PER CAPITA CONSUMPTION EXPENDITURE AND PERSONAL DISPOSAL INCOME IN INDIA-AN ECONOMETRIC ANALYSIS

Lingaraj Mallik, Kalandi Charan Pradhan
M.Phil Scholars, Department of Economics
Pondicherry University, India
lingaraj.pu@gmail.com & kcpradhan1989@gmail.com

Abstract
The present study has made an attempt to analyze the causal relation between percapita consumption expenditure and personal income in India by applying Granger Causality and Koyck approach has been used to estimate the time period for adjustment of percapita personal consumption expenditure on personal disposal income for the period of 1950 to 1993. Data are extracted from National Accounts Statistics and Central Statistical Organization, Government of India. The study found that there is a unidirectional causality runs from percapita consumption expenditure to personal disposal income in case of India. The Koyck Model extends that the mean lag is 30 percentages which represents percapita personal consumption expenditure adjusts to personal disposal income within a relatively long period of time. We found that one percentage change in percapita disposal income that leads to 16 percentage of response in percapita personal consumption expenditure of the peoples which again extends that the major part of the income has been spend on consumption expenditure of the people in India extending very negligible share in saving.
Key Words: Consumption Expenditure, Granger Causality, Augmented Dickey Fuller Test, Koyck Approach.

INTRODUCTION

The role of saving is portraying very significance influence in promoting the development by accelerating investment throughout the nation. In order to eradicate the very incidence of vulnerability of poverty, unemployment, low per capita income and migration, India needs more social overhead capital and economic development. The saving plays a very significant role development process of the any country. Generally in trivial sense the very need of saving is being determined by the major factor as percapita consumption expenditure of the household in the country. Being a developing nation India experiences a large share of income of the people goes to their consumption expenditure and a very negligible share out of total percapita earning goes to savings in various ways which explores the saving capacity of the country as compared to the other developing country and it is of small portion as other countries having. Saving leads to more investment when it is more than of investment. Countries experiencing high saving ratio are very developed in public expenditure in order to have both economic as well as social upliftment and enable to provide maximum social welfare in the respective country. Here we made an investigation to knowing the saving and expenditure pattern of the people by applying econometric methodologies and the result express that the adjustment of convergence is very high in India.

BRIEF REVIEW OF LITERATURE:

Richard H. Adams JR. and Alfredo Cuecuecha (2010) have focused how the receipt of internal remittances and international remittances affect the marginal spending behavior of house hold. Their study has undertaken in house hold survey, Guatemala, United state. To verify their objectives they have employed multinomial logit model and two stages multinomial selection model. They have collected data from Guatemala Encovi during the period of July to December 2010.The survey included 7245 rural and urban households. They found that, what they received from the remittance, they have spent less at margin on key consumption goods and more at margin on important investment goods

Joseph P.Dejuan, John J Seater (1998) postulated that consumption Euler relations are estimated by consumer expenditure survey without creating a synthetic panel that based on the data during 1986-1991 in US. They have followed households for fifteen months, collecting information about expenditure on durable goods and non durable goods and services, household assets and income and various socio economic variables. They have used Consumption Expenditure Survey (CEX) and PILCH model to test Consumption Euler Equation .From their study, they found that there is no evidence that current income movements cause changes in total consumption of nondurable goods and services or in several subcategories of consumption.

Dikaios E. Tserkezos (1991) has focused on the personal disposable income of the Greek economy in a dynamic quarterly relationship. He has treated distributed lag model to verify his objective. He has taken quarterly data on personal disposable income in Greek from 1966:1 to 1982:4, taking in to account the fact that only annual aggregates are available. In this study he has attempted to disaggregate the annually known personal disposable income of the Greek economy using a missing data technique. These estimates were obtained simultaneously with the parameters of a Koyck-type distributed lag model in which the variable under disaggregation was dependent one.

Helen Darling ,Anthony I.Reeser, Rob McGee, & Sheila Williams(2006) their study has made an attempt on self reported sources of income and expenditure, and association between part time employment and spending on fast food, alcohol, cigarettes and gambling for a sample 3434 of secondary school students(2002). Study has undertaken in the New Zealand (NZ).Here they have applied both logistic and negative binomial regression analysis to verify their objectives. They have concentrated that Spending by youth on above products have a negative health impact. Their study has clearly displayed most young people those were part time employees received money from their parents and associated with the purchasing of alcohol and with an increased amount spent on cigarettes and gambling.

