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AN EMPIRICAL EVALUATION OF ALTERNATIVE CONSUMPTION HYPOTHESES IN LESS DEVELOPED COUNTRIES: A CASE STUDY OF IRAN

The University of Oklahoma PH.D. 1980

THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

AN EMPIRICAL EVALUATION OF ALTERNATIVE CONSUMPTION HYPOTHESES IN LESS DEVELOPED COUNTRIES: A CASE STUDY OF IRAN

A PAPER

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

BY

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Norman, Oklahoma

Summer 1980

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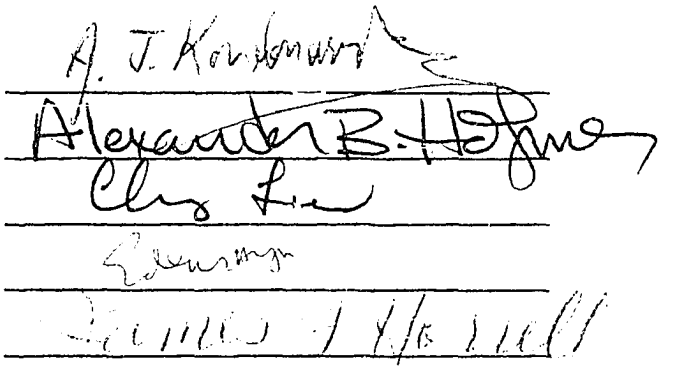

DISSERTATION COMMITTEE

ACKNOWLEDGEMENTS

The author owes a debt of gratitude to numerous individuals who assisted him in the program of studies and in the preparation of this dissertation. The general guidance to complete this dissertation was received from the members of his advisory committee. Dr. Alexander J. Kondonassis, major advisor, Dr. Alexander B. Holmes, and Dr. Eden S. H. Yu were most helpful to the writer in completing this dissertation. Dr. Chong K. Liew and Dr. James E. Horrel served as the other members of the advisory committee and their assistance in the completion of the program of studies and this dissertation is acknowledged. The writer would like to express his gratitude to each of these persons for their assistance and encouragement.

The writer is most grateful to his mother, for without her continuous support and encouragement, the goal would never have been realized.

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CHAPTER I

INTRODUCTION

Empirical evaluation of a hypothesis can fill the gap between the real world and the world of theories. The validity of any hypothesis, according to the scientific method of research, should be tested by empirical evidence. Empirical evidence can reject a hypothesis but it cannot prove its validity.[1] Because most theoretical and empirical works in economics concentrate on the developed countries, their relevance to the less developed countries has been questioned by several groups, especially historical and institutional economists. Yet there has been little effort to test the validity of the economic theories in less developed countries. It seems that the institutional, technological, and behavioral differences between less developed countries and developed countries are overemphasized by some sociologists, and historical and institutional economists. Although there are

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[1]See M. Friedman, "The Methodology of Positive Economics," in Essays in Positive Economics (Chicago, Ill.: University of Chicago Press, 1953).

qualitative as well as quantitative differences between these two groups of countries, with some modification and careful interpretation of empirical results the Western theories can be applied to the less developed countries as well.[1] On the same line of argument, Pandit says:

> It appears to us that what is needed is not a new theory but a careful selection of assumptions and a different emphasis on the various elements of a theory. This calls for a long sequence of experiments before a satisfactory framework is available for empirical research pertaining to the less developed economies.[2]

Not only the generalization of special cases of the developed countries to the less developed countries does not seem to be right, but also the generalization of the special case of a less developed country to the other less developed countries can be questioned because different less developed countries suffer from different types of market imperfections and have different structural and behavioral characteristics.

Ever since Keynes introduced the consumption function in The General Theory of Employment, Interest and Money, published in 1936, many economists have been trying to determine the factors which explain the consumption behavior of the private sector. Knowledge about private consumption

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[1]See H. L. Mint, "Economic Theory and the Underdeveloped Countries," Journal of Political Economy, Vol. LXIII, No. 5 (Oct. 1965), pp. 477-497.

[2]Vishwanath Pandit, "Sources of Inflation in Developing Economies: Case Study of Columbia, India, Korea and Taiwan," Ph.D. Dissertation, University of Pennsylvania, 1971, p. 3.

behavior in any society is vitally important because about 65 to 95 percent of the national income of any country is devoted to private consumption. Because of the importance of private consumption in any economy, we observe that any macro-economic model begins with the estimation of a consumption function. Different consumption hypotheses have been developed to examine consumption functions in the developed countries after the Keynesian revolution in general and during the last three decades in particular.

Beginning with the end of the 1960's and in recent years, this interest has been shifted to the examination of private consumption behavior in less developed economies to see if their consumption patterns follow the same pattern as those of the developed economies. The difference between socio-economic characteristics of these two groups of countries may lead to different results and our purpose in this study is finding the extent of these differences, if any.

In this study, the implications of alternative consumption theories in the less developed economies are judged by using Iran as a special case. Although any developing country is a special case by itself, it seems safe to make a fairly broad generalization from our empirical results to the other less develoepd countries of the southwestern part of Asia. The population of these countries is homogeneous in many respects and our expectation is that their consumption patterns are similar. Many of these countries share similar climate, religion, and ethnic background as well as under-

development characteristics. Some of these characteristics are: high rates of illiteracy, dualistic social and economic conditions, low rate of female participation in the labor market, a relatively young population which is the result of high fertility rate, high rates of migration from rural to urban areas, skewed distribution of income and wealth, foreign domination of the industrial sector (i.e., oil industry), surpluses of labor in the form of obvious and disguised unemployment, and/or strong exportation of primary goods.

At any rate, any generalization from our results to the other less developed countries should be taken as tentative and requiring further investigation. Our primary purpose in this study, as mentioned before, is the examination of the validity of alternative consumption hypotheses for the Iranian economy. Econometric tools are employed to estimate and evaluate each consumption hypothesis for Iran. From these estimations of consumption functions, we can find the marginal propensity to consume, MPC, which has numerous policy implications. For example, the size of MPC gives us the multiplier coefficient which is useful in the prediction of the economic consequences of any fiscal policy. Of course, employing different consumption theories may lead to different estimations for the MPC, mostly because of biases and distortions in parameter estimates. Careful evaluations of empirical results can help us to decide the accuracy of our estimates in each case.

Methodology

To estimate the alternative consumption functions for Iran, we will use the following hypotheses:

1. Absolute Income Hypothesis. According to Keynes, private consumption simply depends on the current disposable income. Classicists believed that consumption and saving depend on the interest rate, but in Keynesian theory, the interest rate is determined by the demand and supply of money, not saving and investment functions.

2. Relative Income Hypothesis. According to Duesenberry, the private consumption does not simply depend on the current disposable income, but it depends on the distribution of income among the households as well. If the position of a household improves by moving to a higher level income group, its marginal propensity to consume will decline and vice versa. According to this theory, the ratio of consumption income, APC, depends on the growth rate of real income y/y_o, where y_o is the previous peak income.

3. Permanent Income Hypothesis. Friedman's permanent income hypothesis assumes variations in the observed consumption/income ratio depend on differences between actual income and some concept of normal income. To estimate a permanent consumption function we will use an indirect method of estimation. Using a distributed lag function of current and past income with geometrically declining weights and replacing an infinite

distributed lag and applying a Koyck transformation leads to a functional relationship between current consumption with current income and lagged consumption. From the estimated coefficient of this function we can find the factor of proportionality of permanent consumption and permanent income.

4. Habit Formation Hypothesis. The influence of habit on consumption behavior of the private sector was suggested by Davis and Brown and included in the past consumption in the consumption function. Later on, Houthakker and Taylor modified their demand function suggested initially to estimate consumption of special products like durable goods, to emphasize the role of habits in the aggregate consumption expenditures. According to this modified version of habit formation hypothesis, current consumption depends on the current income, the previous consumption, and the previous income.

5. Liquid Assets Hypothesis. To link short-run and long-run studies, Tobin suggested including wealth in a Keynesian consumption function. In recent years liquid assets have been used instead of wealth because it is assumed to be more relevant than wealth. According to Zellner, sufficient liquid assets can carry out the desired level of consumption and insufficient levels of liquid assets may reduce consumption of individuals.

The foregoing hypotheses are examined in the next five chapters of this study. Each chapter is divided into three sections. The first section discusses the underlying

theory, criticisms of the theory, and the specifics about the methodology used to estimate and evaluate the empirical results of that chapter. The second section is concerned with the empirical time-series analysis by estimating the implied functional form of the consumption hypothesis for the case of Iran. Discussion about the results is the subject of this section of each chapter. The third section of each chapter is devoted to a brief conclusion concerning our empirical results and their significance for each hypothesis for the case of Iran. The final chapter, Chapter VII, presents the overall summary and conclusions of the study.

The Data Situation: Problems and Sources

Any quantitative study of the economies of the less developed countries faces severe difficulties in obtaining relevant data because of their scarcity, discontinuity, and inconsistencies in different official publications. Any estimation for the periods prior to World War II is based on pure guess and rule of thumb and in some cases it is based on unconfirmed stories and notes. The national income accounts have a short history in many of the less developed countries and Iran is no exception. The official publication of national income accounts of Iran began in 1959 by the Bank Markazi Iran (the Central Bank). Although there is much doubt about the accuracy of these data, they seem to be the best available data. Many factors contribute to the inaccuracy of the

available data in the less developed countries. A high rate of illiteracy prevents a significant proportion of the population in these countries from keeping any accounts regarding their business. Even if we ignore this difficulty, a long period of distrust of the people to the non-nationalistic government and lack of confidentiality of obtained data, in many circumstances, lead to incorrect and biased responses. The lack of experienced manpower and low priority of budget allocation for gathering statistical data add some difficulties in obtaining accurate data. The last difficulty but certainly not the least is the influence of political pressure on the organizations which are responsible for gathering data. Under the existence of a dictatorship in many of the less developed countries, i.e., Iran under the Shah's regime, to make the ruler good in the eyes of the people and more importantly in the international community, national income accounts often indicate a constant improvement in the standard of living of the people of these countries, although that may not be the case.

The nature of underdevelopment allows further mistakes and inaccuracy of data in the case of economies of less developed countries. For example, classification of some expenditures in these countries is not as easy as is the case of developed countries. When a majority of people are suffering from malnutrition, any quantitative and/or qualitative addition to the level of their consumption can lead

to the higher productivity of the labor force. Therefore, such an addition in the consumption is partly investment in human capital. The importance of non-monetized forms of production, especially in agriculture, in developing countries, leads to the estimation of data which are mainly based on guesses.[1]

Given the above mentioned difficulties concerning data in less developed countries, one may wonder what is the significance of an empirical analysis for the economies of these countries. It is obvious that in many cases our degrees of freedom are low because of scarcity of data and we may get biases and distortion in our parameter estimation because of errors of measurements, but abandonment of efforts to quantify is not the solution. The empirical studies of less developed economies reveal the orders of magnitude, direction, and speed of change in major economic variables and also provide some understanding for the need of future research. For example, in the present study we could not use the less aggregated analysis for the different regions of the Iranian economy because of lack of detailed data. We could not estimate the life cycle hypothesis of the consumption function of Iran because measuring of GNP of the Iranian economy by the resource cost-income approach is not available at the present

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[1]See W. J. Barber, "A Critique of Aggregate Accounting Concepts in Underdeveloped Areas," Oxford University Statistics Bulletin, Vol. 25, No. 4 (November 1963), pp. 293-308 for more details.

time. These avenues should be paved in the near future by the authorities who are responsible for gathering data in Iran.

The necessary data used in the empirical analysis of this study for the period of 1959-1976 are described in the text and presented in the Appendix. The major sources of data are the following:

1. Consumption expenditures, income, and price index data are taken from a recent article by Alan Brown.[1] He claims that he adjusted the official published data with the latest revisions by the Iranian officials while he was working in Iran. Because personal disposable income was not available for Iran, he used gross national product less oil and gas revenue and direct taxes as the best proxy of the personal disposable income.

2. Saving, government expenditures, gross investment, depreciation, population, and liquid assets data are derived from the National Income of Iran, 1959-72 and various issues of Annual Report and Balance Sheet of Bank Markazi Iran (the Central Bank). Because statistical data of Iran have been under constant revisions in recent years, there are inconsistencies among various official publications regarding the above data. We used the latest revision of the data in our study because these refined data resulted from the additional information which reduces the measurement error.

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[1]Alan Brown, "A Note on the Consumption Function in Iran," in Oxford Bulletin of Economics and Statistics, 40 (1) (February 19, 1978): p. 5.

3. The Results of Sampling of Rural Households' Budget in 1976, published by the Center of Statistics of Iran in 1977, is used to obtain income and consumption of the Iranian rural population in 1976. The survey was based on a stratified sample of 7061 households which contained 36,728 individuals.

CHAPTER II

ABSOLUTE INCOME HYPOTHESIS

Theoretical Background

Keynes was the first economist who emphasized a stable functional relationship between consumption and current income, although before him some other economists had referred to such a relationship.[1] The classical economists believed that the variations in consumption and saving are associated with changes in the interest rate. The higher the interest rate, the higher the savings and the lower the consumption expenditure.

The underlying assumptions of the absolute income hypothesis are:

1. Consumption expenditures are a stable function of income.

2. The marginal propensity to consume is between zero and one.

3. The marginal propensity to consume, MPC, is less than the average propensity to consume, APC, but APC may decline when income increases. Therefore, as income increases,

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[1]See G. Ackley, Macroeconomic Theory (New York: The MacMillan Company, 1961), p. 218.

APC becomes closer to MPC. This explains the closeness of MPC and APC in the long run because in the long run, nations become wealthier.

4. The APC may be greater than one at low levels of income.

5. As income increases, not only APC declines, but the MPC may also decline.[1]

In Keynes' own words:

> The fundamental psychological law upon which we are entitled to depend with great confidence both a priori from our knowledge of human nature and from the detailed facts of experience, is that men are disposed as a rule and on the average, to increase their consumption as their income increases but not as much as the increase in their income.[2]

This statement suggests and reinforces the decline of the APC and the possibility of decline of the MPC as income increases. If the latter conclusion is correct, then a linear consumption function which assumes a constant MPC is not the right choice. The popularity of the linear consumption function in most empirical studies is due to the fact that the MPC has been constant in most cases and, as a result of that, a linear consumption function has been a good first estimate. In this chapter we will examine both linear and nonlinear consumption functions.

