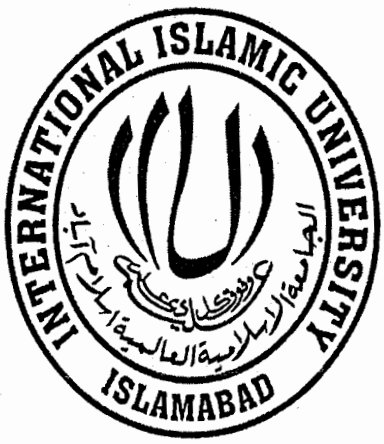
Empirical Test of Rational Expectations-Permanent Income Hypothesis: The Evidence from Pakistan

By

Salma Bibi



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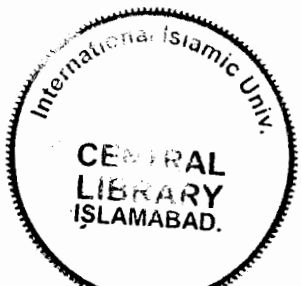

CERTIFICATE

It is to certify that this thesis submitted by **Ms. Salma Bibi** is accepted in its present form by the Department of Economics, International Islamic University, Islamabad as satisfying for the requirement for partial fulfillment of the degree of Master of Philosophy in Economics.

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Salma Bibi

13th January, 2010

Dedicated to

"My Respected Parents"

Abstract

Permanent income hypothesis is considered to be the better policy guide as it conforms better to the empirical tests than other consumption theories. However, nested rival paradigms are attractive because real world seldom conforms to idealized assumptions of theories. The study uses aggregate data for the period 1970-2007 of Pakistan to estimate the nested model of consumption to test the presence of rival consumption by using GMM technique. The study rejects Random Walk Hypothesis in favor of Absolute Income Hypothesis the proportion of those who behave according to Absolute Income Hypothesis is found to be 0.7. The, liquidity constraint is found to be the main reason of rejection of Random Walk Hypothesis.

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CHAPTER 1

INTRODUCTION

The analysis of consumer's behavior is indispensable since most aspects of economic policy require some knowledge of the household behavior. The close interplay between theoretical and empirical consideration together with increasing facilities about availability of different type of data have continued to make the analysis of the consumer behavior an attractive area of research. The importance of empirical evidence on consumer behavior is indisputable to formulate adequate policies. Amongst these stand optimality and impact of tax proposals, the effect of credit constraints, real interest rate changes and uncertainty of saving behavior and appropriate choice of cost of living indices. Effectiveness of public policy depends on the adequate information about consumption behavior of the economic agents. Specifically the effectiveness of policies, fiscal and monetary depends on the value of marginal propensity to consume as the primary indicator of consumer's behavior.

Keeping in view the above, the need for studying behavior of the consumers is imperative. Different theories provide different ideas about the consumer behavior. Keynes (1936) provides a simple answer to the consumption determinant; that present absolute reported income determines consumption demand. He argues that as the incomes of the agents rises, they do not increase their consumption in the same proportion. In other words, the marginal propensity

to consume is positive but less than unity. Later on, Kuznet (1946) provides the evidence that marginal propensity to consume is not decreasing in the long run, rather it is constant and roughly equal to average propensity to consume.

According to Life cycle theory of consumption, developed by Franco Modigliani (1966) and Albert Ando (1949), the typical individual has an income stream that is relatively low at beginning and end of his/her life as compared to the peak income of middle age. The individual is expected to maintain a more or less constant or slightly increasing level of consumption. According to Permanent income hypothesis, Milton Friedman (1957) argues that it is the permanent income and not the current income which determines the consumption pattern. Friedman concludes that consumers want to follow some what smooth consumption path.

Hall (1978) presented Random Walk Hypothesis by incorporating rational expectations, which states that changes in consumption are unpredictable He argues that if the expectations are rational, then the only relevant information to predict future consumption is the current consumption behavior, so consumption follows a Random Walk process.

The tests of permanent income hypothesis are performed through different specifications. First, the original Hall's Model considers the significance of any variable other than lagged consumption as the rejection of theory. Second, the method used by Flavin (1981), interprets the significance of expected income as explanatory variable in regression as evidence for rejection of the theory. Third approach used by Campbell and Mankiw (1989) divides the consumers are

behaving either according to permanent income or according to current income and then estimates the fraction of first type of consumers.

Despite the fact that consumption is the major part of gross domestic product and an influential variable in determining the effectiveness of demand management policies, studies on the topic in Pakistan are rarely available. To our knowledge, there is only a single study which uses the Hall's methodology and Flavin's model but concludes with contradicting results.

The present study empirically analyzes the aggregate consumption behavior with reference to Pakistan. For this objective, we have used different specifications for the purpose including, Hall's Model, Flavin methodology and Campbell and Mankiw methodology. For estimation purposes, we have used the OLS technique in the first two models and the generalized method of moments (GMM) for the third model.

1.1 Objectives of the Study:

The objectives of the study are:

- To test the Random Walk Hypothesis for Pakistan using aggregate data.
- To compare the results when different specifications of the test equation are used.
- To find the proportion of consumers behaving according to permanent income hypothesis by using the nested model of alternative theories.

- To test for the prevalence of liquidity constraint in case of rejection of Random walk model.

1.2 Rationale of the Study:

Keeping in view the fact that consumption constitutes the largest component of the gross domestic product of an economy. There must be sufficient information as to what determines the path of this major variable to devise appropriate demand management policies and to achieve the various objectives with some degree of certainty.

There are different theories about the consumption behavior in literature; however the permanent income hypothesis enjoys greater empirical support. To the best of our knowledge there is no comprehensive study available for Pakistan which has estimated the proportion of consumers supposed to follow the rival consumption paths by applying the latest technique.

The present study will try to check as to which consumption behavior is accepted for Pakistan and what proportion of consumers follow the Random Walk Hypothesis and the rival theory of Absolute income Hypothesis further it will try to find the reason for rejection of the hypothesis concerned.

1.3 Organization of the Study:

The remaining part of this study is organized as follows. Chapter 2 reviews the literature on the theory of consumption behavior and empirical tests of the rational expectations permanent income hypothesis. Chapter 3 presents data and econometric methodology. Chapter 4 describes variables used in the study.

Chapter 5 discusses the estimation results while chapter 6 is devoted to conclusion. The appendix and references are presented at the end.

CHAPTER 2

REVIEW OF LITERATURE

A number of studies are available in the literature that tests the empirical validity of rational expectations permanent income hypothesis. This chapter reviews the existing literature on theoretical underpinnings of the theories of consumption and the empirical tests of the theory. The chapter is divided into two sections. Section 2.1 explains the theories of consumption. Section 2.2 reviews the literature on empirical tests of the theories.

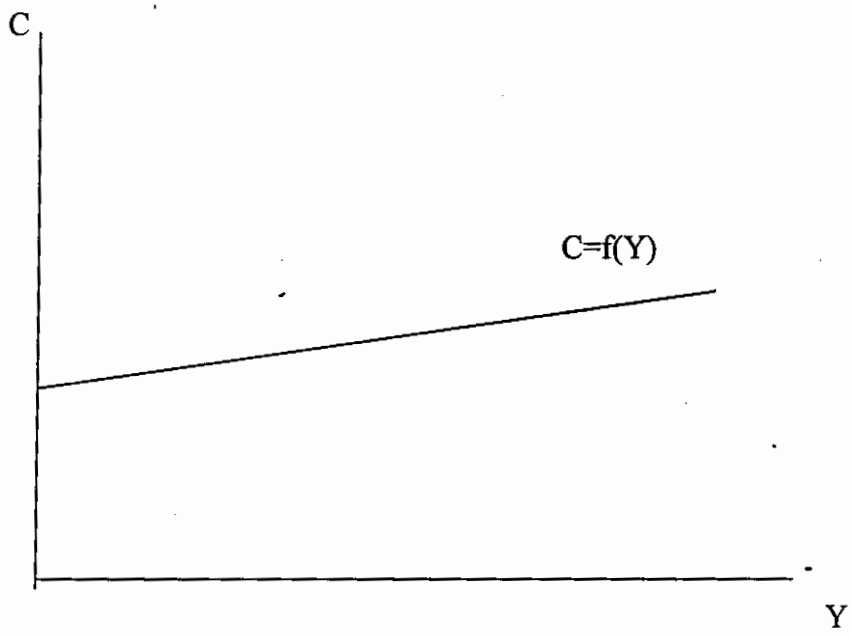
2.1 Theories of Consumption Behavior

Consumption being major part of GDP has been the focus of attention of the economists. The sequence of the study of consumption involved the first conceptual breakthrough by Keynes in 1936. The second step was development of statistical information about the consumer behavior and relationship between consumption, saving and income. The next step in sequence was the development of rival theories. Three different theories were suggested by Duesenberry in1949, Friedman in 1957 and a series of papers by Ando Brumberg and Modigliani in 1950s. These theories have certain similarities and differences in their implications for policy formulation.