K.D.patterson(1995) in his study has focused on state space approach models of the data measurement process (DMI) and the data generation process (DGP) in order to reduce the root mean square error associated with using preliminary vintages of data on the real personal disposable income as predicator of final vintage. His study based on previously DMP involving 13 vintage of data and applied a model of the DGP which exploits Johnson's cointegration framework. He found that real personal Disposable income are extensive both in time and magnitude, and that preliminary vintages of data are not optimal predicators of the final vintage despite the frequent use made of such data for this purpose.

Adebayo B.Aromolaran(2004) study deals with question of how intra – house hold redistribution of income from men and women compares with increasing total income as strategies for increasing calorie intake among low income household. His study has undertaken in Nigeria. He employed both cluster and random sampling for collection of data. He has taken selected 40 household from each of 12 rural /semi urban communities in 3 of the 6 states that made up South –western Nigeria. Data were collected over a period of 6 months (october1999-march2000). This study investigates how per capita calorie intake in low income households of south western Nigeria respond to changes in total house hold income and women's share of household income. This suggests that wealth redistribution from men to women would not increase per capita food energy intake in low income households in rural south western Nigeria.

Paul Gregg, Jane Waldfogel, Elizabeth Washbrook (2005), their study has remarketed on the question of how the UK government's welfare reforms since 1998 have affected the material well-being of children in low income families. They examine changes in expenditure patterns and ownership of durable goods for low and higher income families between the pre reform period (1995-098) and the post reform period (2000-03), using data from the Family Expenditure Survey. Their data prior to 2001-2002 come from the UK Family Expenditure Survey (FES), a continuous survey of household expenditure and income, in existence since 1957. Their study found that the new evidence of the reforms have helped children in the lowest in families catch up to children in higher income families, in terms of both family expenditure on items used by children as well as family ownership of durable goods those most middle class families now own in higher income

Richard Blundell, Ben Etheridge (2009), suggested that the trends in inequality across income, earnings, and consumption in Britain since 1978.They have taken in to consideration instability nature of inequality growth. They have taken data on family expenditure. For their analysis of income dynamic they draw on panel data from the BHPS. Their study has concluded that the UK has seen significant variation in inequality growth over the last three decades. Income inequality ,for all measures ,rose strongly in the 1980s, with some further rise in the late1990s.Consumption inequality, for all measures, rose quite strongly in the early 1980s and then again, although at a slower rate, in the 1990s.

DATA SOURCES

The study has taken data from National Accounts and Central Statistical Organization based on per capita consumption expenditure and percapita disposal saving for the period of 1950 to 1993 and all data are secondary in nature. The data are all adjusted to 1993 base year for the analysis.

METHODOLOGY

In order to verify the objective, the Koyck model has been employed and to know the causality we used the Granger Causality test propounded by Granger in 1969. Augmented Dicky Fuller test has been applied for data stationary purposes.

Koyck Model

Koyck has proposed an ingenious method of estimating distributed lag models that a geometrically declining scheme for the βs. To understand these consider the distributed lag model.

$$\mathbf{Y_t = \beta_0 X_t + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \ldots\ldots\ldots + \beta_p X_{t-p} + \mu_t}$$

(a) All the *βs* have the same sign; and

(b) The βs decline geometrically as in the following equation:

$$\boldsymbol{\beta i = \beta_0 \lambda^{i}}$$

Where λ takes the values among 0 and 1 and i= 0, 1, 2 …n

The median lag

The median lag is the time required for the first half, or 50 percent, of the total change in Y following a unit sustained change in X. For the Koyck model, the median lag as follow.

Median lag = **- log 2/ log λ.** Thus if λ = 0.2 the median lag is 0.4306, but if λ is accomplished in less than half a period, where as in the latter case it takes more than 3 periods to accomplish the

50 percentage change. Being this contrast should not be surprising, for as we know, the higher the value of λ the lower the speed of adjustment, and the lower the value of λ the greater the speed of adjustment.

The Mean Lag:

Provided all β_k are positive, the mean, or average, lag is defined as:

$$\textbf{Mean lag} = \sum_0^\infty k\,\beta_k \,/\, \sum_0^\infty \beta_k$$

Which is simply the weighted average of all the lags involved, with the respective β coefficients serving as weights. In short, it is a lag-weighted average of time. For the Koyck model the mean lag is: Mean lag = λ/ **1-λ,** thus if λ **= ½,** the mean lag is 1.

