

**SENSITIVITY OF CONSUMPTION TO CURRENT INCOME IN
DEVELOPING COUNTRIES: AN EMPIRICAL REINVESTIGATION OF
ABSOLUTE INCOME HYPOTHESIS***

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ABSTRACT

The main purpose of this study is to estimate the Keynesian Absolute Income Hypothesis using panel data from 73 developing countries classified by income groups and regions. In accordance with this purpose, fixed and random effects are used as estimators. The results suggest that current income level is a significant determinant of current consumption expenditures which means that Keynesian consumption function is still valid for developing countries. Besides, marginal and average propensities to consume are smaller than 1 as expected and decreasing from low towards upper-middle income countries. Regionally, the highest marginal and average propensities to consume are estimated for Africa region as expected.

Key words: Developing Countries, Keynes, Absolute Income, Marginal Propensity to Consume, Panel Data

**GELİŞMEKTE OLAN ÜLKELERDE TÜKETİMİN CARİ GELİRE
DUYARLILIĞI: MUTLAK GELİR HİPOTEZİNİN AMPİRİK OLARAK
YENİDEN İNCELENMESİ**

ÖZET

Bu çalışmanın amacı, Keynesyen Mutlak Gelir Hipotezi'ni gelir gruplarına ve bölgelere göre sınıflandırılmış 73 gelişmekte olan ülkenin panel verileri aracılığıyla tahmin etmektir. Bu amaç doğrultusunda sabit ve rassal etkiler tahmincileri kullanılmıştır. Elde edilen sonuçlara göre, gelir düzeyi Keynesyen tüketim modelinin gelişmekte olan ülkeler için hâlâ geçerliliğini gösterir biçimde, tüketim harcamalarının anlamlı bir belirleyicisidir. Bununla birlikte, marjinal ve ortalama tüketim eğilimleri teoriyi destekler şekilde 1'den küçük olup, düşük gelir grubundan üst orta gelir grubuna doğru düşüş göstermektedir. Bölgesel olarak incelendiğinde ise, en yüksek ortalama ve marjinal tüketim eğilimleri beklentilerle uyumlu bir biçimde Afrika bölgesi için tahmin edilmektedir.

Anahtar Kelimeler: Gelişmekte Olan Ülkeler, Keynes, Mutlak Gelir, Marjinal Tüketim Eğilimi, Panel Veri

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1. Introduction

Consumption expenditures stand as the major and largest component of aggregate demand that comprise one of the main sources of long run economic growth. Not only in developed but also in developing countries consumption expenditures have been one of the most privilege topics for theoretical and empirical studies for many years. Consumption expenditures are very important in terms of sources of economic growth and appropriate policy making process.

The motivation of this research arises out of each consumption theory trying to explain consumption expenditures by alternative definitions of income level and current income as being the potential major determinant of consumption expenditures in developing countries. Therefore reinvestigation of absolute income hypothesis (AIH) is supposed as an explanation for these issues.

An evidence on Keynesian consumption hypothesis AIH for developing countries is revealed in this paper. Besides, marginal and average propensities to consume, MPC and APC respectively, are also estimated for countries which are classified as income groups and regions. For this purpose, a static panel data method and specifically fixed - random effects estimators are conducted by using annual data for the period of 2000-2011. The following section presents a review of literature. Third section gives data and methodology of the analysis. Fourth section interprets the results of the estimation and the final section concludes the paper.

2. Theoretical Framework and Related Literature

The validity of observational consumption and saving theory-AIH has been subject to several empirical studies implicitly or explicitly since the late 1920s (e.g. Ramsey, 1928). Although alternatives to Keynes's view have been developed, it still preserves its validity on a large scale.

Keynes (1936) has assumed that consumption is the function of current disposable income in the short run once the variables of interest rates, prices and wealth have been given. According to cross-sectional data for interwar period -particularly on Great Depression era- consumption expenditures and saving rate have been both at very low levels and MPC has been between the range of 0 and 1. For these years during which income level is undoubtedly low, APC has been at high rates and the correlation between consumption and income has been strong that had confirmed the assumptions of the Keynesian theory (Mankiw, 2009, p.496-9).

