

## Prevalence of Duesenberry's Relative Income Hypothesis in Nepalese Economy

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**Abstract:** Present paper examines the prevalence of Duesenberry's relative income hypothesis in Nepalese economy during 1974/75-2019/20 through ARDL bound tests under DEF and Davis-SK specifications. The ARDL under DEF specification is found to be invalid. However, the ARDL bound test under Davis-SK specification is found valid. There exists cointegration among average propensity to consume (APC), demonstration effect and ratchet effect. The coefficient of demonstration effect is found to be negative and that of ratchet effect to be positive as reported by ARDL models. The error correction model also implies that short run shocks significantly affect long run relations among the variables. The departure from the long term growth path due to short run shocks is adjusted by 11.3 % over the next year as indicated by error correction model. This study throws some lights in policy perspective. It is recommended that government of Nepal should impose heavy tax on the consumption of durables luxuries to discourage consumption and encourage rate of saving, which is most inevitable in Nepalese economy to foster growth of employment and income.

**Keywords:** Relative Income, Demonstration Effect, Ratchet Effect, ARDL M models

**JEL Classification:** C<sub>51</sub>, C<sub>52</sub>, E<sub>21</sub>, E<sub>22</sub>, E<sub>60</sub>

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### 1. INTRODUCTION

Keynes (1936) opened the door to further development of theories in macroeconomics. Keynesian macroeconomics is the demand side economics which replaced the supply side economics of neo-classical economics that postulated 'supply creates its own demand'. Blinder (1986) argued that Keynesian economics considers total spending in the economy as aggregate demand affecting the level of income or output, which is influenced by both private and public sectors' decisions. The fiscal policy and monetary policy are the public decisions and Keynes favored fiscal policy arguing monetary policy is powerless to cause aggregate demand. On the other hand, monetary policy, according to monetarists, affects aggregate demand. Blinder further argued that prices are somewhat rigid in Keynesian view and aggregate output

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fluctuates resulting from the fluctuation in consumption, investment and government purchases. Consumption demand is one of the components of aggregate demand affecting level of output.

Keynes (1936) put his view that consumption demand as an important component of aggregate demand. He formulated his absolute income hypothesis (AIH). The AIH stated that current consumption depends on absolute level of income left after payment of personal taxes, which can be called disposable income. The consumption function can be expressed in the linear form as  $C = C_a + bY_d$ .

Tsenkwo (2011) stated that according to Keynes, when income goes on rising, consumption rises too, but not by as much as the increase in income. It implies income is the one and only the determinant of consumption. The relationship between consumption and absolute level of income is best explained by absolute income hypothesis postulated by Keynes. Thus, absolute income hypothesis can be used to estimate consumer behavior (Pehlivan, & Utkulu, 2007). However, Guilfoil (1962) argued that during the phase of business cycle, consumption is influenced by three factors such as economic prospects, post commitments, and present pressures. Yet, these factors may not be accepted as rule in consumption analysis.

The Keynesian absolute income hypothesis implies that as disposable income of individuals goes on rising, people spend smaller and smaller proportion of the increased income on consumption, which means APC goes on diminishing with the rise in absolute income. Drakopoulos (2021) argued as Keynes did. According to him, consumption depends on current disposable income. The disposable income is the income left after payment of direct taxes. The marginal propensity consume determines the magnitude of government expenditure multiplier and tax multiplier. The change in output in the economy is determined by government spending and government spending depends on consumption demand. However, Kuznets (1942) and Goldsmith (1955) questioned the validity of Keynesian hypothesis and its relevance was questioned by them (Singh & Kumar, 1971).

Keynes' consumption theory was not supported by empirical data. After World War II, many economists attempted to develop the consumption theory based on empirical data. J.S. Duesenberry propounded his famous theory 'Relative Income Hypothesis' by using income-consumption data of 1940s. The relative income hypothesis links the consumption level of a household with income and expenditure of the comparable income groups in the society. The relative income hypothesis emphasizes the imitative and competitive consumption behavior of the individuals. The relative income hypothesis states that people with lower income and living in the community of higher incomes tend to spend a larger proportion of their income than the household with higher income. This behavior of the individual is said to be 'demonstration effect.' Duesenberry calls this behavior as 'keeping up with the Joneses' (Dwivedi, 2015).

