

# Contents

<i>Notes on the Contributors</i>	xiv
<i>Preface</i>	xxiv
<b>1 The Potentials and Limits of Economic Analysis: The Contributions of Kenneth J. Arrow</b>	<b>1</b>
<i>George R. Feiwel</i>	
1 Prologue	1
2 Welfare Economics and Social Choice	8
2.1 Coherence, Efficiency, and Optimality	9
2.2 Social Choice and Individual Values	22
3 Existence and Stability of Equilibrium	29
3.1 Existence	29
3.2 Stability	45
4 Existence and Efficiency	50
5 Choice under Uncertainty	55
6 Information, Centralization, and Decentralization	67
6.1 Information as a Commodity	67
6.2 Beyond the Economics of Medical Care	78
6.3 Theory of Discrimination	83
6.4 Centralization and Decentralization	87
7 Production, Capital, and Demand	96
8 A Summing Up	125
Appendix: Some Aspects of the History of Economics	145
<b>PART I: THE MAKERS OF MODERN GENERAL EQUILIBRIUM THEORY</b>	<b>189</b>
<b>2 Oral History I: An Interview</b>	<b>191</b>
<i>Kenneth J. Arrow</i>	
<b>3 Oral History II: An Interview</b>	<b>243</b>
<i>Gerard Debreu</i>	
<b>4 Oral History III: An Interview</b>	<b>258</b>
<i>Leonid Hurwicz</i>	

<b>PART II: VISION, METHOD, APPLICATION</b>	<b>293</b>
<b>5 Arrow's Vision of the Economic Process</b>	<b>295</b>
<i>Christopher Bliss</i>	
1 Introduction	295
2 The Content of a Vision	296
3 Arrow's Vision of Meaning	298
4 The Market and Planning	299
5 Arrow's Vision of Facts	302
6 Conclusion	304
<b>6 Economic Theory and Mathematical Method: An Interview</b>	<b>306</b>
<i>Robert J. Aumann</i>	
<b>7 Transformation in General Equilibrium Theory and Methods: An Interview</b>	<b>317</b>
<i>Andreu Mas-Colell</i>	
<b>8 Theory and Method – Second-Generation Perspective: An Interview</b>	<b>325</b>
<i>Hugo Sonnenschein</i>	
<b>9 Interaction between General Equilibrium and Macroeconomics: An Interview</b>	<b>340</b>
<i>Lawrence R. Klein</i>	
<b>PART III: THEORY OF RESOURCE ALLOCATION</b>	<b>359</b>
<b>10 On the Non-existence of Equilibrium: From Thornton to Arrow</b>	<b>361</b>
<i>Takashi Negishi</i>	
1 Introduction	361
2 Thornton's Examples	362
3 Mill's Interpretations	363
4 Unsuccessful Examples	365
5 Non- <i>Tâtonnement</i> Point of View	368
6 Arrow's Example	370

<b>11</b>	<b>On Equilibria of Bid-Ask Markets</b>	<b>375</b>
	<i>Robert B. Wilson</i>	
1	Introduction	377
2	Formulation	378
3	The Equilibrium: Description and Implications	383
	3.1 Probability Assessments	389
	3.2 Subgame Payoffs	391
	3.3 The Revelation Game	395
	3.4 Monotonicity	399
	3.5 Inefficiency	400
4	The Equilibrium: Construction	400
	4.1 Strategies in the Dutch Auctions	401
	4.2 Strategies in the Initial Phase	405
	4.3 Construction of the Equilibrium Strategies	407
5	The Endgames	408
6	Remarks	410
<b>12</b>	<b>General Equilibrium Analysis of Imperfect Competition: An Illustrative Example</b>	<b>415</b>
	<i>John Roberts</i>	
1	Introduction	415
2	An Illustrative Example	418
3	Conclusions	434
<b>13</b>	<b>Incentive-based Decentralization: Expected-Externality Payments Induce Efficient Behaviour in Groups</b>	<b>439</b>
	<i>John W. Pratt and Richard Zeckhauser</i>	
1	Introduction	439
	1.1 Endowment Contributed by Kenneth Arrow	439
	1.2 Decentralization	440
	1.3 Arrow's Related Contribution	442
	1.4 The Central Question	443
	1.5 Description of a Group	444
	1.6 The Model	444
	1.7 Payment of the Expected Externality: Incentive-based Decentralization	445
	1.8 Examples of Efficient Incentives	446
	1.9 Outline of the Analysis	449

2	Incentives Leading a Group to a Team Optimum – One Stage	449
	2.1 Problem Formulation	449
	2.2 Derivation of Incentives	451
	2.3 Implementability of Incentives Based on Expected Externalities	453
3	Incentives Leading to a Group Optimum with Arbitrarily Many Stages of Observations, Actions and Signals	456
	3.1 Problem Formulation	456
	3.2 Derivation of Incentives in the Multistage Case	457
	3.3 Implementability of Incentives Based on Multistage Expected Externalities	461
	3.4 Interpretation of the Requirements for Implementability	463
	3.5 The Case of Common Public Information	465
	3.6 The Case of Prompt Publicity	466
4	Remarks, Generalizations and Applications	469
	4.1 Features and Limitations	469
	4.2 Generalization of the Value Function	473
	4.3 Choice of Observations	474
	4.4 Differential Transmission of Information	474
	4.5 Example of Efficient Incentives When Actions Convey Information	475
	4.6 Discounting and Chance Termination	477
	4.7 Bargaining and Public Goods	478
	4.8 Application to Collective Decision Problems	479
5	Conclusion	480
<b>14</b>	<b>Arrow and the Theory of Discrimination</b>	<b>484</b>
	<i>Henry Y. Wan Jr</i>	
	1 Introduction	484
	2 The 'Basic' Model and Discriminatory Employment	486
	3 The Extended Model and Discriminatory Assignment	490
	4 Final Remarks	492
<b>15</b>	<b>Specialization, Search Costs, and the Degree of Resource Utilization</b>	<b>498</b>
	<i>Melvin W. Reder</i>	

