4. A generalization of the Owen value
4.1. Uniqueness
4.2. Existence
4.3. Non-redundancy
4.4. An example
5. Properties
5.1. Relation to the Myerson value and to the Owen value
5.2. Consistency
5.3. Stability issues
6. Conclusion
References

Chapter VIII. On a relation between the Myerson value and the position value
1. Introduction
2. Basic definitions and notation
3. A characterization of the position value
4. Conclusion
References

Index