Duesenberry (1949) argued that consumption behaviors of individuals are irreversible, which means as income increases, consumption of the individuals increases sharply; but consumption turns out to be more stable than falling when individuals' income decreases. This behavior is called 'Ratchet Effect'. Thus, relative income hypothesis states that consumption depends not only on absolute income as opined by Keynes but on relative income position of the individuals. Likewise, Leibenstein (1950) and McCormick (1983) also claimed that consumption depends not only on permanent income but also on the income of individual relative to average income in the society.

Thus, relative income hypothesis implies that consumption behavior of households depends not only on their absolute income but relatively on other individuals' income and consumption behavior. People spend on consumption on the basis of what other people do in the society. Hounkpatin et al. (2015)

concluded that people always try to maintain their living standard in accordance with the living standard of rich people in the society.

Modigliani and Brumberg (1954) developed a theory of consumption called 'Life Cycle Hypothesis'. They introduced a theory of spending based on the idea that people make intelligent choices about much to spend at each age. Consumption depends on life time resources of the individual. It is true for each individual that increase in life-time resources leads to proportionate increase in consumption in all periods of life (Deaton, 2005). The life cycle hypothesis argued that individuals try to maintain roughly the same level of consumption over their life time either by taking loan or liquidating assets in their early and late in life. So, during early age and late, the consumption is high with low saving or even dis-saving, but during middle age of life, income is more causing saving to be high (Sablik, 2016).

Modigliani-Brumberg life cycle hypothesis is quite different from Keynes' absolute income hypothesis and Duesenberry's relative income hypothesis. Modigliani and Brumberg rejecting the previous hypotheses emphasized consumption as function of life time resources of individuals. However, the life cycle hypothesis of Modigliani and Brumberg is more or less similar to Milton Friedman's permanent income hypothesis.

Friedman (1957) developed his theory of consumption, popularly known as 'Permanent Income Hypothesis' as an alternative hypothesis to Keynesian absolute income hypothesis and Duesenberry's relative income hypothesis. Keynesian absolute income hypothesis relates household consumption to the current absolute income. Contrary to this, Duesenberry's relative income hypothesis relates household consumption to current relative income. However, Friedman rejected the linkage of consumption to current income or current relative income. According to him, current consumption depends on permanent income. In Friedman's theory, consumption ( $C_t$ ) is taken as the function of permanent income ( $Y_p$ ).

According to Friedman, consumption is proportional to permanent income.  $C_t = kY_p$  ( $k$  is the proportion of the permanent income spent on consumption). Permanent income is the mean of all anticipated income of the households in the long run (Dwivedi, 2015). The permanent income hypothesis is a theory in macroeconomics to explain the formation of consumption patterns. The consumption patterns are formed from future expectations and consumption smoothing (Mankiw & Shapiro, 1984). Thus, according to Friedman, changes in permanent income, but not temporary income, drives changes in consumption. The permanent incomes are the incomes generated from human capital, property and assets over the long run.

The present paper aims at the verification of relative income hypothesis of Duesenberry in Nepalese context through time series data employing econometric methodology. This paper tries to answer the research question whether the relative income hypothesis is relevant to Nepalese economy. A number of studies relating to consumption function are available in economic literature in Nepalese perspective. However, the studies relating to relevance of Duesenberry's relative income hypothesis in Nepalese context are rare in economic literature. The present paper tries to bridge the research gap by testing the relevance of Duesenberry's relative income hypothesis employing the most recent and very useful econometric methodology, ARDL models. The ARDL is very useful model in case of time series with integration of different orders. The rest of the paper is organized as: next section is devoted to 'review of literature,' the section after review of literature endeavors research methodology, while the section after research methodology reveals data analysis and discussion of results, and ends with conclusion and policy implications.

## 2. LITERATURE REVIEW

This section includes theoretical and empirical review on relative income hypothesis. The relative income hypothesis was propounded by J.S. Duesenberry in 1949. The relative income hypothesis appeared as one of the prominent issues in macroeconomic theory before it is being replaced by life cycle hypothesis Modigliani and Brumberg developed in 1954 (Verme, 2013).

In relative income hypothesis, Duesenberry considered both psychological and sociological factors determining consumption. According to Drakopoulos (2020), Duesenberry introduced social interdependencies and habit formation to the study of consumer behavior. The social interdependencies are associated with demonstration effect, which means the consumer wants to keep his living standard not below the average consumption of rest of the society. Secondly, once consumer has attained higher living standard during his peak income level will not go down in consumption as income falls.

