

## **REFERENCES**

- Abraham, R.H. and Shaw, C.P. (1984), **Dynamics - The Geometry of Behaviour**, Aerial Press Inc., Santa Cruz, California,
- Allais, M. (1956), "Explication des cycles économiques par un modèle non linéaire à régulation retardée", *Metroeconomica*, **2**, 4-83.
- Allen, R.G.D. (1967), **Macro-Economic Theory: A Mathematical Treatment**, MacMillan, London.
- Andronov, A.M., Vitt, A.A. and Chaikin, S.E. (1966), **Theory of Oscillators**, Pergamon, London.
- Arnold, V.I. (1973), **Ordinary Differential Equations**, M.I.T. Press, Cambridge, MA. (Russian original, Moscow 1971).
- Benhabib, J. and Day R.H. (1982), "A Characterization of Erratic Dynamics in the Overlapping Generations Model", *Journal of Economic Dynamics and Control*, **1**, 37-55.
- Benhabib, J. and Miyao, T.(1981), "New Results on the Dynamics of the Generalised Tobin Model", *International Economic Review*, **22**, 589 - 596.
- Black, F (1974) "Uniqueness of the price level in monetary growth models with rational expectations", *Journal of Economic Theory* **7**, 53-65.
- Blanchard, O.J. (1979) "Backward and forward solutions for economies with rational expectations", *American Economic Review*, **69**, 114-118.
- Blanchard, O.J. (1981) "Output, the Stock Market and Interest Rates", *American Economic Review*, **71**, 132-143.
- Blatt, J.M. (1978), "On the Econometric Approach to Business Cycle Analysis", *Oxford Economic Papers*, **30** (2), 292-300.
- Blatt, J.M. (1980), "On the Frisch Model of Business Cycles", *Oxford Economic Papers*, **32**, 467-479.

- Blatt, J.M. (1983), **Dynamic Economic Systems: A Post-Keynesian Approach**, Wheatsheaf Books, Brighton, England.
- Blinder, A.S. and Solow, R.M. (1973), "Does Fiscal Policy Matter?", *Journal of Public Economics*, **2**, 319-337.
- Bothwell, F.E. (1952), "The Method of Equivalent Linearization", *Econometrica*, **20**, 269-283.
- Bray, M.M. (1983), "Convergence to Rational Expectations Equilibrium", in R. Frydman and E.S. Phelps (eds.) **Individual Forecasting and Aggregate Outcomes**, Cambridge University Press.
- Brock, W.A. (1975), "A Simple Perfect Foresight Monetary Model", *Journal of Monetary Economics*, **1**, 133-150.
- Burmeister, E. (1980a), **Capital Theory and Dynamics**, Cambridge University Press.
- Burmeister, E. (1980b) "On Some conceptual issues in rational expectations modelling", *Journal of Money, Credit and Banking*, **12**, 800-816.
- Cagan, P. (1956), "The Monetary Dynamics of Hyperinflation", in **Studies in the Quantity Theory of Money**, (M. Friedman, ed.), University of Chicago Press, Chicago.
- Calvo, G. (1977), "The Stability of Models of Money and Perfect Foresight: A Comment", *Econometrica*, **45**, 1737-1739.
- Carlson, J.A. (1968), "An Invariably Stable Cobweb Model", *Review of Economic Studies*, **35**, 360-362.
- Chang, W.W. and Smyth, D.J. (1971), "The existence and persistence of cycles in a nonlinear model: Kaldor's 1940 model re-examined", *Review of Economic Studies*, **38**, 37-44.
- Chillingworth, D.R.J. (1976), **Differentiable Topology with a View to Applications**, Pitman, London.

- Christ, C.F. (1968), "A Simple Macroeconomic Model with a Government Budget Restraint", *Journal of Political Economy*, 76, 53-67.
- Clarkson, B.L. (1978), *Stochastic Problems in Dynamics*, Pitman, London.
- Day, R.H. (1982), "Irregular Growth Cycles", *American Economic Review*, 72, 406-414.
- Desai, M. (1973), "Growth Cycles and Inflation in a Model of Class Struggle", *Journal of Economic Theory*, 6, 527-545.
- Ezekiel, M. (1938), "The Cobweb Theorem", *Quarterly Journal of Economics*, 52, 255-280.
- Evans, F.J. and Fradellos, G. (1982), "The Qualitative Analysis of Nonlinear Dynamic Economic Systems by Structural Methods", in G. Szego (ed.) *New Quantitative Techniques for Economic Analysis*, Academic Press.
- Evans, J.L. and Yarrow G.K. (1981), "Some implications of Alternative Expectations Hypotheses in the Monetary Analysis of Hyperinflation", *Oxford Economic Papers* 34, 61-80.
- Feigenbaum, M.J. (1983), "Universal Behaviour in Nonlinear Systems", Essay No. 7 in *Nonlinear Dynamics and Turbulence*, ed. G.I. Ioos, Pitman.
- Ferri, P. and Greenberg, E. (1989), *The Labour Market and Business Cycle Theories*, Springer-Verlag Lecture Notes in Economics and Mathematical Systems, Vol 325.
- Freedman, H.I. and Waltman, P. (1975), "Perturbation of Two-Dimensional Predator-Prey Equations", *SIAM Journal of Applied Mathematics*, 28, 1-10.
- Frisch, R. (1933), "Propagation Problems and Impulse Problems in Dynamic Economics", in *Essays in Honour of Gustav Cassell*, Allen and Unwin, London.
- Gabisch, G. and Lorenz, H.W. (1989), *Business Cycle Theory: A Survey of Methods and Concepts*, Springer-Verlag Universitext.