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[1] See Ackley, op cit., p. 219, and N. F. Keiser, Macroeconomics (New York: Random House, 1975), p. 77.

[2] J. M. Keynes, The General Theory of Employment, Interest and Money (New York: Harcourt, Brace, 1936), p. 96.

The simplest form of the consumption function is a linear relation between current consumption and current income:

$$c = a + by_d \tag{1}$$

where c and y_d are current consumption and disposable income, respectively, a and b are constants, and a shows a minimum level of need. Keynes assumed that individuals whose income is below a certain level dissave or borrow to satisfy their minimum need to be able to survive. b shows the portion of incremental income which individuals spend for consumption and this is the same as the MPC. The APC can be derived by:

$$APC = \frac{c}{y_d} = \frac{a}{y_d} + b \tag{2}$$

Comparing the APC with the MPC = b, we can find APC > MPC as much as $\frac{a}{y_d}$ (a shows a minimum need of life and is a positive figure). It should be noted that as income increases, $\frac{a}{y_d}$ declines and the difference between APC and MPC becomes smaller.

In most empirical studies of the consumption function, a high coefficient of determination, R^2, is to be found. In most cases, this does not prove that there is a causal relationship between consumption expenditures and disposable income. R^2 might be high because consumption and income tend to rise over time. Also we note that consumption is a major part of national income and this explains the fact that

increases or decreases in the consumption expenditures may change income in the same direction. In other words, the direction of causation between aggregate consumption and aggregate income is not one-sided. Therefore, the consumption function should be determined through a set of simultaneous equations in which income itself is a dependent variable. Using the simultaneous model, we have:

$$c = a + by + u \tag{3}$$

$$y = c + I + G \tag{4}$$

where I and G are gross investment and government spending, respectively, and they are assumed to be exogenous variables. u is a stochastic term with a probability distribution centered at zero and having a finite variance σ_u^2. From equations (3) and (4) we obtain:

$$y = a + by + I + G, \text{ or} \tag{5}$$

$$y = \frac{a}{1-b} + \frac{1}{1-b}I + \frac{1}{1-b}G + \frac{u}{1-b} \tag{5'}$$

If our exogeneous variables are distributed independently from u, first we can estimate equation (5') and then we can use the estimated coefficients of this function to get estimates of a and b in equation (3). This is the indirect least squares approach.[1]

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[1]See J. Johnston, Econometric Methods (New York: McGraw-Hill Book Company, 1972), pp. 342-346.

Instead of estimation of the consumption function, many economists have estimated the saving function as follows:

$$S = a + by_d + u \qquad (6)$$

where S represents savings.

Although in principle estimation of consumption and saving functions should give us the same results concerning marginal propensity to consume, MPC, and marginal propensity to save, MPS, in practice there may be a substantial difference for either MPC or MPS depending upon which function is used. As Ferber says:

> Parameter estimates based on equation (6) are subject to the danger of bias from two sources: the parameter estimates may be dominated by extreme values, and u is not likely to be independent of S. Expressing dollar variables in logarithms (assuming absence of negative term) removes this tendency somewhat, but not altogether.[1]

Using dependent or independent variables in the logarithm, as Ferber suggested, is a nonlinear method of estimation of consumption and/or saving functions. Double log estimation of consumption function is also suggested by Houthakker.[2]

Instead of using consumption and saving as a function of disposable income, it is possible to use the ratio of $\frac{S}{y_d}$ or $\frac{C}{y_d}$ in that functional form. For example:

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[1] R. Ferber, "Research on Household Behavior," American Economic Review, 52 (March 1962): 22.

[2] H. S. Houthakker, "On Some Determinants of Saving in Developed and Underdeveloped Countries," in E. A. G. Robinson, Problems in Economic Development (New York: MacMillan and Company, Limited, 1966), pp. 212-231.

$$\frac{S}{y_d} = a + by_d + u \qquad (7)$$

We can add the change in income as another explanatory variable in the consumption function because it seems that people care more about the change in their income than income in their consumption behavior.[1]

A quadratic functional form can be used to estimate the consumption function if we believe that the nonlinear consumption function can explain the consumption pattern better than a linear function:

$$C = a + by_d + cy_d^2 \qquad (8)$$

Here $MPC = b + 2cy_d$ and it decreases only if its derivative is negative. Therefore, when we use the quadratic functional form for the estimation of the consumption function, if the second derivative of the function

$$\frac{dMPC}{dy_d} = \frac{d^2C}{dy_d^2} = 2c$$

is negative, we conclude that the marginal propensity to consume decreases as income increases.

It should be noted here that by using a quadratic function form for the consumption function, we may commit

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[1]See Irwin Friend, "The Relationship Between Consumers' Expenditures, Savings, and Disposable Income," The Review of Economics and Statistics, 28, November 1946, 208-15.

ourselves to the danger of multicollinearity which may be the result of high correlation between y_d and y_d^2. If this is a serious problem, we cannot rely on the estimated coefficients too much because of their large variances.

Empirical Results

The estimated results of the consumption function of Iran are shown in Table 1. The annual consumption expenditures and income data used for the estimation of the consumption function are both in constant and current terms because although most of the economists suggested using real terms in the estimation of the consumer demand expenditures, there are some reasons to believe that consumers might suffer from the money illusion,[1] especially in a rapidly growing economy such as the Iranian economy. All of the estimated MPCs are highly significant and have the expected positive sign. The MPCs are between zero and one and they are less than the corresponding APCs, as the theory suggested.

Our estimated results indicate that the MPC for Iran during the period of our study is between 0.64 and 0.57. Comparing these estimated MPCs with the MPCs of the advanced countries, we conclude that the marginal propensity to consume for Iran is relatively low.[2] This conclusion appears

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[1] See W. H. Branson and A. K. Klevorick, "Money Illusion and the Aggregate Consumption Function," American Economic Review 59 (December 1969): 832-49.

[2] MPC for the United States, in most of the empirical studies, is estimated to be around 0.77 (between 0.7 and 0.9).

TABLE 1

ESTIMATED CONSUMPTION FUNCTION FOR IRAN

Period Covered	Estimated Function	R^2	D-W	SE	F	
1959-1976	C = 83.47 + 0.64y (9.28) (73.93)	0.997	0.966	25.1	5465.45	(1)
1959-1976	C/P = 1.42 + 0.61 Y/P (10.25) (46.99)	0.993	0.859	0.3	2208.35	(2)
1959-1976	C/N = 0.003 + 0.62 Y/N (13.14) (77.60)	0.997	1.257	0.0007	6022.22	(3)
1959-1976	C/NP = 0.00007 + 0.57 Y/NP (15.05) (44.93)	0.992	1.312	0.000007	2019.20	(4)

Key:
Y = Gross National Produce minus oil and gas revenue and direct taxes;
D-W = Durbin-Watson Statistic;
SE = Standard Error of the regression;
R^2 = Coefficient of Determination;
F = F-statistic;
N = Population in thousands of persons;
P = Price index; and
t values are given in parentheses.

to contradict the assumption (5) that we posited in the preceding section of this chapter. If that assumption were correct, we would expect to have a higher MPC for Iran compared to the MPC of the advanced countries, e.g., the United States. But as Ackley suggested, this assumption is not essential to Keynes' hypothesis.[1] One may argue that the reason for this low MPC in the case of Iran is because of the rapid expansion of the Iranian economy and the numerous and high return speculative activities, e.g., land speculation, which have characterized the period of 1959-1976. Insecurity and lack of welfare programs can also be mentioned as additional reasons for a low marginal propensity to consume.[2] An examination of R^2s and F values of the regressions results in Table 1 indicates a strong correlation between consumption expenditures and income.

The Durbin-Watson statistic indicates the existence of autocorrelation in equation (1) and (2) at the .05 level of significance and inconclusive results for the estimated equations (4) and (5). This may be because of some missing variables in our regressions. With the assumption of the first order Markov scheme relation between the residuals, we apply the Cohrane-Orcutt iterative technique to remove

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[1]Ackley, op cit., p. 219.

[2]One of the reasons for the downfall of the Shah's regime is the lack of welfare programs and inadequacy of housing, especially for the poor.

autocorrelation in our estimated equations. The corrected equations are shown in Table 2. The data reveal an overall improvement over the equations of Table 1.

The estimated coefficients of the consumption function for Iran are shown in Table 3. To make the estimates, the simultaneous method of estimation rather than the ordinary least square method was used.

A comparison of the estimated coefficients of the consumption function in Tables 2 and 3 shows that the estimated MPC is much lower or negative when we used the indirect method of estimation. It seems that measurement error in investment and government expenditures led to biased estimations of the equations of Table 3 and, consequently, to the unacceptable values of the MPC.

We now turn our attention to the adequacy of the quadratic consumption function for countries like Iran. The results for this nonlinear consumption function are shown in Table 4.

Comparing the results of Table 4 with those of Table 1, we observe that the coefficients of income in Table 4 differ sharply from the coefficients of income in Table 1. This is because of the multicollinearity problem that was expected to exist when we introduced the squared value of income as a new explanatory variable.[1] At the same time, the Durbin-Watson

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[1]The correlation coefficients of income and squared income in all of the estimated equations of Table 4 were over 0.9.

TABLE 2

CORRECTED ABSOLUTE-INCOME CONSUMPTION FUNCTIONS

Period Covered	Estimated Function	$\bar{R}^2$	D-W	SE	F	
1960-1976	C = 169.84 + 0.58 Y (3.37) (31.78)	0.998	2.009	19.7	8533.31	(1)
1960-1976	C/P = 2.07 + 0.56 Y/P (4.86) (20.32)	0.995	2.221	0.2	3280.35	(2)
1960-1976	C/N = 0.004 + 0.60 Y/N (8.21) (50.38)	0.998	1.885	0.0006	6722.75	(3)
1960-1976	C/NP = 0.00007 + 0.55 Y/NP (10.72) (31.65)	0.993	1.919	0.000007	2045.37	(4)

Key: See Table 1.

TABLE 3

ESTIMATION OF THE COEFFICIENTS OF THE CONSUMPTION FUNCTION
BY USING SIMULTANEOUS EQUATIONS

Period Covered	Income Function	R^2	D-W	SE	F	a	b	
1960-1976	$Y = 356.27 + 1.04\ (I+G)$ $(5.00)\quad(18.10)$	0.988	2.118	81.45	1227.61	342.57	0.04	(1)
1960-1976	$\frac{Y}{N} = 13.56 + 0.68\ \frac{(I+G)}{P}$ $(3.21)\quad(6.63)$	0.986	2.127	0.66	1044.12	19.94	-2.12	(2)
1960-1976	$\frac{Y}{N} = 0.01 + 1.03\ \frac{(I+G)}{N}$ $(8.32)\quad(21.24)$	0.987	2.025	0.002	1150.23	0.01	0.03	(3)
1960-1976	$\frac{Y}{NP} = 0.0005 + 0.004\ \frac{(I+G)}{NP}$ $(4.28)\quad(7.28)$	0.987	1.880	0.00002	1152.23	10.12	-0.004	(4)

a = intercept of the consumption function

b = MPC

TABLE 4

ESTIMATED QUADRATIC CONSUMPTION FUNCTION FOR IRAN

Period Covered	Estimated Consumption Function	R^2	D-W	SE	F	MPC*	
1959-1976	$C = \underset{(4.91)}{37.76} + \underset{(44.54)}{0.75Y} - \underset{(7.23)}{0.00004Y^2}$	0.999	1.820	12.26	11526.4	0.69	(1)
1959-1976	$\frac{C}{P} = \underset{(2.20)}{0.41} + \underset{(22.78)}{0.82}\frac{Y}{P} - \underset{(6.07)}{0.009}(\frac{Y}{P})^2$	0.998	1.906	0.16	3597.1	0.65	(2)
1959-1976	$\frac{C}{N} = \underset{(5.40)}{0.002} + \underset{(32.80)}{0.74}\frac{Y}{N} - \underset{(5.26)}{1.34}(\frac{Y}{N})^2$	0.999	1.971	0.0004	8038.0	0.67	(3)
1959-1976	$\frac{C}{NP} = \underset{(2.55)}{0.00003} + \underset{(13.12)}{0.79}\frac{Y}{NP} - \underset{(3.79)}{276.42}(\frac{Y}{NP})^2$	0.996	2.037	0.000005	1863.7	0.61	(4)

*To find MPC, we substituted the mean values of income in the formula MPC = b + 2CY.

statistic seems to get closer to 2 and this is due to a reduction in the autocorrelation.

To remove the effects of multicollinearity, the general suggestion by many statisticians is to drop one of the independent variables.[1] In the above case, dropping the squared variable will result in the same estimated consumption functions as in Table 1. We can also add some observations which may break the multicollinearity pattern. Following the latter suggestion will lead to the more sophisticated consumption theories which are the subject of the next chapters.

We conclude from our empirical results that the quadratic consumption function is a better fit than the linear consumption function to explain the consumption behavior of the private sector in less developed countries such as Iran. This conclusion is consistent with the conclusion of Zohar who suggested that a quadratic consumption is a better fit for the less developed countries.[2] Our estimated results indicate that the MPC for the Iranian economy is between 0.6 and 0.7 and the degree of autocorrelation is not high.

If our consumption function is multiplicative in its nature, the use of the linear function would not be an adequate

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[1]For more detailed discussion about multicollinearity, see John Neter and William Wasserman, Applied Linear Statistical Models (Homewood, Illinois: Richard D. Irwin, Inc., 1974), pp. 334-346.

[2]See V. Zohar, "Consumption and Saving in Developing Countries: An International Comparison," Ph.D. Dissertation, Claremont Graduate School and University Center, 1967, p. 16.

choice for the functional form. For example, if we consider the consumption function in the form of:

$$c = ay_d^b E$$

where a and b are parameters and E is a random variable with mean 1 and constant variance, this function can be transformed to

$$\ln C = \ln a + b \ln y_d + \ln E$$

If the transformed error terms, ln E, are independently distributed and their distribution is normal with mean 0 and constant variance, we can estimate ln a and b in the above function.