2.1.1 Absolute Income Hypothesis

John Maynard Keynes (1936) was the first to develop a systematic theory of aggregate consumption spending by the households in his general theory. Absolute income hypothesis is linked to the basic principle of Keynes theory of consumption .The Keynesian consumption theory is based on what he calls "a fundamental psychological law"

"Men are disposed as rule and on average, to increase their consumption as their income increases, but not as much as the increase in their income."



The short run consumption function introduced in the figure. The figure reflects that as income increases people spend a decreasing proportion of their income and increase saving. The graph shows that marginal propensity to consume is less than average propensity to consume where the slope of the line from the origin is average propensity to consume (APC) and slope of the line in the graph is marginal propensity to consume (MPC). Keynes observed this behavior of

consumer expenditure in short run over duration of business cycle. He argued that as people income decreases they will not decrease consumption proportionately to drop in income and vice versa.

In 1946 Simon Kuznet published a study of consumption and saving behavior. First he showed that MPC was equal to APC as income grew along trend. Second, Kuznet suggested that APC varies inversely with income during cyclical fluctuation so the function shown in figure is only short run consumption function. So in 1940s it was clear that the theory of consumption must account for three observed phenomena.

i. Ratio of saving to income or APS increases as income increases so in cross section MPC < APC.

ii. Short run data show that APC is smaller than average during boom and vice versa. So in short run as income fluctuates MPC<APC

iii. Log run data show no tendency for APC to change in long run as income grow along trend, so MPC =APC.

2.1.2 Relative Income Hypothesis:

As there was an apparent contradiction between absolute income hypothesis and observed facts, after Second World War economists carried out several studies aimed at resolving this contradiction. The first attempt in this direction was made by Duesenberry in late 1940s and in the process of investigation he propounded the relative income theory of consumption, often known as relative income hypothesis.

Duesenberry (1949) relative income hypothesis is based on two hypotheses. The first hypothesis is that, consumers are not concerned with their absolute consumption but with their consumption relative to that of population.

So the utility function takes the form

$$U = U\left(\frac{C_0}{R_0}, \ldots \frac{C_t}{R_t} \ldots \frac{C_T}{R_T}\right)$$

Where R's are weighted averages of rest of the population consumption. This says that utility increases only if the individual's consumption rises relative to that of average.

So the result of this assumption is that individual APC depends on his position in income distribution that is person with income lower than average will have higher APC and vice versa .So this provides the explanation for MPC < APC and long run constancy of APC.

Second hypothesis is that current consumption is influenced by not only the absolute and relative income but by the consumption level of the past. This assumption suggests that aggregate ratio of saving to income depends on the level of present income relative to the previous peak income $\hat{Y}$. So

$$\frac{S}{Y} = a_0 + \frac{a_1 Y}{\hat{Y}}$$

This can be converted to the consumption function as APC= 1-APS

$$\frac{C}{Y} = (1 - a_0) + \frac{a_1 Y}{\hat{Y}}$$

MPC will be as $$MPC = (1 - a_0) - \frac{2 a_1 Y}{\hat{Y}}$$

By comparing both, it is evident that MPC < APC. It is clear that in the short run with previous peak income fixed the model implies that MPC< APC. The combination of short run and long run behavior gives the ratchet effect.

A ratchet effect arises due to resistance of the household against the fall in consumption due to income decrease. Duesenberry argues that households do not allow their consumption to fall as proportion to their income decrease. So when consumption does not fall proportionately then APC increases and MPC falls which is called ratchet effect.

Shortcomings of the model

Relative income hypothesis is unable to argue the magnitude of the change in consumption in case of small or large change in income.

Relative income gives weight to the argument that consumption standard are irreversible where this proposition can hold in short run but not in long run as the continuous dis-saving are not possible for the household.

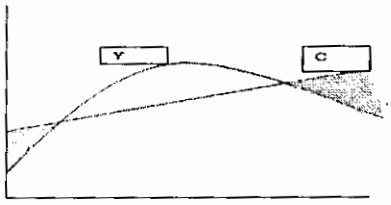
Relative income hypothesis states that income and consumption changes in the same direction which implies that recession be followed by decrease in consumption however 1948-1949 recession period in which the consumption was rising rather than decreasing.

2.1.3 Life Cycle Income Hypothesis:

Life cycle theory of consumption developed by Franco Modigliani (1966) and Albert Ando (1963) postulates that individual consumption in any period depends on resources available to him, rate of return on his accumulated savings and the

age of individual. According to the hypothesis the typical individual has an income stream that is relatively low at beginning and end of her life.

Dollars



Time
Period

The individual is expected to maintain a more or less constant or slightly increasing level of consumption as shown by the line c in graph. The model suggests that in early years of a person life person is net borrower that is first shaded portion of figure. In the middle years she saves to repay the debt and provide for retirement. In the late years she dis-saves the second shaded portion.

If the life cycle theory is correct then by selecting a sample randomly and categorizing it by income level higher income group will be having persons which are at middle years of life and having low APC and vice versa so it show that MPC < APC.

The basic proposition of the model can summarized as follows

i. The consumption of the individual depends on his current physical and financial wealth and life time resources.
ii. Consumption expenditures are financed from his life time income and accumulated wealth.
iii. The consumption level of the individual is more or less constant over his life time.

iv. There is little connection between current income and current consumption.

For the representative consumer if present value raises all his C_t^i must rise more or less proportionately

$$C_t^i = K^i(PV_t^i) \qquad 0<k<1$$

If the population distribution by age and income is relatively constant and taste between present and future consumption are stable the aggregate function is .

$$C_t = K(PV_t)$$

Where the income is assumed to be divided into income from labor and income from assets. So

$$PV_0 = \sum_0^T \frac{Y_t^L}{(1+r)^t} + \sum_0^T \frac{Y_t^P}{(1+r)^t}$$

If the capital markets are efficient then we can assume that present value of income from an asset is equal to value of assets itself measured at the beginning current period .that is $Y_t^P/(1+r)^t = a_0$

We can separate current labor income from unknown future labor income

$$PV_0 = Y_0^L + \sum_0^T \frac{Y_t^L}{(1+r)^t} + a_0$$

Now determining the expected labor income

$$Y_0^e = \frac{1}{T-1}\sum_1^T \frac{Y_t^L}{(1+r)^t}$$

Where T-1 is average remaining life so PV

$$Y_o^e(T-1) = \sum_{1}^{T} \frac{Y_t^L}{(1+r)^t}$$

So the present value expression is

$$PV_0 = Y_0^L + (T-1)Y_0^e + a_0$$

The simplest assumption to measure expected labor income will be that it the just multiple of present labor income.

