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# Verification of Absolute Income Hypothesis in Nepalese Context

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**Abstract**

The present study aimed at verification of Keynes' Absolute Income Hypothesis (AIH) in Nepalese context by using the annual data sets of real consumption and real disposable income over the period 1974/75-2019/20 employing the econometric methodology like Johansen's cointegration test, ARDL models, vector error correction models, FMOLS models and variance decomposition. In short run, the Keynesian postulate 'APC diminishes with the increase in disposable income' was inapplicable, but another postulate 'APC is less than MPC in short run' was valid. It means the Keynesian AIH is found to be partially applicable. Johansen's cointegration test demonstrated the long run equilibrium relationship between consumption and disposable income. The ARDL models suggest that current real consumption is determined by real disposable income in preceding time. The vector error correction models exposed that short run and long run shocks in disposable income significantly affected consumption in the long run. The FMOLS models also evidenced the positive relationship between the variables, in which rise in disposable income in the preceding time caused current consumption to increase. Finally, the variance decomposition indicated that both consumption and disposable income contributed in the variation of consumption. In the long run, 24 percent of the variation in consumption was contributed by consumption itself and 76 percent by disposable income. Present study throws light in policy perspective that government of Nepal is required to launch employment and income generating programs to increase income and hence encourage consumption. Additionally, more investment is required in industrialization and income equality is required to be maintained through progressive tax system.

*Key Words*: absolute income, APC, MPC, cointegration, variance decomposition
*JEL Classification:* B22, B4, C22, C52

## Introduction

Consumption is simply defined as the total demand for all consumer goods and services. Anyanwu (1995) and, Frank & Bernanke (2001) defined consumption as the spending by households on goods and services such as clothing, food items, entertainment, health services and acquisition of assets among others. Consumption expenditure constitutes the largest proportion of the Gross Domestic Product in most countries. According to Muellbauer & Lattimore (1994), consumer expenditure accounts for between 50% and 70% of spending in most economies. According to Keynes, an economic agent by natural instinct, tends as a rule and on the average, to increase his consumption as his income rises, but not by as much as the increase in his income. In his work on the relationship between income and consumption, he came out with the finding that income is the sole determinant of consumption (Tsenkwo,2011). This relationship between income and consumption is popularly known as consumption function.

The consumption function occupies vital role in macroeconomic theory in confirming the relationship between consumption and income. Consumption function has played key role in economic theory since Keynes introduced Absolute Income Hypothesis (AIH) from The General Theory. English economist John Maynard Keynes proposed the Absolute Income Hypothesis as part of his work on the relationship between income and consumption. He stated that consumption is a function of income. If income rises, consumption will also rise but not necessarily at the same rate. Absolute income hypothesis was much refined during the 1960s and 1970s by Tobin (1975). In its developed form, absolute income hypothesis is still generally accepted. Keynes' General Theory in 1936 identified the relationship between income and consumption as a key macroeconomic relationship (Keynes, 1936). Keynes asserted that real consumption ($C_t$) is a function of real disposable income ($Y_t^d$). As income rises, consumption will also rise but not necessarily at the same rate. When applied to a cross section of a population, rich people are expected to consume a lower proportion of their income than poor people.

$$C_t = \alpha + \beta Y_t^d + \varepsilon_t \qquad (0< \beta <1) \qquad (1)$$

Equation (1) holds that absolute consumption is the sum of autonomous consumption ($\alpha$) , induced consumption ($\beta Y_t^d$), and some error terms ($\varepsilon_t$). The coefficient $\beta$ represents marginal propensity to consume (MPC). MPC determines by what amount consumption will change in response to a change in income. While this theory has success in modeling consumption in the short term, attempts to apply this model over a longer time frame have proven less successful. This has led to the absolute income hypothesis falling out of favor as the consumption model of choice for economists.

The consumption function, a key behavioral relationship in macroeconomics, was introduced by Keynes (1936), has no precise functional formulation of the propensity to consume (in his original terminology), his analysis has come to be associated with a simple version of the consumption function that embodies only the more quantitative aspects of his considerations, popularly known as the simple Keynesian consumption function or absolute income hypothesis (AIH). The AIH is readily described using four propositions expressed in terms of the marginal

propensity to consume (MPC) and the average propensity to consume (APC), where the MPC is the change in real consumption for a unit change in real disposable (after-tax) income, and the APC is the ratio of consumption to real disposable income. The AIH asserts that (i) real consumption is a stable function of real disposable income, (ii) MPC is a positive fraction, (iii) MPC is less than the APC in short run, and the APC declines as income rises, (iv) APC tends to be equal to MPC in the long run, and (iv) MPC declines as income rises.