Based on the assumptions stated above, Keynesian consumption function may be defined as in Equation 1:

$$C = a + bY_d \quad (1)$$

$$a > 0; \quad 0 < b < 1$$

where C is real consumption expenditures, Y_d is real disposable income, a is autonomous consumption and b is marginal propensity to consume.

In the second half of 1940s, Kuznets (1946) claimed some weaknesses of the theory by using long-term time series data of USA. Despite an observable increase in income by 19th century, results show that saving rate changed slightly (Modigliani, 1986). Except for Great Depression years, APC has been estimated approximately by 86 percent for 1869-1928 period in 1929 prices while it has been 88 percent between the years of 1869-1948 (Kuznets, 1952, p.507-8). Contrary to Keynesian consumption behaviour APC and APS were nearly stable.

In order to find an explanation for Kuznets paradox, Brady and Friedman (1947) have laid a foundation for relative income hypothesis (RIH). They have suggested that saving rate does not depend on current income level but on relative status of individuals within income distribution. On the other hand, Duesenberry (1949) has suggested that even if disposable income per capita does not change, households increase their consumption expenditures by using their past savings. According to the results acquired by Duesenberry, saving rate of almost 10 percent in USA for the 1925-1930 period diminishes to 9 percent for the period of 1936-1940.

Duesenberry by developing RIH proposes that the main determinant of consumption is the highest income level previously attained rather than current disposable income. So the consumption function in the relative income is defined as in Equation 2:

$$C/Y = a + b Y/\bar{Y} \quad (2)$$

where C/Y is average propensity to consume, \bar{Y} is highest past income level.

In response to this conflict in the literature, permanent and life cycle income hypotheses (LCH) have been developed in 1950s. Apart from AIH, these hypotheses have been built on microeconomic basis. Friedman (1957) in his permanent income hypothesis (PIH) has suggested that consumers focus on resources they expect to gain during their life-time. Moreover PIH divides income level to its permanent and transitory components. Accordingly, consumption is a function of permanent income rather than current income. The effect of the changes in transitory income is limited. In addition, average and marginal propensity to consume are equal consistently with Kuznets (1946)'s findings.

In spite of Modigliani and Brumberg's primary attempts, LCH is developed by Modigliani and Ando (1963) which assumes that individuals consume a constant percent of present value of their life-time income. According to LCH, individuals save in their middle age and dissave (consume) in their old age and retirement period. LCH differs from PIH since wealth term enters to the consumption function and consumption is affected by the changes in both income and wealth. Thus the LCH is explained as in Equation 3:

$$C = (W + tY)/T \quad (3)$$

Where W is initial endowment, t is number of years earning labor income, Y is labor income and T is individual's life span.

For the last 30 years Hall (1978) dominated to the literature by developing a model of permanent income under rational expectations. Hall mentioned Lucas critique within consumption and solved the problem of nonstationarity in time series. Thereby assuming the impossibility to predict the changes in consumption random walk model states that the best estimator of current consumption is the previous consumption. The mechanism lying behind this implication is: A rational expectation gets all information available in the period expectations are created and while these informations are given in time of t , individuals set their consumptions equal to predictions about permanent income. If there is no new information available between two periods permanent income does not change, so that current and previous consumption are equal each other (Attfield et.al, 1991, p.206-8). Then consumption is affected by nothing but unanticipated/unexpected components of the variables such as income, wealth etc (Molana, 1991, p.382). However, in contrast to random walk model of consumption Flavin (1981) suggested that consumption has excess sensitivity to the changes in actual income. Following years the hypothesis was discussed and tested by empirical investigations because of that debate.