Not only can the double log function be used, but logarithmic transformation of either the independent variable, y_d, or the dependent variable, C, is the other possibility.

As revealed by Table 5, the coefficients of determination are high again, indicating high correlation between consumption and income. The degree of autocorrelation is relatively high when we used one of the variables in the logarithmic form (i.e., equations (5), (7), and (9)).[1] It means that the correlation between income and ln E is high or the assumption of the independency of the error terms is violated. Our

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[1]The estimated equations of Table (5) are corrected for removal of autocorrelation. Before such a correction, the degree of autocorrelation was much higher in all semi-log equations.

TABLE 5

ESTIMATED CONSUMPTION FUNCTION OF IRAN USING THE LOGARITHMIC TRANSFORMATION

Period Covered	Estimated Consumption Function	R^2	D-W	SE	F	
1960-1976	$\ln C = 0.57 + 0.87 \ln Y$ (10.98) (108.76)	0.999	2.10	0.02	1359.1	(1)
1960-1976	$\ln \frac{C}{P} = 0.15 + 0.82 \ln \frac{Y}{P}$ (4.53) (54.46)	0.997	2.04	0.02	4884.79	(2)
1960-1976	$\ln \frac{C}{N} = -0.81 + 0.85 \ln \frac{Y}{N}$ (24.90) (99.85)	0.998	2.08	0.02	9412.56	(3)
1960-1976	$\ln \frac{C}{NP} = -2.18 + 0.76 \ln \frac{Y}{NP}$ (19.14) (54.01)	0.995	1.97	0.02	2852.03	(4)
1960-1976	$C = -8488.96 + 1081 \ln Y$ (6.21) (9.56)	0.989	0.88	48.23	1413.15	(5)
1960-1976	$\frac{C}{P} = -10.85 + 7.94 \ln \frac{Y}{P}$ (4.49) (10.68)	0.993	1.58	0.28	2231.26	(6)
1960-1976	$\frac{C}{N} = 0.12 + 0.03 \ln \frac{Y}{N}$ (16.13) (11.13)	0.991	0.91	0.001	1575.69	(7)
1960-1976	$\frac{C}{NP} = 0.002 + 0.0002 \ln \frac{Y}{NP}$ (19.91) (17.11)	0.991	1.88	0.000009	1693.38	(8)

TABLE 5 (Continued)

Period Covered	Estimated Consumption Function	R^2	D-W	SE	F	
1960-1976	$\ln C = 6.77 + 0.0004\ Y$ $(26.04)\ \ (7.52)$	0.994	1.41	0.05	2321.08	(9)
1960-1976	$\ln \frac{C}{P} = 1.93 + 0.04\ \frac{Y}{P}$ $(8.98)\ \ (6.08)$	0.992	2.01	0.04	1931.88	(10)
1960-1976	$\ln \frac{C}{N} - -3.77 + 14.06\ \frac{Y}{N}$ $(14.44)(7.68)$	0.992	1.61	0.03	1774.55	(11)
1960-1976	$\ln \frac{C}{NP} = -8.71 + 1477.89\ \frac{Y}{NP}$ $(58.09)\ \ (6.81)$	0.986	2.25	0.03	1071.53	(12)

estimated coefficients are highly significant in all of the estimated functions. We conclude that the double log consumption function might be better than a semi-log consumption function for Iran. Of course, the coefficient of the independent variable in this case is the elasticity of the private consumption expenditures with respect to income and, as the first four equations in Table 5 show, this elasticity is lower than 1. In other words, the private consumption expenditure for Iran is income inelastic. This confirms the assumption (5) of the first section of this chapter.

We can now include the change in income as a new explanatory variable. The reestimated consumption functions with the inclusion of this variable are shown in Table 6. The change in income variable has a negative estimated coefficient in all of the five estimated regressions. Also, this variable is not significant at the .05 level of significance (except in equation (4) in which the MPC is unreasonably low and therefore unacceptable). Therefore, our conclusion is that inclusion of the change in income in the consumption function of Iran as a new explanatory variable does not improve our consumption function.

Conclusion

In this chapter we discussed the absolute income hypothesis and its underlying assumptions, as well as its functional form. The empirical results of the estimation of

TABLE 6

ESTIMATED CONSUMPTION FUNCTION FOR IRAN USING CHANGE IN INCOME AS AN EXPLANATORY VARIABLE

Period Covered	Estimated Consumption Function	R^2	D-W	SE	F	MPC	
1961-1976	$C = 121.35 + 0.64\ Y - 0.14\ \Delta Y$ (3.43) (20.47) (1.73)	0.998	1.73	19.08	4351.30	0.50	(1)
1961-1976	$\frac{C}{P} = 1.00 + 0.68\ \frac{Y}{P} - 0.15\ \frac{\Delta Y}{P}$ (7.14) (22.32) (1.32)	1.000	1.99	0.21	3910.82000	0.53	(2)
1961-1976	$\frac{C}{N} = 0.004 + 0.65\ \frac{Y}{N} - 0.14\ \frac{\Delta Y}{N}$ (5.56) (20.03) (1.49)	0.998	1.70	0.0006	3335.61	0.51	(3)
1961-1976	$\frac{C}{NP} = 0.00003 + 0.77\ \frac{Y}{NP} - 0.48\frac{\Delta Y}{NP}$ (8.16) (37.52) (6.12)	1.000	2.38	0.000007	2989.62000	0.29	(4)

consumption function for Iran using previous functional forms were also presented.

The primary conclusion of our empirical results is that there is a strong positive relationship between the private consumption expenditures and income. This is reflected in closeness of R^2 to one and the size of the F statistics in all of our estimated equations in the last six tables.

The estimated MPC for Iran is less than the MPC for developed countries such as the United States. This sheds some doubt on one of our assumptions of the absolute income hypothesis which says that when income increases the MPC might decrease--or it perhaps proves that the consumption patterns for the developed countries and the less developed countries are not the same because many structural and behavior differences between these two groups of countries exist.

Another finding was that using the indirect least squared method of the estimation for the coefficients of the consumption function resulted in a lower estimation of the MPC. One reason for this might be because of the omission of the foreign sector in the behavioral equation (5) in the first section. Also, measurement errors in government spending and investment might be other reasons for these results.

There has been a suggestion that a quadratic consumption function may be more appropriate for the less

developed countries than the linear consumption function; our empirical results are consistent with such a suggestion. This conclusion is based on the size of the coefficient of determination, the Durbin-Watson statistics, the F values, and standard errors of regressions of Tables 1 and 4.

It has been found that logarithmic transformation of either dependent or independent variable does not improve our consumption function. The double log consumption function seems to be an appropriate functional form for the consumption function of Iran and the other economies similar to Iran's compared to semi-log consumption function, because the degree of autocorrelation in the estimated double log consumption function is not significant.

Finally, the inclusion of the change in income as an explanatory variable in the consumption function gave a poor result because the estimated coefficient of this variable is not significant at an acceptable level of significance.

In the next chapter, we will examine some of the criticisms of the absolute income hypothesis by J. S. Dusenberry. Because of his dissatisfaction with this simple Keynesian consumption function, he tries to incorporate a factor in the consumption function to show the relative position of consumers in the income distribution. Although ability to pay is an important factor in consumers' decision

making, this is not the only factor, according to the consumption theories, that will be examined in the next chapters.

CHAPTER III

RELATIVE INCOME HYPOTHESIS

Theoretical Background

J. S. Duesenberry criticized the two fundamental assumptions of the simple Keynesian consumption function. These assumptions are: (1) . . ."every individual's consumption behavior is independent of every other individual, and (2) that consumption relations are reversible in time."[1] Concerning the first assumption, Duesenberry believes that the consumption behavior of the individuals are interdependent rather than independent of each other. In other words, the consumption expenditure of individuals does not depend only on their absolute income, but it depends also on their relative position in the income distribution of their society. Moving from a lower position to a higher position in the distribution of income scale causes a smaller percentage of the incremental income devoted to the consumption expenditure by the households, but if they remain in the same position their marginal propensities to consume and save do not change.[2]

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[1] J. S. Duesenberry, Income, Saving and the Theory of Consumer Behavior (Cambridge, Mass.: Harvard U. Press, 1949), p. 9.

[2] Ibid., p. 45.

Regarding the second assumption, Duesenberry believed that consumption behavior is not reversible over time. It means that individuals react differently to upward and downward changes in their income. (In the absolute income hypothesis, the relation between consumption and income can be explained by the same function for either direction of movement of income.) Thus one can conclude that the current consumption does not only depend on the relative income of the individuals, but it is also influenced by the levels of consumption attained in previous periods. When an individual attains a certain level of consumption, it would be difficult and painful for him (her) to reduce the level of consumption despite a reduction in one's income. This line of reasoning leads to the use of the ratio of saving to income as a function of current income to the previous peak income as follows:

$$\frac{S}{Y} = a_0 + a_1 \frac{Y}{Y_0} \tag{1}$$

where a_0 and a_1 are constants and Y_0 is the previous peak income. This average propensity to save function can easily be converted to a consumption function considering the following steps:

$$\frac{C}{Y} = 1 - \frac{S}{Y} \tag{2}$$

then

$$\frac{C}{Y} = (1 - a_0) - a_1 \frac{Y}{Y_0} \tag{3}$$

Equation (3) shows an inverse relationship between APC and the current income. It means that when the current income relative to the previous income increases (decreases) we expect that the APC decreases (increases). If we multiply both sides of equation (3) by Y we get a consumption function in the form of:

$$C = (1 - a_0)\ Y - a_1 \frac{Y^2}{Y_0} \tag{4}$$

To find the MPC we have to take partial derivative from equation (4):

$$MPC = \frac{\partial C}{\partial Y} = (1 - a_0) - 2a_1 \frac{Y}{Y_0} \tag{5}$$

Comparing equations (3) and (5) we conclude that MPC < APC as one could expect.[1] If income increases over time the peak income and the previous income would be the same and $\frac{Y}{Y_0}$ is the growth of income in this case. If this growth of income is constant in the long-run we can conclude that the APC is constant in equation (3).

The advantage of the relative income hypothesis over the absolute income hypothesis is incorporation of habitual behavior to some extent. The psychological factors have some influence on the consumption behavior of individuals and the importance of these factors might be more in the less developed

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[1]For details see W. H.Branson, Macroeconomic Theory and Policy (New York: Harper & Row, Publishers, 1972), pp. 188-190.

countries. The line between different social and economic classes in these countries is more distinctive, especially because of the lack of existence or the narrowness of the middle class group. In the case of Iran, the middle income class has been growing since the end of World War II because of a drastic social and economic change. Before the war, Iran was an isolated country and its economic system was feudalistic. The expansion of the relationship between Iran and the other developed countries after the war familiarized Iranians with the Western style of life. This provided some opportunities for the lower income group to promote their talents as a result of opening of new opportunities by traveling abroad.[1]

Despite the fact of a rapid increase in the number and percentage of the middle income class in Iran, the importance of this group should not be overestimated. To illustrate the degree of skewness of income distribution, the following data are helpful. About 10 percent of the total population of Iran consumes around 40 percent of the total private consumption, while 30 percent of the population consumes only eight percent of the total private consumption.[2]

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[1]The number of exchange students from Iran to the United States at the present time is estimated to be over 50,000 and it is greater than that from any other country. There are many other Iranian students in Canada, Western European countries, and Asian countries. Not all of these students are from rich or even middle class families as some people may suppose. A lot of them are from very poor families who have to support their own expenses.

[2]See "Employment and Income Policies in Iran," (Geneva: ILO, 1973).

More than 50 percent of the Iranians are still living in villages and their transactions are mostly through the barter system of trade. It is doubtful that in an economy such as what we have described above income can be considered as the most important status symbol. The villagers are usually very religious people and the religion of more than 90 percent of the Iranians, i.e., Islam, deemphasizes materialistic aspects of life. Good Moslems are supposed to share their income with other people of their society who are considered to be their brothers. This redistribution of income is made through different religious rules. Sometimes some people may feel obligated to follow those rules although they are not religious. This is a social obligation for them if they want to keep their high and respected status in their society. There are many other symbols such as the degree of religiosity and honesty or family background which determine the status of individuals in such small communities.

On the other hand, the contact of villagers with the urban residents is not frequent and large enough to make them aware of the new products and improvements in the life style. Duesenberry believed that "we can maintain then that the frequency of impulses to increase expenditure depends on frequency of contact with goods superior to those habitually consumed."[1] Because of the lack of contact between different regions, it is apparent that dualistic conditions

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[1]Duesenberry, op. cit., p. 27.

exist when we compare small towns with the large cities and the capital, or towns and villages. We can expect that almost all middle income groups, which are still small in number and in size, are concentrated in the capital and large cities.

The relative income hypothesis might be a good theory concerning the consumption and saving behavior of the middle class and the upper class groups because these two income groups are trying to imitate the consumption behavior of the upper class group and the life style of the Western population, respectively. One may even suspect that moving from a lower position to a higher position in income distribution may increase the marginal propensity to consume of the group in many cases. As Buchanan and Ellis stated correctly, "When average income is somewhat higher, spendthrift habits often prevail, or ceremonial consumption in ostentatious weddings, funerals and religious celebrations may claim any surplus over daily needs. When income rises still further, the populace may attempt to emulate Western, and more specially American, standards of living."[1] This so-called "demonstration effect" is one reason why the average propensity to save (consume) in the less developed countries may decrease (increase) as the income of the individuals goes up and pushes them to a higher bracket of income.

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[1]Norman S. Buchanan and Howard S. Ellis, Approaches to Economic Development (New York: The Twentieth Century Fund, 1955), pp. 301-302.

Duesenberry listed a number of factors that are important in explaining the saving and consumption behaviors. They are "(1) the interest rate, (2) the relation between current and expected income, (3) the distribution of income, (4) the age distribution of the population. Two other factors discussed by supporters of the view that the saving ratio depends on the absolute level of income are (7) the trend toward urbanization, and (8) the introduction of new products."[1] Underlying the relative income hypothesis is the assumption that these factors are either constant or their net influence is small. As a result, we can conclude that the saving ratio is constant over a long period of rising income.