THE REGRESSION MODEL

The simple multiple regression is used to solve the first objective which is followed by ordinary least square technique. Ordinary least square express the relation between dependent and independent variables. Under certain assumptions the method of least square has some very attractive stastical properties that have made it one of the most powerful and popular method of regression analysis. Under the least square technique, the random term is determined in such a manner so that it will become as closer as to explanatory variables. We can avoid the scatterness of the error term around the regression with the help of least square method. It can be done by taking the square of the residuals, which will give more weight age to residuals. The econometric model has been framed for the verification of the adjustment of PPCE and PDI in the following way.

$$PPCE = \alpha_1 + \beta_2 PDI + \mu_t$$

Where,

PPCE = Percapita Personal Consumption Expenditure
PDI = Percapita Disposal Income,
μ = Error Term in the model
t = Time period.

Augmented Dicky Fuller Test for stationarity of data:

Unit root test

The key concept underlying time series process is that of stationarity. A time series is stationary when it has the following three characteristics.

1) Exhibits mean reversion in that it fluctuates around a constant long run mean
2) Has a finite variance that is time invariant, and
3) Has a theoretical correlogram that diminishes as the lag length increases.

In its simplest term a time series (Y_t) is said to be stationary if

1) $E(Y_t)$= constant for all t,
2) Var (Y_t) = constant for all t, and
3) Cov (y_t, $yt+_k$) = constant for t and all k≠0

Three possible forms of the ADF test are given by the following equations:

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta Y_{t-1} + \mu_t$$

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta Y_{t-1} + \mu_t$$

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \alpha_{2t} + \sum_{i=1}^{p} {}_i \Delta Y_{t-1} + \mu_t$$

The Granger Causality Test:

In order to find out the influence of PDI on PPCE the Granger Causality Test has been used. Granger test of causality extends that a variable "PDI "causes another variable "PPCE" if the latter can be predicted well from past values of PDI and PPCI than from the past value of Y alone. Similarly PPCE causes PDI if the X variable can be predicted well not only from its past value also from the lagged values of PPCE. If PDI causes PPCI and PPCI does not PDI, then PDI is said to be causing PPCI .unidirectional or one-way causation from PDI to PPCE .If PDI causes PPCI and PPCI causes PDI, then there is said to be bidirectional causality or feedback between them. For an empirical verification of Granger causality test, it is necessary to estimate two regressions of the following from:

$$PPCE_t = \alpha_0 + \sum_{i=1}^{n} \alpha i\ PDI_{t-1} + \sum_{j=1}^{n} PPCE_{t-j} + \mu_{1t}$$

$$PDI_t = \beta_0 + \sum_{i=1}^{n} \beta 2\ PDI_{t-I} + \sum_{j=1}^{n} PPCE_{t-1} + \mu_{2t}$$

Where, PDI_t and $PPCI_t$ are two stationary time series. α_0, α_1, α_2, β_0, β_1 and β_2 are coefficients μ_1 & μ_2 are mutually uncorrelated white noise series. Under the mentioned hypothesis that PDI_t causes $PPCI_t$, the null hypothesis that: $\alpha_1=\alpha_2=0$, which may be rejected in favour of alternative hypothesis that $\alpha_1=0$ and $\alpha_2 \neq 0$.

RESULT AND FINDINGS:

Regression Result

As per the regression result we found that the PDI has a positive impact on PPCE at 5% level of significance as per the probability value (0.0181) and it extends that one percentage change in Personal Disposal Income that leads to 16 percentages changes in Percapita Personal Consumption Expenditure. The adjusted R-Square represents that 13 percentages variation in PPCI due to the independent variable i.e. PDI. The estimated equation has been given below.

$$PPCE_t = 0.0079 + 0.162025\ PDI_t + \mu_t$$
$$[2.46421] \quad + [2.544308]$$
$$(0.0181) \qquad (0.149) \qquad , R^2 = 0.139295,$$

D. W stat=2.262704

The t-statistics represents both constant and slope coefficients are statistically significant. D.W.staistics value of 2.262704 shows there is no significance evidence of autocorrelation present in the model.

Koyck Model estimation:

$$PPCE = \alpha_1 + \beta_2 PDI + \lambda\ PPCE_{t-1} + \mu_t$$
$$PPCE = 1.247372 + 0.685515PDI + 0.0993\ PPCE_{t-1} + \mu_t$$
$$[4.13027] + [4.160765] \quad + [8.962838]$$
$$(0.0002) \qquad (0.0002) \qquad (0.000)$$
$$Adjust\text{-}R^2 = 0.9970,\ SE = 0.009566,$$

The model resulted from a Koyck-type transformation and the λ is 0.0993 which makes the median lag is around 0.30022 and the mean lag is 0.110351. Henceforth it is suggested that PPCE (Percapita Personal Consumption Expenditure adjusts) to PDI (Personal Disposal Income) within a very relatively long period of time in case of India. The adj-R^2 value 0.9970 illustrates

99 percentage of variation due to Percapita personal disposal income and the previous period of percapita personal consumption expenditure of the households. Where the PPCE of the households is only depends on 9 percentages and 68 percentages is due to current PDI. According to probability value all coefficient are significant at 1% level of significance.