Since the consumption is excessively sensitive to current income the hypothesis is generally rejected in developing countries (e.g. Haque & Montiel, 1989; Corbo & Schmidt-Hebbel, 1991; Gan & Soon, 1994; Patnaik, 1997; Bilgili, 2006; Rao & Sharma, 2008; Paz & Gomes; 2008; Lee & Sawada, 2010; Berg, 2013). For instance, Chyi and Huang (1997) tested the sensitiveness of consumption expenditures to current income in East Asia and estimated the sensitiveness coefficient (λ) between the range of 0,54-0,73. On the other hand Campbell and Mankiw (1990) estimated the coefficient as approximately 0,2 for England and 0,4 for France. Other studies such as Hatzinikolaou (1999) tested the hypothesis and sensitiveness coefficient for Greece and λ is estimated within the range of 0,36-0,71 for three different models. Rao and Sharma (2008) found the coefficient between 0,53 – 0,48 for Fiji and between 0.3 - 0.24 for Australia. Particularly for developing countries these findings is derived from liquidity constraints that imperfect capital markets cause, precautionary saving incentive arisen from uncertainty and myopic/Keynesian/short-sighted behaviour based on households' decisions that are not rational.

Though it seems to lose validity in terms of its assumptions and alternative hypotheses were developed, absolute income hypothesis is still valid. Since other theories are not adequate to explain all types of consumption behaviour and they rely on the Keynesian consumption theory. Heim (2007) sets up a Keynesian model with only current value of income (income after tax paid) using USA consumption data. MPC is estimated approximately by 0.73. Another study testing the validity of absolute income in China for the period of 1978-2009 resulted that per capita income and per capita consumption move together in the current year and the gap between them increases after 1994 which means that per capita saving in China decreases over time. The estimated MPC is about 0.75 (Yang, 2011, p. 125-130).

Shahbaz et.al. (2013) tested the absolute income hypothesis applying the ARDL cointegration approach. In this context the long-run relationship was examined between private savings and per-capita income, investment, previous saving, public saving, inflation, terms of trade, contribution of agricultural sector to national income and political instability for the period of 1972-2011. The results indicate that a 1 percent increase in economic growth (per capita income) raises private savings about 0.52 percent. So the results confirm AIH.

3. Data and Methodology

All data are gathered from World Bank Development Indicators-WDI (2013) database. Due to lack of data for disposable income and consumption expenditures on nondurable goods, the selected countries are limited (18 low, 27 lower-middle, 28 upper-middle income groups) rather than all developing countries.² Instead, household final consumption expenditures (constant 2005 US\$) and Gross Domestic Product (constant 2005 US\$) are used as proxies for the 2000-2011 period for all countries. The data is annual and the series are expressed in terms of natural logarithms because of the exponential growth probability in the data.

Panel data refers to the “pooling” of observations on a cross-section of households, countries, firms, etc. over several time period (Baltagi, 2005). Therefore the most appropriate method for our analysis, balanced panel³ data analysis method is employed. Within this framework, fixed and random effect models are estimated.

3.1. Fixed Effects Model (FEM)

One of the estimators used for panel data analysis method is *fixed effects model* (FEM). Constant term is group-specific in the fixed effects model. The fixed effects estimator is also known as the least squares dummy variable estimator, allowing for different constants for each group by containing a dummy variable (Asteriou and Hall, 2011, p.418-9). The model is written as:

$$y_{it} = \alpha + x_{it}\beta + \mu_i + v_{it} \quad (4)$$

Dummy variable allows to take different group-specific estimations for each of the constants of each cross section:

² Nondurable consumption expenditures are used as a proxy for consumption in several studies which estimate consumption function. Hence consumption expenditures for durable goods are excluded from some applications. On the other hand, the depreciation on stock of durable goods is considered as consumption. This distinction is enable to cause data sets to be differentiated. For instance, Lee and Kong (2000) investigate the effect of aggregate consumption expenditures and nondurable expenditures separately while both Gan and Soon (1994) and Zhang and Wan (2004) use aggregate consumption expenditures as a proxy for consumption expenditures that consist of durable and nondurable consumption expenditures.