Although the above assumption might be correct for a developed country like the United States, we cannot hold to it for a less developed country such as Iran. For example, there has been an upward trend toward urbanization during the 1959-1976 period. The great difference in per capita income of the large cities and small towns and villages, on the one hand, and the lack of attention to educational and economic needs of small towns and villages by the government and planners, on the other hand,have caused a high rate of migration to the large cities, especially the capital of the country, Tehran.

The other factors listed above also cannot be con-

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[1]Duesenberry, op. cit., p. 57.

sidered constant or less influential on the saving income ratio of Iran even during the short period of our study.[1] The population of Iran has become younger in the last 20 years because of improvements in the medical care field and the high rate of fertility in the country. Rapid changes in the laws and customs have brought about a lot of other changes like change in attitudes of the population. The improvement in the communications system and mass media might be responsible for many of these changes. These changes can be felt mostly in urban areas. Rural residents do not have too much contact with urban residents and it is doubtful that they can be affected by the consumption pattern of the urban residents. It seems that most of the rural residents keep consuming those goods that they are used to. If this is true, the previous consumption might explain the current consumption behavior of these individuals better than previous income.[2]

Empirical Results

The estimated regression of the relative income hypothesis is:

$$\frac{S}{Y} = \underset{(6.90)}{-1.67} + \underset{(8.29)}{1.73}\frac{Y}{Y_o} \qquad (6)$$

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[1] Ozaeta, "An Econometric Study of the Private Consumption in a Developing Economy: The Case of Spain," Ph.D. Dissertation, Indiana University, 1969, p. 42. Ozaeta also addressed the rapid rate of urbanization and the importance of introduction of new goods for the case of Spain.

[2] This point will be discussed in Chapter V when we explain the habit persistence hypothesis.

$R^2 = 0.82$; $n = 17$; $D - W = 1.95$; $F = 68.7$

(t-values are given in parentheses).

Comparing this estimated equation with the estimated consumption functions of Table 1, we can conclude that the R^2s and F statistics in Table 1 are much higher. But the coefficients of the independent variable of the above estimated regression are highly significant. This shows that although the correlation betwen the dependent and independent variables is not as high as Table 1, the correlation between them still exists. Comparing the estimated equation (6) with the estimated equation by Duesenberry for the United States,[1] i.e.,

$$\frac{S_t}{Y_t} = 0.25 \frac{Y_t}{Y_0} - 0.196$$

we can conclude that our estimated coefficients have the correct signs but the marginal effect of the independent variable is higher for Iran.

In any case, because the coefficients are highly significant and R^2 is high, we conclude the relative income hypothesis is relevant for Iran. Our finding contradicts Ozeata's conclusion for the Spanish economy.[2]

Unfortunately, further tests of the relative income hypothesis for Iran are not possible because of a lack of

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[1] Duesenberry, op. cit., p. 71.

[2] Ozeata, op. cit., p. 45.

data. During the 1959-1976 period the income variable in constant terms shows an upward trend for any specific year according to the existing data. As a result, the Iranian economy has not experienced any contraction and/or recession. For this reason, it is impossible to observe the reversibility or irreversibility of the consumption relations during different phases of the business cycle. Data for different income groups are not available to analyze the "demonstration effect" discussed above.

Conclusion

Chapter III dealt with the explanation of the relative income hypothesis and its underlying assumptions. The possible relevancy of this hypothesis for the less developed countries in general was discussed by using Iran as a specific example.

We found a relatively strong correlation between the consumption/income ratio with the current income/peak income ratio. Our conclusion is that the relative income hypothesis is applicable for less developed countries such as Iran, although other studies do not confirm this conclusion. In comparison with absolute income hypothesis, we may conclude that results on the relative income hypothesis were poor (e.g., compare the R^2s and F statistics of Table 1 and equation (6)).

Because of the lack of data, we were not able to test all the assumptions and predictions of Duesenberry's

hypothesis and for this reason we may believe that the question of applicability of this hypothesis for Iran has been answered inconclusively. But this hypothesis was a step forward compared to the simple Keynesian hypothesis. It stimulated and directed the new consumption hypotheses which are the subject of our next chapters.

CHAPTER IV

PERMANENT INCOME HYPOTHESIS

Theoretical Background

One of the most acceptable consumption hypotheses is Friedman's permanent income hypothesis. The importance of this hypothesis is reflected by the following statement of Michael K. Evans:

> Without making final judgement whether the strict terms of the permanent income hypothesis all hold, it can be fairly said that the weight of evidence supports this theory. Friedman's formulation has reshaped and redirected much of the research on the consumption function. It is unusual today to discuss the consumption function without referring to Friedman's terms of reference.[1]

According to the permanent income hypothesis, consumption does not simply depend on the level of current income, but also on the basis of expected future income. Friedman makes a distinction between measured income and permanent income. According to this distinction, measured income is the actual income received and recorded during some time period, but "permanent income is to be interpreted as reflecting the effect of those factors

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[1]Michael K. Evans, Macroeconomic Activity: Theory, Forecasting, and Control (New York: Harper & Row, Publishers, 1969), p. 34.

that the unit regards as determining its capital value or wealth. . ."[1] The difference between the permanent and measured components of income is called transitory income. "The transitory component is to be interpreted as reflecting 'other' factors, factors that are likely to be treated by the unit affected as 'accidental' or 'chance' occurrences . . ."[2] The relationship between these three components of income can be shown by the following identity:

$$y_m = y_p + y_t \tag{1}$$

where y_m, y_p, and y_t are measured income, permanent income, and transitory income, respectively.

Similarly measured consumption, c_m, can be divided into two components which are permanent consumption, c_p, and transitory consumption, c_t or:

$$c_m = c_p + c_t \tag{2}$$

The transitory component of consumption might be specific or general. "Some of the factors producing transitory component of consumption are specific to particular consumer units, such as unusual sickness, an especially favorable opportunity to purchase, and the like; others

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[1] M. Friedman, A Theory of the Consumption Function (Princeton, N.J.: Princeton University Press for NBER, 1957), p. 21.

[2] Ibid., pp. 21-22.

affect groups of consumer units in the same way, such as an unusually cold spell, a bountiful harvest, and the like."[1] Permanent consumption is the average lifetime consumption of the consumer units.

Friedman differentiates between consumption and consumer expenditures. By consumption he means the expenditure on the non-durable goods plus the "use" value of the durable goods over a period of time. The rest of the expenditures on durable goods -- in excess of services derived from the stock of the durable goods -- can be treated as saving.

The relationship between permanent consumption and permanent income can be shown as

$$c_p = k\, y_p \qquad (3)$$

where k is the factor of proportionality between permanent consumption and permanent income which is the same as MPC and APC out of permanent income. Friedman assumes that k is independent of permanent income for any consumer unit. Thus the average of the factor of proportionality between permanent consumption and permanent income for all income groups is the same and is equal to the population average in cross-section studies. Although k is independent of permanent income, it does depend on some factors such as the rate of interest, the ratio of non-human wealth to permanent

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[1] Ibid., pp. 22-23.

income, demographic factors, ethnic differences, etc.

There have been some criticisms of the permanent income hypothesis concerning the above mentioned assumptions about k. For example, if k depends on the demographic factors and as many studies show, the level of population is related to the level of income or the other factors such as education which depends on income level itself, we cannot assume that k is independent from permanent income. Or as Evans argues, "The APC will increase somewhat as the size of family increases, although this relationship clearly becomes less important as the size of the family continues to increase."[1] Again the size of the family is assumed to be determined by the income level. On the average, the size of the family has been found to decrease as the income of the households increases.

To study the theory of permanent income empirically we need some additional assumptions. Friedman makes the following three assumptions regarding the transitory and permanent components of income and consumption:

1. The means of transitory consumption and transitory income for a group are zero:

$$E(y_t) = E(c_t) = 0 \tag{4}$$

2. The covariance between transitory components of

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[1]Evans, op. cit., p. 29.

income and consumption and their corresponding permanent components is zero. In other words, transitory components of income and consumption are uncorrelated with permanent components of income and consumption:

$$\text{Cov}\ (c_p,\ c_T) = \text{Cov}\ (y_p,\ y_T) = 0 \tag{5}$$

3. Finally, transitory consumption and transitory income are uncorrelated:

$$\text{Cov}\ (c_T,\ y_T) = 0 \tag{6}$$

The first assumption is not necessary for the development of the permanent income hypothesis, especially when we apply it to time-series data. This assumption facilitates the estimation of the parameters of the system. Assumptions 2 and 3 apply to both time-series and cross-section analysis.

If the means of transitory consumption and transitory income for a group are zero, then the average of measured consumption over the average of measured income of the group is the factor of proportionality between permanent consumption and permanent income. In this case, this ratio can be identified. Without the existence of assumption 1, the MPC out of permanent income is not identifiable, but only the product of this factor and the elasticity of permanent consumption to permanent income can be determined.[1] The interpretation of

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[1]See Marc Nerlove, Distributed Lags and Demand Analysis for Agricultural and Other Commodities, Agricultural Marketing Service, United States Department of Agriculture, Agriculture Handbook No. 141, June 1958, pp. 99-103 for more details.

the regression of consumption on income is much simpler if assumption (1) holds.

> Friedman specifies additional assumptions appropriate in the context of time-series data. On the basis of an examination of existing time-series studies of the relation between income and consumption, Friedman concludes that permanent income should be susceptible of representation as a weighted average of incomes for current and past years. The transitory component of consumption is taken to be a purely random error term; that is, no systematic relationship between the transitory components of different time periods exists. . .[1]

Assumption (3) suggests that the difference between current and permanent income in any period of time would be saved. This point has been criticized by many economists. For example, Friend and Kravis believe that: "It is not clear that individuals do not consume a significant fraction of an increment in income even if the increment was unanticipated and is not expected to consume."[2] According to Friedman, assumption (3) does not imply that transitory income and transitory consumption expenditures are uncorrelated. If we define consumption as expenditures on nondurables and the services of durables at any period of time, then we can assume that the transitory income does not affect the transitory consumption.

The transitory components of consumption and income are merging with the errors of measurement of measured components of consumption and income. In general, if the vari-

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[1] Ibid., p. 102.

[2] I. Friend and I. B. Kravis, "Consumption Patterns and Permanent Income," The American Economic Review (May 1957), p. 542.

ances of transitory components of consumption and income are not zero, the probability estimate of k in equation (3) is less than the actual value. In other words, ordinary least squares method led to an underestimation of k.[1]

The permanent consumption function does not have an intercept. This means that the APC and the MPC out of permanent income are equal. This equality of the APC and the MPC is consistent with the findings of Kuznets and Goldsmith for the U.S. economy in the long-run.[2]

To estimate a permanent consumption function, many methods have been suggested by Friedman and other economists. One of these methods is used in the next section of this chapter to estimate the factor of proportionality of permanent consumption and permanent income for the case of Iran.

To estimate permanent income, Friedman suggested the use of a weighted average of present and past income with a geometrically declining weight. Originally Friedman used 17 years to estimate permanent income as follows:

$$\hat{y}_p = y_t + \lambda y_{t-1} + \ldots + \lambda^{17} y_{t-17} \qquad (8)$$

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[1]See Johnston, op. cit., p. 282.

[2]S. Kuznets, Uses of National Income in Peace and War (New York: National Bureau of Economic Research, 1942), p. 30; and R. Goldsmith, A Study of Saving in the United States, Vol. 1 (Princeton, N.J.: Princeton University Press for NBER, 1955), p. 22.

where λ is the ratio of the weights in the two successive years. Equation (8) can be written in a simpler form such as:

$$\hat{y}_p = (1 - \lambda) \sum_{i=0}^{16} \lambda^i y_{t-1} \qquad (8)'$$

Friedman used different values for λ to estimate $\hat{y}_p$. In each case he used the result as an explanatory variable to estimate permanent consumption function and chose that value of λ which gave the highest value for the coefficient of determination, R^2. Obviously, using the current consumption for permanent consumption does not generate bias in the estimation of the parameter because consumption is the dependent variable.[1]

If in equation (8) we do not truncate the lag function for 17 years and replace it by an infinite distributed lag and apply a Koyck transformation, we obtain a consumption function such as:[2]

$$c_t = \lambda c_{t-1} + k(1 - \lambda) y_t \qquad (9)$$

where k is the slope of permanent consumption function. This function is used to estimate k for the Iranian economy in the next section. The presence of lagged dependent variable in

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[1] See Johnston, op. cit., pp. 281-291 for more detailed information about errors in variable models.

[2] See Kenneth F. Wallis, Topics in Applied Econometrics (London: Gray-Mills Publishing Ltd., 1973), pp. 16-17.

our regression equation and a strong possibility of the existence of autocorrelated errors may lead to serial correlation or distributed lag bias.[1]

Empirical Results

To estimate the slope of permanent consumption function for Iran, we used equation (9) of the preceding section. The regression results were:

$$c_t = \underset{(8.63)}{0.31y_t} + \underset{(10.51)}{0.67c_{t-1}} \qquad (10)$$

$R^2 = .99$; n = 17; D · W = 1.63

t values are given in parentheses.

Both of the independent variables are significant at the .01 level of significance. The marginal effect of consumption of the last year is greater than the current income at least in the short-run as equation (10) indicates. Comparing equation (10) with the equation (1) of Table 1, we observe that the short-run MPC has dropped from .64 to .31 when we included consumption of the last period in our regression. This indicates that the consumption of the last period and current income are highly correlated.

As the above estimated equation shows, R^2 is very high. When we have lagged dependent variable as an explanatory

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[1] See Johnston, op. cit., pp. 65-73, for more details. This problem will be discussed in more detail in the next chapter.

variable, the use of Durbin-Watson statistic for autocorrelation test is no longer appropriate and an h test can be used.[1] To use the h test, the sample size should be at least 25, which is not the case in equation (10).