Relative income hypothesis states that utility of an individual derived from consumption depends on relative magnitude rather than absolute magnitude. It implies that consumption of an individual depends on the level of income relative to average income of the society. The consumption of a family is determined by the consumption of its surroundings. Khan (2014, as cited in Bisset and Tenaw, 2020) and Masson (2020, as cited in Bisset and Tenaw, 2020) argued that consumption of a family primarily depends on the highest level of income of that family previously attained and consumption pattern of the neighbors. At previously attained highest income, consumption of the family was also high. There was habit of high consumption in the previous period when income was reached at peak level. Now, as income decreases at current time, a family's consumption would not fall in accordance with the fall in income. This implies consumption behaviors are irreversible. The irreversible consumption behavior according to Duesenberry is said to be 'Ratchet Effect.' This is the first proposition of relative income hypothesis. The second proposition is that consumption of a family is influenced by consumption of other rich family in the society. This is called 'Demonstration Effect.'

Relative income hypothesis emphasizes that consumption expenditure of a family does not depend solely on absolute income as Keynes did, but also relatively on other people's income and consumption (Applanaidu & Islam, 2018). As opined by Kosicki (1987), households always try to maintain their consumption pattern in accordance with the average consumption standard of the other households in the community.

Singh and Kumar (1971) provided a theoretical framework on Duesenberry's relative income hypothesis. Relative income hypothesis is based on socio-psychological behavior of consumer and it is originated from the basic two postulates: (a) consumption behaviors of individuals are interdependent, and (b) these behaviors are irreversible. The first postulate is associated with demonstration effect of consumption, while second postulate reveals habit formation of the consumer. Based on the above postulates, Duesenberry's consumption function can be expressed as:

$$\left(\frac{C}{Y}\right)_t = \alpha + \beta \left(\frac{Y}{Y_0}\right)_t \quad (1)$$

where,  $C, Y$  and  $Y_0$  represent private consumption expenditure, personal disposable income and past peak income respectively with  $\alpha$  and  $\beta$  as the parameters to be estimated, and  $\beta$  being in general negative. The consumption function is irreversible such that  $\left(\frac{C}{Y}\right)$  is higher when  $Y < Y_0$ . Duesenberry,

Eckstein and Fromm (1960) suggested a modification in equation (1). In place of  $\left(\frac{C}{Y}\right)_t$ , we write  $\left(\frac{C}{Y}\right)_t^*$ , which represents expected or desired consumption-income ratio.

$$\left(\frac{C}{Y}\right)_t = \alpha + \beta \left(\frac{Y}{Y_0}\right)_t \tag{2}$$

$\left(\frac{C}{Y}\right)_t^*$  can be determined by ‘Nerlovian partial adjustment’ process (Nerlove, 1956).

$$\left[\left(\frac{C}{Y}\right)_t - \left(\frac{C}{Y}\right)_{t-1}\right] = \gamma \left[\left(\frac{C}{Y}\right)_t^* - \left(\frac{C}{Y}\right)_{t-1}\right] \tag{3}$$

Where  $\gamma$  is the coefficient of adjustment. Now, Duesenberry, Eckstein, and Fromm (DEF) consumption function can be expressed as:

$$\left(\frac{C}{Y}\right)_t = \alpha' + \beta' \left(\frac{Y}{Y_0}\right)_t + \gamma' \left(\frac{C}{Y}\right)_{t-1} \tag{4}$$

Where,  $\alpha' = \alpha\gamma, \beta' = \beta\gamma$  and  $\gamma' = 1 - \gamma$

In equation (4), the parameter  $\beta'$  represents Duesenberry’s demonstration effect, while  $\gamma'$  the ratchet effect.

Singh and Kumar further presented Davis (1953) consumption function in which past peak income is replaced by past peak consumption( $C_0$ ) and equation (1) is converted as:

$$\left(\frac{C}{Y}\right)_t = \alpha + \beta \left(\frac{Y}{C_0}\right)_t, \beta < 0 \tag{5}$$

Again, applying Nerlovian “partial adjustment” model on Equation (5), we obtain the Singh and Kumar (1971), SK specification of relative income hypothesis as represented by equation (6)

$$\left(\frac{C}{Y}\right)_t = \alpha' + \beta' \left(\frac{Y}{C_0}\right)_t + \gamma' \left(\frac{C}{Y}\right)_{t-1} \tag{6}$$

where,  $\beta'$  and  $\gamma'$  represent Duesenberry’s demonstration  $\gamma'$  effect and ratchet effect respectively under Davis-SK specification.