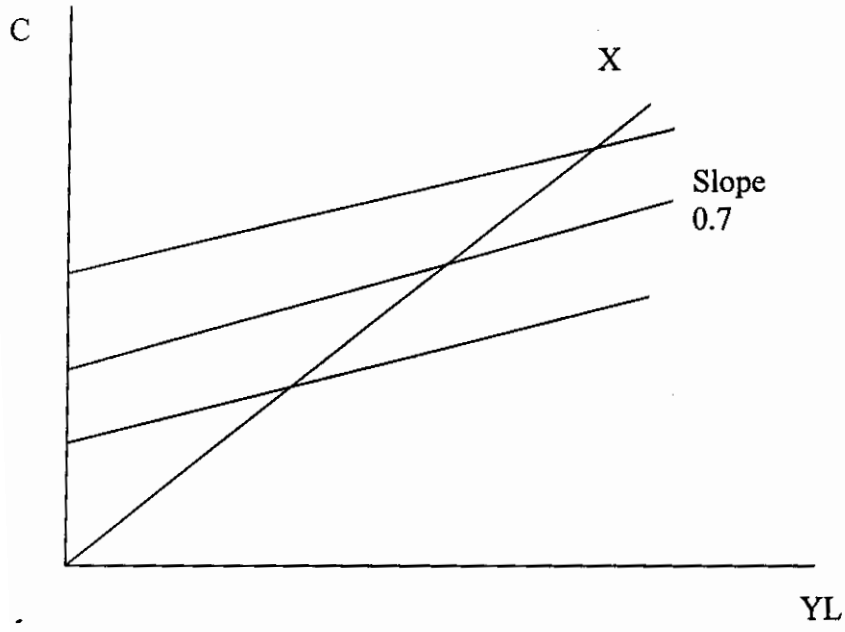
$$Y_o^e = \beta Y_o^L$$

So $PV_0 = [1 + \beta (T-1)] Y_0^L + a_0$

And consumption expression will be

$$C_o = K[1 + \beta (T-1)] Y_0^L + Ka_0$$

The above given consumption estimated by annual US data and showed MPC out of labor income to b e 0.7 and MPC out of assets to be 0.06. The consumption function graphed as



The intercept is set by the level of the assets the slope show MPC out of labor income. In short run cyclical fluctuation with the assets remaining constant consumption and income will vary along a single consumption function. In long run as consumption function shifts up as by saving assets increase.

This Modigliani model of consumption explains all three of observed consumption phenomenon.

There remains the question concerning the role of current income in explaining current consumption in the model. To a certain extent the analysis obscures the point by assuming that expected average income depends on the current income raising the leverage of current income on current consumption.

2.1.4 Permanent Income Hypothesis:

Milton Friedman (1957) developed theory known as permanent income hypothesis. According to the theory it is the permanent income not the current income which determines the consumption pattern. Friedman assumes that consumer wants to smooth his actual income stream into more or less flat consumption pattern

According to the model income is composed of permanent and transitory component. The permanent income is defined as lifetime income divided by the life time of individual. Where the transitory component can be either positive or negative, is that part of income produced by the influences that individual units regard as random.

The propositions of the permanent income hypothesis are as follows

$C_p = kY_p$

i. That is permanent or planed consumption is certain proportion of the permanent income and this proportionality factor need not to be constant. K presumably depends on interest rate, the return on saving, individual tastes shaping the indifference curves and the variability of expected income.

ii. Total measured income is the sum of permanent and transitory income. Transitory income can be thought as random component of the income stream. That is

$Y_i = Y_p + Y_t$

iii. Measured consumption is the sum of the permanent and transitory consumption.

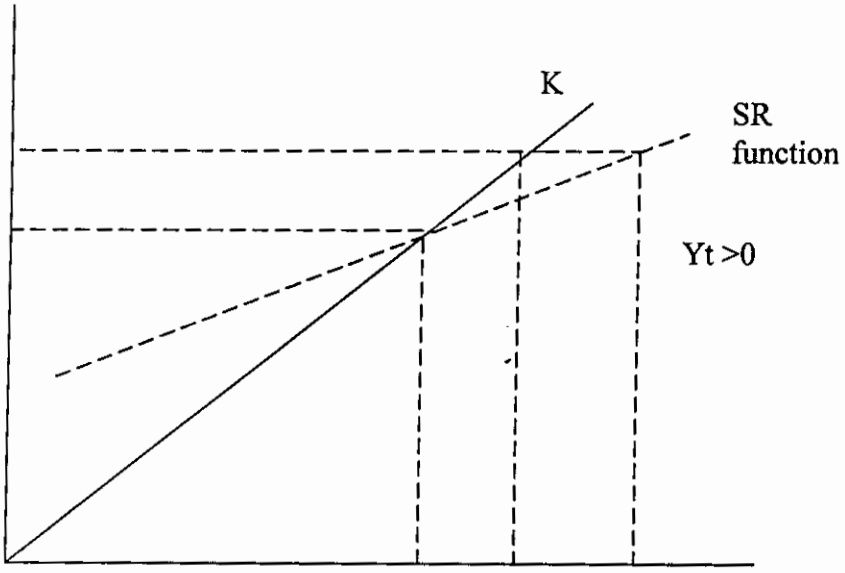
iv. Correlation between permanent income and transitory income is zero. That is Y_t is random fluctuation around Y_p so that covariance of both across individuals is zero.

v. Correlation between permanent consumption and transitory consumption is zero, so that C_t is just random variation around C_p thus the covariance of C_t and C_p is zero.

vi. Correlation between transitory income and transitory consumption is zero, that is a sudden increase in income due to transitory fluctuation, will not effect immediately consumption of individual. So the covariance of C_t and Y_t is also zero.

Assumption that is MPC < APC can be explained as consider a randomly selected sample of population classified by income level. As a group having high observed income than average population income will be having positive transitory income. So for this group the observed income will be greater than permanent income. As transitory consumption is not related to the permanent consumption and transitory income so their transitory consumption will be zero as the average permanent consumption is population average. So the average measured consumption being equal to permanent consumption, but average measured income greater than permanent income, so measured consumption to income ratio will be less than k.

Thus the Friedman model also explains that MPC < APC the results can be represented by graph as shown



The solid line K˙ show the relation ship between permanent consumption and income where y is average measured income if a sample is taken when measured average income is on trend the transitory income will be zero the point Cp is

population measured permanent consumption. If a sample considered is having with income above than population that is the group is having positive transitory income so their permanent income is less than measured average income. To locate average consumption both measured and permanent for the group K will be multiplied to have $C_i = C_p$ along the K line. So for the above average group point A will show the C_i and Yi below the permanent consumption line. Similarly if a group is taken as whose average income is below measured income and joining the both point we will obtain the cross sectional consumption function. This function has smaller slope that under permanent function so it shows that MPC < APC.

As over time national average permanent income grows then the cross sectional consumption function shifts up so we observe that in long run time series are the movements of average consumption and income along line K so long run APC= MPC. Model assumes that individual tries to smooth his actual income stream into more or less flat consumption pattern.

Large number of studies shows the support of permanent income hypothesis. As the theory implies that MPC =APC which means that rich and poor person consumes the same proportion of their income. Where empirical evidence is inconsistent with this view which imply that MPC declines as income increases.

2.1.5 RATIONAL EXPECTATION REVOLUTION

Lucas and Sargent (1970) argued that Keynesian economics have ignored the effect of expectation on behavior. They argued that the expectation formed by the

people were rational and based on the information they had, not the adaptive. Rational expectation has 3 major implications:

- Lucas Critique

The first implication of the rational expectation is that existing macroeconomics model are not helpful to design policy as variables are assumed to be dependent on past values of other variables including policy variables so economic model capture relationship of variables held in past .As policies change Lucas argued that the way the people formed their expectation will change too.

- Rational Expectations and Phillips Curve

The second implication of rational expectations when rational expectations were incorporated into Keynesian models they showed very un-Keynesian results within the logic of the Keynesian models, Lucas therefore argued that unanticipated changes in money should affect output. Predictable movement in money should have no effect on activity.

- Optimal Control versus Game theory

Third implication of the rational expectation was that if agents had rational expectations then it is right way was to think the policy as game between policy makers and economy. So the right tool was not optimal control but game theory.

2.1.6 Rational Expectations - Permanent Income Hypothesis the Emergence of Random Walk Hypothesis:

Theoretical Foundations of Random Walk Hypothesis:

Hall (1978) suggested a different approach for studying consumption behavior that was based on rational expectation and quadratic utility function

$$U_t = C_t - \frac{a}{2} C_t^2$$

Subject to the constraints

$$\sum C_t < A_0 + \sum Y_t$$

As consumer wants to maximize the life time utility then by Euler condition re-concluded that

$$C_t - C_{t-1} = \varepsilon_t$$

So this model implies that consumption is martingale process, or changes in consumption are unpredictable. In other words any information at period t-1 can not be used for forecasting changes in consumption in future.

