The Divergent Dynamics of Economic Growth

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This book is a non-technical summary of the life's work of a master of the evolutionary, adaptive and non linear dynamic aspects of economic theory. The book begins with an introductory chapter and outline of the arguments of the book, followed by eleven self-contained essays ordered in four sections dealing with adaptive economic theory, technological change, long-run epochal development and musings on a general theory of development. The book is free from equations and keeps the jargon to the minimum, defining new terms as it goes, so the reader need not be a professional economist (but being one does help).

The reader will find three uses for this book:

Firstly, the book contains a non-technical introduction to the theory and practice of recursive programming, a modeling framework that looks at repeated optimizing behaviors over time, with iteratively (and hence adaptively) applied optimizing decision-making by economic actors with incomplete information. This method of systems analysis “describe[s] choices in a neighborhood of current practice based on a cautious response to estimates of future consequences using partial information and calculated for a finite, usually short, time horizon (pg. 6, emphasis in the original).” Day and his co-authors provide several examples of applications of the recursive programming schema to agricultural pricing, especially in Chapters Four and Five. Chapter Four examines—and rather successfully explains—why sharecropping died out in the United States in the Post-War period. This chapter stands out as an example of the careful application of a new theory to existing data, in an attempt to explain the broad features of the system under study. After reading this chapter, one feels the author has gained some predictive power over or insight into the system’s development over time. Day’s modeling style connects well thought out behavioral algorithms to significant non-linearities through feedbacks, firstly in a servo-mechanistic way through switches and rules, (see Chapter Three), and later in a less mechanical way to bring out the chaotic elements in seemingly deterministic systems. In Chapter Eleven for example, Day and his coauthors arrive at the main thrust of their argument using the idea of punctuated equilibria.

Secondly, the reader will be led through the development of Day’s ideas as they emerged in the author’s mind. For example, in the first essay of the book-proper, we see Day in 1976 worrying about the economics of sustainable resources and the proper modeling of limited (and developmentally limiting) resources, contrasting the findings of the ‘world models’ with standard inter-temporally optimizing neoclassical growth models’ predictions. In Chapter Eleven, written some twenty years later, Day is discussing the discovery of complex economic dynamics in seemingly simple systems,
still incorporating limited resources in his models. This is not simply the routine arbitrage of another set of cool techniques into the discipline under the label of ‘complexity’, but rather the natural technical evolution of a sustained research program of understanding of disequilibrium processes over time. Maybe it’s the writing, which is crisp and clear, but everything seems to fit together rather well. We are not given the explicit connection, but the interpretation of multiphase dynamics on page 208 as analogous to structural change strikes the same note with the reader as the description of generic capital goods trajectories on page 106.

Thirdly, the reader will gain an appreciation of the subtler uses of high-powered mathematics in the investigation of apparently well-understood phenomena like firm behavior during differing policy regimes. Standard theory holds that in the event of a shift in policy regimes, the firm simply recalculates its costs relative to some well-defined cost function, differentiates lots of things, and continues on its way. Chapter Seven shows us a firm adapting dynamically to such a regime change, in the presence of taxes and transfers, price-fixing, limited resources, differing technology, and limited information. The model predicts a firm’s behavior constantly fluctuating, always out of equilibrium: “Although [these] models possess competitive equilibria in principle, in practice they generally portray growth and fluctuations out of equilibrium as enterprises adapt and the economy evolves (pg. 136).”

Sadly, Day’s early work on behavioral economics is not summarized here, and this is a pity. A more comprehensive treatment, for example, of his contributions towards understanding Herbert Simon’s research program (cf. Velupillai (forthcoming) and Day (1964), quoted therein), or his later work on chaos and computation—one example being Day and Pavlov, (2004)—would have given the reader a greater appreciation of the breadth of his interests and contributions across different strata of the discipline. The reader gets glimpses of this in Chapter Six, especially section 6.2.4, where the behavioral properties of a generic class of firms is discussed, but the full range of Day’s interests is, I feel, not well enough covered. Another full section on complex economic dynamics would have been preferable to the brief overview given in chapter Eleven.

The Diverging Dynamics of Economic Growth shows us an empirically minded theorist who believes in equilibrium analysis—as the beginning of a more substantial and realistic theory of economic behavior: “…I think it would be more instructive...to turn the argument around and to recognize in equilibrium a foundation for a disequilibrium theory of economic change (pg. 223).” Day spends much of the book exploring the dynamics of specific markets potentially very far from equilibrium through simulation, calibration and data-fitting, and is less concerned with deriving the steady state conditions of the systems he and his coauthors build. Methodologically speaking, his work is a demonstration of a way forward in the economic analysis of real systems without equilibrium analysis, through simulation and careful modeling of the real world and calibration, taking into account the computational aspects of the problem at hand. As an introduction to such work, this book can only be praised.

References


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