- Gandolfo, G. (1980), **Economic Dynamics: Methods and Models**, North Holland, Amsterdam.
- Goldman, S. (1972), "Hyperinflation and the Rate of Growth in the Money Supply", *Journal of Economic Theory*, 5, 250-257.
- Goodwin, R.M. (1950), "A Nonlinear Theory of the Cycle", *Review of Economic Statistics*, XXXII, 4, 316-320.
- Goodwin, R.M. (1951), "The Nonlinear Accelerator and the Persistence of Business Cycles", *Econometrica*, 19, No. 1, January, 1-17.
- Goodwin, R.M. (1967), "A Growth Cycle", in C.H. Feinstein (ed.), **Socialism, Capitalism and Growth**, C.U.P., Cambridge.
- Goodwin, R.M., Krieger, M. and Vercelli, A. (1984), (eds.) **Nonlinear Models of Fluctuating Growth**, Springer-Verlag.
- Gray, M. and Turnovsky, S.J. (1979), "The Stability of Exchange Rate Dynamics Under Perfect Myopic Foresight", *International Economic Review*, 20, 643-660.
- Guckenheimer, J. and Holmes, P. (1983), **Nonlinear Oscillations, Dynamical Systems and Bifurcations of Vector Fields**, Springer-Verlag, New York.
- Guckenheimer, J. (1984) Review of "The Lorenz Equations: Bifurcations, Chaos and Strange Attractors" by C Sparrow, Springer-Verlag 1982. *American Mathematical Monthly*, May 1984, 325-6.
- Hadjimichalakis, M.G. (1971), "Equilibrium and Disequilibrium Growth with Money - The Tobin Models", *Review of Economic Studies*, 38, 457-479.
- Hadjimichalakis, M.G. (1981), "Expectation of the 'myopic perfect foresight' variety in monetary dynamics", *Journal of Economic Dynamics and Control*, 3, 157-176.
- Hahn, F.H. (1960) "The Stability of Growth Equilibrium", *Quarterly Journal of Economics*, 74, 206-226.

- Hahn, F.H. (1966) "Equilibrium Dynamics with Heterogeneous Capital Goods", *Quarterly Journal of Economics*, 80, 633-646.
- Hansson, B.A. (1982), *The Stockholm School and the Development of Dynamic Method*, Croom-Helm, 1982.
- Hartman, P. and Olech, C. (1962), "On Global Asymptotic Stability of Solutions of Ordinary Differential Equations", *Transactions of the American Mathematical Society*, 104, 154-178.
- Hickman B.G., (ed) (1972), *Econometric Models of Cyclical Behaviour*, vols.1 and 2 NBER Studies in Income and Wealth No. 3V, Princeton University Press.
- Hicks, J.R. (1950), *A Contribution to the Theory of the Trade Cycle*, Oxford, Clarendon.
- Hicks, J.R. (1974), "Real and Monetary Factors in Economic Fluctuations", *Scottish Journal of Political Economy*, 21, 205-214.
- Hirsch, M.W. and Smale, S. (1974), *Differential Equations, Dynamical Systems and Linear Algebra*, Academic Press, N.Y.
- Ichimura, S. (1955), "Towards a General Nonlinear Macrodynamical Theory of Economic Fluctuations", Ch. 8 in K. Kurihari (ed.), *Post Keynesian Economics*, New Jersey : Rutgers University Press.
- Infante, E.F. and Stein, J.L. (1980), "Money Financed Fiscal Policy in a Growing Economy", *Journal of Political Economy*, 88, 259-287.
- Jensen, R.V. and Urban, R. (1984), "Chaotic Behaviour in a Non-linear Cobweb Model", *Economics Letters*, 15, 235-240.
- Kaldor, N. (1940), "A Model of the Trade Cycle", *Economic Journal*, 50, 78-92.
- Kaldor, N. (1972), "The Irrelevance of Equilibrium Economics", *Economic Journal*, 82, 1237-1255.