This result implies that individuals will do a better job by smoothing thier consumption, that is, if current marginal utility of consumption is higher than expected future marginal utility then it is better raising current consumption.

So one way can be to regress changes in consumption on variables known at t-1 and if the coefficients turns out to be zero then random walk hypothesis is accepted.

2.2. Empirical Tests of Rational Expectation Permanent Income Hypothesis

With the incorporation of Rational Expectations the permanent income hypothesis suggests that changes in consumption are unpredictable .The theory was tested with dataset of different countries. Since large number of studies led to the rejection of the theory, so further tests were conducted to have possible reasons of this rejection the reasons so explored included liquidity constraints due to imperfection of capital markets and myopic behavior of agents. The test of the theory included different specification.

2.2.1 Empirical Tests of Theory:

The original Hall's model was based on the notion that significance of any other variable except lagged consumption will lead to the rejection of the theory. The theory was tested by Campbell and Mankiw (1989) by using the instrumental variable technique and time series data (1953-86) for US economy. The study used different idea, from Hall's Model that half of the household base their consumption expenditure on the current income while other half keep their permanent income in view. The estimate of the rule of thumb[1] consumers rejects the permanent income hypothesis. For the robustness of results for United States same equation for G-7 countries has been estimated. The results of which shows United Kingdom as exception to failure of the both models, further the inter-

[1] Rule of thumb consumers are said to following the Absolute Income Hypothesis

temporal elasticity of substitution is estimated which turns to be zero when rule of thumb consumers are incorporated into the model.

Flavin (1981) study by using time series data of the period of 1949-1979 of the United States analyzes role of current income in providing new information about future income. The study first defines permanent income and discusses that Hall and Sargent (1978) contradictory results are the same if the definition of the permanent income be used by sergeant study is corrected and difference in consumption variables used by the two authors account for major part of gap between both authors results. The paper also discusses the role of current income in signaling changes in permanent income. By using nondurable consumption as dependent variable, the hypothesis that consumption shows no excess sensitivity to current income is rejected. The study shows that model formed Hall is reduced form of structural model used by author. So when structural model is just identified the test of both show same values of test statistics.

Rational expectations permanent income hypothesis has been tested by using the data from different sources as Hayashi (1982) tested the rational expectations permanent income hypothesis by instrumental variable technique. The test of hypothesis depends very much on choice of consumption measure for United States aggregate time series annual data for sample period of 1948-78. The study uses data from two different sources .The study finds the rejection of permanent income hypothesis when consumption measures are used from National Income and Product Account as such consumption measure is not consumption measure

that permanent income hypothesis purports to explain . Whereby using 2nd measure of consumption permanent income hypothesis is not rejected where it shows high standard error of coefficients so point estimate of coefficients show sizeable fraction of liquidity constrained household in population. So picture of consumption behavior arising from study shows that individuals are liquidity constrained and government can control the aggregate demand by its effect on consumption expenditures by liquidity constrained and durable expenditure by wealth constrained agents as these are the component of aggregate demand.

Chow (1985) studies the accelerator principle by developing a model of consumption and investment function. The model is estimated by using two stage least squares for the observation from 1953-1982. As the consumption function is formulated with income and lagged consumption as explanatory variable .The consumption function results are found consistent with stochastic version of permanent income hypothesis suggested by Hall (1978) that is estimated current income is found insignificant. So the study finds that model based on rational expectation permanent income hypothesis of consumption and accelerator hypothesis of investment are applicable to the developed economies as well as less developed economies like China.

Altongi and Siow (1987) test the rational expectation permanent income hypothesis against the Keynesian model with imperfect capital markets. As the Keynesian model implies that coefficient of regression of changes in consumption

on instruments for anticipated and unanticipated component of income change should be equal, whereas rational expectation life cycle model emphasizes that only instrument for unanticipated component matters. The study uses two stage least squares technique and data period of 1968-1981 from the panel study of income dynamics. Data is modified and outliers have been removed in a way that power of test is not affected. The result show the lagged income determinants do not have significant effect on consumption .The finding of the study rejects the Keynesian hypothesis that consumption responds to anticipated and unanticipated changes in income in the same way. When test for liquidity constraints is conducted that does not show evidence against perfect capital markets assumption.

Hall's suggested the significance of any other variable except lag consumption as rejection of the theory, where Falvin (1985) suggests the significance of parameter of current expected income to rejection of the theory. So Ahmad M Khalid (1994) empirically analyzed the rational Expectation Permanent Income Hypothesis for data of 1960-1992 for Pakistan used different specifications. First by using Hall's Model which accepts Rational Expectation Permanent Income Hypothesis as the only lagged consumption coefficient turns to be significant .To check the robustness of the unexpected results for the developing country like Pakistan the current disposable income is included in the model which turns statistically different from zero. So results are not found robust as the inclusion of the current income presents different findings. At 2nd stage when Flavin

Methodology is adopted the parameter of current expected income turns significant which is contrary to the RE/PIH.

Shea (1995) tested the Random Walk hypothesis by using the household data for the period of 1981-1987 isolates the household in the panel study of income dynamics whose heads can be matched to particular union contracts. The data of such a variable is used to have household specific measure of expected wage growth. Consumption is then regressed on expected growth rate of heads salary so for the acceptance of the rational expectation permanent income hypothesis coefficient has to be insignificant which turns out of 0.89 depicting large deviation from the Random Walk Hypothesis. The study examines whether liquidity constraints can explain the failure of rational expectation permanent income hypothesis .The results are supportive to the prevalence of liquidity constraints which is explained by the sensitivity of consumption to the expected wage growth larger for low wealth than for high wealth households.

Lusardi (1996) has estimated the Euler Equation by using micro data generated from two different sources that is the consumption data is taken from consumer expenditure survey where income data is taken from panel study of income dynamics, as consumption data given in panel study of income dynamics is only of food consumption. The study tries to find whether relationship between predictable consumption and income growth can be found if micro-data is used. The study uses the instrumental variable technique as is used by Campbell and Mankiw for the data set of 1980-1987 from quarterly interview for the country of

United States. The study finds consistent results with the evidence in macro data provided by Campbell and Mankiw study.

Seater et al (1997) focuses on the point that income innovation causes same size revision in consumption as in permanent income for group of 87 countries with data of period of 1960-1992. The dataset contains the values of all the countries which are not centrally planned .For estimation full information maximum likelihood is used. The equality of the revision in permanent income to revision in consumption is rejected in 34 out of 87 countries and in these 34 countries 19 countries results supports the view that response of permanent income to an income innovation is greater than the size of revision in consumption arising from income innovation. The data finds the rejection of rational expectation permanent income hypothesis for developing countries and acceptance of hypothesis for developed countries. So there can be possible explanation for that is their data quality may be poor .So test is conducted by dividing the samples into subsets according to the data quality. The country with A quality data supports Rational Expectations Permanent Income Hypothesis and no support with lower quality data. There is high correlation between stage of development and quality of data.

Talor (1997) has tried to develop the behavioral model of nondurable consumption expenditure using the quarterly data from 1976(1) -1992(2) of Austria. The study uses the primary as well as secondary data. The study employed the questionnaire to determine the variables which are important in

respondents' nondurable expenditure decision. The survey results indicated that economic agents decision to expend on nondurable is centered around their previous purchases, the need for the product, the financial situation of economic agents, the price the amount of available credit and quality of nondurable goods and services. The behavioral consumption function is formed and nondurable consumption is regressed on disposable household income and lagged consumption. The econometric results obtained from such behavioral consumption function show weak evidence against Halls rational expectation permanent income hypothesis the study finds that all the variables chosen by respondents have proven to be significant predictors of change in nondurable consumption expenditures.

Dejaun (2003) tests the implication of the rational expectation permanent income hypothesis that the size of revision in consumption, due to an income innovation is equal to size of revision in permanent income due to some increase in income innovation .It can be shown if revision in consumption due to income innovation are equal to the size of revision in permanent income then their variances must be equal such a way is direct test of rational expectation permanent income hypothesis. So study uses the direct test of rational expectation permanent income hypothesis. The data period of the study is 1953-1998 and taken from the state personal income published by United States for 48 states of United States. The results found by study are strong though not quite perfectly support permanent income hypothesis for all 48 states. So study suggests that permanent income

hypothesis is reasonable model for describing the response of the state level consumption to state level income innovation. So support of permanent income hypothesis shows contrast to the view that liquidity constraints, myopia or behavior toward risk require sense of aggregate consumption data.