According to Bisset and Tenaw (2020), we can use DEF and Davis-SK specifications to test Duesenberry’s demonstration effect and ratchet effect in the empirical analysis assuming APC is the linear function of relative income which implies demonstration effect is same across the households within different income groups.

McCormick (2018, as cited in Bisset and Tenaw, 2020) argued that lower-income people have the constant pressure to consume more, while high-income people have less pressure to spend more than before. This implies that poor people have higher APC and rich people have lower APC. In underdeveloped countries, the APC is very high due to the dominance of low-income people. Due to the reason, APC as linear function of relative income cannot suitably measure the demonstration effect. So, APC is assumed to be the quadratic function of relative income to measure the demonstration effect. Now, the DEF and Davis-SK specifications in which APCs are taken as the quadratic function of relative income are expressed as:

$$\text{DEF specification: } \left(\frac{C}{Y}\right)_t = \alpha + \beta_1 \left(\frac{Y}{Y_0}\right)_t + \beta_2 \left(\frac{Y}{Y_0}\right)_t^2 + \gamma' \left(\frac{C}{Y}\right)_{t-1} \tag{7}$$

$$\text{Davis-SK specification: } \left(\frac{C}{Y}\right)_t = \alpha + \beta_1 \left(\frac{Y}{C_0}\right)_t + \beta_2 \left(\frac{Y}{C_0}\right)_t^2 + \gamma' \left(\frac{C}{Y}\right)_{t-1} \tag{8}$$

Where,  $\beta_1$  is expected to be negative, which means Duesenberry’s demonstration effect is likely to be stronger for lower-income groups, and  $\beta_2$  is expected to be positive.

Once theoretical review is presented, this paper now focuses on the empirical review of relative income hypothesis. Singh, Drost and Kumar (1978) examined the Duesenberry's relative income hypothesis for India, Canada, Netherlands and West Germany and found Duesenberry's hypothesis being valid for Canada only. Kosicki (1987) argued that although Duesenberry's relative income hypothesis held up well under cross section empirical tests, it was replaced by lifecycle and permanent income hypothesis models. The results given by lifecycle and permanent income hypothesis models are found to be less controversial as relative income hypothesis, Kosicki added.

Sanders (2010) also found the Duesenberry's relative income hypothesis being held substantial empirical credibility with rich set of implications such as negative spending externalities, the effect of public provision taxes on wasteful spending race and Pareto implications universal income growth. Clark and Oswald (1996) took the sample of 5000 British workers and found their satisfaction level being inversely related to comparison wage rates, which supported Duesenberry's relative income hypothesis. Likewise, Bowles and Park (2005), using the time series data from ten OECD countries, found a strong positive correlation between average working hours and the share of consumption of the richest members in the society. Their findings proved the Duesenberry's relative income hypothesis being valid. Clark, Westergård-Nielsen and Kristensen (2009) by using primary data of the residents in Denmark found the level of satisfaction of the individuals being positively related to the income of their neighbors. The level of satisfaction of the respondents was found to be higher when their neighbors were rich. On the other hand, Lindley and Lorgelly (2005) found the Duesenberry's relative income hypothesis being invalid when they carried out the study of the relationship between self-reported health and the measures of inequality in British economy. However, Khan (2014) in his study proved Duesenberry's relative income hypothesis being valid for Pakistan.

Ayeni and Akeju (2017) carried out a research for Nigeria to test Duesenberry's relative income hypothesis and Friedman's permanent income hypothesis using ARDL bound test and found weak existence of habit formation by Nigerian consumers. It means, Duesenberry's relative income hypothesis remained invalid. The permanent income hypothesis for Nigerian economy also remained invalid during the study period.