- Kalecki, M. (1935), "A Macrodynamic Theory of Business Cycles", *Econometrica*, 3, 327-344.
- Kemp, M.C. and Kimura, Y. (1978), *Introduction to Mathematical Economics*, Springer-Verlag, N.Y.
- Keynes, J.M. (1936), *The General Theory of Employment, Interest and Money*, Harcourt, Brace and World, New York.
- Kolmogoroff, A. (1978), "Sulla Teoria di Volterra della Lotta per l'Esistenza", *Giorn. Ist. Ital. Attuari*, 1, 74-80, 1936. Reprinted and translated in Scudo, F. (ed.) *The Golden Age of Theoretical Ecology*, Springer-Verlag, New York.
- Kregel, J.A. (1980), "The Theoretical Consequences of Economic Methodology: Samuelson's Foundations", *Metroeconomica*, XXXII, 1, 25-38.
- Krylov, N.M., and Bogoliubov, N.N. (1947), *Introduction to Nonlinear Mechanics*, Princeton University Press. Russian Original, Moscow, 1937.
- La Salle, J. (1949), "Relaxation Oscillations", *Quarterly of Applied Mathematics*, 1, 1-19
- Leontief, W.W. (1934), "Verzögerte Angebotsanpassung und Partielles Gleichgewicht", *Zeitschrift für Nationalökonomie*, V, bd. 5, 670-676.
- Levinson, N. and Smith, O.K. (1942), "A General Equation for Relaxation Oscillations", *Duke Math. J.*, 2, 382-403.
- Li, T.I. and Yorke, A.J. (1975), "Period Three Implies Chaos", *American Mathematical Monthly*, 82, 985-992.
- Lichtenberg, A.J. and Lieberman, M.A. (1983) "Regular and Stochastic Motion", Springer-Verlag, N.Y.
- Liénard, A. (1928), "Etude des Oscillations Entretenues", *Revue Générale de l'Electricité*, 23, 901-946.

- Lorenz, E.N. (1963), "Deterministic Non-periodic Flows", *Journal of Atmospheric Science*, **20**, 130-141.
- Lorenz, H.W. (1989), *Nonlinear Dynamical Economics and Chaotic Motion*, Springer-Verlag Lecture Notes in Economics and Mathematical Systems, Vol. 334.
- Lucas, R.E. Jr. (1975), "An Equilibrium Model of the Business Cycle", *Journal of Political Economy*, **83**, 1113-1144.
- Manning, R. (1970), "Stability of Cobwebs", *Economic Record*, **46**, 588-589.
- Manning, R. (1971), "A Generalization of a Cobweb Theorem", *Review of Economic Studies*, **38**, 123-125.
- Markus, L. (1971), *Lectures in Differentiable Dynamics*. A.M.S. Publications: Providence.
- Marsden, J.E. and McCracken, M.F. (1976), *The Hopf Bifurcation and its Application* Applied Math. Sciences, Vol. 19, Springer-Verlag, Berlin.
- May, R.M. (1976a), "Simple Mathematical Models with Very Complicated Dynamics", *Nature*, **261**, 459-467.
- May, R.M. (1976b), *Theoretical Ecology: Principles and Applications*, Blackwell Scientific, Oxford.
- May, R.M. (1983), "Nonlinear Problems in Ecology and Resource Management", in G. Iooss (ed.) *Chaotic Behaviour of Deterministic Systems*, North-Holland.
- McCallum, B.T. (1983), "On Non-uniqueness in Rational Expectations Models", *Journal of Monetary Economics* **11**, 139-168.
- Meadows, D.L. (1970), *Dynamics of Commodity Production Cycles*, Wright-Allen Press, Cambridge, Mass.
- Medio, A. (1979), *Teoria Nonlineare del Ciclo Economico*, Società Editrice il Mulino, Bologna.

- Meyer, W.J. (1984), **Concepts of Mathematical Modelling**, McGraw-Hill, New York
- Migulin, V., Medvedev, V., Mustel, E. and Parygin, V. (1983), **Basic Theory of Oscillations**, Mir, Moscow.
- Minorsky, N. (1962), **Nonlinear Oscillations**, Van Nostrand, New York.
- Minsky, H.P. (1957), "Monetary Systems and Accelerator Models", *American Economic Review*, 47, 859-883.
- Minsky, H.P. (1982), **Inflation, Recession and Economic Policy**, Wheatsheaf Books, Brighton, England.
- Mullineux, A.W. (1984), **The Business Cycle after Keynes**, Wheatsheaf Books, Brighton.
- Nerlove, M. (1958), "Adaptive Expectations and Cobweb Phenomena", *Quarterly Journal of Economics*, 72, 227-240.
- Obstfeld, M. and Rogoff, K. (1983), "Speculative Hyperinflations in Maximizing Models: Can we Rule them Out?", *Journal of Political Economy*, 91, 675-687.
- Olech, C. (1963), "On the Global Stability of an Autonomous System on the Plane" in **Contributions to Differential Equations**, (J.P. La Salle ed.) vol. 1, Interscience New York.
- Orsag, S.A. and McLaughlin, J.B. (1980), "Evidence that Random Behaviour is Generic for Nonlinear Differential Equations", *Physica 1D*, 68-79.
- Oster, G. (1978), "The Dynamics of Nonlinear Models with Age Structure", in **Studies in Mathematical Biology**, Pt II, Math. Assoc. America, Washington.
- Peixoto, M.M. (1962), "Structural Stability on Two-dimensional Manifolds", *Topology*, 1, 101-120.
- Ploeg, F. (1983), "Economic Growth and Conflict over the Distribution of Income", *Journal of Economic Dynamics and Control*, 5, 253-279.



