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THE ALLOCATION OF TIME AND GOODS OVER THE LIFE CYCLE

GILBERT R. GHEZ
and
GARY S. BECKER
University of Chicago and
National Bureau of Economic Research

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(Resolution adopted October 25, 1926, and revised through September 30, 1974)

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Introduction

GILBERT R. GHEZ and
GARY S. BECKER

This book, which deals with the allocation of resources by families over the lifetime of their members, is part of a rapidly growing literature on the economics of the household that views family formation, dissolution, acquisition of skills, and the use of resources as amenable to economic analysis. In this volume, we concentrate on the allocation of time and the consumption of goods by family members over their life cycle. We present a powerful theory with a variety of implications, and offer evidence that the theory is consistent with observed lifetime behavior.

Economists have in the past paid little attention to life cycle behavior. While the importance of future events in current decision making has been recognized at least as long ago as in Irving Fisher's study of consumption behavior, typically economists have not sought to give a systematic explanation of observed variations in behavior with age; even in the voluminous work on the consumption function only a tiny fraction has been devoted to variations in consumption with age. The direction pioneered by Irving Fisher and more recently by Milton Friedman has not been followed in the analysis of labor supply: students of labor supply have been slow to incorporate the effect of future variables on current participation. Although some writers have distinguished between the transitory component and the permanent component of wage variables in labor supply analysis, the underlying form is usually not rigorously developed.

One major implication of this neglect has been that in analyzing cross-sectional data, economists have for the most part not clearly separated those effects that are age-related from those that are not. Similarly, little sorting has been attempted in time series analysis between those effects which are related to age and those which are related to calendar time.

The importance of improving our understanding of life cycle behavior is underscored by the increasing selectivity of government policy. During the 1960s there was an enormous surge in public expenditures on education, with young persons being the prime beneficiaries, at least initially. Other groups in the population are voicing their concerns. Efforts are being made to reduce the cost of child care to women, so that fewer women would need to withdraw from the labor force during their twenties and thirties. The aged are becoming increasingly vocal, perhaps in response to the shifting age distribution of the population.

It is our contention that the paucity of thinking and empirical work on life cycle behavior is related to some gaps in existing theories. In this volume we therefore propose a basic model for the analysis of life cycle behavior, and offer a series of empirical tests of its implications.

One premise of our analysis is that families take account of expected future events when making decisions. A second premise is that time is a scarce resource. Therefore, families are forced to allocate their time in an efficient way, just as they are forced to make efficient choices about the uses of their incomes. Families make decisions about their participation in the work force concurrently with consumption and savings decisions. In the literature on the consumption function it is generally assumed that labor force participation and income from work are fixed by factors outside the household's control, although research in labor supply has yielded repeated evidence to the contrary. The interrelation between these decisions provides considerable insight into the life cycle patterns of both the labor supply and consumption.

A third premise is that families engage in activities that require both time and goods for their realization. This is the sense of the so-called characteristics or production function approach to consumption decisions. The basic notion is that little useful output can be obtained from goods unless time at home is available and similarly for time without goods. It emphasizes that households are producers and consumers wherever they go, not just producers at work and consumers at home. In studies done in the last few years, this approach has provided a powerful framework for analyzing many kinds of household behavior, in particular, the demand for recreational

goods, the demand for health, the effects of differences in income and education on labor supply and expenditures on goods, etc.[1]

From these premises we derive a series of novel implications. We show, for instance, that the number of hours supplied to the market is expected to be positively related to the price of time over the life cycle. This explains why people work hardest when their market productivity is greatest and why they retire at old age when their productivity is low. Previous analyses have yielded ambiguous predictions because of the difficulties experienced in separating substitution and income effects.

We also show that consumption is expected to change in a definite way over the life cycle as the price of time changes. We show that under suitable parameter restrictions, consumption would be positively related to the price of time over the lifetime: it would rise more rapidly the more rapidly the wage rate was rising. There is much accumulated evidence showing that persons having more schooling have more rapidly rising earnings capacities.[2] Our theory predicts that they would also have more rapidly rising consumption levels. We predict that consumption would rise in response to seasonal and cyclical upswings. On the other hand, the relation between consumption and age, at least in the framework of perfect capital markets and no uncertainty, essentially cannot be explained by applying the standard analysis of consumption planning. Indeed, in the latter, the smoothing of the income stream is stressed in an extreme form, whereby consumption would be constant over the life cycle, barring interest rate effects, time preference effects and the effects of changes in family size.