It should also be noted that the AIH predicts a simple positive relationship between consumption and income, such that the two should not move in opposite directions, nor one change and not the other. However, data shows the two variables disobey this suggested relationship, the most prevalent of such irregularities involving an increase in consumption with a decrease in income, which the AIH is unable to account for. Moreover, the AIH consistently under predicted consumption for the mid-twentieth century. This is partly explained by noting that during and immediately following World War II (1939-1945), increases in income could not be translated into increased expenditure due to rationing, forced holdings of liquid assets being subsequently converted into increased consumption demand following the relaxation of rationing. Such reasoning suggests that assets, and thereby wealth, may be a significant consumption determinant, and gave rise to modern theories of consumption, such as the life-cycle hypothesis (Modigliani & Brumberg 1954; Ando & Modigliani 1963) and the permanent income hypothesis (Friedman 1957), which emphasized the role of wealth and other factors in explaining the paradoxes noted above.

The Keynesian AIH asserts that current real consumption is determined by current real disposable income of households and consumption is a stable function of disposable income. This theoretical version of Keynes can be taken as a narrow concept in empirical perspectives. The current consumption is determined not only by absolute level of disposable income but also by a number of factors like price level, expected prices, rate of interest, position of income distribution in the society, permanent income of households and so on. If other factors are held unchanged and consumption is taken as the function of disposable income alone, the AIH postulated by Keynes is claimed to be still incomplete in econometric point of view.

Current consumption is determined not only by current disposable income but also by lagged values of disposable income of the preceding time periods. A big research gap is found between Keynesian theoretical AIH and empirical analysis of income-consumption relation. Moreover, if real current consumption is taken as the function of current real disposable income without avoiding the influence of time and as econometric tools are handled, the regression results will be spurious with no meaningful interpretation, because the data on consumption and disposable income are the time series data. This is another important research problem of Keynesian AIH.

Different types of research gaps as mentioned above exist in the then Keynesian AIH. However, the present paper tries to bridge one of the research gaps of influence of time by using the stationary data of real consumption and real disposable income. The present paper aims at verification whether Keynes' AIH is applicable in Nepalese context.

## Literature Review

This section includes the brief theoretical review of basic Keynesian Absolute Income Hypothesis along with the subsequent consumption hypotheses. Additionally, some other empirical findings in the favor and disfavor of Keynesian AIH are also reviewed.

Keynes (1936) postulated the Keynes psychological law popularly known as the absolute income hypothesis (AIH). The law states that current consumption expenditures is a function of current disposable income and that as income increases, consumption expenditure increases but by less than proportionately. According to him, the marginal propensity to consume (MPC) is less than the average propensity to consume (APC) and APC falls as income increases.

Based on these specifications, according to Keynes, if we consider the fact that a consumer considers her disposable income when deciding how much to consume, we actually consider her net income. Thus, the AIH states that the real consumption is a function of real income (real disposable income). In other words, what determines the real consumption level is the real income. Here, MPC was expected to be constant and close to one, and the autonomous consumption, was expected to be small and positive (Fernandez-Corugedo, 2004).

The earlier studies, testing the validity of the theory presented evidences supporting the AIH (Friedman, 1957). However, the first contradiction with Keynes' AIH was presented in Kuznet (1946) paper, where he investigated consumption and saving by using a sample period of 1869-1936. In that study, Kuznet stated that though there were substantial improvements in the GDP, APC was rather stable. These findings were in contradiction with the AIH stating that as income increased, APC was expected to be decreasing. Studies testing the validity of AIH, using household data and short-term data, presented evidence in support of AIH. In some studies where household consumption is investigated, the researchers have presented evidence showing that households with more income had more consumption, which can be regarded as an evidence of MPC being positive as stated by AIH. Thus, the authors have concluded that Keynes‟ AIH could be used in the estimation of consumer behavior (Pehlivan & Utkulu, 2007). In another study, Davis (1952), using the US annual real consumption and real disposable income data over the 1929-1940 period has presented evidences not contradicting with AIH. However, in the following periods, more studies presented evidences showing that, when tested with long term annual data, the consumption function appeared to be mis-specified, which is commonly called as 'the consumption puzzle' (Mankiw, 1992).

The Relative Income Hypothesis (RIH) developed by Duesenberry (1948), based on psychological factors, states that consumption, in contradiction to AIH, is not only a function of real income, but also a function of highest past income level. According to Duesenberry, the consumption decisions of individuals are not independent of each other and thus consumption should be studied from a psychological and social point of view.