Now to find the long run MPC, which is the slope of permanent consumption function, we can use

$$k = \frac{\text{Estimated coefficient of current income}}{1 - (\text{Estimated coefficient of previous consumption})}$$

as equation (9) indicates. The estimated k in this case for the Iranian economy is 0.94. This is consistent with the results of some other studies of Iran. For example, Looney estimated 0.1451 and 0.9416 as the short-run and long-run MPC of Iran using the data for the period of 1959-74.[2]

As we can observe, the long-run MPC for Iran is much higher than the short-run MPC. This difference between short-run and long-run MPC can be the result of slow adjustment of consumers in their consumption behavior to the highest level of income.[3]

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[1] See Johnston, op. cit., p. 313 for more details on the h test.

[2] Robert E. Looney, A Development Strategy for Iran through the 1980s, (New York: Praeger Publishers, 1977), p. 169, Appendix D. The differences between the model he used and our model are: (1) he used GNP as a proxy of disposable income but we used GNP minus oil and gas revenue and direct taxes for the same purpose, and (2) he included an intercept in his consumption function but we did not have it in equation (10). We use such a functional form in the next chapter when we discuss the Habit Persistence Hypothesis. Despite these differences between Looney's model and ours, we got similar results.

[3] Ibid., p. 170.

Comparison between our estimated results and similar studies for the developed countries, e.g., the United States, indicates that the estimated long-run MPC of the developed countries is lower in most cases.[1] This is consistent with what we would expect to see when we compare the MPC of developed countries with that of less developed countries. There are few studies which show the long-run MPC for the United States is as high as 0.96, although the adjustment period is shorter than in the case of less developed countries.[2]

To see if our estimated long-run APC, k, is consistent with the cross-section studies, we show the APC of different income groups of the rural residents in 1976 in Table 7.[3] One of our assumptions in the preceding section was that the means of transitory income and transitory consumption are zero for a group. In other words, transitory income and transitory consumption are random variables distributed around zero. Therefore, in cross-section studies the ratio of measured consumption/measured income for an income group is the same as the ratio of permanent consumption/

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[1] In many empirical studies for the different periods of time, long-run MPC of the United States is in the range of 0.8 to 0.9. See Evans, op. cit., pp. 65-66.

[2] See R. J. Ball and P. S. Drake, "The Relationship Between Aggregate Consumption and Welath," International Economic Review, Vol. 5, No. 1 (January 1965): 63-81.

[3] Data are obtained from The Results of Sampling of Rural Households' Budget in 1976, No. 776, Iran, Tehran: The Center of Statistics of Iran, 1977, pp. 74-81.

permanent income which is the same as the long-run APC and the MPC for that group. As we observe from Table 7, the long-run APC of rural residents supports our finding by time-series estimation.

Conclusion

In the first section of this chapter, we discussed the permanent income hypothesis; its assumptions, and the criticisms of these assumptions. One method of estimation of permanent consumption was described briefly. This indirect method of estimation was used to estimate the factor of proportionality between permanent consumption and permanent income for the Iranian economy. Because the function used is linearly homogeneous, there is no difference in using either current terms or constant terms for our variables. For this reason, only current terms were used in our estimation. Although Friedman emphasizes that consumption of nondurables and consumption of the services of durables should be used as consumption rather than consumption expenditures on both of these classes of goods, in our estimation the latter one, i.e., consumption expenditure, is used. The reason for this is that available data for durable goods are imperfect in the case of Iran and any approximation of their use value in each year might give us higher measurement error.

The primary conclusion of our empirical results is that the long-run MPC for the Iranian economy is 0.94, which

TABLE 7

LONG-RUN APC OF VARIOUS INCOME GROUPS
OF THE RURAL RESIDENTS OF IRAN
IN 1976

Income Bracket (Rials)	Average Income	Average Consump.	APC = $\frac{\text{Average Consumption}}{\text{Average Income}}$
2,500 - 4,999	3,750	4,816.45	1.28
5,000 - 7,499	6,250	6,203.72	.99
7,500 - 9,999	8,750	8,649.78	.98
10,000 - 14,999	12,500	12,212.65	.97
15,000 - 19,999	17,500	17,208.13	.98
20,000 - 29,999	25,000	25,134.60	1.00
30,000 - 49,999	40,000	37,328.65	.93
50,000 - 99,999	75,000	67,502.07	.90

is relatively high compared to most of the studies about the developed countries, such as the United States. This is what we expected to observe when we compare the economies of developed and less developed countries. But the estimated short-run MPC of Iran is 0.31 and is relatively low. This may be the result of a long-period of adjustment in consumption patterns following any change in the income of consumers. The reason for that is the social barriers of sudden change in consumption patterns in many small communities where the contact of people is frequent, and they know each other too closely.

The estimated results indicate that the importance of previous consumpion is greater than the current income for the economies such as Iran. One reason might be the result of large self-sufficiency of agricultural products by the farmers. The change in the consumption of these consumers is gradual and the habitual factor has a more important role in this regard.

Finally the long-run APC of rural residents for 1976 was calculated. The results support our finding about the long-run MPC by time series estimation of permanent consumption. From our empirical results, we can conclude that the permanent income hypothesis is applicable for economies such as the Iranian economy. The permanent income hypothesis is based on the expectation of consumers concerning their future income. This expectation can be formed on the basis of the

past. There are some other consumption hypotheses emphasizing the role of habits in consumers' decision making. The effect of habits on the consumption can be shown by the inclusion of past income and/or past consumption. We will examine two of these consumption hypotheses in the next chapter.

CHAPTER V

HABIT PERSISTENCE AND HABIT FORMATION HYPOTHESIS

Theoretical Background

In the discussion of the relative income hypothesis in Chapter III, the irreversibility of the consumption behavior of consumers over time was mentioned. For this reason, Duesenberry included the last peak income variable in the saving and consumption functions. This variable captures the effect of habitual factors in the consumption behavior of consumers. Brown argues that the past consumption is a better indication of the habits than past income. This is so because ". . . consumer demand reacts to changes in consumer income with a certain slowness, and thus past real consumption exerts a stabilizing effect on current consumption."[1] This hypothesis is supported by many other economists, especially in the case of the less developed countries. For example, Pandit believes ". . . persistence habit is quite pronounced in underdeveloped economies particularly because a large

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[1] T. M. Brown, "Habit Persistence and Lags in Consumer Behavior," Econometrica, 20, No. 3 (July 1952), p. 359.

chunk of the output in such economies is self consumed. Moreover, habits force themselves directly through previous consumption levels rather than through previous income as the Duesenberry-Modigliani hypothesis asserts."[1]

According to Brown's hypothesis, consumption does not only depend on current income, but past consumption can be regarded as an explanatory variable. Therefore, the functional form of consumption can be shown as[2]:

$$C_t = \alpha + \beta_1 y_t + \beta_2 C_{t-1} \qquad (1)$$

where t represents time dimension. Davis suggested the use of the previous peak consumption, $\overset{\circ}{c}$, in the consumption function rather than the past consumption[3]:

$$C = \alpha + \beta_1 y + \beta_2 \overset{\circ}{c} \qquad (2)$$

Obviously, if consumption has a steady growth over time, the results of estimation from equations (1) and (2) are the same.

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[1]V. Pandit, "Sources of Inflation in Developing Economies: Case Study of Colombia, India, Korea, and Taiwan," Ph.D. Dissertation, University of Pennsylvania, 1971, pp. 50-51.

[2]As we can see, this function is similar to equation (9) of the last chapter, used to estimate permanent consumption function. The difference is only inclusion of intercept here. This was first pointed out by Klien. See L. R. Klien, "The Friedman-Becker Illusion," Journal of Political Economy, Vol. 66, No. 6 (December 1958), p. 541.

[3]Tom E. Davis, "The Consumption Function as a Tool for Prediction," Review of Economics and Statistics, 34 (August 1952), pp. 270-277.

To reduce the possible multicollinearity problem resulting from the correlation between the independent variables, we also employ the two-stage least squares for the estimation of habit persistence effect in the consumption function. In this case we first estimate:

$$y_t = a\ c_{t-1} + b\ I_t + c\ G_t + E_t \qquad (3)$$

In the second stage, we will use the estimated values of y_t in the consumption function (1).[1]

As we mentioned in the last chapter, the short-run MPC in equation (1) is β_1 and the long-run MPC is $\frac{\beta_1}{1 - \beta_2}$ and the long-run adjustment of consumers to any change in their income is expected to be more.

Houthakker and Taylor also incorporated the importance of habit formation in their consumption function.[2] Their model for consumption expenditures consists of two equations. The first equation is a behavioral relationship which indicates that consumption depends on current income, y, and a "state variable," s, reflecting the last period consumption:

$$C = a + bS + dy + u \qquad (4)$$

This function is linear because they believe that ". . . linearity with respect to income has been found to be a good approxi-

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[1] See Evans, op. cit., pp. 50-51.

[2] H. S. Houthakker and L. D. Taylor, Consumer Demand in the United States, 1929-1970: Analysis and Projections (Cambridge, Massachusetts: Harvard University Press, 1966).

mation by most students of the subject."[1]

The second equation indicates that the rate of change in the state variable over time, $\dot{s}$, can be expressed as:

$$\dot{s} = c - hS \tag{5}$$

In other words, equation (5) indicates that the effect of the last period consumption on the present consumption declines linearly over time. S can be considered as the build up of a psychological stock of habit in the above relationships.

We expect the coefficient of the state variable in equation (4), b, to be positive. From the structural model, Houthakker and Taylor develop a new formulation of the consumption function:

$$C_t = A_o + A_1 C_{t-1} + A_2 y + A_3 y_{t-1} + V_t \tag{6}$$

where V_t is the error term. The relation among the coefficients of this regression function and the coefficients of the structural function can be shown as[2]:

$$a = \frac{2A_o(A_2 - \frac{1}{2}A_3)}{A_3(A_1 + 1)}, \quad b = \frac{2(A_1 - 1)}{A_1 + 1} + \frac{A_3}{A_2 - \frac{1}{2}A_3}$$

$$d = \frac{2(A_2 - \frac{1}{2}A_3)}{A_1 + 1}, \quad \text{and} \quad h = \frac{A_3}{A_2 - \frac{1}{2}A_3}$$

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[1] Ibid., p. 173.

[2] Ibid., pp. 13-14.

The relation between h and coefficients of equation (6) can be found from the above relationships as follows:

$$\frac{1}{h} = \frac{A_2 - 1/2\ A_3}{A_3} = \frac{A_2}{A_3} - 1/2 \qquad (7)$$

This means that h is smaller the greater the effect of one dollar change in income compared to that of a dollar's difference in the past income.[1]

Empirical Results

The data set used to estimate Brown's formulation of the consumption function of Iran leads to the following results:

$$c_t = \underset{(1.73)}{36.25} + \underset{(5.63)}{0.43}\ y_t + \underset{(2.60)}{0.42}\ c_{t-1} \qquad (8)$$

$$R^2 = .99 \qquad n = 17 \qquad D - W = 1.29$$

$$\frac{c_t}{P} = \underset{(1.76)}{0.58} + \underset{(6.84)}{0.42}\ \frac{y_t}{P} + \underset{(2.94)}{.42}\ \frac{c_{t-1}}{P} \qquad (9)$$

$$R^2 = .99 \qquad n = 17 \qquad D - W = 1.57$$

t values are given in parenthesis. As can be seen, both independent variables are significant at the .05 level. The high level of R^2 indicates a strong relation between the

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[1] Ibid., p. 19.

current consumption and the explanatory variables. One can conclude that the inclusion of the previous consumption in the consumption function of Iran has improved our functional form because the marginal effect of this variable is as important as the income variable in the above regressions.

The long-run MPC of Iran according to our findings is 0.74 and 0.72 for the above two consumption regressions. This seems to be relatively lower than what we expected and indicates that savings might be an important constraint to the development of the Iranian economy. Originally Brown estimates 0.40 and 0.59 as the short-run and long-run MPCs of the Canadian economy for the years of 1926-1941 and 1946-1949. But his estimation of the long-run MPC is on the low side compared with those from many other studies.[1]

One point should be emphasized: the reaction of the consumers to change in income is not immediate, rather it takes time to appear fully. For this reason, inclusion of lags in consumption which reveal the consumer's habits in their consumption behavior is justified and realistic. At the same time, the existence of multicollinearity in the above consumption function as a result of similar trends in income and last period consumption makes it difficult to distinguish the marginal effect of each independent variable. For this reason, the different empirical works do not lead to similar

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[1]For example, Kuznets' estimation of the long-run MPC of the U.S. is in the range of 0.85-0.88. See Kuznets, op. cit., p. 30.

results because the size of the coefficients varies largely from one study to the others. Also, instability in the estimated coefficients may be the result of few degrees of freedom. These problems make comparison between our empirical findings and those from the studies of the other countries difficult.[1]

The two-stage least squares yields the following estimated regression for the Iranian economy:

$$C_t = -26.32 + \underset{(0.38)}{0.23}\ \hat{Y}_t + \underset{(0.89)}{0.85}\ C_{t-1} \quad (10)$$

(0.38) (0.89) (1.58)

$R^2 = 0.99$; $n = 16$; $D - W = 2.13$

In this case, only consumption of the last period is significant at the 0.10 level. It seems that the 2SLS estimates have not improved our consumption regression because in all of the estimated results we have had so far there is a strong relationship between consumption and current income while the regression equation (10) fails to reveal such a relationship. It is possible that the measurement error in investment and government expenditures led to the biased estimates of $\hat{Y}$ and as a result such a weak relationship between this variable and consumption appeared.