Transitional economic behavior generally affect the consumption behavior of the agents Deng *et al* (2008) analyses the consumption behavior of urban residents in China with data of 1986-2004 by instrumental variable technique. The study finds the conclusion that there is excess sensitivity of consumption during economic transitional period .This excess sensitivity is caused by sticky expectations due to uncertainty and forward and conceptual liquidity constraint .As in the centrally planned economy micro macro risks were zero due high social security benefits as it is the transitional period so uncertainty causes the excess sensitivity. The author argues that agents of the economy are not facing the immediate liquidity constraint but are faced with the forward and conceptual liquidity constraints. As the Chinese people have the view that their expected income will fall so they do not have immediate liquidity constraints, so to avoid the future risks there is excess sensitivity of consumption. So this excess sensitivity causes negative effect on government policies to stimulate domestic demand.

Kuan et al (2008) has reexamined the permanent income consumption relationship based on the innovation regime switching model. The study is based on United States data from 1959-2006. The study finds that consumption vastly

under acts the permanent innovation in labor income while it reacts about correctly to the transitory ones when compared with permanent income hypothesis prediction. The result of the study also indicates the excess sensitivity of consumption.

2.2.2 Test for the Presence of Liquidity Constraints:

Since the rational expectation permanent income hypothesis has been rejected in large number of studies so efforts were made to find the possible reasons rejection in practice. Major reason of failure of theory found the assumption of perfect capital markets as the markets are imperfect which causes the borrowing constraints for consumers.

Rejection of permanent income hypothesis has been tested for different countries to find out the possible reason of rejection of the hypothesis by using different proxies for liquidity constraint as Flavin (1985) analyses that whether the empirical rejection of rational expectations-permanent income hypothesis is due to prevalence of Myopia and liquidity constraints in agents .Myopia is tested whether marginal propensity to consume out of transitory income is nonzero. Because agents are myopic that is if the marginal propensity of consumption of transitory income turns different from zero, some individual are liquidity constrained if the excess sensitivity of consumption to the current income arises because of imperfection in the capital markets. The study uses the unemployment rate as proxy for prevalence of liquidity constraint. When unemployment is included in model to have impact on consumption estimate of excess sensitivity of consumption falls and becomes insignificant .So simple Keynesian function with

nonzero MPC is an incomplete model and study suggest that liquidity constraints are an important part of explanation of observed excess sensitivity of consumption to current income.

To find the possible reason of rejection of rational expectation permanent income hypothesis several tests were conducted some of the studies finds that liquidity constraints and myopia to be the reason of excess sensitivity of consumption to income. Mankiw (1985) argues that studies finding the excess sensitivity of consumption to income assume that income is stationary around a deterministic trend and provides the evidence contradicting theory. The study finds that disposable income is random walk as autocorrelation of the level of real disposable personal income per capita begins at one and decline only slightly. The study concludes that standard testing procedures are invalid and biased by conducting the Monte Carlo experiment assuming 25 years quarterly data .So findings of the study suggest that tests for the importance of liquidity constraints may require the data on individuals. As it is more likely that individual transitory income will differ but such variation is not found in aggregate data.

As the developing countries try to reduce their fiscal deficits to improve aggregate saving and investment performances. Where Ricardian Equivlance suggests that changes in public sector saving may be offset by changes in private saving. The empirical validity of this proposition depend on the extent to which household are liquidity constrained. Haque (1989) tested the prevalence of liquidity constraints

for the sample of 16 developing economies with data cover period of 1960-1985 estimating the parameters with instrumental variable least squares method. The result indicates that full Ricardian Equivlance can be rejected for 15 of 16 countries and point estimate show that larger proportion of population behaves as if it were liquidity constrained.

Zeldes (1989) tries to determine that whether empirical rejection found by the studies are due to borrowing constraints rather than failure of other auxiliary assumptions .The data of the US cover the period of 15 years that is from 1968-1982 taken from the panel study of income dynamics. The observation has been spilt into two groups on the basis of their financial asset to income ratio, low asset observation form group I and vice versa. The Euler equation for group I will violate and will be satisfied for group II. The results support the view that borrowing constraints affect consumption in United States as Euler equation is violated for the observation for which the constraints are binding.

Wilcox (1989) argues that households are often prevented to consume as is suggested by permanent income hypothesis due to prevalence of liquidity constraints. By using the quarterly data of the period 1949-1988 by using the instrumental variable technique finds that consumption reacts to current income to an extent greater than is warranted by permanent income hypothesis. The study argues that apparent rejection of permanent income hypothesis might be as

consumption growth may be affected by changes in real interest rate and be .completely in accord with permanent income hypothesis. So hypothesis implies that changes in nominal interest rate and changes in unemployment rate, which proxy for changes in current income affect the growth rate of the aggregate consumption. The results are consistent with the view that large number of households finds themselves liquidity constrained, as unemployment rate and interest rate coefficients are large and statistically significant. The study further argues that constraints emanates from households being constrained in their ability to borrow as result to lenders payments to income restrictions , which is tested by the hypothesis of the equality of interest rate and unemployment rate spending elasticity , where results are unable to reject the equality hypothesis. So impact of fiscal and monetary policies, short term or long run will depend on the amount of liquidity constraints faced by various households.

Reason of the rejection of the rational expectation permanent income hypothesis has been termed as myopia, liquidity constraints and risk aversion Shea (1995) tests the presence of two alternative hypotheses that is Myopia and Liquidity Constraint to be reason of rejection of Rational Expectation Permanent Income Hypothesis using aggregate data for the period of 1956-1988. Both of the properties can be tested as in presences of myopic agents consumption tracks current income where in presence of liquidity constrained agents consumption is found to more strongly correlate with predictable income increases than decreases. So by following Campbell and Mankiw model when consumption is

regressed on income and interest rate then under myopia coefficient (λ) should be positive and significant .The result suggests that consumption is much more sensitive to predictable income declines than increases which is found inconsistent to the myopia and liquidity constraints .In general the results are inconsistent with the both life cycle permanent income hypothesis and with myopia and liquidity constraint. The occurrence of such results requires the incorporation of the loss aversion into inter-temporal preferences.

As the markets for consumer credit are limited in developing countries so population faces the liquidity constraints. Ila Patnaik (1997) develops a simple test to measure the poverty in developing countries. Excess sensitivity hypothesis is tested for India using annual data for the period of 1960-1993. The model is estimated by using instrumental variable technique as is developed by Campbell and Mankiw in which the economy is assumed to comprise of two groups of consumers the liquidity constrained and unconstrained consumers. The result indicates excess sensitivity of consumption to income that is the major role of income in explaining the consumption. This provides an evidence for inability of some households to save or borrow to smooth consumption.

2.2.3 Consumption and interest Rate:

As for determining the consumption the interest rate is considered an important variable so different studies has been conducted to access the responsiveness of the consumption to the interest rate changes.

The relationship between consumption growth and real interest rate has attracted considerable interest of the economists for the research. Weber (1993) tries to estimate the elasticity of inter-temporal substitution for consumption. The study uses British data from national accounts and from family expenditure survey for the period of 1970-1986 with instrumental variable technique. By using the aggregate data the inter-temporal elasticity of substitution is found 0.3 and by using cohort data where in a cohort nobody younger than 30 or older than 50 is included, the elasticity turns out to be 0.8. So estimate of elasticity of inter-temporal substitution for consumption are lower for aggregate data than average cohort data. The magnitude of elasticity is important for different issues as deadweight loss of interest, income taxation and effect of changes in interest rate on saving

Fuse (2004) estimates the inter-temporal elasticity of substitution for Japan using the two steps method first by Canonical Cointegration Regression and at second step by GMM, for the data of 1970-1998. By using the data of nondurable and then by using the durables data finds that estimate of inter-temporal elasticity of substitution is at one good model are significant where these estimates are larger when two good model is used. So the study finds that Japanese consumer have larger reaction to the interest rate increases.