On the other hand, the Permanent Income Hypothesis (PIH) developed by Friedman (1957), assumes the consumers want to maximize not only their current but also life time utility, and focuses on the optimization of this issue. PIH separates consumption and current expenditure and also income and current receipts. According to PIH, the permanent component of

consumption is a function of permanent component of income. According to Friedman, temporary income changes do not change temporary consumption; therefore, consumers decide their level of consumption based on their permanent income levels. And thus, since the temporary consumption in aggregate is zero, the observed consumption is equal to the permanent consumption.

The last hypothesis is the Life Cycle Hypothesis (Modigliani, 1966). LCH also considers consumers trying to maximize their life time utility, but also takes into account the evolution of household consumption and income. The most important difference from PIH is that LCH assumes finite life of households. According to LCH, when consumers decide how much to consume in the current period, they take into account their expectations regarding the future (Sachs & Larrain, 1993).

Different empirical researches associated with income-consumption relation with reference to AIH are available in macroeconomic and macro-econometric literature. For example, Adedotun (1978) showed positive correlation between consumption expenditure and per capita income in Nigeria. On the other hand, Uwujaren (1977) concluded that consumption in Nigeria is a function of current and permanent income. His study relates Friedman Permanent Income Hypothesis In a similar vein, Iyoha (2001) has perceived consumption as a function of disposable income and lagged value of income.

Robinson & Marinucci (2001) tested for cointegration for consumption and income, and provided evidence that they are cointegrated, where the order of integration for the residuals is found to be higher than 0.5 but smaller than one. Lettau & Ludvigson (2001), by using quarterly US aggregate consumption and labor income data, provided evidence suggesting that the two variables are cointegrated. Hualde & Robinson (2002) investigated cointegration for consumption and income. Gil-Alana (2003), using UK and Japan data, investigated cointegration for consumption and income and the test regarding the order of integration of the residuals provided results suggesting the variables may be fractionally cointegrated, where the order of integration of residuals are greater than 0.5 but smaller than one. Slacalek (2005), using a sample group of 26 industrial countries, provided evidences supporting the hypothesis that consumption and disposable income are cointegrated. Rudd & Whelan (2006) investigated consumption and labor income and concluded no cointegration between the variables, when tested with a sample of postwar US data. Dreger & Reimers (2006) investigated the relationship between private consumption and disposable income, using a sample of EU countries and stated that their evidence on the cointegration of these variables is ambiguous.

## Research Methodology

### Data and Variables

The present study is based on empirical analysis that employs the secondary data of GDP, consumption and direct tax covering the period from FY 1974/75 to FY 2019/20. The necessary data for the present study have been taken from Economic Survey (various issues), Ministry of Finance (MOF). The nominal data sets are converted into real terms with the help of GDP deflator with base year 2000/01. Consumption and disposable income in real terms transformed

into natural logarithm hereafter are denoted by $LnC_t$ and $LnY_t$ respectively, which are the variables in the present study.

**Methodology**

Present study employs econometric methodology to verify the Keynesian AIH in Nepalese context. Various econometric test used in the study are: Phillips-Perron unit root test, Johansen's cointegration test, ARDL bound test, vector error correction (VECM) models, fully modified ordinary least square (FMOLS) under cointegrating regression, and variance decomposition. These econometric tests and models used in the present study are summarized below.

***Phillips-Perron (PP)Unit Root Test***

Phillips & Perron (1988) propose an alternative (nonparametric) method of controlling for serial correlation when testing for a unit root. The PP method estimates the non-augmented Dickey Fuller test equation $\Delta y_t = \alpha y_{t-1} + x_t'\delta + \varepsilon_t$ and modifies the $t$-ratio of the $\alpha$ coefficient so that serial correlation does not affect the asymptotic distribution of the test statistic. Where $y_t$ is the variable under study, $x_t$ is the optional exogenous regressors which may consist of constant, or a constant and trend $\tilde{t}_\alpha$and $\varepsilon_t$ is the white noise error term. The PP test is based on the statistic: (Eviews 7, User's Guide)

$$\tilde{t}_\alpha = t_\alpha\left(\frac{\gamma_0}{f_0}\right)^{\frac{1}{2}} - \frac{T(f_0-\gamma_0)(se(\hat{\alpha}))}{2f_0^{\frac{1}{2}}s} \quad (2)$$

where $\hat{\alpha}$ is the estimate, $t_\alpha$ the t-ratio of $\alpha$, $se(\hat{\alpha})$ is the coefficient standard error of the test regression, $\gamma_0$ is a consistent estimate of the error variance and the remaining $f_0$ an estimator of the residual spectrum at frequency zero. Finally, $T$ represents number of observations.