We also consider the acquisition of skills by family members over their lifetime. We show how optimal life cycle investment in human capital is determined and explain why investment tends eventually to

1. See, for instance, Reuben Gronau, *The Value of Time in Passenger Transportation: The Demand for Air Travel* (New York: NBER, Occasional Paper 109, 1970); Robert Michael, *The Effect of Education on Efficiency in Consumption* (NBER, Occasional Paper 116, 1972); Michael Grossman, *The Demand for Health: A Theoretical and Empirical Investigation* (NBER, Occasional Paper 119, 1972); Arleen Leibowitz, "Woman's Allocation of Time to Market and Nonmarket Activity" (Ph.D. diss., Columbia University, 1972); Robert Willis, "A New Approach to the Economic Theory of Fertility Behavior," *Journal of Political Economy*, vol. 81 (March/April 1973), pp. 14–64.

2. See in particular Jacob Mincer, *Schooling, Experience, and Earnings* (New York: NBER, 1974).

fall with age. Many of the interesting issues in human capital investment theory and the relation between such investments and labor supply and consumption are sketched out but not fully developed here.

Other aspects of family planning are introduced in a more casual way. For instance, little attention is paid to the optimal timing of children, and no attention is paid to the timing of marriage and separation, although these too bear on consumption behavior. We believe, however, that the basic structure laid out in this book will provide a convenient framework for research on these issues.

Much of this book is devoted to testing the theory with empirical evidence. For this purpose the BLS Survey of Consumer Expenditures for 1960–61 and the 1/1,000 Census sample [3] of the U.S. population for 1960 are systematically exploited. We devise a methodology for using the empirical data to isolate life cycle effects, and show that these data are generally consistent with the implications of the theory. In particular, we find there are sizable positive responses of both consumption and labor supply to variations in the price of time over the life cycle, when we hold some other determinants fixed. We also find evidence of substitution between goods and husband's time, and between husband's time and wife's time. These estimates are combined at the end of this book to predict the effect of changes in the price of time unrelated to the life cycle; in particular, the effect on secular changes in labor supply and consumption of the secular growth in real wage rates over the last half century. The predicted values of consumption and hours of work are in general the same as the observed values of the variables over the last fifty years. We also find that the estimates are consistent with the observed procyclical responses of consumption and labor force participation. In summary, we believe that the basic model of time in home production has wide applicability and strong explanatory power. Its strength lies in its ability to interpret vastly different bodies of data.

Our discussion is organized into four chapters. In the first one we present the theoretical model. In the second, we discuss the empirical methodology and report on estimates of the life cycle consumption function of different groups in the population. In the third,

3. See Chapter 3, Note 36, below.

we present estimates of the life cycle labor supply function for different groups. In the fourth, we integrate the estimates in the second and third chapters, and suggest some further applications.

Most of the material in this volume was completed several years ago. Since that time several other studies of life cycle allocation of time and goods have been developed. We believe that our theoretical analysis goes somewhat further than these other studies do, and that our empirical analysis of life cycle behavior is the most extensive and most clearly related to the theoretical analysis.

Since this work is a mixture of jointly credited and separately credited material, it may be useful to describe more precisely the relative contributions of each of the authors. Becker is mainly responsible for developing the basic model and for the empirical work on hours of work of men reported in Chapter 3. Ghez is responsible for developing the derived demand equations given in the text, for much of the empirical procedure used throughout this volume, and for his results on consumption patterns in Chapter 2. He is also mainly responsible for the discussion of the human capital model and its interaction with consumption decisions.

Acknowledgments

This study was conducted mainly at the National Bureau of Economic Research and funded by grants from the Carnegie Corporation and the Carnegie Commission on Higher Education, for whose financial assistance we are very grateful.

This book is the result of a substantial research effort over the last several years. Since its publication has been delayed, we have benefited from concurrent and subsequent research carried out by others. However, the original thrust and flavor of the book remain.

We are grateful to Jacob Mincer for his constructive comments at every stage of this project; to Robert Michael and Michael Grossman, who offered continued discussion of virtually every aspect of this book and whose research efforts overlapped ours in part; to the members of the National Bureau's Staff Reading Committee, James Heckman, F. Thomas Juster, and Warren Sanderson, for many useful comments; to members of the Workshop in Applications of Economics at the University of Chicago, in particular H. Gregg Lewis, and to members of the Labor Workshop at Columbia University.

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Finally, Ghez owes a special thanks to his wife, Susanne, for her continued encouragement and for bearing part of the costs of a long process of creation.

THE ALLOCATION OF TIME AND GOODS OVER THE LIFE CYCLE