A study by Rao (2007) tries to find the proportion of consumers in developing and developed countries by using the technique by Campbell and Mankiw. The dataset includes the yearly observation for the period of 1974-2005. λ estimate

for Fiji ranged from .527 to .475, where as for Australia it ranged from .300 to .244. So from equation it can be said that Permanent income hypothesis consumers in Fiji are 47% and in Australia that is higher at 70%. So proportion of Permanent Income Hypothesis consumers in Australia is about 40% higher than Fiji. Where the estimate of elasticity coefficient shows that Australian consumers are more risk averse than Fijian as affect of real rate of interest (the positive income effect) seems to dominate substitution effect (the negative) for Fiji. Whereas in Australia negative substitution effect is more dominant .So such findings provide implication for monetary policy and Ricardian equivalence .As Permanent income hypothesis consumers are lower in Fiji so Ricardian Equivalence Theorem will not hold so budget deficit effect will be significant.

Summing up it can be said that rational expectation permanent income hypothesis is accepted for the countries with data of high quality and where the assumption of perfect capital markets is fulfilled it is rejected in presence of imperfect capital markets and poor data set.

The present study will try to empirically analyze the consumption behavior of economic agents for Pakistan by using the aggregate data. For this objective, in the present study different specifications of the test equation will be used as by Hall's model in which the significance of any other variable except lag consumption will be evidence against theory. Then by Campbell and Mankiw methodology which nests the rival consumption theories. As nesting the rival

paradigms are attractive because real world seldom conforms to idealized assumption of theories. In Campbell and Mankiw model there is categorization of the agents into two groups one consuming according to permanent income 2nd "Rule of Thumb"[2] consumers consuming current income under assumption when interest rate is constant and allowed to vary.

[2] The rule of thumb consumer are taken as behaving according to the Absolute Income Hypothesis

CHAPTER 3

METHODOLOGY

3.1 Theoretical Foundations of Random Walk Hypothesis:

Hall (1978) suggested an approach for studying consumption in the presence of rational expectations. Consider the representative household's utility function[3],

$$U_t = C_t - \frac{a}{2}C_t^2$$

Subject to the constraint $\sum C_t < A_0 + \sum Y_t$

As consumer wants to maximize the life time utility, this is a problem in dynamic optimization, which can be solved by Euler equation approach. Consider the case, in which a representative consumer forgoes consumption in period 1 by incurring a utility cost accompanied by an increase future expected benefit of increased consumption. If the individual maximizes life time utility then this cost should be equal to expected benefit, i.e.

Utility Cost = Expected Utility Benefit

Where utility cost is measured as marginal utility multiplied by foregone consumption and similar is the case for expected utility gain[4]. This implies

$$(1-ac)\Delta C = [1-E(C_t)]\Delta C$$

So $C_1 = E_1(C_t)$

[3] We have taken quadratic utility function which is one of the ingredients of random walk model. This utility function makes marginal utility linear and is responsible for certainty equivalence, which is one of the critical assumptions of this theory, [for more details see Romer (2001)]

[4] We have ignored interest rate because in random walk model of consumption interest rate is taken equal to discount rate. So both can safely be taken as zero

As $C_t = E_{t-1}C_t + \varepsilon_t$

Where $C_1 = E_1 C_t$

So $C_{t-1} = E_{t-1}C_t$

$C_t = C_{t-1} + \varepsilon_t$

$C_t - C_{t-1} = \varepsilon_t$

So this model implies that consumption is martingale process and changes in consumption are unpredictable. So any information at period t-1 can not be used for forecasting changes in consumption in future.

This result implies that individual, will do a better job by smoothing thier consumption, that is, if current marginal utility of consumption is higher than expected future marginal utility then it is better raising current consumption.

In this regard, one way of testing random walk model of consumption is to regress changes in consumption on variables known at t-1. If any of the coefficients turn out to be zero then random walk hypothesis is accepted.

3.2 Econometric Methodology

Random walk hypothesis has been tested by different techniques, [see for instance Hall (1978); Campbell and Mankiw (1989); and Flavin (1981)]. So for testing Random Walk Hypothesis different specification can be used.

3.2.1 Hall's Method

As Hall's model (1978) formulate that changes in consumption are unpredictable, so it can be tested by regressing consumption on the lagged values consumption and on other variables. So model can be specified as

$$C_t = \gamma_0 + \gamma_1 C_{t-1} + \sum_{i=2}^{T} \gamma_i Z_{t-i} + \varepsilon_t$$

Where

C_t: current period's consumption expenditure

C_{t-1}: previous period's consumption expenditure

Z_{t-i}: vector of other variables lagged by one or more periods that may be useful in predicting current consumption, the vector may include income, unemployment, real money balances etc.

The simple model is based on testing the hypothesis that $\gamma_i = 0$ which implies that consumption follows Random Walk. In other words the statistical significance of any variable other than the lagged consumption is evidence against the Random Walk hypothesis.

3.2.2 Campbell and Mankiw Test

Another approach used in this study is due to Campbell and Mankiw (1989). They used the nested model to test the validity of alternative theories. The hypothesis followed by the model is that λ is a fraction which accrues to the individuals who consume according to their current income, while $(1-\lambda)$ fraction represents the individuals who consume according to permanent income.

Where income of the two groups is Y_{1t} and Y_{2t} so total income

$$Y_t = Y_{1t} + Y_{2t}$$

And $Y_{1t} = \lambda Y_t$

$$Y_{2t} = (1-\lambda)Y_t$$

As the first group agents consume current income so $C_{1t} = Y_{1t}$

Having $\Delta C_{1t} = \Delta Y_{1t} = \lambda \Delta Y_t$

Whereas for 2nd group $\Delta C_{2t} = (1-\lambda)\varepsilon_t$, i.e. change in consumption is unpredictable for this group

So change in aggregate consumption

$$\Delta C_t = \Delta C_{1t} + \Delta C_{2t} = \lambda \Delta Y_t + (1-\lambda)\varepsilon_t$$

An important problem in this regard arises as the equation cannot be estimated by ordinary least squares since e_t may be correlated with ΔY_t. One of the possible solutions is to estimate the equation by instrumental variable technique. For instant, any lagged stationery variable is a valid instrument, if it is correlated with income but uncorrelated with the error term. Then ΔC and ΔY are regressed directly on instruments and if there are K instruments, X_{1t} through X_{kt}, the general system is

$$\Delta C = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \ldots\ldots\ldots\ldots \beta_k X_{kt} = X_t \beta + \eta C_t$$

$$\Delta Y = \gamma_0 + \gamma_1 X_{1t} + \gamma_2 X_{2t} + \ldots\ldots\ldots\ldots \gamma_k X_{kt} = X_t \gamma + \eta Y_t$$

As instrumental variable technique is useful in the sense that it has lesser parameters in the reduced form so conserving the degrees of freedom and providing more powerful test of null hypothesis.

3.2.3 Flavin Methodology

Flavin (1981) suggests estimating a consumption function and a forecasting equation for income which determines the expected and unexpected components of income. The next step to follow is to regress consumption on expected and unexpected components of income. The random walk hypothesis implies that only current unexpected income should influence the consumption in other words, the parameter of expected income must be insignificant for the acceptance of theory.

3.3 Consumption and Interest Rate

The Random Walk Hypothesis rests on the assumption that interest rate is zero. If we allow for the nonzero interest rate then the Budget Constraint is

$$\sum \frac{1}{(1+r)^t} C_t < A_0 + \sum \frac{1}{(1+r)^t} Y_t$$

Where r is interest rate

But in this case, we have to incorporate discount rate in the utility function. So the Utility function is given as

$$U = \frac{1}{(1+\rho)^t} \frac{C_t^{1-\theta}}{1-\theta}$$

Where ρ is discount rate

Again we can solve the problem by applying Euler's condition. If the consumer decreases the current period consumption accompanied by an increase in future

consumption by 1+r times the amount of decrease, then utility cost of foregone consumption must be equal to future utility gain.