There are two choices we will have make when performing the PP test. First, we must choose whether to include a constant, a constant and a linear time trend, or neither, in the test regression. Second, we will have to choose a method for estimating $f_0$. The null hypothesis for PP unit root test is 'variable has unit root'. If null hypothesis is not rejected, the variable will have unit root and it is said to be non-stationary variable. On the other hand, if null hypothesis is rejected, the variable will be stationary.

***Johansen's Cointegration Test***

The present study has employed the Johansen & Juselius (1990) test for finding the long run equilibrium relationship between consumption and disposable income. This procedure proposes Maximum likelihood (ML) estimation and evaluates multiple cointegrating vectors. Through maximum Eigen value test and trace-statistic, the number of cointegrating vectors are examined under Johansen's method. The maximum Eigen-value test is given by equation (3)

$$\lambda_{max} = -Tln(1-\lambda_{r+1}) \quad (3)$$

where $\lambda_{max}$ is the maximum Eigen-value test, $\lambda_{r+1\ldots\ldots\lambda_n}$ are the $n-r$ smallest squared canonical correlations and $T$ is the number of observations.

The trace statistic is given by equation (4).

$$\lambda_{trace} = -T\sum \ln(1-\lambda_i) \quad (4)$$

***Autoregressive Distributed Lag Model***

A distributed lag model is a model for time series data in which a regression equation is used to predict current values of a dependent variable based on both the current values of an explanatory variable and the lagged values of this explanatory variable. Autoregressive Distributed Lag (ARDL) cointegration technique or bound test of cointegration Pesaran & Shin, (1999), Pesaran, Smith & Shin (2001) and, Johansen & Juselius (1990) cointegration techniques have become the solution for determining the long run relationship between series that are non-stationary.

The autoregressive distributed lag approach is demonstrated by using an $ARDL(p,q)$ regression with an $I(d)$ regressor for the dependent variable ($LnC_t$) and explanatory variable ($LnY_t$),

$$LnC_t = \gamma_0 + \beta_1 LnC_{t-1} + \cdots + \beta_p LnC_{t-p} + \theta_0 LnY_t + \theta_1 LnY_{t-1} + \cdots + \theta_q LnY_{t-q} + \varepsilon_t \quad (5)$$

*(*where p and q are the lags of the variables $\mathrm{LnC_t}$ and $\mathrm{LnY_t}$ respectively and these lags may not necessarily be of the same order, $\mathrm{t} = 1,2,\ldots\ldots\mathrm{T}$ and $\varepsilon_t \sim \mathrm{iid}(0,\sigma^2)$)

***Vector Error Correction Models (VECM)***

A vector error correction (VEC) model is a restricted VAR designed for use with nonstationary series that are known to be cointegrated. The VEC has cointegration relations built into the specification so that it restricts the long-run behavior of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. The cointegration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments.

VEC models are useful for estimating both short-term and long-term effects of one time series on another. The term error-correction relates to the fact that last-period's deviation from a long-run equilibrium, the error, influences its short-run dynamics. Thus, ECMs directly estimate the speed at which a dependent variable returns to equilibrium after a change in other variables.

The estimable VEC models in case of bi-variate time series consumption and disposable income are given by equations (6) and (7).

$$\Delta LnC_t = \gamma_1 + \rho_1 Z_{1t-1} + \sum_{i=1}^{n} \alpha_i \left(\Delta LnC_{t-i} + \Delta LnY_{t-i}\right) + \varepsilon_{1t} \quad (6)$$

$$\Delta LnY_t = \gamma_2 + \rho_2 Z_{2t-1} + \sum_{i=1}^{n} \beta_i \left(\Delta LnC_{t-i} + \Delta LnY_{t-i}\right) + \varepsilon_{2t} \quad (7)$$

where, $\Delta LnC_t$ first difference of consumption in log form, $\Delta LnY_t$ the first difference of disposable income in log form, $Z_{1t-1}$, $Z_{2t-1}$ are the first lag of error terms in equation (5) and (6) respectively and $\gamma_1$ and $\gamma_2$ are intercepts, $\alpha_i$ and $\beta_i$ are the coefficients of lagged variables and finally, $\rho_1$ and $\rho_2$ are the coefficients of error correction terms in equations (5) and (6) respectively.

***Fully Modified Ordinary Least Square Models (FMOLS)***

Phillips & Hansen (1990) propose an estimator which employs a semi-parametric correction to eliminate the problems caused by the long run correlation between the cointegrating equation and stochastic regressors innovations. The resulting Fully Modified OLS (FMOLS)

estimator is asymptotically unbiased and has fully efficient mixture normal asymptotic allowing for standard Wald tests using asymptotic Chi-square statistical inference.