- Rau, N. (1985), "Simplifying the Theory of the Government Budget Restraint", Oxford Economic Papers, 37, 210-229.
- Rayleigh, R. (1877), *The Theory of Sound*, Dover Edition 1945, New York.
- Rose, H. (1967), "On the Nonlinear Theory of the Employment cycle", Review of Economic Studies, 34, 138-152.
- Rossler, O.E. (1979), "Continuous Chaos - Four Prototype Equations", Annals of New York Academy of Sciences, 376-392.
- Samuelson, P.A. (1947) *Foundations of Economic Analysis*, Harvard University Press, Cambridge, Mass.
- Samuelson, P.A. (1967) "Indeterminacy of Development in a Heterogeneous-Capital Model with Constant Saving Propensity". In *Essays on the Theory of Optimal Economic Growth*, ed. K Shell, M.I.T. Press, Cambridge, Mass.
- Sargent, T.J. and Wallace, N. (1973), "The Stability of Models of Money and Growth with Perfect Foresight", *Econometrica*, 41, 1043-1048.
- Scarth, W.M. (1985) "A Note on Non-uniqueness in Rational Expectations Models", *Journal of Monetary Economics* 15, 247-254.
- Schinasi, G.J. (1981), "A Nonlinear Dynamic Model of Short Run Fluctuations", *Review of Economic Studies*, XLVIII, 649-656.
- Schinasi, G.J. (1982), "Fluctuations in a Dynamic, Intermediate-run IS-IM Model: Applications of the Poincare-Bendixsen Theorem", *Journal of Economic Theory*, 28, 369-375.
- Schuster, H.G. (1985), "Deterministic Chaos", Physic-Verlag, Weinheim.
- Sheffrin, S.M. (1983), "Rational Expectations", Cambridge University Press.
- Shiller, R.J. (1978), "Rational Expectations and the Dynamic Structure of Macroeconomic Models: A Critical Review", *Journal of Monetary Economics* ,4, 1-44.

- Singh, Y.P. (1985), "Stability Analysis of Weakly Interconnected Nonlinear Systems", *International Journal of Systems Science*, 16, 713-725.
- Sims, C.A. (ed.) (1977), *New Methods in Business Cycle Research*, Federal Reserve Bank of Minneapolis.
- Smale, S. (1963), "Diffeomorphisms with many periodic points", in *Differential and Combinatorial Topology*, S.S. Cairns (ed.), Princeton University Press, Princeton.
- Sparrow, C. (1983), *The Lorenz Equations: Bifurcations, Chaos and Strange Attractors*, Springer-Verlag, Berlin.
- Stoker, J. (1950), *Nonlinear Vibrations*, Interscience Publishers, New York.
- Taylor, J.B. (1977), "Conditions for Unique Solutions in Stochastic Macro-economic Models with Rational Expectations", *Econometrica*, 45, 1377-1385.
- Tobin, J. (1965), "Money and Economic Growth", *Econometrica*, 33, 671-684.
- Torre, V. (1977), "The existence of limit cycles and control in complete Keynesian systems by theory of bifurcations", *Econometrica*, 45, 1457-1466.
- Turnovsky, S.J. (1977), *Macroeconomic Analysis and Stabilization Policy*, Cambridge University Press.
- Velupillai, K. (1979), "Some Stability Properties of Goodwin's Growth cycle", *Z. fur Nationalokonomie*, 39, 245-257.
- Volterra, V. (1931), *Theorie Mathematique de la Lutte pour la Vie*, Gauthier-Villars, Paris.
- Watson, J.G. and Reiss, E.L. (1982), "A Statistical Theory for Imperfect Bifurcation", *SIAM Journal of Applied Mathematics*, 42, 135-14.
- Zarnowitz, V. (1985), "Business Cycle Theory", *Journal of Economic Literature*, 23, 523-580.

