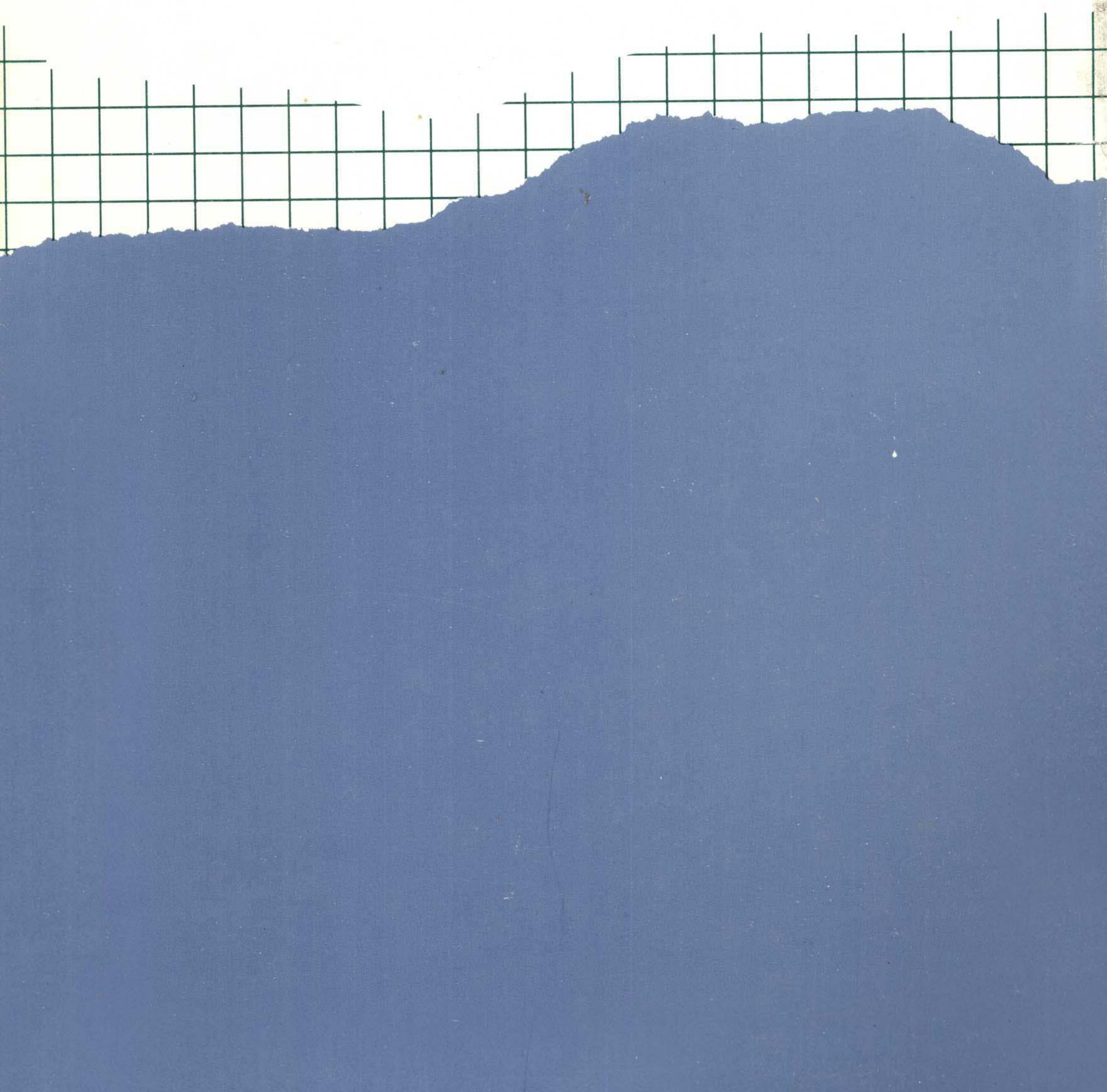
CONSUMPTION BEHAVIOR and the EFFECTS OF GOVERNMENT FISCAL POLICIES

Randall P. Mariger



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To the memory of Susan Lee Campbell, who was a passenger on the Korean airliner shot down by Soviet forces over the Sea of Japan on September 1, 1983. She was a bright, energetic person and a dear friend.