FMOLS method employs kernel estimators of the nuisance parameters that affect the asymptotic distribution of the OLS estimator. For asymptotic efficiency this method modifies least squares to account for serial correlation effects and test for the endogeneity in the regressors that result from the existence of a cointegrating relationship (Aljebrin, 2012). Once the variables under study are cointegrated, the effect of independent variable on dependent variable can be explored directly using Eviews econometric software. It is, therefore, the models for FMOLS are not mentioned here.

***Variance Decomposition***

The Variance Decomposition also referred to as the Forecast variance decomposition, essentially denotes the breakdown of the forecast error variance for a particular time horizon. Explicitly, the Variance Decomposition separates the variation in an endogenous variable into the component shocks to the VAR/VECM. In essence, this analysis provides information about the relative importance of each random innovation in affecting the variables in the VAR/VECM (Ludi & Ground, 2006; Georgantopoulos, 2012). Also, the Variance Decomposition can reveal which variables in the model has short term or long-term impacts on another variable of interest.Therefore, the main reason to conduct the variance decomposition is to obtain information about the relative significance of each random innovation in affecting the variables in the estimated model (Meniago, Mukuddem-Petersen, Petersen, & Mah , 2013).

## Results and Discussion

### Average Propensity to Consume (APC) and Marginal Propensity to Consume (MPC)

Whole study period has been divided into five sub-periods and the APC in these sub-periods are presented through Table 1. The time series data for both disposable income and consumption are found increasing with respect to time. It means, rise in disposable income caused consumption to increase. However, the APC in different sub-periods are found increasing until 2013/14 and after that it is found decreasing. The Keynesian postulate, ‘rise in disposable income causes consumption to increase’ is found valid but APC should diminish with the increase in income in accordance with Keynesian view. Hence, the trend of APC failed to follow the Keynesian view during the study period.

The average of the APC is found to be 0.91 and MPC 0.89. The MPC is less than all short run APCs. The Keynesian postulate, ‘MPC is less than APC in short run’ is found valid during the study period. The Keynesian view, ‘APC equals MPC in the long run’ is found inapplicable in Nepalese economy during the study period. It can be concluded that the Keynesian ‘Absolute Income Hypothesis’ is partially applicable in the economy of Nepal.

**Table 1**

*Calculation of Short Run APC*

| Sub-Periods | APC |
|---|---|
| 1974/75-1983/84 | 0.90 |
| 1984/85-1993/94 | 0.91 |
| 1994/95-2003/04 | 0.92 |
| 2004/05-2013/14 | 0.94 |
| 2014/15-2019/20 | 0.91 |

Income-consumption causality with the help of APC and MPC alone is not sufficient and complete in the present context. A number of tests are available in the econometrics to show the causal relationship between income and consumption and verify the Absolute Income Hypothesis. Some of the key econometric test have been performed in the present study. Results from these econometric tests are presented below.

**Results from Phillips-Perron Unit Root Test**

The results from Phillips-Perron unit root test are presented through Table 2.

**Table 2**

*Phillips-Perron Unit Root Test*

| Variables | PP test statistic | Test critical value at 5 % level | Probability |
|---|---|---|---|
| $LnY_t$ | 3.9969 | -1.9483 | 1.0000 |
| $\Delta LnY_t$ | -2.5026 | -1.9484 | 0.0135 |
| $LnC_t$ | 17.1600 | 1.9483 | 1.0000 |
| $\Delta LnC_t$ | -6.5108 | -1.9484 | 0.0000 |

(a) $H_0$: *variable has unit root (b) Exogenous: none (c) Bandwidth: Newey-West automatic-using Bartlett Kernel*

From Table 2, it is observed that the variables $LnY_t$ and $LnC_t$ are not significant at level forms as reported by the corresponding probability values at 5 % level of significance. The null hypothesis for both variables is not rejected. Hence, these variables are non-stationary at level forms. However, the null hypothesis for both variables are rejected at their first differences implying that both variables are stationary at first difference. Hence, both variables $LnY_t$ and $LnC_t$ are $I(1)$.

**Johansen's Cointegration Test**

Before carrying out the Johansen's cointegration test, it is necessary to identify the appropriate lag length. There are various criteria for selecting the lag length such as FPE, AIC, SC and HQ. The endogenous variables $LnY_t$ and $LnC_t$ are found to be significant at lag 1 as reported by all of these criteria. Hence, lag 1 is selected for each endogenous variable in their autoregressive and distributed lag structure in estimable cointegrating equations, ARDL models and Vector Error Correction models.