### 3. METHODOLOGY

#### 3.1 DATA AND VARIABLES

Present paper uses secondary data on the time series variables disposable income and private consumption during the period 1974/75-2019/20. The data are taken from Economic Survey, Ministry of Finance, Nepal. The disposable incomes are obtained by subtracting direct taxes from National Income (NI). The nominal time series are converted into real terms with the help of GDP deflator with base year 2000/01. The researcher calculates other variables required for relative income hypothesis with the help of real disposable income and real private consumption. The values of the variables required for Duesenberry's relative income hypothesis are calculated and transformed into natural logarithms. The Duesenberry's variables after transformation into logarithmic forms are presented as:

$$\ln\left(\frac{C}{Y}\right)_t, \ln\left(\frac{Y}{Y_0}\right)_t, \ln\left(\frac{Y}{Y_0}\right)_t^2, \ln\left(\frac{Y}{C_0}\right)_t, \ln\left(\frac{Y}{C_0}\right)_t^2 \text{ and } \ln\left(\frac{C}{Y}\right)_{t-1}$$

#### 3.2 ECONOMETRIC METHODOLOGY

Autoregressive Distributed Lag (ARDL) models are the econometric models used in this study as main methodology to test the relevance of Duesenberry's relative income hypothesis. The ARDL models are also called

ARDL bound testing approach, which is used to find the cointegration relationship among the variables of Duesenberry's relative income hypothesis. The variables required for relative income hypothesis are listed by equations (7) and (8) under DEF and Davis-SK specifications respectively. According to Kripfganz and Schneider (2018), ARDL models are the most popular models to examine the short run and long run relationship between and among the variables. The ARDL models are very powerful tools to analyze the dynamic relationship with time series data in a single equation framework. The current value of dependent variable is allowed to depend on its own past values as well as the current values plus past values of explanatory variables. The single equation frame work will include non-stationary, stationary data or a mixture of both types. With the help of ARDL models, we can separate the long run and short run effects through error correction mechanism. Additionally, the ARDL models can be used to test long run relationship commonly known as cointegration among the variables under study.

Let  $Y_t$  be the dependent variable and  $X_{1t}, X_{2t}, \dots, X_{nt}$  be the independent variables. The  $ARDL(p, q, r, s, u..m)$  model with dependent variable  $Y_t$  and independent variable  $X_{1t}, X_{2t}, X_{3t} \dots X_{nt}$  can be expressed as:

$$Y_t = \beta_0 + \sum_{i=1}^p \alpha_i Y_{t-i} + \sum_{j=1}^q \gamma_j X_{1t-j} + \sum_{k=1}^r \delta_k X_{2t-k} + \dots + \sum_{l=1}^s \theta_l X_{nt-l} + \varepsilon_t \quad (9)$$

where,  $p, q, r \dots$  are the lags of dependent variable  $Y$  and independent variables  $X_1, X_2 \dots X_n$  respectively. The parameters  $\alpha_i, \gamma_j, \delta_k, \dots, \theta_l$  are the coefficients of dependent variable  $Y_t$  and independent variables  $X_{1t}, X_{2t} \dots X_{nt}$  respectively and  $\varepsilon_t$  is a random disturbance term.

The model in equation (9) can be re-parameterized in conditional error correction form, in which we have taken  $Y_t$  as dependent variable and only one independent variable  $X_t$ :

$$\Delta Y_t = \beta_0 - \rho(Y_{t-1} - \theta_i X_t) + \sum_{i=1}^{p-1} \alpha_i \Delta Y_{t-i} + \sum_{j=0}^{q-1} \gamma_j X_{t-j} + \varepsilon_t \quad (10)$$

Shrestha and Bhatta (2018) claimed that equation (10) is a single equation system of conditional error correction form that integrates the short run adjustments along with the long run relationship without  $\rho$  correction term that represents speed of adjustment. The coefficient  $\theta_i$  represents long run coefficient, which is:

$$\theta_i = \frac{\sum_{j=1}^q \gamma_j}{\rho}$$

Before carrying out ARDL bound test, present study employs Phillips-Perron unit root test to identify the stationarity of the variables under study. The main aim of testing the stationarity of the variables to examine whether any variable is  $I(2)$ . The variable/s with order  $I(2)$  will be inappropriate to handle ARDL models.

## 4. RESULTS AND DISCUSSION

### 4.1 PHILLIPS-PERRON UNIT ROOT TEST

Phillips and Perron (1988, as cited in E views 10: User's Guide) propose an alternative (non-parametric) 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 and  $\tilde{\varepsilon}_\alpha$  and  $\varepsilon_t$  is the white noise error term. The PP test is based on the statistic is given by:

$$\tilde{t}_\alpha = t_\alpha \left( \frac{\gamma_0}{f_0} \right)^{\frac{1}{2}} - \{T(f_0 - \gamma_0) Se(\hat{\alpha})\} / 2(f_0)^{\frac{1}{2}} s \quad (11)$$

where,  $\hat{\alpha}$  is the estimate,  $t_\alpha$  is the ratio of  $\alpha$ ,  $Se(\hat{\alpha})$  is the coefficient of standard error of the test regression,  $\gamma_0$  is the consistent estimate of the error variance and the remaining  $f_0$  an estimator of the residual spectrum at frequency zero, and  $T$  represents number of observation. The null hypothesis under PP

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test is 'the 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. The results from Phillips-Perron unit root test are presented through Table 1.