The marginal utility is given by

$$MU = \frac{C_t^{-\theta}}{(1+\rho)^t}$$

$$\frac{C_t^{-\theta}}{(1+\rho)^t} = \frac{(1+r)C_t^{-\theta}}{(1+\rho)^{t+1}}$$

The condition can be rearranged to get

$$\frac{C_{t+1}}{C_t} = \left[\frac{1+r}{1+\rho}\right]^{\frac{1}{\theta}}$$

In the log transformation the above equation will assume the form

$$\Delta C_t = \mu + \sigma r_t + \varepsilon_t$$

r_t is the interest rate σ is the inter-temporal elasticity of substitution

This equation will be estimated again using the instrumental variables technique.

The same model can be estimated by using the categorization of the consumers into two groups; one group depending on the current income and remainder following the above equation. So the equation to be estimated is as follows

$$\Delta C_t = \mu + \lambda \Delta Y_t + \theta r_t + \varepsilon_t$$

Where $\theta = (1-\lambda)\sigma$

The methodology to follow

The model to be estimated in the study is as follows. For the Hall methodology following models will be estimated

$$C_t = \gamma_o + \gamma_1 C_{t-1} + \eta_t \quad \text{..... (1)}$$

$$\Delta C_t = \gamma_o + \gamma_2 C_{t-2} + \gamma_3 Y_{t-1} + \gamma_4 Y_{t-2} + \eta_t \quad \text{..... (1.1)}$$

$$\Delta C_t = \gamma_o + \gamma_2 C_{t-2} + \gamma_5 \Delta Y_{t-1} + \eta_t \quad \text{..... (1.2)}$$

$$\Delta C_t = \gamma_o + \gamma_3 Y_{t-1} + \gamma_4 Y_{t-2} + \gamma_6 Y_{t-3} + \gamma_7 Y_{t-4} + \eta_t \quad \text{..... (1.3)}$$

$$\Delta C_{tt} = \gamma_o + \gamma_2 C_{t-2} + \gamma_8 C_{t-3} + \gamma_9 C_{t-4} + \eta_t \quad \text{..... (1.4)}$$

$$\Delta C_t = \gamma_o + \gamma_{10} M_{t-1} + \eta_t \quad \text{..... (1.5)}$$

$$\Delta C_t = \gamma_o + \gamma_{11} U_{t-1} + \eta_t \quad \text{..... (1.6)}$$

Where C_{t-i}: lagged consumption

Y_{t-i}: lagged disposable income

M_{t-i}: lagged real money balances; and

U_{t-i}: lagged unemployment rates

In the above equation if $\gamma_i = 0$ it means that consumption follows random walk with drift. Alternative specifications have been tested by using lags of the variables to be considered as determinant of consumption.

For the robustness of the results methodology of Campbell and Mankiw is also applied. For this purpose following equation is estimated

$$\Delta C_t = \Delta C_{1t} + \Delta C_{2t} = \lambda \Delta Y_t + (1 - \lambda)\varepsilon_t \quad \text{.....(1a)}$$

Under this hypothesis the change in consumption is weighted average of change in current income and unforecastable innovation in permanent income. As if λ =0 then according to the above equation random walk hypothesis is considered as true.

The approach to follow is to estimate the value of the coefficient λ directly and then test the hypothesis that λ is zero. But an important point to be noted is that equation cannot be estimated by ordinary least squares as the error term may be correlated with y_t. The solution is to estimate the equation be generalized methods of moments. Any lagged stationery variables are taken as valid instruments since they are orthogonal to error term.

The estimate of λ is important from the economic view point that it will show economic importance of deviation from theory. If estimate of λ is closer to zero then one can say that Random walk hypothesis is approximately true that is most of the income goes to the consumers who obey the theory. Whereas if λ estimate is larger, then it will be concluded that most of consumers follow the alternative theory of consumption.

We begin our analysis of consumption and interest rate by maintaining the hypothesis that random walk hypothesis is correct. To estimate the inter-temporal elasticity of substitution, following model used.

$$\Delta C_t = \mu + \sigma r_t + \varepsilon_t \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

r_t is the interest rate σ is the inter-temporal elasticity of substitution

This equation is estimated using generalized methods of moments technique.

The same model can be estimated by using the categorization of the consumers into two groups; one group consumes the current income and remainder follows the random walk hypothesis. So the equation to be estimated is as follows

$$\Delta C_t = \mu + \lambda \Delta Y_t + \theta r_t + \varepsilon_t \quad \text{..... (2.1)}$$

Where $\theta = (1-\lambda)\sigma$

In this equation the result to test is that whether the consumption growth responds to the variation in the interest rate as Hall assumes that random walk hypothesis to be correct and uses the absence of the relation between consumption and real interest rate as evidence for small elasticity.

In the case of rejection of the random walk hypothesis the prevalence of liquidity constraints will be tested by using the unemployment rate as proxy for liquidity constraints.

$$\Delta C_t = \alpha_0 + \alpha_1 \Delta U_t + \varepsilon_t \quad \text{..... (3)}$$

$$\Delta C_t = \lambda \Delta Y_t + \alpha_1 \Delta U_t + \varepsilon_t \quad \text{..... (3.1)}$$

The above models will be estimated using ordinary least squares techniques. The coefficient α_1 will show the effect on consumption of an increase in unemployment. The estimated value of α_1 is expected to be negative if the liquidity constraints affect consumption.

CHAPTER 4

DATA AND VARIABLES DESCRIPTION

4.5.1 Data Description.

Empirical analysis is carried out with adequate and reliable data as mistakes in data collection can lead to incorrect conclusions. So before empirical analysis to be carried out the data must be checked properly. We have tried to check the consistency and reliability of data before conducting the study. To estimate our model, annual data for the period of 1972-2007 has been used.

The data set used in the study is annual and has been retrieved from different data sources. Data on variables (i.e. of consumption, income, GDP Deflator, interest rate, money balances) is collected from yearbook of International Financial Statistics (IFS) published by International Monetary Fund (IMF). Data on some variables (i.e. unemployment rate, direct taxes) is collected from Pakistan economic Survey and Handbook of Pakistan Economy prepared by state bank of Pakistan.

4.5.2 Variables Description

Personal Disposable Income

The income that remains once consumers have received transfers from the government and paid their taxes. y_t is measured as disposable personal income per-capita.

Households Consumption

C_t is household consumption expenditure.

Money Balances

Money balances are taken as addition of money and quasi money, where quasi money is defined as highly liquid assets that can easily be converted into cash.

Unemployment Rate

Unemployment rate is fraction of labor force participants who are unemployed, that is, the ratio of unemployed to the labor force.

Interest Rate

Data on call money rate are used as interest rate. It is the interest rate that bank charges to brokers.

GDP Deflator

The ratio of nominal GDP to real GDP is a measure of overall price level, which represents the average price of final goods produced in the economy.

CHAPTER 5

ESTIMATION RESULTS

As a first step, we have tested all series for the presence of unit root process. For this purpose Augmented Dickey Fuller test has been used. Results show the absence of unit roots at 1st difference for all variables so log differenced data have been used in estimation (The results are shown in the appendix-5A). All the variables except the unemployment rate are in log form.

As in the model some of the specifications contain the lagged dependent variables as explanatory variable so Durbin Watson test cannot be used to test the presence of autocorrelation so LM test is used for the purpose.

The results of the models 1 to equation 1.6 (Page 42) are reported in the table 5.1.

Table 5.1 Results of Hall's Methodology

Equation	1	1.1	1.2	1.3	1.4	1.5	1.6
Constant		.12 (.26)	-.31 (.57)	-1.41 (-3.34)	0.11 (0.21)	-0.45 (1.6)	-0.07 (-1.29)
C_{t-1}	1.00 (400)						
C_{t-2}		-.26 (-3.00)	0.02 (.49)		-0.05 (-0.28)		
C_{t-3}					0.22 (0.71)		
C_{t-4}					-0.17 (-0.86)		
Y_{t-1}		.96 (.83)		2.35 (1.78)			
Y_{t-2}		-.64 (-0.55)		-0.82 (-.38)			
Y_{t-3}				1.12 (.57)			
Y_{t-4}				-2.50 (-2.11)			
dY_{t-1}			1.93 (1.43)				
M_{t-1}						0.07 (1.7)	
U_{t-1}							0.02 (2.21)
R^2	0.92	.36	.06	0.37	0.02	0.08	0.12

D-W	1.32	1.85	1.45	1.90	1.16	1.45	1.34
LM Stats		0.00	2.08		2.80		
(Probability)		(.99)	(.15)		(.07)		

The figures in parenthesis are t- values

From data in our sample, we are unable to reject the Hall's random walk hypothesis of consumption as no variable other than lagged consumption turns out to be statistically significant. The statistical insignificance of variable means the provision of an evidence of rejection of random walk hypothesis. It means that none of the variables is predictor of current consumption. If the variables had turned significant then the conventional theories of consumption would have been true. The unemployment rate turns significant pointing out the presence of liquidity constraints. The results are in line with Khalid (1994) except for the significance of unemployment rate coefficient .The results seem unexpected for the country like Pakistan where the prevalence of liquidity constraint is expected and the capital markets are imperfect.

