Macroeconomic Dynamics, **16** (Supplement 1), 2012, 1–4. Printed in the United States of America.
doi:10.1017/S1365100511000599

INTRODUCTION TO *MACROECONOMIC DYNAMICS* SPECIAL ISSUE IN HONOR OF KAZUO NISHIMURA: NONLINEAR DYNAMICS IN EQUILIBRIUM MODELS

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Over the past three decades, analysis of dynamics has come to the forefront of macroeconomic theory. A key impetus for progress on this front has been the connections developed between equilibrium growth theory, on one hand, and the field of nonlinear dynamics, on the other. Kazuo Nishimura's work has been at the center of these advances, and the lines of research he initiated remain an exciting area of study for young researchers with strong technical skills.

Since his first papers appeared in the late 1970s, Kazuo Nishimura has lit a bright path for those of us who seek to understand optimal growth and nonlinear dynamics. He has made outstanding contributions to three main fields of economic theory: international trade, general equilibrium, and economic growth. With his remarkable insight, creativity, and energy, Kazuo has transformed our understanding of economic growth, business cycles, and the relationship between them.

We thank Raouf Boucekkine for allowing us to initiate this special issue of *Macroeconomic Dynamics*. We also thank the editor, Bill Barnett, and the special issue editors, Steve Turnovsky and Lee Ohanian, for their support. Most of the contributions in this volume were presented at the international conference "New Challenges for Macroeconomic Regulation: Financial Crisis, Stabilisation Policy and Sustainable Development," GREQAM, Marseille, France June 9–11, 2011. Financial support from CNRS, Ecole d'Economie de Paris, Centre d'Economie de la Sorbonne—Pôle Macroéconomie, Centre d'Economie de la Sorbonne—Pôle Economie Mathématique, GREQAM, ADRES, CEPREMAP, Ministère de la Recherche, Université de la Méditerranée, Université Paul Cézanne, and Université Paris I Panthéon–Sorbonne is gratefully acknowledged. Special thanks go to Isabelle Mauduech, Corinne Michaud, and Aziza Sikar, whose help in organizing the conference was invaluable. Address correspondence to: Alain Venditti, GREQAM, 2 rue de la Charité, 13002 Marseille, France; e-mail: alain.venditti@univmed.fr.

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As editors of the current volume, we are truly delighted to present this special issue honoring Professor Kazuo Nishimura on the occasion of his 65th birthday. The authors of the research papers published here have all had the privilege of working with Kazuo, and their contributions are evidence of his far-reaching influence on economic theory. In the lead article, Jean-Michel Grandmont, a long-time friend, describes Kazuo and his most important contributions. As he puts it, "Kazuo Nishimura is a great economic theorist who has devoted his scientific life in this field to the analysis of multiple equilibria and business cycles in economic models. Actually it is striking to see that his concern with multiplicity of economic equilibria started quite early in his academic life."[1] The papers collected in this special issue illustrate this statement, but also show that Kazuo's influence on the economics profession goes far beyond these topics.

The first set of three contributions is concerned with aggregate optimal growth models. The first paper, by Robert Becker and Tapan Mitra, "Efficient Ramsey Equilbria," shows that Ramsey equilibrium models with heterogeneous agents and borrowing constraints yield efficient equilibrium sequences of aggregate capital and consumption. The proof of this result is based on verifying that equilibrium sequences of prices satisfy the Malinvaud criterion for efficiency.

This paper is followed by "Existence of Competitive Equilibrium in an Optimal Growth Model with Heterogeneous Agents and Endogenous Leisure." Here, Aditya Goenka, Cuong Le Van, and Manh-Hung Nguyen prove the existence of competitive equilibrium in a single-sector dynamic economy with heterogeneous agents, an elastic labor supply, and complete assets markets. The method of proof relies on some recent results concerning the existence of Lagrange multipliers in infinite-dimensional spaces and their representation as summable sequences. It contains an application of the inward-boundary fixed point theorem.

In the third paper in this group, "Discrete Choice and Complex Dynamics in Deterministic Optimization Problems," Takashi Kamihigashi shows that complex dynamics arises naturally in deterministic discrete choice problems. In particular, he shows that if the objective function of a maximization problem can be written as a function of a sequence of discrete variables, and if the maximized value function is strictly increasing in an exogenous variable, then for almost all values of the exogenous variable, any optimal path exhibits aperiodic dynamics. This result is applied to a maximization problem with indivisible durable goods, as well as to a Ramsey model with an indivisible consumption good. In each model, it is shown that optimal dynamics is almost always complex.