All the variables except  $\ln\left(\frac{C}{Y}\right)_{t-1}$  are found to be stationary in first difference and hence they are  $I(1)$ . Whereas  $\ln\left(\frac{C}{Y}\right)_{t-1}$  is  $I(0)$ . The proposed ARDL model includes a mixture of  $I(1)$  and  $I(0)$  variables to examine the equilibrium relationship among the variables.

**Table 1**

*Results from Phillips-Perron Unit Root Test*

Variables	PP Test statistic	Test Critical Value at 5% Level	Probability
$\ln\left(\frac{C}{Y}\right)_t$	-0.7820	-1.9483	0.3718
$\ln\left(\frac{Y}{Y_0}\right)_t$	-0.4274	-1.9484	0.5232
$\ln\left(\frac{Y}{Y_0}\right)_t^2$	-0.4261	-1.9484	0.5237
$\ln\left(\frac{C}{Y}\right)_{t-1}$	-6.0235	-1.9486	0.0000
$\Delta\ln\left(\frac{C}{Y}\right)_t$	-22.7806	-1.9484	0.0000
$\Delta\ln\left(\frac{Y}{Y_0}\right)_t$	-34.5176	-1.9486	0.0000
$\Delta\ln\left(\frac{Y}{Y_0}\right)_t^2$	-34.5058	1.9486	0.0000
$\ln\left(\frac{Y}{C_0}\right)$	0.2525	1.9488	0.7546
$\ln\left(\frac{Y}{C_0}\right)_t^2$	0.1015	1.9488	0.7095
$\Delta\ln\left(\frac{Y}{C_0}\right)_t^2$	-7.6412	-1.9488	0.0000

### 4.2 RESULTS FROM ARDL MODELS

The ARDL models need suitable lag/s to be included into dependent and independent variables. Applying Akaike information criterion, we choose suitable lags required to be included into the variables



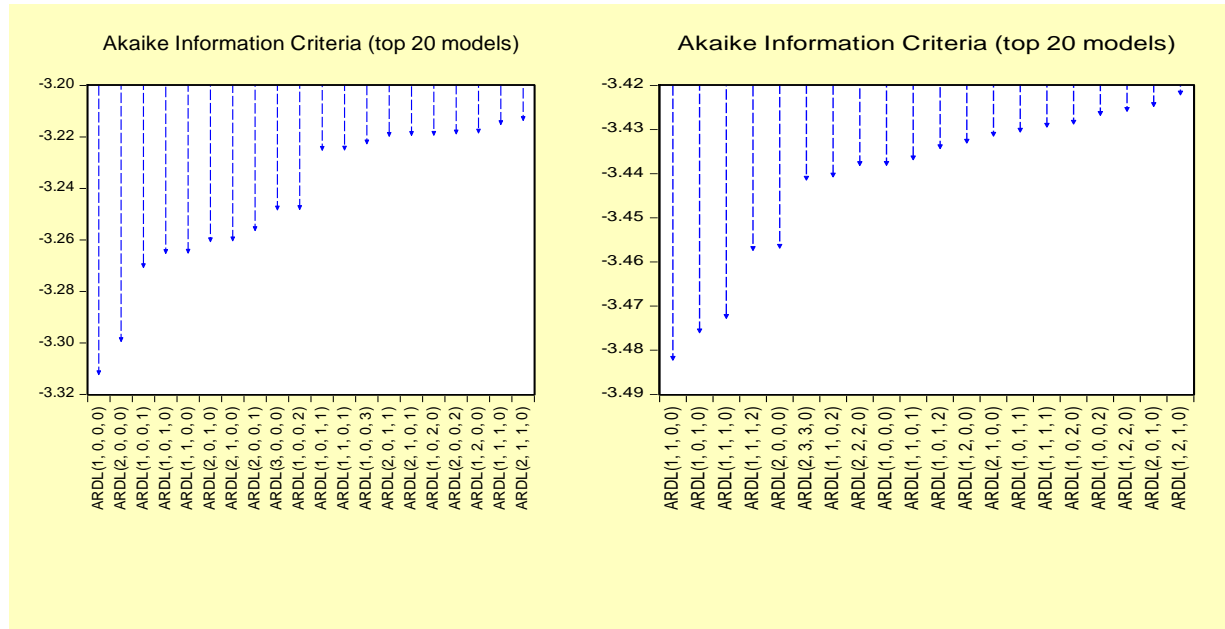
under study. The suitable lags to be included into the variables as provisioned by equation (7) and (8) under DEF and Davis-SK specifications are presented through Figure 1.

