

Founding Editors:

M. Beckmann

H. P. Künzi

Managing Editors:

Prof. Dr. G. Fandel

Fachbereich Wirtschaftswissenschaften

Fernuniversität Hagen

Feithstr. 140/AVZ II, 58084 Hagen, Germany

Prof. Dr. W. Trockel

Institut für Mathematische Wirtschaftsforschung (IMW)

Universität Bielefeld

Universitätsstr. 25, 33615 Bielefeld, Germany

Co-Editor:

C. D. Aliprantis

Editorial Board:

**A. Basile, A. Drexl, G. Feichtinger, W. Güth, K. Inderfurth, P. Korhonen,
W. Kürsten, U. Schittko, P. Schönfeld, R. Selten, R. Steuer, F. Vega-Redondo**

Springer-Verlag Berlin Heidelberg GmbH

Stefan Napel

Bilateral Bargaining

Theory and Applications



Springer

Author

Stefan Napel
Institute of Economics Theory and Operations Research
University of Karlsruhe
Kaiserstraße 12
76128 Karlsruhe
Germany

Cataloging-in-Publication data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Napel, Stefan:
Bilateral bargaining : theory and applications / Stefan Napel. - Berlin ;
Heidelberg ; New York ; Barcelona ; Hong Kong ; London ; Milan ; Paris ;
Tokyo : Springer, 2002
(Lecture notes in economics and mathematical systems ; 518)
ISBN 978-3-540-43335-4 ISBN 978-3-642-56160-3 (eBook)
DOI 10.1007/978-3-642-56160-3

ISSN 0075-8450
ISBN 978-3-540-43335-4

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

<http://www.springer.de>

© Springer-Verlag Berlin Heidelberg 2002
Originally published by Springer-Verlag Berlin Heidelberg in 2002

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Typesetting: Camera ready by author
Cover design: *Erich Kirchner*, Heidelberg

Printed on acid-free paper SPIN: 10869236 55/3142/du 5 4 3 2 1 0

Acknowledgements

Wolfgang Eichhorn deserves special thanks for his vital support as my Ph. D. supervisor. Siegfried Berninghaus, Jörg Gutsche, Armin Haas, Manfred Holler, Stefan Seifert, and Mika Widgrén were key motivators of my research and contributed to it in several ways. Material for this book also benefitted from suggestions made by Christian Bayer, Matthias Brueckner, Ingolf Dittmann, Karl-Martin Ehrhart, Susanne Fuchs-Seliger, Werner Güth, Burkhard Hehenkamp, Laurence Kranich, René Levínský, Moshé Machover, Atanasios Mitropoulos, Dilip Mookherjee, Alfred Müller, Anders Poulsen, Hannu Salonen, Dov Samet, Wendelin Schnedler, Alexander Tieman, and Karl-Heinz Waldmann. A number of seminar, summer school, workshop, and conference participants provided significant academic stimuli and Ingeborg Kast gave important organizational help. Thanks go to all of them. Moreover, I am particularly grateful to my family for their support – it was crucial for this work in many respects.

Karlsruhe, January 2002

Stefan Napel

Contents

Introduction	1
1. Essentials of Bargaining Theory	5
1.1 Early Formalizations and Models	6
1.2 Cooperative Solutions	10
1.2.1 The Nash Bargaining Solution	11
1.2.2 Alternative Solutions	22
1.3 Non-cooperative Models	25
1.3.1 Games with Finite Horizon	26
1.3.2 Rubinstein's Alternating Offers Model	30
1.3.3 Strategic Bargaining with Incomplete Information ...	44
1.4 Evolutionary Models	49
1.4.1 Adaptive Play	51
1.4.2 Replicator Dynamics and the Ultimatum Minigame ...	60
1.4.3 Bargaining Automata	67
1.5 Empirical Evidence and Discussion	73
2. Aspiration-based Bargaining	81
2.1 Related Literature	82
2.2 The Model	84
2.3 Theoretical Results	88
2.4 Simulation Results	91
2.5 Concluding Remarks	96
2.6 Proofs	98
3. Bilateral Bargaining and Decision Power	109
3.1 Power Indices	110
3.2 Inferior Players	115
3.3 The Strict Power Index	117
3.4 Inferior Players in a Probabilistic Setting	121
3.5 Concluding Remarks	123

4. Bargaining and Justice	127
4.1 Bargaining Solutions and Principles of Social Justice	128
4.1.1 Nash Bargaining Solution	128
4.1.2 Kalai-Smorodinsky Bargaining Solution	131
4.1.3 Egalitarian and Utilitarian Bargaining Solutions	132
4.2 Rawls's Theory of Justice	135
4.3 Binmore's Theory of the Social Contract	138
4.4 Discussion	147
 Appendix: Game-theoretic Concepts, Notation, and Results ..	153
 List of Symbols	165
 List of Figures	169
 References	171
 Index	185