<b>16 Information Disclosure and the Economics of Science and Technology</b>	<b>519</b>
<i>Partha Dasgupta and Paul A. David</i>	
1 Arrow, Information and the Underdeveloped Economics of Science	519
2 Do Science and Technology Produce Different Kinds of Knowledge?	523
3 Institutionalized Disclosure versus Secrecy	527
4 Public Consumption versus Private Capital	529
5 Priority and Patents	530
6 Science and Technology – The Perilous Balance	534
<b>PART IV: DECISION-MAKING UNDER UNCERTAINTY</b>	<b>543</b>
<b>17 Von Neumann–Morgenstern Utilities, Risk Taking, and Welfare</b>	<b>545</b>
<i>John C. Harsanyi</i>	
1 Introduction	545
2 The Axioms	547
3 Need for an Outcome-Oriented Position	549
4 Prudential and Moral Reasons for an Outcome-Oriented Position	552
5 The Economic Meaning of von Neumann–Morgenstern Utility Functions	553
6 Complementarity, Substitution, and von Neumann–Morgenstern Utilities	555
7 Conclusion: von Neumann–Morgenstern Utility Functions in Welfare Economics and in Ethics	556
<b>18 Arrow–Bayes Equilibria: A New Theory of Price Forecasting</b>	<b>559</b>
<i>Horace W. Brock</i>	
Introduction	559
Domain of Application of the New Theory	561
1 Bayesian Decision Theory and ‘Rational’ Price Forecasting	563
1.1 Price Uncertainty as ‘Future State’ Uncertainty	563
1.2 Knowledge as Future-Oriented Expertise	563

1.3 Inference about the Likelihood of Future States via Probabilistic Expansion and Bayes's Theorem	564
1.4 Structural versus Reduced Form Intelligence	565
1.5 'Riskiness' as Degree of Confidence	565
1.6 Summary	565
2 Arrow-Bayes Price Equilibria	566
2.1 Notation	566
2.2 Price Forecasting in Arrow's Original Model	568
2.3 Models in Stochastic Structural Form	569
3 Comparison with Traditional Econometric Models	575
3.1 A Bayesian Structural Model	575
3.2 Solving for a Price Forecast	576
3.3 Comparing the Forecast ( $p$ ), and ( $p$ )	577
3.4 Formal Comparison of the Two Models	581
4 Implementation and Estimation via an Expert System	583
4.1 An Arrow-Bayes Event Tree	583
4.2 The Expert-System	584
4.3 Other Considerations Bearing on Implementation	586
5 Explaining and Forecasting Price Volatility: Copper and Currencies	588
5.1 Copper Price Variability	588
5.2 Asymmetric Price Risk	589
5.3 Dollar Volatility in the Spot Market	591
Concluding Remarks	592
Appendix: Acknowledgement and Personal Note	593
<b>19 Rational Learning and Rational Expectations</b>	<b>597</b>
<i>Margaret Bray and David M. Kreps</i>	
1 Introduction	597
2 Rational Learning: An Example	603
3 Rational Learning Models and Convergence of Beliefs	610
4 Rational Learning within a Rational Expectations Equilibrium	613
5 Convergence to a Stationary Rational Expectations Equilibrium	615
6 Concluding Remarks	621

<b>20 Aspects of Investor Behaviour Under Risk</b>	<b>626</b>
<i>Benjamin M. Friedman and V. Vance Roley</i>	
1 The Derivation of Linear Homogeneous Asset Demand Functions	627
1.1 Analysis in Continuous Time	628
1.2 Analysis in Discrete Time	630
1.3 Isomorphic Assumptions	632
2 Evidence on the Symmetry Hypothesis	632
2.1 Evidence from Institutional Investors	633
2.2 Evidence from Individual Investors	636
3 The 'Bliss Point' Problem	641
3.1 Quadratic Utility	642
3.2 Negative Exponential Utility with Joint Normally Distributed Asset Returns	645
4 Summary and Conclusions	647
<b>21 Oligopolistic Uncertainty and Optimal Bidding in Government Procurement: A Subjective Probability Approach</b>	<b>654</b>
<i>Robert E. Kuenne</i>	
1 Bidding in a Competitive Market Structure	655
2 The Firm's Bidding Decision	657
3 Parametric Displacement Analyses	666
3.1 Displacement of a Scale Parameter, $a_k$	667
3.2 Displacement of the Shape Parameter, $c_k$	668
3.3 The Expected Value of Information	670
4 Conclusion	672
<b>22 Taking Pure Theory to Data: Arrow's Seminal Contribution</b>	<b>675</b>
<i>Robert M. Townsend</i>	
<b>PART V: ARROW'S REFLECTIONS ON THE ESSAYS</b>	<b>683</b>
<b>23 Reflections on the Essays</b>	<b>685</b>
<i>Kenneth J. Arrow</i>	