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Contents

1 Introduction

For more than twenty years the life-cycle theory of consumption (Modigliani and Brumberg, 1954) has provided the popular framework for analyzing important economic issues. Among these issues are the following: (1) How does an unfunded social security system affect the size of the capital stock? (2) How do government fiscal policies affect the consumption-investment mix? (3) Is a consumption tax "superior" to an income tax? (See, for example, Auerbach and Kotlikoff, 1983b; Diamond, 1965; Eisner, 1969; Feldstein, 1974, 1978; and Kotlikoff, 1979a.)

In recent years evidence has arisen suggesting that the life-cycle consumption theory has serious deficiencies. Kotlikoff and Summers (1981) find that it cannot account for the size of the U.S. capital stock; White (1978) finds that it cannot explain the amount of aggregate annual savings in the United States; and Atkinson (1971) and Oulton (1976) find that it cannot explain the degree of inequality of wealth in Britain. In addition, Hall and Mishkin (1982) and Hayashi (1984) conclude that the life-cycle consumption theory explains only part of the sensitivity of consumption to contemporaneous income for a cross section of households.

These studies bring into question two fundamental assumptions underlying the life-cycle consumption theory — namely, that there are no planned bequests and that human capital is marketable. As is demonstrated in Chapter 3, these assumptions have important implications for the effects of government fiscal policies on the real economy.

A primary objective of this study is to test whether liquidity constraints and planned bequests are prevalent. To do so, I fit a life-cycle consumption model that incorporates liquidity constraints, but no planned bequests, to data on a cross section of U.S. families in 1962–63. The estimated model, in conjunction with estimates of alternative models, enable me to make inferences about the respective effects of liquidity constraints and social security wealth on consumption. As Barro (1974) has shown, the effect of social security on consumption yields indirect evidence pertaining to the prevalence of planned bequests. I also examine the fit of the model for various subsamples to uncover evidence directly relating to planned bequests. Among the findings discussed are the following:

(1) The consumption model fits the data very well and the parameter estimates are reasonable. The model explains more than 60% of the consumption variance for families with net worth less than $250,000 in 1963, and who constitute 94.2% of the sample and represent 99.1% of the U.S. population in 1963.

(2) Liquidity constraints have an important effect on consumption. I estimate that liquidity-constrained families make up 19.4% of the population of families represented in the sample. These families were responsible for 16.7% of total consumption undertaken by the population sampled.

(3) Social security wealth is indistinguishable from other forms of wealth in its effect on consumption. Furthermore, I conclude it is 95% certain that, in any period, each dollar of net social security receipts has at least 60% as great an effect on consumption as does one dollar of ordinary net noninterest income.[1]

(4) There is evidence that families with net worth exceeding $250,000 in 1963 intend to leave bequests. These families represent 0.9% of the population in 1963 and held approximately 30% of the total wealth in that year.

(5) For families in the lower 99.1% of the wealth distribution, the model explains the consumption behavior of all age groups quite well. In particular, there is no evidence that older families, for whom the desire to leave a bequest would be most evident, consume significantly less than the model predicts.

The models I estimate are rigorously derived, assuming that families maximize the expected value of intertemporal utility subject to the appropriate constraints. To my knowledge, these are the first estimates of a reasonable structural consumption model.[2] The advantage of estimating a structural model is made evident in the latter half of this study, where I utilize the estimated model to simulate the effects of government fiscal policies on the real economy. For this purpose I simulate policy-induced consumption changes for the population of families represented by the sample as well as a hypothetical population of families. Clearly, these tasks require a structural consumption model. My simulations suggest the following:

(1) A 10% incremental tax on labor income immediately decreases the consumption of families represented by the sample by 18.4% of the incremental tax revenue. This change would only be 25% as large if no families were liquidity constrained.