These three papers are followed by a second set of papers that deal with two-sector growth models. In "Long-Run Optimal Behavior in a Two-Sector Robinson–Solow–Srinivasan Model," Ali Khan and Tapan Mitra study the nature of long-run behavior in a two-sector model of optimal growth. They provide an explicit solution of the optimal policy function generated by the optimal growth model. For a particular configuration of parameter values, they provide an explicit solution of the unique absolutely continuous invariant ergodic distribution generated by the optimal policy function.

This paper is followed by "Endogenous Business Cycles in OLG Economies with Multiple Consumption Goods," in which Carine Nourry and Alain Venditti consider a two-sector OLG economy with a pure consumption good and a mixed good that can be either consumed or used as capital. They prove that the existence of Pareto-optimal expectations-driven fluctuations is compatible with standard sectoral technologies if the share of the pure consumption good is low enough. This result suggests that some fiscal policy rules can prevent the existence of business-cycle fluctuations in the economy by driving it to the optimal steady state as soon as it is announced.

The third paper in this group is "Does the Capital Intensity Matter? Evidence from the Postwar Japanese Economy and Other OECD Countries," by Harutaka Takahashi, Kohichi Mashiyama, and Tomoya Sakagami. This paper focuses on capital intensity, which plays an important role in two-sector and multisector growth models. The purpose of their research is to measure the capital intensities of the consumption good and the investment good sector in the postwar Japanese economy, as well as in other OECD countries. Their empirical evidence strongly supports the common capital-intensity assumption: the consumption good sector is more capital-intensive than the capital good sector.

In a third set of papers, stochastic dynamic models are considered. In "Bounding Tail Probabilities in Dynamic Economic Models," John Stachurski provides conditions for bounding tail probabilities in stochastic economic models in terms of their transition laws and shock distributions. Particular attention is given to conditions under which the tails of stationary equilibria have exponential decay. By way of illustration, the technique is applied to a threshold autoregression model of exchange rates.

Kenji Sato and Makoto Yano, in their paper "On a Stochastic Growth Model with L^∞ Dual Vectors: A Differential Analysis," investigate a stochastic growth model in which dual vectors lie in an L^∞ space. This condition ensures that the value of a stock vector is jointly continuous with respect to the stock vector and its support price vector. The result is based on the differentiation method in Banach spaces that Makoto Yano developed earlier for stochastic optimal growth models.

The final two papers are more oriented toward empirical considerations. In "The Equity Premium in Consumption and Production Models," Levent Akdeniz and Davis Dechert use a simple model with a single Cobb–Douglas firm and a consumer with a CRRA utility function to show the difference in the equity premia in the production-based Brock model and the consumption-based Lucas model. They show that the equity premium in the production-based model exceeds that in the consumption-based model with probability one.

In the final paper of this volume, "Does Fiscal Policy Matter? Blinder and Solow Revisited," Roger Farmer and Dmitry Plotnikov use an old-Keynesian representative agent model and consider temporary bond-financed paths of government purchases that are similar to the actual path that occurred during WWII. They show that a temporary increase in government purchases does crowd out private consumption expenditure but can also reduce unemployment.

Most of the contributions in this volume were presented during the conference "New Challenges for Macroeconomic Regulation: Financial Crisis, Stabilisation Policy and Sustainable Development," which was held on June 9–11, 2011 at GREQAM in Marseille, and was dedicated to Kazuo. In reviewing these papers, we have been struck by enduring and fundamental importance of Kazuo's research, and the influence it has had on researchers in our field.

We, the editors of this volume, have been privileged to benefit from Kazuo's warmth, generosity, and insight over many years. We hope that this special issue of *Macroeconomic Dynamics* will not only celebrate a great economist who has made such important contributions to economic theory, but also stimulate much additional research on macroeconomic dynamics. Within this new research, we have little doubt that Kazuo's own contributions will continue to lead the way. It is with great pleasure that we present this collection of papers as a special issue in his honor.

NOTE

1. For a complete list of Kazuo's contributions, see Grandmont's paper in this issue.

https://doi.org/10.1017/S1365100511000599 Published online by Cambridge University Press