Now we use equation (6) of the preceding section to estimate the coefficients of the structural model for the habit

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[1] See Evans, op. cit., pp. 56-57, for some of the empirical results for the U.S. economy.

formation hypothesis developed by Houthakker and Taylor. The regression results are:

$$C = 18.77 + 0.78\ C_{t-1} + 0.51_{(y_t - y_{t-1})} + 0.16y_{t-1} \quad (11)$$

$$(0.76)\quad (0.40)\qquad (0.73)\qquad (5.73)$$

$$R^2 = 0.99; \qquad n = 17; \qquad D - W = 1.71$$

$$\hat{a} = 131.25; \quad \hat{b} = 0.12; \quad \hat{d} = 0.48; \quad \hat{h} = 0.37$$

The possibility of the existence of autocorrelation of the residuals in the above regression equation was pointed out by Houthakker and Taylor this way: "It is an established fact that autocorrelation in the error terms leads to an underestimate of σ^2 when the method of least squares is used to estimate parameters. Correspondingly, the classical formula will understate the true projecting variance. . . ."[1]

Several suggestions have been made to improve the empirical results when we have autocorrelation between the residuals with lagged dependent variables in our model. The use of instrumental variable, a method of simultaneously estimating the parameters of the structural equation and the autoregression coefficient of the error term, are some of these suggestions. Evidence shows that these procedures should

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[1]Houthakker and Taylor, op. cit., p. 40. For more information about autocorrelation in the error terms, see pp. 40-42.

not be used if the sample size is not very large.[1] Taylor and Wilson suggest that, in most cases where the sample size is not very large, "OLS itself is preferred to these methods, while 3PLS is even more to be preferred."[2]

The application of the three-pass least squares method, 3PLS, is suggested to eliminate autocorrelation in the error terms. This method suggests the use of the residual of the estimated equation (11) which is lagged one period, V_{t-1}, as a new explanatory variable. Underlying this procedure is the assumption of first order Markov scheme in the error terms of equation (6). The empirical results of using 3PLS method in estimating the structural parameters are

$$C_t = \underset{}{-18.87} + \underset{(0.55)}{0.83}\ C_{t-1} + \underset{(3.92)}{0.47}(y_t - y_{t-1}) + \underset{(0.84)}{0.15}\ y_{t-1} + \underset{(3.98)}{1.16} V_{t-1} \qquad (12)$$

$$R^2 = 0.99; \qquad n = 15; \qquad D - W = 2.02$$

$$\hat{a} = 51.56; \quad \hat{b} = 0.19; \quad \hat{d} = 0.43; \quad \hat{h} = 0.37$$

Our empirical results indicate that except for the change in the income variable and the intercept, other

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[1] See L. D. Taylor and T. A. Wilson, "Three-pass Least Squares: A Method for Estimating Models with a Lagged Dependent Variable," Review of Economics and Statistics, 66, November 1964, p. 340.

[2] Ibid., p. 340.

variables are highly significant. The size of the coefficient of the last period consumption is the indication of the importance of habit formation in economies such as the Iranian. As we expected, the coefficient of h is positive. When we compare this estimated value of h with the estimated values for the developed countries such as the United States and Canada, we observe the estimated value of h for the Iranian economy is relatively low.[1] In other words, the ratio A_2/A_3 for Iran is greater than that of the developed countries. This is apparent from our estimated results that the marginal effect of the change in income is greater than the marginal effect of the last period income. The interpretation of this finding is that the consumers in the less developed countries are sensitive to a sudden change in their income because the fluctuation of income in these countries is more frequent compared to the case of the developed countries. Our results confirm the finding of Ozeata of the estimated value of h for the Spanish economy.[2] Because the change in income variable is not significant at an acceptable level of significance, we tried to reestimate our consumption function by including current and last period income rather than change in income. The results are:

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[1]The estimated values of h for the U.S. and Canada are 1.266 and 0.862, respectively, as Houthakker and Taylor estimated.

[2]See Ozeata, op. cit., p. 55.

$$C_t = 18.77 + 0.78\ C_{t-1} - 0.34\ y_{t-1} + 0.51\ y_t \quad (13)$$
$$(0.78) \quad (2.40) \qquad (1.28) \qquad (5.37)$$

$$R^2 = 0.99; \qquad n = 17; \qquad D - W = 1.71$$

We can observe an improvement in our estimated results because all the independent variables of equation (13) are significant at the 0.20 level and the short-run MPC is almost the same size that we had found before. We should note that 0.20 level of significance is not an appropriate level for testing the hypothesis and last period income is not significant at 0.05 level in equation (13). Liviatan suggested to use the two-stage method for the estimation of equation (13).[1] In the first stage, we regress C_{t-1} as a function of y_{t-1} and use the estimated values of C_{t-1} in equation (13). This procedure leads to the consistent estimates of the coefficients because the c_{t-1} and the other independent variables are uncorrelated in this case. Using the two-stage method of estimation and including the residual values of the last period as an independent variable, the following results are obtained:

$$C_t = 17.66 + 0.84\ c_{t-1} - 0.35\ y_{t-1} + 0.49\ y_t$$
$$(0.49) \quad (2.96) \qquad (0.90) \qquad (3.20)$$

$$+ 1.07\ V_{t-1} \quad (14)$$
$$(2.73)$$

$$R^2 = 0.99; \qquad n = 15; \qquad D - W = 2.03$$

[1] N. Liviatan, "Consistent Estimations of Distributed Lags," International Economic Review, Vol. 4, 1963, pp. 44-52.

$$C_t = \underset{(0.49)}{17.66} + \underset{(2.96)}{0.84}\ c_{t-1} + \underset{(0.58)}{0.14}\ y_{t-1} + \underset{(3.20)}{0.49}\ (y_t - y_{t-1})$$

$$+ \underset{(2.73)}{1.07}\ V_{t-1} \qquad (15)$$

$R^2 = 0.99$ $\qquad$ $n = 15$ $\qquad$ $D\text{-}W = 2.03$

Obviously equations (14) and (15) are similar and we could estimate one of them to have the estimated results for the other one. Again this two-stage estimation of the consumption function confirms our previous results concerning the size of the short-run MPC and the significance of the independent variables. The short-run MPC of Iran is around 0.50 and this is consistent with our estimation of the absolute income hypothesis in Chapter II. All the independent variables, except the income of last period, are highly significant. This leads us to conclude that habit formation is a definite improvement in the theories of consumption.

Conclusion

Two hypotheses of consumption emphasizing the role of habits in the consumption behavior were discussed in this chapter. One of these hypotheses is the habit persistence originated by Brown and Davis and the other one is the habit formation hypothesis of Houthakker and Taylor. The similarity of these two hypotheses is the incorporation of the previous consumption in the consumption function. The emphasis in these theories is on the practical methods of

estimation and testing rather than on the development of new ideas.[1]

The primary conclusion of our empirical results is that there is a strong positive relationship between the past consumption on the current consumption. Our estimated short-run MPC for Iran was found to be relatively low, which is consistent with our previous findings. In most cases, the estimated results show that the coefficient of the past consumption outweighs the coefficient of current income. This indicates the consumption habit plays a greater role on the current consumption than current income. In other words, the changing traditional life styles is a relatively slow process in economies such as Iran's.

The two-stage least squares for the estimation of habit persistence hypothesis for Iran led to poorer results due to the measurement errors in investment and government spending variables.

Because of the possibility of distributed lag bias in the estimation of habit formation hypothesis, we used 3PLS to eliminate possible autocorrelation in the error terms. The estimated results did not change much compared to OLS estimates. For removing the possible multicollinearity as a result of high correlation among the independent variables, we used the two-stage least squares suggested by

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[1]See Houthakker and Taylor, op. cit., p. 6.

Liviatan. Again our estimated results were not much different from the previous estimates. We consider both habit persistence and habit formation a relative improvement in the previous theories of consumption.

In the next chapter we will examine the liquid assets hypothesis. According to many economists accumulation of liquid assets encourages consumption expenditures of consumers. We are going to investigate this applicability of the consumption hypothesis for the Iranian economy.

CHAPTER VI

LIQUID ASSETS HYPOTHESIS

Theoretical Background

There are different explanations about the possible effect of liquid assets on consumer expenditures. Keynes mentioned the possible effect of wealth on consumption. Later many economists tried to explain the nature of this effect. A decrease in the general level of prices increases the real value of wealth of the wealth holders which stimulates their consumption. This stimulation of consumption increases the aggregate demand in the deflationary periods and cures the deficient aggregate demand. This change in real value of wealth as the result of change in the general level of prices is called the "Pigou effect" because Pigou was the first economist who discovered the importance of the relationships between value of wealth and price level and the final effect of that on the consumption.[1]

Liquid assets (change in liquid assets) have been used as a proxy for wealth because it is easier to measure and it

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[1]See Morris Cohen, "Liquid Assets and the Consumption Function," Review of Economics and Statistics, 36 (May 1954): 202.

has been argued that liquid assets are the more relevant element of wealth (change in wealth) to be included in the consumption function.[1] According to this view, "If liquid assets are sufficient with respect to some desired position, consumption plans will be carried out, but if they are insufficient, expenditures will be reduced."[2]

There is no general agreement among the experts in the fields of consumers' behavior analysis about the inclusion and significance of liquid assets in the consumption function. Some of them believe there is little justification to use liquid assets in the consumption function.[3] Some others believe that liquid assets is the reason for shifts in the consumption function. There is a suggestion that a liquid assets variable may be a proxy of permanent or expected income.[4] In any case, the interpretation of the coefficient of liquid assets in the consumption function seems to be difficult.

Crockett and Friend believe that the effect of liquid assets on consumption and saving depends on

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[1]See K. F. Wallis, op. cit., p. 22; and Susan W. Burch and Diane Werneke, "The Stock of Consumer Durables, Inflation, and Personal Saving Decisions," Review of Economics and Statistics, Vol. LVII, No. 2 (May 1975): 142.

[2]Wallis, op. cit., p. 22.

[3]See Evans, op. cit., p. 44.

[4]See Z. Griliches, G. S. Maddala, R. Lucas, and N. Wallace, "Notes on Estimated Aggregate Quarterly Consumption Functions," Econometrica, Vol. 30, No. 3 (July 1962): 491-500.

> whether assets are the result of windfall or the past savings decisions and, in the second case, on the particular savings motives involved. At least three points should be noted: (1) Liquid assets, and to some extent other assets, permit families to consume in excess of income (or income less contractual savings) when for any reason they wish to do so. (2) The holding of assets, liquid or otherwise, lessens the motivation for saving, since the marginal utility of acquiring assets presumably decreases with the amount held. (3) The effect of these two factors cannot be judged from cross sectional analysis because the composition of high and low asset groups differs in several significant ways.[1]

Although Klien and Tobin had used liquid assets in the consumption function before Zellner, the liquid assets hypothesis of consumption function is associated with Zellner because he included liquid assets in the consumption function and then compared his empirical findings with the results of the other consumption hypotheses.[2] In addition to the liquid assets variable and disposable income, he used the past consumption as an indicator of habit persistence following Brown's theory. In Zellner's regression equations, all of the observations are quarterly rather than annual data. The reason for this is because "utilization of quarterly rather than annual data provides the investigator with a much larger sample of observations which is of importance in obtaining reliable parameter and in testing hypotheses."[3]

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[1] Jean Crockett and Irwin Friend, "A Complete Set of Consumer Demand Relationships," in I. Friend and R. Jones (editors), Consumption and Saving, Vol. I (The University of Pennsylvania, 1960), p. 15.

[2] A. Zellner, "The Short-run Consumption Function," Econometrica (October 1957): 552-567.

[3] Ibid., p. 552.

Zellner estimated the following liquid assets consumption functions:

$$(1) \quad c = a + by + dL_{t-1}$$

$$(2) \quad c = a + by + dc_{t-1} + eL_{t-1}$$

$$(3) \quad c = a + by + d\overset{\circ}{c} + eL_{t-1}$$

$$(4) \quad c = a + by + d\overset{\circ}{y} + eL_{t-1}$$

$$(5) \quad c = a + by + dy_{t-1} + eL_{t-1}$$

where L, $\overset{\circ}{c}$, and $\overset{\circ}{y}$ represent liquid assets, past peak consumption, and past peak income, respectively. Obviously, when consumption and income have steady growth over time, e.g., the case of the Iranian economy during the period of 1959-1976, equations (2) and (3), (4) and (5) lead to the same results.

In addition to the above functional forms we will use liquid assets, change in income, and income as the regressors of the consumption function suggested by Klien.[1] In any case, if liquid assets play the role of "real balances effect" on consumption, we expect the positive sign for the coefficient of this variable.

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[1]See George E. Graig, "Predictive Accuracy of Quarterly and Annual Aggregate Saving Functions," Journal of American Statistical Association, Vol. 65, No. 331 (September 1970): 1131-1145.

Methodology and Criteria for the Evaluation Of Empirical Results

The methodology used by Zellner to estimate different consumption functions is ordinary least squares and least squares applied to the reduced form of a simultaneous model described in Chapter II. His criteria for the evaluation of the empirical results are:

> (a) parameter estimates with an algebraic sign consistent with a priori expectations, (b) confidence intervals for parameters not wide enough to include zero at a reasonable confidence level, (c) non-autocorrelated residuals as shown by application of the Durbin-Watson Test, (d) predictive ability measured by comparison with that of several naive models, and (e) percentage of variation in consumption "explained" by a particular coefficient of determination.[1]

The first three criteria are essential to Zellner. If an estimated function can pass these rules then it can be compared with the other functional forms of consumption function used by Zellner to confront the last two criteria. There are some criticisms regarding these arbitrary criteria for the evaluation of the empirical results. For example, in equation (2) the lagged dependent variable is included as a regressor. Obviously, the application of the Durbin-Watson test for detecting autocorrelation between residuals is inappropriate in this case as mentioned in the last two chapters. Even in the other equations dismissal of a regression because of the existence of autocorrelated residuals does not

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[1] Zellner, op. cit., p. 558.

seem to be the right decision. Moreover, if autocorrelation exists between the residuals of a regression which includes lagged dependent variables, we face the distributed lag bias in our estimation. For this reason application of the 2SLS method of estimation seems to be a better choice. Thus, we will use 2SLS method as well as OLS method in our estimation of liquid assets consumption function in the next section.

There are some other criticisms concerning the other arbitrary criteria used by Zellner. For example, Ackley believes

> We should put little reliance on Zellner's statistical findings, since he arbitrarily rejected all forms of consumption functions which yielded a negative marginal propensity to consume, even though such functions were fitted by statistical techniques which are theoretically superior to the techniques used in functions which he accepted.[1]

Empirical Results

Yearly data are used to estimate the consumption function of Iran using the stock of liquid assets in the end of the last period as a regressor. The results are shown in Table 8. All of the independent variables are highly significant (except liquid assets variable in equation 1b). The value of the coefficient of determination is high, indicating the goodness of fit of the estimated regressions. The problem of multicollinearity exists in the estimated regressions and this is the reason for the deviation of the

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[1]Ackley, op. cit., p. 277.