***Results from Johansen Cointegration Test***

The Johansen method of cointegration is based on maximum-eigen and trace statistic value. Results of the tests are being given by the Table 3 and Table 4.

**Table 3**

*Test based on Maximum Eigen Value ($\lambda_{max}$)*

| Null Hypothesis | Alternative Hypothesis | Eigen-Values ($\lambda_i$) | Max-Eigen Statistic ($\lambda_{max}$) | 0.05 Critical Value |
|---|---|---|---|---|
| $r = 0$* | $r = 1$ | 0.4492 | 26.2429 | 14.2646 |
| $r \leq 1$ | $r = 2$ | 0.0302 | 1.3521 | 3.8414 |

*Endogenous Variables: $LnY_t$ and $LnC_t$ Order of VAR = 1 * Denotes the rejection of the hypothesis at 0.05 level, Maximum eigen-value test indicates 1 cointegrating vector, i.e. r =1 at 0.05 level.*

Using first order VAR of the two variables under investigation, the hypotheses of $r = 0$ is uniformly rejected in favor of the alternative hypothesis $r = 1$ and second null hypothesis $r \leq 1$ is not rejected employing the maximum eigen-value test as reported by the 4th column of Table 4. This implies that there is 1cointegrating vectors ($r = 1$).

Turning to the trace test as reported by Table 4, the null hypotheses $r = 0$ is rejected and second null hypothesis $r \leq 1$ is not rejected at 5 percent level of significance implying 1 cointegrating vectors.

**Table 4**

*Test based on Trace Statistic ($\lambda_{trace}$)*

| *Null Hypothesis* | *Alternative Hypothesis* | *Eigen-Values ($\lambda_i$)* | *Max-Eigen Statistic ($\lambda_{max}$)* | *0.05 Critical Value* |
|---|---|---|---|---|
| $r = 0$* | $r = 1$ | 0.4492 | 27.5950 | 15.4947 |
| $r \leq 1$ | $r = 2$ | 0.0302 | 1.3521 | 3.8414 |

*Endogenous Variables: $LnY_t$ & $LnC_t$ Order of VAR = 1, *Denotes the rejection of the hypothesis at 0.05 level, Maximum eigen-value test indicates 1 cointegrating vector, i.e. r =1 at 0.05 level.*

Thus, on the basis of both maximum eigen-value test as well as trace statistic, the consumption and disposable income for economy of Nepal are found to be cointegrated during the study period. It means there is long run equilibrium relationship between disposable income and consumption in Nepal.

***Autoregressive Distributed Lag (ARDL)***

The results from $ARDL(p,q)$ have been presented through Table 5, in which $C_t$ is taken as dependent variable, and $LnC_t$ and $LnY_t$ with lagged $p = 1$ and $q = 0,1$ as explanatory variables. Both variables (dependent and explanatory) under study are non-stationary, I(1). The Akaike Information Criteria (AIC) is used to select suitable lag under ARDL model. Among the twenty alternative models evaluated, the value of AIC at ARDL (1,1) is found to be minimum (-2.957).

**Table 5**

*Results from ARDL $(p,q)$ Model with $LnC_t$ as Dependent Variable*

| Explanatory Variables | Coefficients | Standard Errors | t-Statistic | Probability |
|---|---|---|---|---|
| $LnC_{t-1}$ | $\beta_1$ = 0.0459 | 0.1513 | 0.3039 | 0.7627 |
| $LnY_t$ | $\theta_0$ = 0.2443 | 0.1242 | 1.9669 | 0.0560 |
| $LnY_{t-1}$ | $\theta_1$ = 0.7221 | 0.1720 | 4.1980 | 0.0001 |
| $\gamma_0$ | $\gamma_0$ = -0.1838 | 0.1439 | -1.2775 | 0.2086 |

$R^2$ = 0.9931, $\hat{R}^2 = 0.9926$, F-statistic = 1979.485, Probability (F-statistic) = 0.0000

The coefficient of current disposable income ($LnY_t$) is significant only at 10 % level revealing that current real disposable income has the little impact on current real consumption. However, the coefficient of disposable income of preceding time ($LnY_{t-1}$) is positive and significant at less than 1 % level as reported by t-statistic and corresponding probability value. The value of the coefficient is $\theta_1$ = 0.7221, which indicates that 10 % increase in real disposable income in preceding time has caused real consumption of current time to increase by 7.2 %. The value of $\hat{R}^2$ is 0.9926, implying 99.26 % of the variation in real consumption is explained by real disposable income, hence it represents the goodness of fit of the model. The F-statistic of the calculated result is also significant sufficiently. Thus, the ARDL model reveals cointegration between real consumption and real disposable income in Nepalese economy during the study period.