(2) A 10% incremental tax on labor income, followed by an anticipated reduction in the rate of tax on labor income ten years later that keeps the present value of the government's revenue constant, immediately reduces consumption by 9.0% of the initial incremental tax revenue. This consumption change would be only 20% as large if no families were liquidity constrained. The lagged effects of this policy are significant in spite of liquidity constraints. Over nine years consumption falls by 33.4% of the initial incremental tax revenue.

(3) Eliminating the social security system in the United States would increase the steady-state capital stock by at least 6.5% and possibly by as much as 31.3%. This increase is generally *larger* when liquidity constraints are imposed than when they are not.

(4) Life-cycle savings are not nearly large enough to explain the size of the U.S. capital stock.

The latter three sets of findings are implied by simulations for a hypothetical population of families.

I conclude from these simulations that the short-run effects of government fiscal policies on aggregate demand, while significantly greater than they would be in the absence of liquidity constraints, are still rather small. In the longer term, however, government fiscal policies have a significant effect on capital intensity.

The organization of the remaining chapters is as follows. Chapter 2 presents the theoretical framework that underlies the entire study. I begin with a simple life-cycle consumption model introduced by Yaari (1964) which, in the spirit of Modigliani and Brumberg (1954), assumes perfect capital markets and no planned bequests. This model then is generalized in two directions. First, it is extended to the case where net worth must exceed some arbitrary level, which may vary over time, in each period. The solution to the agent's problem is expressed in a form that is empirically applicable. Second, the model is adapted to the case where the family cares about its descendants. Chapter 3 motivates this study and draws heavily on the material in Chapter 2. It begins by demonstrating the important implications of liquidity constraints and intergenerational transfers for the effects of government fiscal policies on the real economy. The second part of the chapter critically evaluates the recent empirical evidence concerning liquidity constraints and intergenerational transfers. It is concluded that our current knowledge of these phenomena is quite limited. Chapter 4 presents the consumption model that serves as the basis for my empirical investigations. This model incorporates liquidity constraints, but no planned bequests, and is applicable to a family. The data used to estimate the parameters of the model are discussed in Chapter 5. Chapter 6 contains a stochastic specification of the model and a discussion of my estimation procedure. The empirical results are reported in Chapters 7 and 8. Chapter 7 presents the parameter estimates for my preferred model, tests the model's robustness, and examines the effects of liquidity constraints on consumption. Chapter 8 generalizes the Chapter 7 model specification to the case where intergenerational transfers may be operative. It tests the implications of this model for the effect of social security on consumption and finds that the Chapter 7 specification cannot be rejected. Evidence directly relating to planned bequests is also presented. Chapters 9, 10, and 11 contain the simulation results. Chapter 9 investigates the effect of liquidity constraints on the lifetime consumption profiles of various families; Chapter 10 studies the effect of temporary taxes on aggregate consumption; and Chapter 11 simulates the steady-state equilibrium of various economies with and without a social security system like the one currently in place in the United States. Finally, Chapter 12 summarizes my findings.

2 The Theoretical Framework

Modern consumption theory extends the static theory of the consumer to an intertemporal setting to explain an agent's choice of consumption, and perhaps leisure, over time. This theory has spawned a variety of models I refer to as choice-theoretic consumption models. In these models: (1) The objects of choice are made explicit; (2) a monotonically increasing and strictly concave utility function is postulated to represent preferences for the objects of choice; (3) constraints facing the agent are made explicit; and (4) the agent is assumed to make choices that maximize expected utility, subject to the constraints imposed. Normally the objects of choice are real consumption expenditure, and perhaps leisure, in each period of the agent's planning horizon.

A special class of choice-theoretic consumption models, which until recently have been the accepted paradigm in consumption theory, are life-cycle models. These models evolved from the model of Modigliani and Brumberg (1954) and tend to share the following characteristics.

(1) The agent is rational and attempts to maximize his expected utility derived from his family's consumption, and perhaps leisure, over his planning horizon.

(2) The agent's planning horizon is the lifetime of himself and his spouse—parents and mature children are not provided for.

(3) The agent has access to perfect insurance and capital markets.