One possible explanation could be that the estimated equations may not be true specification of the model. If this is the case then testing the hypothesis needs alternative approach, we estimated a nested model to capture the rival consumption theories. Nesting rival paradigms are attractive because real world seldom conforms to the idealized assumptions. So equation 2 has been estimated using the generalized method of moments.

The results of the equation are reported in table 5.2

$$\Delta C_t = \Delta C_{1t} + \Delta C_{2t} = \lambda \Delta Y_t + (1 - \lambda)\varepsilon_t$$

Table 5.2

Row	Instruments	λ Estimate	t value	S.E coefficient
1	C(-2) C(-3) C(-4) Y(-2) Y(-3) Y(-4)	0.775	2.37	0.32

It is evident from the above that the hypothesis ($\lambda = 0$)is rejected at 5 % level of significance. The fact λ=0.775 providing the evidence for rejection of random walk hypothesis. Since only a small proportion of consumers (0.225) follow the random walk hypothesis and a larger proportion follows the rule of thumb.

The results of the equations 2 and 2.1 are reported in the table 5.3. As Hall assumes that random walk hypothesis is correct and uses the absence of the relation between consumption and real interest rate evident from small value of elasticity.

We begin our analysis of consumption and interest rate by maintaining that random walk hypothesis is correct. So to consider only the rational expectation permanent income consumers, following model is used to estimate the inter-temporal elasticity of substitution.

$$\Delta C_t = \mu + \sigma r_t + \varepsilon_t$$

$$\Delta C_t = \mu + \lambda \Delta Y_t + \theta r_t + \varepsilon_t$$

Table 5.3

	Instruments	σ/θ Estimate (s.e)	t value	Probability
1	C(-2) C(-3) C(-4) Y(-2) Y(-3) Y(-4) R(-2) R(-3) R(-4)	0.004 (0.32)	.60	0.32
2	C(-2) C(-3) C(-4) Y(-1) Y(-2) Y(-3) Y(-4) R(-2) R(-3) R(-4)	0.08	9.80	0.00

The above results show the inter-temporal elasticity to be small at 5 % significance level. When the rule of thumb consumers are incorporated in the model the results are found to be quite different from the first model. The interest coefficient turns significant showing that it is affecting the consumption growth. The results are in line with Weber (1993) and Fuse (2004), which finds consumers have larger reaction to interest rate changes.

The random walk hypothesis is rejected showing the presence of large number of current income consumers in the economy. The reason of rejection as discussed by Flavin (1985) Shea (1995) is the non-fulfillment of the assumption of perfect capital markets leading to liquidity constraints for the agents. The prevalence of liquidity constraint can be checked by using the unemployment rate as proxy. Results are reported in table 5.4

$$\Delta C_t = \alpha_0 + \alpha_1 \Delta U_t + \varepsilon_t$$

$$\Delta C_t = \lambda \Delta Y_t + \alpha_1 \Delta U_t + \varepsilon_t$$

Table 5.4

	Eq. 3 (t-values)	Eq. 3.1 (t-values)
Constant	0.05 (2.73)	
Y		0.99 (2.6)
U	-0.12 (4.64)	-0.11 (4.44)
R^2	0.38	0.36
D.W	1.31	1.33

The results show that unemployment rate is significant and has negative relationship with consumption so showing the excess sensitivity of consumption to the unemployment rate. The findings of the study are consistent with the findings of study by Wilcox (1989) in which the author finds the interest rate and unemployment rate as negatively and significantly related. The D.W results indicate the presence of autocorrelation so the model is estimated including the AR (1) term and the coefficient remains the same showing the robustness of the results. The model with AR (1) term is shown in appendix.

Discussion

Hall (1978) model has been tested in different countries by using micro and aggregate data. The evidence favours the theory in some of the countries while rejected it in others. The present study is conducted on the data of Pakistan and provides the evidence of rejection of Permanent Income Hypothesis and acceptance of the conventional theory of Absolute Income. The unemployment rate is used as proxy for the prevalence of the liquidity constraint in a number of studies.

The reason of rejection of theory can be the failure of the assumption of Random walk model. The Perfection of capital markets is the main assumption of model which means there are no borrowing and lending constraints in the economy. Pakistan is a developing country, where failure of this assumption may be the primary cause of the rejection of theory since majority of the people are constrained by non-availability of easy credit.

The results of excess sensitivity of the consumption toward income, unemployment and interest rate provide the evidence for the presence of liquidity constraints in the economy. In developing countries the observed interest rate may not reflect correctly the cost of holding money as there exist (1) institutional rigidities and regulations which set the interest and discount rates; (2) unorganized money markets which yield substantially higher interest rates;

(3) and immature financial markets which offer a limited range of alternative assets to the wealth holders. So under such conditions, physical assets may represent the most common form of wealth holding.

Likewise the capital market, are under developed. So agents face the credit constraints and are unable to follow the path of consumption as suggested by the rational expectations permanent income hypothesis. So the imperfection of the capital markets can be regarded as reason of rejection of Random Walk hypothesis.

APPENDIX-5A

The Unit root results for all of the variables to be used in the data are reported in the following table:

Variables	**Levels**	**First Difference**	**Conclusion**
	ADF T-test	**ADF T-test**	**I(1)**
Consumption	-0.057791	-3.420834**	I(1)
Income	-1.506052	-2.781691***	I(1)
Money	-0.836554	-3.649962*	I(1)
Interest rate	-4.070536	-7.430310*	I(1)
Unemployment	-1.529204	-4.250397*	I(1)

Note: the Mackinnon critical values of significance at 1%, 5% and 10 % are -3.6289, -2.9472 and -2.6118 respectively. The superscripts *, **, *** show significance at 1%, 5% and 10 % respectively.

Table: Results of the model of liquidity constraint

Variables	Coefficient	t-value	Probability
C	.05	2.01	0.05
D(U)	-0.11	4.49	0.000
AR(1)	.34	2.03	.04
R^2	.45		
D-W	1.7		

CHAPTER 6

SUMMMARY AND CONCLUSION

The present study has analyzed the consumption behavior in Pakistan with reference to the Random walk hypothesis. For this purpose annual data for the period of 1972-2007 has been used. By following the Hall (1978) methodology, that is, regressing consumption on its determinants, the results interestingly reveal that theory is acceptable except for the significance of the unemployment rate which shows the presence of liquidity constraint in the economy. However this result is not robust to further modifications in the model. When a nested model is estimated to find the proportion of consumers supposed to behave according to the rational expectations their number is found to be quite low as compared to the consumers behaving according to Absolute Income Theory , which is about 70%.

In order to verify whether or not liquidity constraint is the primary reason of rejection of the rational expectations permanent income hypothesis; the unemployment rate was used as proxy for the prevalence of liquidity constraint. The results indicated that unemployment has the expected negative relationship with consumption. The estimates of the coefficient of unemployment rate were quite robust to changes in specification of the model. For instance, when changes

in income were incorporated in the model besides the path of unemployment the results remained stable.

POLICY IMPLICATIONS

To achieve economic goals household consumption is affected for which the policy implication of the consumption theories matters a lot, e.g. during the period of high inflation the government is often required to curb household inflation by increase in tax rate. As the Absolute Income Hypothesis states that current consumption depends on current absolute income and the consumption responds to the anticipated and unanticipated changes in income in the same way. As the study has provided the evidence that the economy comprise of large proportion of the agents following the absolute income hypothesis, so the policy implication is that tax cut and subsidy will affect consumption in the current year and magnitude of the effect will depend on marginal propensity to consume.

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