After employing ARDL model, our next job is to verify the cointegration between two variables $LnC_t$ and $LnY_t$ through ARDL bound test. Table 6 portrays the results from ARDL bound test.

**Table 6**

*Results from ARDL Longrun form and Bound Test*

| Description | Value | Level of Significance | $I(0)$ | $I(1)$ |
|---|---|---|---|---|
| | | | Asymptotic: $N = 1000$ | |
| F-statistic | 20.45 | 10 % | 3.02 | 3.51 |
| $k$ =1 | | 5 % | 3.62 | 4.16 |
| | | 2.5 % | 4.18 | 4.79 |
| | | 1 % | 4.94 | 5.58 |

$H_0$: *No level relationship* *Included Observation: T = 45*

Table 6 suggests that the F-statistic with degree of freedom $T - k = 44$ is 20.45, which is greater than all critical values at $I(1)$. The null hypothesis is strongly rejected at 5%, 2.5% and

1% level of significance. Hence, there exists level relationship between the variables, real consumption and real disposable income. The ARDL bound test also supports the cointegration between the variables under study.

***Vector Error Correction (VEC) Models***

These models are useful for estimating both short run and long run effect of disposable income on consumption and consumption on disposable income. Table 7 reveals the results from VEC models.

**Table 7**

*Vector Error Correction Estimates*

| Explanatory Variables | Dependent Variable: $\Delta LnC_t$ | Dependent Variable: $\Delta LnY_t$ |
|---|---|---|
| | Coefficient with std. error and t-stat | Coefficient with std. error and t-stat |
| Constant | 0.0426<br>(0.2234)<br>[ 2.4936*] | 0.0562<br>(0.0202)<br>[ 2.7783*] |
| (ECT) | -0.9914<br>(0.0360)<br>[-4.4366*] | 0.4873<br>(0.2641)<br>[ 1.8448] |
| $\Delta LnC_{t-1}$ | 0.1238<br>(0.1595)<br>[ 0.7761] | -0.2665<br>(0.1886)<br>[-1.4134] |
| $\Delta LnY_{t-1}$ | -0.0984<br>(0.3585)<br>[-0.2746] | -0.1946<br>(0.4238)<br>[-0.4592] |

**(**) indicates statistical significance at 1% (5%) level, figures in ( ) and [ ] represent std. error and t-statistic respectively.*



From table 4, it is observed that

(i) With $\Delta LnC_t$ as dependent variable, the coefficient of ECT is found to be significant at 1 % level, which indicates that the short run shocks significantly affect the long run relationship between consumption and disposable income.

(ii) The negative value of coefficient of ECT indicates that $LnC_t$, following any positive short run shocks, declined. Consequently, the short run shocks appeared to pull down the $LnC_t$ below the long run equilibrium level.

(iii) The absolute value of the coefficient of ECT is lower than unity, which implies that $C_t$ converges to the long run equilibrium level following the short run shocks. Thus, long run relationship between $LnC_t$ and $LnY_t$ is found to be stable.

The VEC models, thus, imply that short run shocks in disposable income has the effect on consumption and the long run relationship between consumption and disposable income is found to be stable.

***Results from Fully Modified Ordinary Least Square Models (FMOLS)***

Using FMOLS regression with trend specification 'none', the regression results are given by equation (8) as:

$$\Delta LnC_t = 0.0414 + 0.0621\Delta Y_t \quad \text{[t-stat:0.6975] (probability: 0.4893)} \qquad (8)$$

The FMOLS regression, with trend specification 'constant', portrayed the insignificant coefficient of $\Delta Y_t$ at 0 lag and, other trend specification like 'linear trend' and 'quadratic trend' also gave the insignificant coefficient. However, employing maximum lag 1, FMOLS cointegrating regression reveals the results as exhibited by Table 8.

***Table 8***

***Results from FMOLS Model with $C_t$ as Dependent Variable***

| Explanatory Variables | Coefficients | Standard Errors | t-Statistic | Probability |
|---|---|---|---|---|
| $\Delta \mathrm{LnY_t}$ | 0.1094 | 0.0898 | 1.2184 | 0.2302 |
| $\Delta Ln\mathrm{Y_{t-1}}$ | 0.6906 | 0.2253 | 3.0643 | 0.0039 |
| Contant | 0.0102 | 0.0127 | 0.7981 | 0.4295 |

*(Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)*

The coefficient of $\mathrm{LnY_{t-1}}$ is 0.6906, which is positive and significant at less than 1 % level. This coefficient represents long run income elasticity of consumption, which means 10 % rise in real disposable income in the preceding period causes current real consumption to increase by 6.9 %. The FMOLS test implies that current consumption is determined by income of the preceding period. This result suggests that current consumption behaviors of individuals are affected by past income. If individuals could generate more income in the previous period, then they now tend to spend more in consumption in the current time.