Figure 1 portrays the selection of suitable lags to be included into the autoregressive distributed lag models. The graphical plots in accordance with Akaike information criterion, ARDL (1,0,0,0) model for DEF specification and ARDL (1,1,0,0) models for Davis-SK specification are found to be suitable.

**Figure 1**

*Optimal Selection of Lag for ARDL Using Akaike Information Criterion*

*(Left part for DEF specification and right part for Davis-SK specification)*



Employing ARDL (1,0,0,0) model under DEF specification, no coefficients of independent variables are significant. So, we apply ARDL (1,1,0,0) model under Davis-SK specification alternative to DEF specification. Table 2 displays the results associated with ARDL (1,1,0,0) unde Davis-Sk specification.

Table 2 presents Duesenberry’s demonstration and ratchet effect of relative income hypothesis under Davis-SK specification. The coefficient of  $\left(\frac{Y}{C_0}\right)_t$  represents demonstration effect, which is negative and significant at 1% level. This negative coefficient implies that rise in level of income does not significantly increase consumption-income ratio. The demonstration effect is prevalent in Nepalese economy. On the other hand, the coefficient of  $\left(\frac{Y}{C_0}\right)_t^2$  represents ratchet effect, which is positive and significant at 1% level. This indicates that a fall in income does not lead to rise consumption income ratio. During the period of prosperity, the level of consumption has reached at a peak level but when recession arises in the economy, the consumption will not fall as much as income fall, which means APC falls. Thus, the ratchet effect produces positive relationship between level of income and average propensity to consume.

**Table 2**

Results from ARDL (1,1,0,0) Model with  $\left(\frac{C}{Y}\right)_t$  as Dependent Variable

Explanatory Variables	Coefficients	Standard Errors	t-Statistic	Probability
$\left(\frac{C}{Y}\right)_t (-1)$	-0.1340	0.3173	-0.4224	0.6752
$\left(\frac{Y}{C_0}\right)_t$	-4.0946	1.2195	-3.3574	0.0019
$\left(\frac{Y}{C_0}\right)_t (-1)$	0.1748	0.0881	1.9829	0.0550
$\left(\frac{Y}{C_0}\right)_t^2$	1.507678	0.4740	3.1801	0.0030
$\left(\frac{C}{Y}\right)_{t-1}$	-0.0029	0.0017	-1.6745	0.1027
<i>Constant (C)</i>	3.5315	0.8589	4.1114	0.0002

Once the ARDL models are employed, the next step is to apply ARDL bound test and error correction models to examine the cointegration between the variables. Table 3 shows the results from ARDL bound test and Table 4 the results from unrestricted error correction model under Davis-SK specification expressed by equation (7).

**Table 3**

Results from ARDL Long Run form and Bound Test

Description	Value	Level of Significance	<i>I</i> (0)	<i>I</i> (1)
			Asymptotic N=1000	
F-statistic	12.43	10%	2.37	3.2
<i>k</i>	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

$H_0$  : No level relationship Included Observation: T = 42

Table 3 reveals that the F-statistic is 12.43, 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. The ARDL bound test supports the cointegration among the variables under study. It means the demonstration effect and ratchet effect is prevalent in Nepalese economy in the long run.

Finally, Table 4 reveals the results of the short run parameter along with that error correction term. The coefficient of  $d\left(\frac{Y}{C_0}\right)_t$  is -4.0946 which is negative and significant at less than 1% level implying that there is high prevalence of demonstration effect on the consumption pattern of Nepalese individuals. The Davis-SK specification is highly applicable in Nepalese consumption function. The coefficient of error correction term is also negative and significant sufficiently. The result implies that short run shocks significantly affect long run equilibrium among the variables consumption income ratio, demonstration effect and ratchet effect. The coefficient of error correction term -1.1340 implies that there is departure from the long term growth path of average propensity to consume due to short run shocks, which is adjusted by 11.34 % over the next year.