TABLE 8

THE ORDINARY LEAST SQUARES ESTIMATED CONSUMPTION FUNCTION OF IRAN

USING LIQUID ASSETS AS A REGRESSOR

No.	Equation (Numbers in parentheses are t-values)	R^2	D-W	SE	F
(1a)	$C_t = \underset{(3.83)}{61.39} + \underset{(10.50)}{0.79}y_t - \underset{(2.06)}{0.36}L_{t-1}$	0.99	1.83	22.83	3060.70
(1b)	$\frac{C_t}{P} = \underset{(3.51)}{1.16} + \underset{(7.04)}{0.73}\frac{y_t}{P} = \underset{(1.22)}{0.28}L_{t-1}$	0.99	1.34	0.28	1012.17
(2a)	$c_t = \underset{(0.13)}{2.15} + \underset{(9.27)}{0.56}y_t - \underset{(5.49)}{0.66}L_{t-1} + \underset{(4.91)}{0.48}y_{t-1}$	0.99	2.13	12.93	6004.96
(2b)	$\frac{c_t}{P} = \underset{(0.24)}{0.09} + \underset{(6.93)}{0.54}\frac{y_t}{P} - \underset{(3.92)}{0.69}\frac{L_{t-1}}{P} + \underset{(4.20)}{0.54}y_{t-1}$	0.99	2.15	0.18	1585.89
(3a)	$c_t = \underset{(0.13)}{2.15} + \underset{(14.88)}{1.05}y_t - \underset{(4.91)}{0.48}(y_t - y_{t-1}) - \underset{(5.49)}{0.66}L_{t-1}$	0.99	2.13	12.93	6004.99
(3b)	$\frac{c_t}{P} = \underset{(0.24)}{0.09} + \underset{(10.48)}{1.07}y_t - \underset{(3.66)}{0.54}(y_t - y_{t-1}) - \underset{(3.90)}{0.69}L_{t-1}$	0.99	2.05	0.0004	3839.13
(4a)	$c_t = \underset{(0.29)}{-6.41} + \underset{(8.66)}{0.59}y_t - \underset{(3.80)}{0.47}L_{t-1} + \underset{(3.83)}{0.49}c_{t-1}$	0.99	2.67	15.11	4398.00
(4b)	$\frac{c_t}{P} = \underset{(0.12)}{0.06} + \underset{(7.31)}{0.60}\frac{y}{P} - \underset{(2.57)}{0.44}\frac{L_{t-1}}{P} + \underset{(3.36)}{0.47}\frac{c_{t-1}}{P}$	0.99	2.60	0.20	1232.21

estimated coefficients in these equations.[1] We estimated the MPC of the Iranian economy over the period of 1959-1976 to be around 0.55 using the simple Keynesian theory of the consumption function. The overestimation of the MPC of Iran in the first two equations of Table 8 is the result of high correlation between the two independent variables. The autocorrelation test can be used for the first six equations of Table 8.[2] It seems that there is no indication of correlation between the residuals (this test for equation (2) is inconclusive).

In all of the regressions of Table 8, the sign of the liquid assets variable is negative. As we mentioned before, the expected sign for this variable is positive in the consumption function and negative in the saving function and many studies for the developed countries support the "real balances effect" on the consumption expenditures of the private sector.[3] There are some studies dealing with less developed countries which reveal either a negative relation or insignificance of the liquid assets variable on the consumption expenditures of the private sector. The reason for that

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[1]The correlation coefficient between income and liquid assets in our estimates was 0.99, which is extremely high.

[2]In the last two equations, the lagged dependent variable is used as an explanatory variable and the use of the Durbin-Watson Test for detecting autocorrelation is improper. The h test cannot be used because the sample size is less than 25.

[3]See Zellner, op. cit., p. 560; and Graig, op. cit., p. 1135.

may be the multicollinearity problem mentioned before. The existence of high correlation between the independent variables not only affects the size of the estimated parameters, but also it may change the signs of the estimates.[1] The plausible explanation of high correlation between income and the liquid assets variables can be understood by examination of the components of liquid assets variable used in our estimation. Money and quasi money are the two general components of the liquid assets variable. Money consists of notes and coins in circulation and demand deposits. Quasi money includes saving deposits and time deposits, the latter includes insurance premiums and personal retirement funds. Ozaeta, who found negative estimated coefficients for the liquid assets for the Spanish economy, claims that saving in liquid assets is subject to habit formation itself and also the higher liquidity assets in the previous year mean that consumers are subject to "less presure" to consume.[2]

In other studies concerning the less developed countries, the coefficient of liquid assets is not significant at an acceptable level. If liquid assets are a proxy of wealth, it can be argued that the inequality of wealth distribution in the less developed countries may prevent influences on

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[1]The estimated parameters are still unbiased but their variances are not minimum.

[2]Ozeata, op. cit., p. 71.

aggregate consumption.[1] For many consumers in these countries, the actual level of liquid assets is much below the desired level and for this reason the effect of liquid assets on consumption expenditures is negative, if it has any effect.

The use of 2SLS method of estimation of the liquid assets consumption led to the poorer results.[2] This was also the case in the last chapter when we applied the 2SLS method for the estimation of habit persistence consumption function. Zellner who used Haavelmo's consumption model, namely reduced form resulted from a set of simultaneous equations, led to this result: that only in two cases (only one of them included liquid assets variable) the estimated results are acceptable. In the other cases, he rejected this statistical method of estimation of the consumption function because of the negative estimates of the MPC.[3]

To test the predictive ability of the liquid assets hypothesis, we can use three naive models and compare the prediction of our estimated regressions with them following the procedure used by Zellner.

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[1]See Pandit, op. cit., p. 122.

[2]In many cases, the estimated MPC was negative or too low (i.e., 0.07), which was not consistent with our previous findings.

[3]Zellner, op. cit., p. 561. Although Ackley criticized him for rejecting those regression equations which led to negative estimation of the MPC, it seems that justification for negative MPC is hard if not impossible.

These naive models are:

$$c_t = c_{t-1} \tag{6}$$

$$c_t = c_{t-1} + (\Delta c)_{t-2} \tag{7}$$

$$c_t = \left(\frac{c}{y}\right)_{t-1} y_t \tag{8}$$

The first naive model (NMI) predicts current consumption to be the same as the last period consumption. The second naive model (NMII) predicts the current consumption to be equal to the last period consumption plus the previous change in the consumption expenditures. Finally, the third naive model (NMIII) predicts current consumption by applying the past APC to the current period income.

To summarize the predictive accuracy of different consumption functions using liquid assets as a regressor and to compare them with the three naive models described above, we use average absolute error, extreme errors, and direction of change for each functional form of the consumption function shown in Table 9. The observations are deflated by a price index and we excluded equation (3) of Table 8 in our comparison because basically equations (2) and (3) of Table 8 lead to the same results.

Examination of the predictive accuracy of our estimated functions of Table 9 reveals that the average absolute errors of the liquid assets functions are much smaller than the naive models. With regard to the direction of change, the liquid

assets functions are better than NMII. We rank our estimated functions in Table 10 based on the tests of predictive ability.

On the basis of predictive ability and the other empirical characteristics of the estimated functions summarized in Table 8, we conclude that the liquid assets consumption functions including lagged income and lagged consumption are preferred and that they are an improvement over the naive models and simple Keynesian consumption functions described in Chapter II. The coefficients of determination are high for all estimated functions of Table 8 but the test of autocorrelation is inconclusive for equation (1b). Obviously, inclusion of more independent variables in a function reduces the correlation between residuals and the set of equations (2) and (3) are not exceptions to this rule. Although multicollinearity can distort the estimation of the coefficients because of large variances of these estimates, it does not seem to be a problem in the equations (2), (3), and (4) of Table 8. The size of the MPC in these estimated equations is almost the same as our findings in Chapter II for the absolute income hypothesis. Again, there is an overestimation of the MPC of Iran in equations (1a) and (1b).[1]

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[1]For comparison of different saving functions, Graig used almost the same procedure described above. He used four naive models, some of them different from ours, and compared the average relative errors and Thiel's u statistic for predictive ability of the functions. Reasonableness of the estimates were compared for each estimated function to make the final judgement. See Graig, op. cit., pp. 1136-1142.

TABLE 9

PREDICTIVE ABILITY OF ESTIMATED LIQUID ASSETS CONSUMPTION FUNCTIONS AND NAIVE MODELS FOR THE IRANIAN ECONOMY

Model or Function	Average Absolute Error (In 100 billion rials At Constant Prices)	Extreme Errors	Direction Of Change (Proportion Of Incorrect Predictions For All Years
NMI	1.13	3.15,0.09	--
NMII	0.48	1.43,-0.93	3/14
NMIII	0.42	0.18,-1.91	1/14
$\frac{C_t}{P} = f(\frac{Y_t}{P}, \frac{L_{t-1}}{P})$	0.19	0.44,-0.34	1/14
$\frac{C_t}{P} = f(\frac{Y_t}{P}, \frac{L_{t-1}}{P}, \frac{Y_{t-1}}{P})$	0.12	0.38,-0.24	1/14
$\frac{C_t}{P} = f(\frac{Y_t}{P}, \frac{L_{t-1}}{P}, \frac{C_{t-1}}{P})$	0.13	0.36,0.29	1/14

TABLE 10

RANKED PERFORMANCE ON TESTS OF PREDICTIVE ABILITY

Model or Function	Average Absolute Error	Range of Error	Direction Of Change
$\frac{C_t}{P} = f(\frac{Y_t}{P}, \frac{L_{t-1}}{P}, \frac{Y_{t-1}}{P})$	1	1	1 1/4
$\frac{C_t}{P} = f(\frac{Y_t}{P}, \frac{L_{t-1}}{P}, \frac{C_{t-1}}{P})$	2	2	1 1/4
$C_t = f(Y_t, L_{t-1})$	3	3	1 1/4
NMIII	4	4	5
NMII	5	5	1 1/4
NMI	6	6	--

Conclusion

In this chapter an explanation of the theoretical reasons for the inclusion and the possible significance of liquid assets variable as a regressor in the consumption function was presented. In addition, the methodology and criteria used by Zellner and the estimated results of the different functional forms for the liquid assets consumption function were discussed.

The primary conclusion of our empirical results is that there is a strong negative relationship between private liquid assets and private consumption expenditures in the Iranian economy. A number of other studies for less developed countries have led to the same conclusions. This sheds some doubt on the so-called "real balances effect" on consumption in the less developed countries. As long as the actual liquid assets are much below the desired level of liquidity in these countries, we expect that this negative relationship between liquid assets and consumption expenditures holds. The inequality of wealth and income in less developed countries and uncertainty about the future can explain the tendency of the individuals in these countries to hold a major part of their income in the form of liquid assets.

Different functional forms for a liquid assets consumption function were used in this chapter. The first functional form which includes only income and liquid assets variables as the explanatory variables leads to poorer

results. The Durbin-Watson statistic had inconclusive results indicating a possibility of omission of some important variables. When we included lagged income and/or lagged consumption (both of them reveal the effects of habit formation in consumption), the results improved. This is consistent with our findings in the last two chapters about the importance of habit on consumption expenditures of the private sector of the less developed countries such as Iran. Zellner's findings for the consumption function of the United States support our results.[1]

Although the correlation between liquid assets and the other explanatory variables, e.g., income, was found to be high, it does not seem to affect the MPC or the coefficient of lagged consumption compared to our previous findings. Therefore, the multicollinearity problems do not seem to be too serious in the estimated equations of liquid assets consumption functions which included either lagged income or lagged consumption.

Application of the 2SLS method of estimation led to the poorer statistical and economically reasonable results. It seems the measurement errors in investment and government spending might be the reason, as mentioned before.

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[1]His findings are more general than ours because he chose these two functional forms as the best formulation of the consumption function among many other formulations. See Zellner, op. cit., p. 564.

From our empirical results we conclude that liquid assets can explain consumption of the private sector in economies such as the Iranian but their effect is reciprocal to the effect of liquid assets on consumption of the private sector in the developed countries. As a result, the Pigou effect does not provide the stimulation on aggregate consumption in these economies during the recessionary periods. The next chapter summarizes some of the main findings of our study concerning alternative consumption hypotheses.

CHAPTER VII

SUMMARY AND CONCLUSIONS

This dissertation is primarily concerned with an empirical analysis of the private consumption behavior of Iran. Five alternative consumption theories were selected and applied to the Iranian economy to test their application in less developed countries such as Iran.

In our empirical analysis we found few differences, some similarities, and some inconclusive results compared to the findings for developed countries.

In general the empirical results of the study suggest that although there are many socio-economic differences between developed and less developed countries, they do not affect the applicability of the same consumption theories in both groups of countries. But the interpretation and the marginal effects of variables in the consumption functions of less developed countries differ from the developed countries.