***Results from Variance Decomposition***

The variance decomposition requires stationary time series in the VAR specification. The time series under study are $I(1)$. For VAR specification, it is necessary to select suitable lag for each endogenous variable $\Delta LnY_t$ and $\Delta LnC_t$, we have selected Akaike Information Criterion (AIC). In accordance with AIC, each endogenous variable is significant at lag 3. Hence, lag 3 is selected as the suitable lag for VAR specification.

Table 9 portrays the results from variance decomposition $\Delta LnY_t$ and $\Delta LnC_t$ on $\Delta LnC_t$ of 15 periods. The table exhibits the numerical percentile decompositions of $\Delta LnC_t$ contributed by the variables $\Delta LnC_t$ itself and $\Delta LnY_t$. Variations in consumption for $1 \leq t \leq 2$ are approximately 26 % by shocks transmitted through income channel and remaining 74 % by consumption itself. However, after period 2 the contributions of consumption are found to be declining and that of income are found to be increasing. At period 5 to period 10, the contributions of consumption variations by themselves are reduced to 30 % and by income increased to 70 %.

When period 15 is reached, the consumption variations of Nepalese economy by themselves are reduced to 24 % and by income increased to 76 %. In the long run, variations in consumption are due to the consumption itself and disposable income. This implies that consumption varies due to the variations of both consumption and disposable income. During the study period of long run, consumption itself contributed approximately one-fourth and that disposable income three-fourth in total variations of consumption.

***Table 9***

*Variance Decomposition of Disposable Income and Consumption on Consumption*

| Period | Standard Error | $\Delta C_t$ | $\Delta Y_t$ |
|---|---|---|---|
| 1 | 0.063602 | 100.0000 | 0.000000 |
| 2 | 0.081457 | 74.38538 | 25.61462 |
| 3 | 0.091326 | 59.99498 | 40.00502 |
| 4 | 0.094451 | 56.09429 | 43.90571 |
| 5 | 0.097323 | 53.58959 | 46.41041 |
| 6 | 0.109062 | 43.20080 | 56.79920 |
| 7 | 0.117290 | 37.48242 | 62.51758 |
| 8 | 0.120871 | 35.43869 | 64.56131 |
| 9 | 0.123278 | 34.19792 | 65.80208 |
| 10 | 0.131303 | 30.49214 | 69.50786 |
| 11 | 0.137510 | 28.10759 | 71.89241 |
| 12 | 0.139980 | 27.33451 | 72.66549 |
| 13 | 0.142168 | 26.70699 | 73.29301 |
| 14 | 0.147137 | 25.20406 | 74.79594 |
| 15 | 0.152112 | 23.83955 | 76.16045 |

## Conclusion and Policy Implication

Observing the trend of short run APCs, Keynesian AIH is found inapplicable in Nepalese context during the study period. On the other hand, on comparing APC and MPC, the long run APC is found to be greater than MPC. It implies that Keynesian AIH is found partially applicable.

Based on econometric test such as Johansen's cointegration test, ARDL models, vector error correction models, FMOLS regression and variance decomposition test, there exists causal linkage between level of consumption and disposable income. These all test imply that there is association between consumption and disposable income. The ARDL model suggests that current consumption is determined by past income, which indicates that a 10 % rise in real disposable income in the preceding period causes current real consumption to increase by 7.22 %.

In VEC models, short run and long run shocks in disposable income are found causing consumption in the long run. Besides, FMOLS regression implies that income elasticity of consumption is 0.69, which means 10 % rise in disposable income causes 6.9 % rise in consumption indicating current consumption as a function of disposable income of the preceding period.

The present study throws some light in policy perspectives as well. Since consumption is found to be dependent on disposable income, the government should launch employment and income generating programs to increase income of the society. The income and property tax is required to reduce to increase disposable income and encourage consumption. The tax on luxuries should be increased and tax reductions are inevitable for basic and normal goods to

ensure equitable distribution of income. The equitable income distribution causes propensity to consume to increase.

Secondly, government should invest more and more capital on industrialization. The increase in investment will have dual effects: income and capacity generating effects. This, in turn, promotes employment income and thereby high economic growth can be achieved. While doing so, consumption will not be discouraged.

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