**Table 4**

*Results from Error Correction Modeling with ARDL (1,1,0,0)*

Explanatory Variables	Coefficient	Standard Error	t-Statistic	Probability
$d\left(\frac{Y}{C_0}\right)_t$	-4.0946	0.5101	-8.2063	0.0000
$ECT(-1)$	-1.1340	0.1364	-8.3113	0.0000

#### 4.3 RESIDUALS AND STABILITY DIAGNOSTICS

The robustness of the estimated ARDL (1,1,0,0) model is tested through residuals and stability diagnostics applying Breusch-Godfrey approach and Breusch-Pagan-Godfrey (BPG) approach for serial correlation and heteroscedasticity respectively in the residuals of the estimated ARDL. Moreover, the stability of the estimated model is tested through Ramsey's RESET test. Table 5 presents residuals diagnostic and stability test for estimated ARDL (1,1,0,0).

From Table 5, it is observed that F-statistic, value of  $(T \times R^2)$  and probability value of  $\chi^2$  under Breusch-Godfrey Serial Correlation LM test imply that the null hypothesis 'no serial correlation' is not rejected. Hence, the residuals of estimated ARDL are not serially correlated. Likewise, the residuals are also free from heteroscedasticity problem as reported by F-statistic, value of  $(T \times R^2)$  and corresponding probability value of  $\chi^2$  under BPG model. Finally, as reported by t-statistic and F-statistic under Ramsey's RESET test, the estimated ARDL is robust bearing the property of linearity and hence it is stable model.

**Table 6**

*Residuals and Stability Diagnostics for Estimated ARDL (1,1,0,0) Models*

Test Statistics	B-G Serial Correlation	B-P-G Heteroscedasticity	Ramsey's RESET		
F-statistic	0.5298	1.0774	0.4822		
Degree of Freedom	(2,34)	(5,36)	(1,35)		
Probability	0.5935	0.3892	0.4920		
$T \times R^2$	1.2695	5.4670	t-Statistic Summary		
Probability $\chi^2$	0.5301	0.3616	t-stat	DF	Prob.
			0.6944	35	0.4920

## 5. CONCLUSION AND POLICY IMPLICATIONS

Present study attempts to examine the impact of Duesenberry's demonstration effect and ratchet effect on Nepalese consumption pattern through ARDL bound test by employing annual time series of disposable income and private final consumption for Nepalese economy. The models selected for Duesenberry's relative income hypothesis are from DEF specification and Davis-SK specification. In both specifications, the rate of consumption is assumed to be the quadratic function of demonstration and ratchet effect. The ARDL under DEF specification could not be applied in Nepalese economy during the study period.

The alternative ARDL under Davis-SK specification is found to be applicable in Nepal. Both demonstration effect and ratchet effect appears in Nepalese consumption. The coefficient of demonstration effect is negative implying a fall in consumption-income ratio resulting from the rise in society's consumption. As consumption of other people in society increases, the consumption of an individual will increase causing APC to fall. Hence, the coefficient of demonstration effect becomes negative. On the other hand, the coefficient of ratchet effect is found to be positive. It implies that during the phase of prosperity, income has reached a peak level. A peak level income causes higher consumption with low APC. On the other hand, as income, during the phase of recession, decreases; consumption will decrease but at a smaller proportion than the fall in income. As a result, APC falls than before representing ratchet effect to be positive. The Davis-SK specification proved to be prevalence of both demonstration effect and ratchet effect in Nepalese consumption over the long run.

Present study is equally important in policy perspective. Nepalese average propensity to consume is found to be more than 90% leaving average propensity to save less than 10%. A less than 10% saving rate cannot promote desired level of capital formation in Nepal. Due to the insufficient growth of capital formation, Nepalese growth of employment and income is below the target rate. There is dependence on foreign sector for both employment and income in Nepal. To exploit abundance of hydropower, minerals and tourism prospects, Nepal needs more capital formation. The capital formation rate cannot be promoted until the saving rate increases. Since Nepalese consumption is found to be characterized by imitative and competitive nature, it is necessary to discourage demonstration effect by means of heavy tax on durables and luxuries. This will cause saving rate to increase, and thereby rate of capital formation could be promoted to achieve high growth of income and employment.

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