Data in Table 11 summarize the estimated consumption function for Iran. The estimated results indicate that there is a strong positive relationship between consumption expenditures and the level of income. But income is not

TABLE 11

SUMMARY OF THE ALTERNATIVE CONSUMPTION FUNCTIONS OBTAINED FOR THE IRANIAN ECONOMY

No.	Hypothesis	Equation	R^2	D-W
1.	Absolute-Income	$c_t = 83.47 + 0.64\ y_t$ (9.28) (73.87)	0.99	0.97
2.	Relative-Income	$\frac{S_t}{Y_t} = -1.81 + 1.84\ \frac{y_t}{y_o}$ (7.15) (8.46)	0.83	1.64
3.	Permanent-Income	$c_t = 0.31y_t + 0.67c_{t-1}$ (8.63) (10.51)	0.99	--
4a.	Habit-Persistence	$c_t = 36.25 + 0.43y_t + 0.42\ c_{t-1}$ (1.73) (5.63) (2.60)	0.99	1.29
4b.	Habit-Formation	$c_t = 18.77 + 0.78c_{t-1} + 0.51(y_t-y_{t-1}) + 0.16y_{t-1}$ (0.76) (2.40) (0.73) (5.73)	0.99	1.71
4c.	Habit-Formation	$c_t = -18.87 + 0.83c_{t-1} + 0.47(y_t-y_{t-1}) + 0.15y_{t-1} + 1.16v_{t-1}$ (0.55) (3.92) (0.84) (3.98) (3.42)	0.99	2.02
5a.	Liquid Assets	$c_t = 61.39 + 0.79y_t - 0.36L_{t-1}$ (3.83) (10.50) (2.06)	0.99	1.83
5b.	Liquid Assets	$c_t = 2.15 + 0.56y_t - 0.66L_{t-1} + 0.48y_{t-1}$ (0.13) (9.27) (5.49) (4.91)	0.99	2.13
5c.	Liquid Assets	$c_t = -6.41 + 0.59y_t - 0.47L_{t-1} + 0.49c_{t-1}$ (0.29) (8.66) (3.80) (3.83)	0.99	2.67

the only factor which influences consumption behavior. This is true in less developed countries as well as in developed countries. For this reason residuals of the estimated equation (1) are highly correlated as the Durbin-Watson statistic indicates. It seems that the existence of high autocorrelation in estimated equation (1) is the result of omission of some important explanatory variables. At the same time, since there is no other explanatory variable except income in equation (1), there is no need to worry about a multicollinearity problem, therefore the coefficient of income in this equation is the best estimate of the short run MPC of the Iranian economy. The size of the short-run MPC for the Iranian economy is relatively low compared to data obtained for the developed countries. The reason for the low short-run MPC for a less developed country such as Iran might be the result of uncertainty and the traditional life style in Iran. In an economy in which wage earners are still a small fraction of the population and income of rural residents depends on natural forces which are highly variable and not under human control, e.g., the level of annual rainfall, it is not surprising to observe a relatively high short-run MPS. It seems that in these economies a bandwagon effect plays an important role in the demand of the consumers.[1] According to this effect, "an individual will demand more (less)

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[1]For a discussion about the bandwagon effect on demand, see H. Leibenstein, "Bandwagon, Snob, and Veblen Effects in the Theory of Consumers Demand," The Quarterly Journal of Economics, 64 (May 1950), pp. 183-203.

of a commodity at a given price because some or all individuals in the market also demand more (less) of the commodity."[1] This is true especially in small communities and villages in that most of the people know each other and acceptance by the other members of the community seems important to them. Most individuals in these societies avoid a rapid change in their lifestyle following a change in their income. Those individuals who increase their consumption immediately upon an increase in their income may be classified as the "new rich." A gradual change in lifestyles may be acceptable. In the long-run consumers may migrate out of their communities if they feel some form of hostility towards them because of their changing lifestyle.

Equations (2), (3), (4a), (4b), (4c), (5b), and (5c) of Table 11 incorporate the effect of habit on the consumption behavior. The present consumption is affected by the level of past income and past consumption which are used as the indicators of the habit formation. It seems that habit formation is an important factor to explain the private consumption behavior of the economies such as Iran's.

Detailed examination of relative income and permanent income hypotheses for Iran were not possible due to the lack of data. Therefore our study for Iran led to inconclusive results concerning all of the assumptions and predictions of these consumption theories.

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[1]Ibid., p. 189.

Finally the last explanatory variable used to test consumption behavior of the Iranian private sector was a liquid assets variable. The last three equations of Table 11 include a liquid assets variable in the consumption function. Our results indicate that a liquid assets variable is another important factor in explaining the consumption pattern of Iranians. However, its effect is in the opposite direction compared to the developed countries.

A skewed distribution of income in the Iranian economy during the 1959-1976 period led to a strong preference of the majority of the Iranian population to hold liquid assets because the desired level for the liquid assets was not fulfilled for many of them. This is the reason for the difference in the effect of liquid assets on consumption behavior of the Iranians and the consumers of the developed countries. Generally speaking, this variable has a positive relationship with the consumption expenditures in the developed countries but for our estimated results the sign of this variable was negative.

Concerning future research on consumption theories in Iran, it is suggested that a number of improvements in data-gathering are needed as follows:

- Detailed data for measurement of GNP by the income-cost approach.
- Less aggregated data for different regions and different sectors and professions.

- A better and closer estimation of personal disposable income.
- Longer time series data for all variables, perhaps quarterly data.
- Employment and unemployment data.

An improvement in data collection and reliability will make it possible to test the consumption theories used in this study more effectively. Although such an undertaking would prove difficult and expensive, it would pay tremendous dividends in studying the economy of Iran further and in planning Iran's future.

SELECTED BIBLIOGRAPHY

Ackley, G. Macroeconomic Theory. New York: The MacMillan Company, 1961.

Ball, R. J., and P. S. Drake. "The Relationship Betwen Aggregate Consumption and Wealth." International Economic Review. Vol. 5, No. 1, January 1964, pp. 63-81.

Bank Markazi Iran. Annual Report and Balance Sheet. Tehran, 1959-1977.

_____. National Income of Iran, 1338-50 (1959-1972). Tehran, 1974.

Barber, W. J. "A Critique of Aggregate Accounting Concepts in Underdeveloped Areas." Oxford University Statistics Bulletin. Vol. 25, No. 4, November 1963, pp. 293-308.

Branson, W. H. Macroeconomic Theory and Policy. New York: Harber & Row, Publishers, 1972.

Branson, W. H. and A. K. Klevorick. "Money Illusion and the Aggregate Consumption Function." American Economic Review. Vol. 59, No. 5, December 1969, pp. 832-849.

Brown, Alan. "A Note on the Consumption Function in Iran." Oxford Bulletin of Economics and Statistics. Vol. 40, No. 1, Feb. 1978.

Brown, T. M. "Habit Persistence and Lags in Consumer Behavior." Econometrica. Vol. 20, No. 3, July 1952, pp. 355-371.

Buchanan, Norman S. and Howard S. Ellis. Approaches to Economic Development. New York: The Twentieth Century Fund, 1955.

Burch, Susan W. and Diane Wernake. "The Stock of Consumer Durables, Inflation, and Personal Saving Decisions."

Review of Economics and Statistics. Vol. LVII, No. 2, May 1975, pp. 141-154.

Cohen, Morris. "Liquid Assets and the Consumption Function." Review of Economics and Statistics. Vol. 36, No. 2, May 1954, pp. 202-211.

Davis, T. E. "The Consumption Function as a Tool for Prediction." Review of Economics and Statistics. Vol. 34, No. 3, August 1952, pp. 270-277.

Duesenberry, J. S. Income, Saving and the Theory of Consumer Behavior. Cambridge, Mass.: Harvard University Press, 1949.

Employment and Income Policies in Iran. Geneva: ILO, 1973.

Evans, Michael K. Macroeconomic Activity: Theory, Forecasting, and Control. New York: Harper & Row, Publishers, 1969.

Ferber, R. "Research on Household Behavior." American Economic Review. Vol. 52, No. 1, March 1962, pp. 19-63.

Friedman, M. A Theory of the Consumption Function. Princeton, N.J.: Princeton University Press for National Bureau of Economic Research, 1957.

_____. Essays in Positive Economics. Chicago, Ill.: University of Chicago Press, 1953.

Friend, Irwin. "The Relationship Between Consumers' Expenditures, Savings, and Disposable Income," Review of Economics and Statistics. Vol. 28, November 1946, pp. 208-215.

Friend, I. and R. Jones (editors). Proceedings of the Conference on Consumption and Saving. University of Pennsylvania, 1960, Vol. 1

Friend, I. and I. B. Kravis. "Consumption Patterns and Permanent Income." American Economic Review, Vol. XLVII, No. 2, May 1957, pp. 536-555.

Glahe, Fred R. Macroeconomics: Theory and Policy. New York: Harcourt Brace Jovanovich, Inc., 1973.

Goldsmith, R. A Study of Saving in the United States. Vol. 1, Princeton, N.J.: Princeton University for National Bureau of Economic Research, 1955.

Graig, George E. "Predictive Accuracy of Quarterly and Annual Aggregate Saving Functions." Journal of American Statistical Association. Vol. 65, No. 331, September 1970, pp. 1131-1145.

Griliches, Z.; G. S. Maddala; R. Lucas; and N. Wallace. "Notes on Estimated Aggregate Quarterly Consumption Functions." Econometrica. Vol. 30, No. 3, July 1962, pp. 491-500.

Houthakker, H. S. and L. D. Taylor. Consumer Demand in the United States, 1929-1970: Analysis and Projections. Cambridge, Massachusetts: Harvard University Press, 1966.

James, Robert Glenn. "The Permanent-Income Hypothesis and Other Aggregate Consumption Functions." Ph.D. Dissertation, University of Oregon, 1978.

Johnston, J. Econometric Methods. New York: McGraw-Hill Book Company, 1972.

Keiser, N. F. Macroeconomics. New York: Random House, 1975.

Keynes, J. M. The General Theory of Employment, Interest and Money, New York: Harcourt, Brace,. 1936. .

Klien, L. R. "The Friedman-Becker Illusion." Journal of Political Economy. Vol. 66, No. 6, December 1958, pp. 539-545.

Kuznets, S. Uses of National Income in Peace and War. New York: National Bureau of Economic Research,1942.

Leibenstein, H. "Bandwagon, Snob, and Veblen Effects in the Theory of Consumers' Demand." The Quarterly Journal of Economics. Vol. 64, No. 2, May 1950, pp. 183-207.

Liviatan, N. "Consistent Estimations of Distributed Lags." International Economic Review. Vol. 4, 1963, pp. 44-52.

Looney, Robert E. A Development Strategy for Iran through the 1980s. New York: Praeger Publishers, 1977.

Mint, H. L. "Economic Theory and the Underdeveloped Countries." Journal of Political Economy. Vol. LXII, No. 5, Oct. 1965, pp. 477-497.

Nerlov, Marc. Distributed Lags and Demand Analysis for Agricultural and Other Commodities. Washington: U.S. Department of Agriculture, Agriculture Handbook No. 141, June 1958.

Neter, John and William Wasserman. Applied Linear Statistical Models. Homewood, Illinois: Richard D. Irwin, Inc., 1974.

Ozaeta, O. "An Econometric Study of the Private Consumption in a Developing Economy: The Case of Spain." Ph.D. Dissertation, Indiana University, 1969.

Pandit, Vishwanath. "Sources of Inflation in Developing Economies: Case Study of Columbia, India, Korea and Taiwan." Ph.D. Dissertation, University of Pennsylvania, 1971.

Robinson, E. A. G. Problems in Economic Development. New York: MacMillan and Company, Limited, 1966.

Shahshahavi Madni, Ahmad. "An Econometric Model of Development for an Oil-based Economy: The Case of Iran." Ph.D. Dissertation, University of Colorado, 1976.

Taylor, L. D. and T. A. Wilson. "Three-Pass Least Squares: A Method for Estimating Models with a Lagged Dependent Variable." Review of Economic and Statistics. Vol. 66, No. 4, November 1964, pp. 329-346.

The Results of Sampling of Rural Households' Budget in 1976. No. 776. Iran, Tehran: The Center of Statistics of Iran, 1977.

Wallis, Kenneth F. Topics in Applied Econometrics. London: Gray-Mills Publishing, Ltd., 1973.

Zellner, A. "The Short-run Consumption Function." Econometrica. Vol. 25, No. 4, October 1957, pp. 552-567.

Zohar, V. "Consumption and Saving in Developing Countries: An International Comparison." Ph.D. Dissertation, Claremont Graduate School and University Center, 1967.

APPENDIX

Time Series Data Used in the Text

Time series data of the Iranian economy used in the text to estimate alternative consumption hypotheses are presented in the following table. All of the variables in the table are annual data and are expressed in billions of Rials (except price index and population). Base year for using constant variables is 1974 and population is in thousands of persons.

y: Gross national product less oil and gas revenue and direct taxes

C: Private consumption expenditures

P: Price index

N: Population

S: National savings

I: Gross domestic fixed capital formation

D: Depreciation of fixed capital

G: Government consumption expenditures

L: Liquidity of the private sector

TABLE A-1

TIME SERIES DATA USED IN THE TEXT

Year	(1) y	(2) C	(3) P	(4) N	(5) S	(6) I	(7) D	(8) G	(9) L
1959	249.4	213.3	54.6	21171	44.4	52.7	19.8	30.3	43.63
1960	270.8	232.2	59.2	21776	46.3	57.8	21.6	32.5	--*
1961	279.7	241.5	60.1	22398	49.5	54.3	22.4	34.1	--
1962	294.3	260.5	60.7	23038	52.7	47.4	23.8	35.4	57.5
1963	30809	265.8	61.3	23696	57.9	51.5	25.2	40.3	69.1
1964	346.8	299.8	64.0	24373	60.6	63.2	28.3	49.9	81.5
1965	389.7	320.4	64.2	25069	78.0	85.5	31.9	65.9	92.3
1966	426.3	355.3	64.7	25785	80.2	90.0	35.2	74.8	105.5
1967	464.2	373.9	65.2	26522	99.0	119.3	38.9	85.9	120.7
1968	522.9	427.2	66.2	27280	105.1	136.5	44.1	101.2	144.4
1969	580.0	470.7	68.6	28059	119.3	156.4	49.3	121.2	175.4
1970	647.7	537.3	69.4	28861	134.0	167.3	55.9	141.6	205.9
1971	734.6	566.9	73.3	29686	266.8	216.3	68.5	189.0	235.7
1972	937.2	676.9	78.0	30355	595.2	287.4	64.8	252.6	296.3
1973	1187.5	875.9	86.7	31136	600.6	363.3	83.7	325.4	400.0
1974	1663.5	1166.4	100.0	31925	1327.1	562.0	114.1	628.3	515.8
1975	2054.1	1411.4	109.0	32712	1354.9	1065.6	147.2	807.4	810.1
1976	2783.8	1799.9	123.3	33662	1354.9	1477.9	196.2	1003.6	1145.5

*Data not available.

Source: The figures of the first three columns in the table are taken from the article of Alan Brown, "A Note on the Consumption Function in Iran," in the Oxford Bulletin of Economics and Statistics, Vol. 40, No. 1, Feb. 1978, p. 5; and the sources for the rest of the columns of the table are: Bank Markazi Iran, National Income of Iran, 1338-50 (1959-72); Bank Markazi Iran, Annual Report and Balance Sheet, various issues.