- Vol. 236: G. Gandolfo, P.C. Padoan, A Disequilibrium Model of Real and Financial Accumulation in an Open Economy. VI, 172 pages. 1984.
- Vol. 237: Misspecification Analysis. Proceedings, 1983. Edited by T.K. Dijkstra. V, 129 pages. 1984.
- Vol. 238: W. Domschke, A. Drexl, Location and Layout Planning. IV, 134 pages. 1985.
- Vol. 239: Microeconomic Models of Housing Markets. Edited by K. Stahl. VII, 197 pages. 1985.
- Vol. 240: Contributions to Operations Research. Proceedings, 1984. Edited by K. Neumann and D. Pallaschke. V, 190 pages. 1985.
- Vol. 241: U. Wittmann, Das Konzept rationaler Preiserverwartungen. XI, 310 Seiten. 1985.
- Vol. 242: Decision Making with Multiple Objectives. Proceedings, 1984. Edited by Y.Y. Haimes and V. Chankong. XI, 571 pages. 1985.
- Vol. 243: Integer Programming and Related Areas. A Classified Bibliography 1981-1984. Edited by R. von Randow. XX, 386 pages. 1985.
- Vol. 244: Advances in Equilibrium Theory. Proceedings, 1984. Edited by C.D. Aliprantis, O. Burkinshaw and N.J. Rothman. II, 235 pages. 1985.
- Vol. 245: J.E.M. Wilhelm, Arbitrage Theory. VII, 114 pages. 1985.
- Vol. 246: P.W. Otter, Dynamic Feature Space Modelling, Filtering and Self-Tuning Control of Stochastic Systems. XIV, 177 pages. 1985.
- Vol. 247: Optimization and Discrete Choice in Urban Systems. Proceedings, 1983. Edited by B.G. Hutchinson, P. Nijkamp and M. Batty. VI, 371 pages. 1985.
- Vol. 248: Plural Rationality and Interactive Decision Processes. Proceedings, 1984. Edited by M. Grauer, M. Thompson and A.P. Wierzbicki. VI, 354 pages. 1985.
- Vol. 249: Spatial Price Equilibrium: Advances in Theory, Computation and Application. Proceedings, 1984. Edited by P. T. Harker. VII, 277 pages. 1985.
- Vol. 250: M. Roubens, Ph. Vincke, Preference Modelling. VIII, 94 pages. 1985.
- Vol. 251: Input-Output Modeling. Proceedings, 1984. Edited by A. Smyshlyayev. VI, 261 pages. 1985.
- Vol. 252: A. Birolini, On the Use of Stochastic Processes in Modeling Reliability Problems. VI, 105 pages. 1985.
- Vol. 253: C. Withagen, Economic Theory and International Trade in Natural Exhaustible Resources. VI, 172 pages. 1985.
- Vol. 254: S. Müller, Arbitrage Pricing of Contingent Claims. VIII, 151 pages. 1985.
- Vol. 255: Nondifferentiable Optimization: Motivations and Applications. Proceedings, 1984. Edited by V.F. Demyanov and D. Pallaschke. VI, 350 pages. 1985.
- Vol. 256: Convexity and Duality in Optimization. Proceedings, 1984. Edited by J. Ponstein. V, 142 pages. 1985.
- Vol. 257: Dynamics of Macrosystems. Proceedings, 1984. Edited by J.-P. Aubin, D. Saari and K. Sigmund. VI, 280 pages. 1985.
- Vol. 258: H. Funke, Eine allgemeine Theorie der Polypol- und Oligopolpreisbildung. III, 237 pages. 1985.
- Vol. 259: Infinite Programming. Proceedings, 1984. Edited by E. J. Anderson and A. B. Philpott. XIV, 244 pages. 1985.
- Vol. 260: H.-J. Kruse, Degeneracy Graphs and the Neighbourhood Problem. VIII, 128 pages. 1986.
- Vol. 261: Th.R. Gullledge, Jr., N.K. Womer, The Economics of Made-to-Order Production. VI, 134 pages. 1986.
- Vol. 262: H.U. Buhl, A Neo-Classical Theory of Distribution and Wealth. V, 146 pages. 1986.