³ If panel data consists of equal observations for all countries and variables, then it is called as a *balanced panel*.

$$y_{it} = \beta x_{it} + \mu_1 D1_i + \mu_2 D2_i + \dots + \mu_N DN_i + v_{it} \quad (5)$$

We need to apply tests to check whether fixed effects should be included in the model. The *F Test* can be used to check fixed effects. The null hypothesis is that all the constants are the same (common constant method):

$$H_0 : \mu_1 = \mu_2 = \mu_3 = \dots = \mu_N \quad (6)$$

Fixed effects model captures all effects that are specific to a particular individual and do not vary over time (Asteriou and Hall, 2011, p.418-9).

3.2. Random Effects Model

Random effects method (REM) which is also named as Error Components Model is an alternative method of estimating a model. The difference between REM and FEM is that REM handles the constants for each section not as fixed, but as random parameters. Hence the variability of the constant for each section (country or individual) comes from:

$$\alpha_i = \alpha + v_i \quad (7)$$

v_i is a zero mean standard random variable. One main disadvantage of random effects approach is that the unobserved group effects are correlated with the explanatory variables, then the estimates will be biased and inconsistent. On the other hand, it has some advantages that it has fewer parameters to estimate than the FEM and allows for additional explanatory variables that have equal value for all observations within a group by allowing for dummies (Asteriou and Hall, 2011, p.419).

Random effects model is estimated by generalized least squares method (GLS). The conversion in this method is applied by subtracting weighted average of independent variable y_{it} over time from y_{it} . While θ is a function of the variances of error term and random effects, the data is determined by (Brooks, 2008, p.498-9):

$$y_{it}^* = y_{it} - \theta \bar{y}_i \quad (8)$$

$$x_{it}^* = x_{it} - \theta \bar{x}_i \quad (9)$$

3.3. Hausman Test

The Hausman specification test indirectly enables a preference between fixed versus random effects under the null hypothesis of random effects are uncorrelated with the other explanatory variables within the model. The random effect is an efficient and consistent estimator if there is no correlation between random effects and explanatory variables (Baltagi, 2005, p.18-19; Gujarati and Porter, 2012, p.606-7). For this reason

Hausman test (1978) is used as a decision-maker in this study in order to attain a valid result.

The hypotheses for Hausman test are formed as (Maddala, 2002, p.578-79):

H_0 : There is no correlation between x_{it} and ϵ_i'

H_1 : There is correlation between x_{it} and ϵ_i'

So the Keynesian consumption model to estimate is,

$$\ln\text{CONS}_{it} = \alpha_i + \beta \ln\text{INC}_{it} + v_t + \epsilon_{it} \quad (10)$$

Where;

CONS_{it} = Country i 's household final consumption expenditures

INC_{it} = Country i 's gross domestic product in year t

β = Marginal propensity to consume (MPC)

α_i = Individual (group) effects

v_t = Unobservable time effects

ϵ_{it} = Error term

Developing countries which are classified by income groups are presented on Table 1. The classification is based on World Bank classification criteria. Within this classification, middle income countries are separated into two different groups: lower and upper middle income countries.

Table 1: Classification of the countries by Income Per Capita (IPC) Levels

Country	IPC level*
Low income	1.035 \$ and less
Lower-middle income	1.036 \$ - 4.085 \$
Upper middle-income	4.086 \$ - 12.615 \$

* Gross national income per capita in 2012 is considered.

4. Empirical Results

Results for each income group

First of all, developing countries are classified by their income level (low, lower middle, upper middle) and model specification tests are implemented for each country group in order to determine the most appropriate panel data model. Thus Table 2 presents relevant results on fixed (FEM) and random effects (REM) models.