Friedman's permanent income model (Friedman, 1957) shares many of the insights of Modigliani and Brumberg's life-cycle model but is different in some important respects. In particular, Friedman did not specify the length of the horizon and suggested that younger households may have difficulty borrowing against their future labor earnings. These complications forced him to leave his model largely unspecified.[1]

As pointed out in Chapter 1, the second and third assumptions underlying the life-cycle consumption theory have come under close scrutiny in recent years. This chapter investigates how the behavioral implications of the theory are altered when these assumptions are relaxed. We begin with a presentation of a prototype life-cycle model that was first introduced by Yaari (1964) and includes the Modigliani and Brumberg and the Friedman models as special cases. This model is generalized in Section 2.2 to the case where borrowing is restricted. Then, in Section 2.3, a model that allows for planned bequests is presented. All these models assume that the intertemporal utility function has an additive form and depends only on real consumption expenditure in each period. The implications of these assumptions are explored in Appendix A.

This chapter contains the basic theoretical framework that underlies the remainder of the book. In particular, the model of Section 2.2, which allows for liquidity constraints, is the basis for the empirical model of Chapter 4. The Yaari model of Section 2.1, in turn, is the basis for the model of Section 2.2. The properties of these models, therefore, are investigated in some detail. In addition, the results given in Section 2.3 concerning planned bequests are extremely useful for determining how the empirical model, which assumes no planned bequests, would reveal their existence. I refer to this material when devising tests for planned bequests in Chapter 8.

This chapter, with the exception of Section 2.2.3, assumes no uncertainty. The effect of uncertainty on consumption is discussed in Chapter 4.

2.1 A Prototype Life-Cycle Consumption Model

Yaari (1964) develops a consumption model in which the agent faces no uncertainty. He considers two cases, one where the agent derives utility from bequests left to her descendants and one where she does not. The latter case is reviewed here and a discussion of the bequest problem is delayed until Section 2.3. Yaari's continuous time framework is translated to a discrete time framework to facilitate comparability with other models that are presented later.

2.1.1 The General Model

Yaari makes the following assumptions:

(1) The agent's lifetime (horizon) is certain to be $T + 1$ periods long.

(2) The rate of return on investments in each period is certain and equal to that which must be paid on borrowed funds.

(3) Noninterest income in each period is certain and exogenous.

(4) Preferences for lifetime consumption are represented by a utility function of the form

$$V_0(C_0,C_1, \ldots ,C_T) = \sum_{i=0}^{T} \alpha(i,0)U(C_i),$$

where C_i is real consumption expenditure in period i, $U(C_i)$ is a monotonically increasing and concave function giving the level of utility experienced in period i, $\alpha(i,0)$ is a subjective discount factor, and time is measured relative to the time the agent is age 0.

(5) The agent must be solvent at the end of period T.

(6) The agent is rational and maximizes lifetime utility subject to the constraints he faces.

The second argument of the subjective discount factor denotes the period in which the optimal consumption plan is formulated, here assumed to be period 0. This dependence is allowed so that later I may discuss the question of whether the agent continues to follow the plan formulated at time 0 as he ages. For now the reader is advised to ignore the dependence of α on its second argument.

Under these assumptions, the agent's problem is

$$\underset{\mathbf{C}}{\text{Max}}\ V_0(\mathbf{C}) = \sum_{i=0}^{T} \alpha(i,0)U(C_i) \tag{2.1}$$

subject to

$$A_{T+1} \equiv [P(T,0)]^{-1} \sum_{i=0}^{T} P(i,0)(YL_i - C_i) \geq 0 \tag{2.2}$$

$$\leftrightarrow \sum_{i=0}^{T} P(i,0)C_i \leq W_0 \equiv \sum_{i=0}^{T} P(i,0)YL_i,$$

$$\mathbf{C} \geqq \mathbf{0}, \tag{2.3}$$

where

$$\mathbf{C} = [C_0,C_1, \ldots ,C_T], \tag{2.4}$$

$$P(i,0) = \prod_{j=0}^{i-1} (1 + R_j)^{-1}, \quad \text{for } i = 1,2, \ldots ,T, \tag{2.5}$$
$$= 1, \quad \text{for } i = 0,$$

and R_i, YL_i, and A_i are, respectively, the real net rate of return, real net