- Vol. 263: M. Schäfer, Resource Extraction and Market Structure. XI, 154 pages. 1986.
- Vol. 264: Models of Economic Dynamics. Proceedings, 1983. Edited by H.F. Sonnenschein. VII, 212 pages. 1986.
- Vol. 265: Dynamic Games and Applications in Economics. Edited by T. Başar. IX, 288 pages. 1986.
- Vol. 266: Multi-Stage Production Planning and Inventory Control. Edited by S. Axäster, Ch. Schneeweiss and E. Silver. V, 264 pages. 1986.
- Vol. 267: R. Bernelmans, The Capacity Aspect of Inventories. IX, 165 pages. 1986.
- Vol. 268: V. Firschau, Information Evaluation in Capital Markets. VII, 103 pages. 1986.
- Vol. 269: A. Borglin, H. Keiding, Optimality in Infinite Horizon Economies. VI, 180 pages. 1986.
- Vol. 270: Technological Change, Employment and Spatial Dynamics. Proceedings 1985. Edited by P. Nijkamp. VII, 468 pages. 1986.
- Vol. 271: C. Hildreth, The Cowles Commission in Chicago, 1939-1955. V, 176 pages. 1986.
- Vol. 272: G. Clemenz, Credit Markets with Asymmetric Information. VIII, 212 pages. 1986.
- Vol. 273: Large-Scale Modelling and Interactive Decision Analysis. Proceedings, 1985. Edited by G. Fandel, M. Grauer, A. Kurzhanski and A.P. Wierzbicki. VII, 383 pages. 1986.
- Vol. 274: W.K. Klein Haneveld, Duality in Stochastic Linear and Dynamic Programming. VII, 295 pages. 1986.
- Vol. 275: Competition, Instability, and Nonlinear Cycles. Proceedings, 1985. Edited by W. Semmler. XII, 340 pages. 1986.
- Vol. 276: M.R. Baye, D.A. Black, Consumer Behavior, Cost of Living Measures, and the Income Tax. VII, 119 pages. 1986.
- Vol. 277: Studies in Austrian Capital Theory, Investment and Time. Edited by M. Faber. VI, 317 pages. 1986.
- Vol. 278: W.E. Diewert, The Measurement of the Economic Benefits of Infrastructure Services. V, 202 pages. 1986.
- Vol. 279: H.-J. Büttler, G. Frei and B. Schips, Estimation of Disequilibrium Models. VI, 114 pages. 1986.
- Vol. 280: H.T. Lau, Combinatorial Heuristic Algorithms with FORTRAN. VII, 126 pages. 1986.
- Vol. 281: Ch.-L. Hwang, M.-J. Lin, Group Decision Making under Multiple Criteria. XI, 400 pages. 1987.
- Vol. 282: K. Schittkowski, More Test Examples for Nonlinear Programming Codes. V, 261 pages. 1987.
- Vol. 283: G. Gabiachi, H.-W. Lorenz, Business Cycle Theory. VII, 229 pages. 1987.
- Vol. 284: H. Lütkepohl, Forecasting Aggregated Vector ARMA Processes. X, 323 pages. 1987.
- Vol. 285: Toward Interactive and Intelligent Decision Support Systems. Volume 1. Proceedings, 1986. Edited by Y. Sawaragi, K. Inoue and H. Nakayama. XII, 445 pages. 1987.
- Vol. 286: Toward Interactive and Intelligent Decision Support Systems. Volume 2. Proceedings, 1986. Edited by Y. Sawaragi, K. Inoue and H. Nakayama. XII, 450 pages. 1987.
- Vol. 287: Dynamical Systems. Proceedings, 1985. Edited by A.B. Kurzhanski and K. Sigmund. VI, 215 pages. 1987.
- Vol. 288: G.D. Rudebusch, The Estimation of Macroeconomic Disequilibrium Models with Regime Classification Information. VII, 128 pages. 1987.
- Vol. 289: B.R. Meijboom, Planning in Decentralized Firms. X, 168 pages. 1987.
- Vol. 290: D.A. Carlson, A. Haurie, Infinite Horizon Optimal Control. XI, 254 pages. 1987.
- Vol. 291: N. Takahashi, Design of Adaptive Organizations. VI, 140 pages. 1987.

