

Forward-Looking Decision Making. HALL, ROBERT E. Princeton, NJ: Princeton University Press, 2010. Pp. xiii, 126. \$39.50

Economists who have received their training in the last quarter-century certainly encountered the technique of dynamic programming in their graduate studies. More than likely, that encounter took place in the field of macroeconomics, where dynamic programming was the framework of choice for the real business cycle models advanced by the neoclassical macroeconomists of the 1980s and after. These first generation real business cycle models gave way to a broader class of models now referred to as dynamic stochastic general equilibrium (DSGE) models which admit a wider array of frictions than the early models did. The reliance on dynamic programming, however, remains a key feature of these models. Though initially popularized by neoclassical market clearing models, the technique is now a central part of many New Keynesian models as well.

As business cycle research was completely transformed by the introduction of the dynamic programming technique, researchers in other areas began to take notice. The dramatic improvement in computing power, faster and better algorithms for solving dynamic programming problems, and a new generation of economists who learned the technique in graduate school all contributed to the appearance of dynamic programming models in labor economics, international economics, and many other areas. The common thread running through all of these applications is the characterization of the problem as one in which a decision-maker encounters essentially the same problem at successive points in time and makes a decision at that time which affects their future state.

Robert Hall's *Forward Looking Decision-Making* is an exposition of a number of these types of problems. This book is the product of the Gorman Lectures in Economics at University College London where Hall was the invited lecturer in 2008. Hall begins with two short chapters recapping the essential concepts of dynamic programming and recent research on preferences. He then follows with five different applications drawn from diverse areas of economics.

Originally presented as a lecture series, the presentation is often terse with many details left to the reader. This text is not an introduction to dynamic programming for the novice reader. Its purpose is rather to expose the reader who is already familiar with the technique to new areas

in which it may be productively employed.

The second chapter explains recent research on preferences which are critical to the development of the models that follow in the text. The central theme of Hall's lectures is that in each of these contexts there is a forward looking decision that a household or an individual is making. The dynamics of the system depend critically on the preferences of that household or individual. In particular, they depend on the preference parameters affecting various measures of elasticity. Hall's choice of demand system is the Frisch demand system. He summarizes recent literature on estimating elasticities in that system including labor supply elasticity, coefficient of relative risk aversion, intertemporal substitution, and consumption-hours complementarity. This section may substantially interest researchers and students who are familiar with dynamic programming and would benefit from a discussion of the current issues and unresolved questions concerning preferences.

The remainder of the book deals with examples in different areas. One such area which is particularly of interest to current policymakers is the economics of health care. The task is to explain the increasing share of GDP being spent on health care in the United States. In the dynamic programming model, based on Robert Hall and Charles Jones (2007), spending on health care is treated as an investment in longevity. Household utility depends on consumption and health status in the sense that better health leads to a longer lifetime in which to enjoy consumption goods. Every period the household must allocate income to consumption and health care spending based on their current state (income and life expectancy). After calibrating the model to economic and health data, the model predicts that health care's share of GDP should rise in roughly the same fashion as it has in recent decades. The dynamic mechanism by which this occurs is that the value of an additional year of life rises faster than income, a finding which is corroborated elsewhere in the literature. The model is relatively simple, yet quite rich in its implications and in its suggestions for further research. Hall makes a strong case for implementing the dynamic programming framework more widely in health care economics.

Another related area is long-term care insurance. Hall summarizes the simple yet effective model of Jeffrey Brown and Amy Finkelstein (2008) which illustrates the use of a discrete state variable in a dynamic program. The discrete states of the model represent the types of care required by an individual at a point in time. Brown and Finkelstein

calibrate a Markov transition matrix to provide the stochastic process that drives the model. Their result is that the availability of Medicaid for low income individuals discourages people from purchasing private long-term care insurance. The threshold of wealth at which it no longer makes sense to buy private insurance is quite high. The model has important implications for how Medicaid might be restructured to bring more individuals into the private insurance market and improve the efficiency of the distribution of long-term care services.

Similar to the preceding examples, the other cases Hall studies (labor markets, idiosyncratic risk, and government debt) all focus on the key decision making problem faced by a household or individual. The conclusion in each case is that the dynamic programming methods employed by Hall and other researchers in these areas can provide important insights to important policy questions.

The lectures contained in this book will interest researchers and students who already have a working knowledge of dynamic programming and wish to broaden their horizons in terms of the applications of the technique. As a textbook, it may be useful as a supplement for graduate courses which teach dynamic programming or research seminar courses. The bibliography contains over fifty references, mostly from the last decade, which provide students and researchers with plenty of additional examples. The book would be an excellent addition to any college or university library's collection of materials on dynamic economics.

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References

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