Table 2: Group (individual) effects F, BP-LM and Honda⁴ Test results

Country	F-Test		BP-LM Test		Honda Test	
	Statistic	p value	Statistic	p value	Statistic	p value
Low Income	13.193	0.0000***	282.939	0.0000***	16.821	0.0000***
Lower Middle Income	103.914	0.0000***	1351.385	0.0000***	36.761	0.0000***
Upper Middle Income	1341.724	0.0000***	1788.440	0.0000***	42.289	0.0000***
All Countries	445.953	0.0000***	4549.96	0.0000***	67.453	0.0000***

***p < 0.01, ** p < 0.05, * p < 0.1

According to Table 2, null hypothesis for F test statistics is rejected that individual fixed effects do not exist. So F test results show that for all group of countries, FEM is preferred at 1% significance level. But still we should search for random effects. Since we reject the hypothesis saying random effects do not exist, both LM and Honda test results indicate that for all group of countries REM is accepted at 1% significance level.

On the other side, Hausman test (1978) determines whether any correlation exists between explanatory variables and random effects or not. In case of any correlation random effects model is inconsistent and FEM is preferred whereas if there is no correlation between explanatory variables and random effects REM is efficient and consistent (Asteriou and Hall, 2011). Table 3 presents Hausman test results and appropriate models. According to Table 3, we are supposed to prefer REM for low and lower middle income countries while we prefer FEM for other groups.

Table 3: Hausman Test Results

	Statistic	p value	Estimator
Low Income	1.097	0.295	REM
Lower Middle Income	1.139	0.286	REM
Upper Middle Income	6.474**	0.011	FEM
All Countries	7.050***	0.008	FEM

***p < 0.01, ** p < 0.05, * p < 0.1

At this point, panel-level autocorrelation and heteroscedasticity test results are presented on Table 4. Tests are different dependent upon the model preferred -fixed or random effects-.

⁴ Alternative hypothesis for Breusch-Pagan (1980) test statistics is formed as $H_1: \sigma_u^2 \neq 0$ and/or $\sigma_\lambda^2 \neq 0$. However Honda (1985) states that because variance can not be negative alternative hypothesis has to be changed. Then Honda hypothesises it again as $H_1: \sigma_u^2 \geq 0$ and/or $\sigma_\lambda^2 \geq 0$.

Table 4: Autocorrelation and heteroscedasticity tests for fixed and random effects

	Autocorrelation test			Heteroscedasticity test
	$LM_{\mu\rho}$	$LM_{\mu \rho}$	$LM_{\rho \mu}$	(LM_h)
Low Income	288.38***	265.92***	5.44**	204.92***
LowerMiddle Income	1376.83***	1268.61***	25.44***	777.77***
	Autocorrelation test			Heteroscedasticity test
UpperMiddle Income		152.42***		310.91***
All countries		218.71***		1529.12***

***p < 0.01, ** p < 0.05, * p < 0.1

$LM_{\mu\rho}$: Testing random effects and first-order autocorrelation

$LM_{\mu|\rho}$: Testing random effects while autocorrelation occurs

$LM_{\rho|\mu}$: Testing autocorrelation while random effects occur

All test results in Table 4 reveal that null hypothesis (*no autocorrelation and no heteroscedasticity*) is rejected at 5% significance level meaning that for all income groups both autocorrelation and heteroscedasticity are detected in series.

After all, with the assumption of autocorrelation and heteroscedasticity problems and modelling them by applying some coefficient covariance methods such as Period-SUR and White-period, the coefficients are estimated finally. First column in Table 5 presents the coefficient results for each income group. Coefficients are significant at %5 significance level. Also coefficients are increasing from low-income countries towards upper middle income countries.

Table 5: Income Elasticity, MPC and APC Estimation Results

	Coefficient (Elasticity)	Average APC	Average MPC
Low Income	0.897*** (0.000)	0.768	0.688
Lower Middle Income	0.966*** (0.000)	0.639	0.617
Upper Middle Income	1.031*** (0.000)	0.446	0.459
All countries	0.973*** (0.000)	0.497	0.484

***p < 0.01, ** p < 0.05, * p < 0.1

Probability values of coefficients are in the paranthesis.