- 
- Vol. 292: I. Tchijov, L. Tomaszewicz (Eds.), *Input-Output Modeling*. Proceedings, 1985. VI, 195 pages. 1987.
- Vol. 293: D. Batten, J. Casti, B. Johanson (Eds.), *Economic Evolution and Structural Adjustment*. Proceedings, 1985. VI, 382 pages. 1987.
- Vol. 294: J. Jahn, W. Krabs (Eds.), *Recent Advances and Historical Development of Vector Optimization*. VII, 405 pages. 1987.
- Vol. 295: H. Meister, *The Purification Problem for Constrained Games with Incomplete Information*. X, 127 pages. 1987.
- Vol. 296: A. Börsch-Supan, *Econometric Analysis of Discrete Choices*. VIII, 211 pages. 1987.
- Vol. 297: V. Fedorov, H. Läuter (Eds.), *Model-Oriented Data Analysis*. Proceedings, 1987. VI, 239 pages. 1988.
- Vol. 298: S.H. Chew, Q. Zheng, *Integral Global Optimization*. VII, 179 pages. 1988.
- Vol. 299: K. Marti, *Descent Directions and Efficient Solutions in Discretely Distributed Stochastic Programs*. XIV, 178 pages. 1988.
- Vol. 300: U. Derigs, *Programming in Networks and Graphs*. XI, 315 pages. 1988.
- Vol. 301: J. Kacprzyk, M. Roubens (Eds.), *Non-Conventional Preference Relations in Decision Making*. VII, 155 pages. 1988.
- Vol. 302: H.A. Eiselt, G. Pederzoli (Eds.), *Advances in Optimization and Control*. Proceedings, 1986. VIII, 372 pages. 1988.
- Vol. 303: F.X. Diebold, *Empirical Modeling of Exchange Rate Dynamics*. VII, 143 pages. 1988.
- Vol. 304: A. Kurzhanski, K. Neumann, D. Pallaschke (Eds.), *Optimization, Parallel Processing and Applications*. Proceedings, 1987. VI, 292 pages. 1988.
- Vol. 305: G.-J.C.Th. van Schijndel, *Dynamic Firm and Investor Behaviour under Progressive Personal Taxation*. X, 215 pages. 1988.
- Vol. 306: Ch. Klein, *A Static Microeconomic Model of Pure Competition*. VIII, 139 pages. 1988.
- Vol. 307: T.K. Dijkstra (Ed.), *On Model Uncertainty and its Statistical Implications*. VII, 138 pages. 1988.
- Vol. 308: J.R. Daduna, A. Wren (Eds.), *Computer-Aided Transit Scheduling*. VIII, 339 pages. 1988.
- Vol. 309: G. Ricci, K. Velupillai (Eds.), *Growth Cycles and Multisectoral Economics: the Goodwin Tradition*. III, 126 pages. 1988.
- Vol. 310: J. Kacprzyk, M. Fedrizzi (Eds.), *Combining Fuzzy Imprecision with Probabilistic Uncertainty in Decision Making*. IX, 399 pages. 1988.
- Vol. 311: R. Färe, *Fundamentals of Production Theory*. IX, 163 pages. 1988.
- Vol. 312: J. Krishnakumar, *Estimation of Simultaneous Equation Models with Error Components Structure*. X, 357 pages. 1988.
- Vol. 313: W. Jammernegg, *Sequential Binary Investment Decisions*. VI, 156 pages. 1988.
- Vol. 314: R. Tietz, W. Albers, R. Selten (Eds.), *Bounded Rational Behavior in Experimental Games and Markets*. VI, 368 pages. 1988.
- Vol. 315: I. Orishimo, G.J.D. Hewings, P. Nijkamp (Eds.), *Information Technology: Social and Spatial Perspectives*. Proceedings, 1986. VI, 268 pages. 1988.
- Vol. 316: R.L. Basmann, D.J. Slotje, K. Hayes, J.D. Johnson, D.J. Molina, *The Generalized Fechner-Thurstone Direct Utility Function and Some of its Uses*. VIII, 159 pages. 1988.
- Vol. 317: L. Bianco, A. La Bella (Eds.), *Freight Transport Planning and Logistics*. Proceedings, 1987. X, 568 pages. 1988.
- Vol. 318: T. Doup, *Simplicial Algorithms on the Simplotope*. VIII, 262 pages. 1988.
- Vol. 319: D.T. Luc, *Theory of Vector Optimization*. VIII, 173 pages. 1989.
- Vol. 320: D. van der Wijst, *Financial Structure in Small Business*. VII, 181 pages. 1989.
- Vol. 321: M. Di Matteo, R.M. Goodwin, A. Vercelli (Eds.), *Technological and Social Factors in Long Term Fluctuations*. Proceedings. IX, 442 pages. 1989.
- Vol. 322: T. Kollintzas (Ed.), *The Rational Expectations Equilibrium Inventory Model*. XI, 269 pages. 1989.
- Vol. 323: M.B.M. de Koster, *Capacity Oriented Analysis and Design of Production Systems*. XII, 245 pages. 1989.
- Vol. 324: I.M. Borzse, B.M. Pötscher, *Game Theoretical Foundations of Evolutionary Stability*. VI, 145 pages. 1989.
- Vol. 325: P. Ferri, E. Greenberg, *The Labor Market and Business Cycle Theories*. X, 183 pages. 1989.
- Vol. 326: Ch. Sauer, *Alternative Theories of Output, Unemployment, and Inflation in Germany: 1960–1985*. XIII, 206 pages. 1989.
- Vol. 327: M. Tawada, *Production Structure and International Trade*. V, 132 pages. 1989.
- Vol. 328: W. Güth, B. Kalkofen, *Unique Solutions for Strategic Games*. VII, 200 pages. 1989.
- Vol. 329: G. Tillmann, *Equity, Incentives, and Taxation*. VI, 132 pages. 1989.
- Vol. 330: P.M. Kort, *Optimal Dynamic Investment Policies of a Value Maximizing Firm*. VII, 185 pages. 1989.
- Vol. 331: A. Lewandowski, A.P. Wierzbicki (Eds.), *Aspiration Based Decision Support Systems*. X, 400 pages. 1989.
- Vol. 332: T.R. Gullledge, Jr., L.A. Litteral (Eds.), *Cost Analysis Applications of Economics and Operations Research*. Proceedings. VII, 422 pages. 1989.
- Vol. 333: N. Dellaert, *Production to Order*. VII, 158 pages. 1989.
- Vol. 334: H.-W. Lorenz, *Nonlinear Dynamical Economics and Chaotic Motion*. XI, 248 pages. 1989.
- Vol. 335: A.G. Lockett, G. Isele (Eds.), *Improving Decision Making in Organisations*. Proceedings. IX, 806 pages. 1989.
- Vol. 336: T. Puu, *Nonlinear Economic Dynamics*. VII, 119 pages. 1989.
- Vol. 337: A. Lewandowski, I. Stanchev (Eds.), *Methodology and Software for Interactive Decision Support*. VIII, 309 pages. 1989.
- Vol. 338: J.K. Ho, R.P. Sundarraj, *DECOMP: an Implementation of Dantzig-Wolfe Decomposition for Linear Programming*. VI, 206 pages. 1989.
- Vol. 339: J. Terceiro Lomba, *Estimation of Dynamic Econometric Models with Errors in Variables*. VIII, 116 pages. 1990.
- Vol. 340: T. Vaako, R. Ayres, L. Fontvieille (Eds.), *Life Cycles and Long Waves*. XIV, 293 pages. 1990.
- Vol. 341: G. R. Uhlich, *Descriptive Theories of Bargaining*. IX, 165 pages. 1990.
- Vol. 342: K. Okuguchi, F. Szidarovszky, *The Theory of Oligopoly With Multi-Product Firms*. V, 167 pages. 1990.
- Vol. 343: C. Chiarella, *The Elements of a Nonlinear Theory of Economic Dynamics*. IX, 149 pages. 1990.
-