The Augmented Dickey Fuller result are reported in the below table-1 which shows all data are non-stationary at level which is depicted in the table and the p-value expresses non-stioanrity of the data. For making stationary we have taken 1st difference which makes stationary at 5% level of significance as per p-value.

Table-1: ADF Test

Variables	Level		First difference	
	't'statistics	Prob. Value	't'statistics	Prob. Value
LOGPPPCI	0.806965	0.9930	-9.4028	0.0000
LOGPDI	3.765900	1.0000	-5.07789	0.0001

In order to know the causal nexus between percapita personal consumption and percapita personal disposal income we have estimated the Granger Causality test which is reported in below table. The result shows that up to lag 6 the causality runs from Personal Percapita Consumption Income to Personal Disposal income. The probability values are significant at 5% level of significance of all 6 lags by rejecting the null hypothesis of not Granger Causes PPCI and PDI but there is no significance evidence of bidirectional causality between percapita personal consumption expenditure and personal disposal income.

Table-2: Granger causality estimation results

H_0	Lags	F-Value	Prob. Value
DLOGPPCI does not Granger Cause DLOGPDI	**2**	7.33502	0.0022
DLOGPDI does not Granger Cause DLOGPPCI	**2**	0.01734	0.9828
DLOGPCCI does not Granger Cause DLOGPPCI	**4**	6.5923	0.0007
DLOGPDI does not Granger Cause DLOGPPCI	**4**	1.16251	0.3476
DLOGPPCI does not Granger Cause DLOGPDI	**6**	3.67709	0.0104
DLOGPDI does not Granger Cause DLOGPPCI	**6**	0.97372	0.4649

CONCLUSION

As per the Koyck Model we estimated that the convergence between PPCE and PDI is very high which extends 30 percentages of variations and for the adjustment and it will take the same percentages in a very long period of time in India. The Granger Causality test reveals that there is a unidirectional casualty runs from PPCE to PDI and there no significant causality detected from PDI to PPCE in India. Up to 6 lags it is estimated that the causality is due to percapita personal consumption expenditure and maximum portion of income has been spend on consumption due to low percapita income of the people. The regression result shows that there is 16 percentages of changes in percapita personal consumption expenditure due one percentage changes in percapita disposal income of the people. Hence forth according to the empirical result maximum share is being spent on consumption and it leads to a high convergence between Per capita personal consumption expenditure and personal disposal income of the people.

REFFERNCES

Adebayo B.Aromolarn (2004), “Household income, women’s income share and food calorie intake in South Western Nigeria” Journal of food policy29 (2004) pp507-530

Damodar N.Gujurati & Sangeetha,” Basic Econometrics, Forth edition. Mc Graw Hill.

Demetrious Austeriou,” Applied Econometrics: A modern approach Using Eviews and Micro fit.

Dikaios E. Tserkezos (1991) “A distributed lag model for quarterly disaggregation of the annual personal disposable income of the Greek economy” Economic modeling 1991.

Enders, W. (1995) “Applied Econometric Time Series”, John Willey and Sons, New York

.Hamilton, (2003) “Time Series Econometrics”, Princeton

Helen Dralling, Anthony I.Reeder, Rob McGee,and Sheila Williams (2006), “Brief report: Disposable income, and spending on fast food, alcohol, cigarettes , and gambling by New Zealand secondary school students”, Journal of Adolescence 29(2006)\pp 837-843.

Joseph P.Dejuan, John J Seater (1998) “The permanent income hypothesis: Evidence from the consumer expenditure survey” Journal of Monetary Economics 43(1998) PP 351-376.K.D.Patterson (1995), “Forecasting the final vintage of real personal disposable income: A state space approach”, International Journal of Forecasting 11(1995) pp395-405.Paul Gregg, Jane Waldfogel, Elizabeth Washbrook (2006), “Family expenditures post-welfare reform in the UK: Are low- income families starting to catch-up?” Journal Labour Economics 13(2006) pp721-746.

Richard H. Adams JR. and Alfredo Cuecuecha (2010), “Remittances, Household Expenditure and Investment in Guatemala” Journal of world development vol.38, No.11, pp. 1626-1641, 2010.Richard Blundell, Ben Etheridge (2010), “Consumption, income and earnings inequality in Britain” Review of Economic Dynamics 13(2010)76-102.