Due to the logarithmic transformation of series, estimated coefficients are not MPCs but income elasticities of consumption unlike basic Keynesian consumption function. Therefore one percent increase in income increases consumption about 0.90%,

0.97%, 1.03% and 0.97% respectively for low, lower middle, upper middle income countries and for all countries. The findings show that income elasticity of consumption is largest for upper middle income countries. In other words, for upper middle income countries, response of consumption expenditures to an increase in income is higher. Besides that MPC is smaller than APC in short-term analyses which causes the ratio of MPC/APC to be smaller than 1.

In accordance with the assumptions of Keynesian consumption theory, consumption expenditures tend to increase with an increase in disposable income, but the rate of increase is slighter than increase in income. If income increases consumption increase with a decreasing rate. According to present application, towards an upper income countries MPCs are expected to diminish gradually.

The elasticity coefficients and averages of countries' consumption expenditures and income levels (average APCs in second column) are used to estimate MPC levels (in third column) for each group.

Income elasticity of consumption is;

$$E = \left(\frac{dC}{dY} \right) \times \left(\frac{Y}{C} \right)$$
$$E = MPC \times \left(\frac{1}{APC} \right)$$

and elasticity is equal to the ratio of MPC to APC. In short, the formula is,

$$E = \left(\frac{MPC}{APC} \right).$$

Table 5 summarizes that both APC and MPCs tend to decrease from low income towards upper middle income countries. Moreover MPC is positive and smaller than unity as theory assumes. While a unit increase in income raises consumption expenditures by 0.68 unit in low income countries, the ratio falls to 0.46 for upper middle income countries. On the other hand, the consumed part of average income APC for the years of 2000-2011 is about 76 percent in low income countries whereas it is almost 45 percent for upper middle income countries. As expected, propensities to consume decrease as income level increases.

Regional Estimation Results

Keynesian consumption model with MPCs and APCs are also estimated for Asian (29), African (29) and Latin American (15) countries regionally. Models for the regions are determined as REM, REM and FEM for Asia, Africa and Latin America

respectively. However we present only final estimation results here regarding MPC and APCs in order not to repeat every process.⁵ The results are presented in Table 6.

Table 6: Coefficient, APC and MPC Estimation Results – Regionally

	Coefficient (Elasticity)	Average APC	Average MPC
Asia	0.926*** (0.000)	0.515	0.477
Africa	0.922*** (0.000)	0.663	0.611
Latin America	1.071*** (0.000)	0.411	0.440

***p < 0.01, ** p < 0.05, * p < 0.1
Probability values of coefficients are in the paranthesis.

The results presented in Table 6 indicate that in Asian and Latin American countries, one unit increase in income causes consumption to increase approximately by 0.48 and 0.44 while this ratio raises to 0.61 in Africa region. Besides, twelve-year average APC is nearly 66 percent in African countries and 41 percent in Latin American countries while MPC is 0.61 for Africa and 0.44 for Latin America. So the fraction of income spent and marginal propensity to consume increase from Latin America to Africa. In addition, MPCs for Asia and Latin America are too close, rather than APC is higher in Asia than Latin America.

5. Conclusion

In this study, sensitivity of household final consumption expenditures to current income has been investigated for developing countries by using random and fixed effects estimators. As expected, current income is a significant determinant of consumption expenditures for each group of countries. Besides, the marginal propensity to consume is positive and smaller than unity for all categories held, so is average propensity to consume. From low towards upper middle income group countries and from Africa towards Latin America, average marginal propensity to consume and average propensity to consume tend to fall. This means that estimation results support the view of short-term Keynesian absolute income hypothesis.

Most African countries live on the brink of starvation have very low levels of income implying the highest marginal propensity to consumption ratio as expected. Indeed as Asia, Latin America and Afrika on average having 188, 168 and 23 billion dollars income respectively during the analysis period reveals the matter of income gap between these regions. Since one of the most effective channel stimulating economic growth is consumption expenditures, an effective development policy that is sensitive to

⁵ Model specification results are available from the author upon request.

the mechanisms determining and/or directing consumption are required to be implemented particularly in developing countries.

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