G. Fandel, H. Dyckhoff, J. Reese (Eds.)

## Essays on Production Theory and Planning

1988. 48 figures, 46 tables. XII, 223 pages.  
ISBN 3-540-19314-6

The thirteen essays of this book deal with aspects of production management, which have shown a growing importance in research, teaching and practice within the last few years. The contents range from theoretical issues to case studies. Significant relations among different essays (chapters) give rise to group them into four major parts dealing with separate themes of production management:

- fundamental organizational aspects of the production process
- general problems and modern concepts of materials management
- joint production with surplus, waste and hazardous byproducts
- production aspects of cutting stock and trim loss problems.

The contributions are connected by their common conceptual framework emphasizing the production theoretic foundation.

W. Weidlich, G. Haag (Eds.)

## Interregional Migration

### Dynamic Theory and Comparative Analysis

With contributions by Å. E. Andersson, G. Haag, I. Holmberg, J. Ledent, M. Munz, D. Pumain, G. Rabino, R. Reiner, N. Sarafoglou, M. Sonis, W. Weidlich

1988. 129 figures, 64 tables. XIV, 387 pages.  
ISBN 3-540-18441-4

In part I of this book a dynamic migratory model connecting the microlevel of individual migration trends with the macrolevel of interregional migration is developed. Its derivation makes use of the master equation method. Applying a ranking regression analysis, the trend parameters of the model are correlated to regional socio-economic key factors.

In part II the model is applied to interregional migration within the countries Federal Republic of Germany, Canada, France, Israel, Italy and Sweden.

In part III a comparative analysis of the results is given.

In part IV a selfcontained derivation of the master equation and of solutions relevant for the migratory system is given, the ranking regression analysis is exemplified and a computer program for the estimation of trendparameters is added.

G. Fels, G. M. von Furstenberg (Eds.)

## A Supply-Side Agenda for Germany

### Sparks from - the United States - Great Britain - European Integration

1989. 7 figures. VI, 439 pages. ISBN 3-540-50544-X

This book deals with supply-side economics and the needed reorientation it would bring to West German policy. The change, recommended after searching analysis, would add up to an overall strategy for freeing markets, for removing government-imposed distortions, and for using free-market approaches to correct distortions imposed by pressure groups. The strategy would pierce Germany's state-supported encrustations and corporatism. It would equip the country to follow the lead of the United States and Great Britain in starting to escape from the tangle in which taxes, regulations, and unemployment have grown in step. The impending completion of the European internal market in 1992 adds urgency to this task.

D. Bös, M. Rose, C. Seidl (Eds.)

## Welfare and Efficiency in Public Economics

1988. 28 figures. XVI, 424 pages. ISBN 3-540-18824-X

This book contains 15 selected and revised papers presented at a conference in Neresheim, West Germany, in June 1986. Prof. H. W. Sinn writes in his introduction to the book: "The common topic is measurement of welfare, both from efficiency and from equity perspectives. For many economists, welfare is a diffuse, arbitrary and ambiguous concept. The papers collected in this book show that this view is not justified. Though not beyond all doubt, welfare theory today is crisp and clear, offering fairly straightforward measuring concepts. It even comes up with numbers that measure society's advantage or disadvantage from specific policy options in monetary units. Politicians get something they can intuitively understand and argue with, and they do not have to be afraid that all this is metaphysics or the result of the scientist's personal value judgements."

Springer-Verlag Berlin  
Heidelberg New York London  
Paris Tokyo Hong Kong

Springer 