Testing Stationarity of Consumption-Income Ratios Incorporating Nonlinearities and Asymmetries: Evidence from Emerging Economies

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Abstract

To account for the nonlinearities and asymmetries while studying the stochastic properties of consumption-income ratios, Average Propensity to Consume (APC), for fourteen emerging economies, this study calls in the exponential smooth transition autoregressive (ESTAR) and asymmetric exponential smooth transition autoregressive (AESTAR)unit root testing procedures developed by Kapetanios, Shin, & Snell (2003) and Sollis (2009). Except for Chile, Morocco and Peru, consumption-income ratios turn out to be non-stationary processes for the selected time periods. Thus, the consumption behaviors in these countries appear to be congruent with the Absolute Income Hypothesis (AIH), Involuntary Savings and Marxian Under-compensating Theories. Accordingly, the policy implications have permanent effects on the consumption of households for all the countries except for Chile, Morocco and Peru. This warrants the use of fiscal policy for these countries.

Keywords: Absolute Income Hypothesis (AIH), Permanent Income Hypothesis (PIH), ESTAR, &AESTAR

JEL: C01, C10, E20 & E27

Introduction

Stochastic properties of consumption income ratio, average propensity to consume (APC), have always been a subject of interest for economists. Empirical modelling of consumption functions requires testing the mean reverting behaviour of APC. A stationary APC depicts the long run relationship between consumption and income. This leads to their convergence towards a constant in long run. On the other hand, the non-stationary APC challenges the constancy of APC as well as belief of unit elasticity of consumption. Basically, there are two schools of thoughts regarding stochastic properties of consumption income ratios. First school of thought emphasizes that APC is non-stationary. The Keynesian Absolute Income Hypothesis (AIH), the Involuntary Savings Theory and the Marxian Under-Compensating Theory support this school of thought. In contrast to that the second school of thought emphasizes that APC is stationary. The theories that support that school of thought include the Permanent Income Hypothesis (PIH), Life Cycle Hypothesis (LCH), the Habit Persistence Model (HPM) and the Relative Income Hypothesis (RIH).

These conflicting results have different economic policy implications. If APC has unit root, then it means that it is path dependent therefore its current value depends on past values. So the temporary policy shocks will have a permanent effect because the effect accumulates over time. Also if APC is non-stationary and it declines over time as suggested by AIH then GDP will be more volatile. This is because of the fact that in case of declining APC, the variable components in aggregate demand such as investment and exports become more dominating factors in cyclic fluctuations. Thus consumption can no more provide built-in stabilization to economy unless or until government take appropriate measures to increase the share of these expenditures in output. Government can increase the private consumption by giving rise to disposable income which is possible by cutting taxes. So, according to Abeysinghe & Choy (2004) the fiscal policies would be more effective in case of non-stationary APC. Thus, declining APC, as suggested by AIH, will challenge the interventionist fiscal policies. The instruments which are normally controlled by central bank do not directly affect consumption expenditure.

Hence there is no role of interest rate, money or exchange rate. However, if these instruments affect disposable income then they will also affect consumption expenditure indirectly. In contrast to that stationary APC implies the existence of long run equilibrium relationship between consumption and income. Also, the results of shocks would be temporary because consumers try to smooth their consumption over period of time as suggested by the LCHand the PIH. In this case, monetary policies would be more effective and aggregate demand management policies would be less effective. This is because according to LCH and PIH, consumption is determined by permanent income which is greatly affected by changes in monetary policy. This is because portfolio adjustments are needed across the whole range of durable goods as well as financial assets. In addition to that, according to LCH and PIH, the consumers care about two time periods i.e. present and future so the role of expectations becomes evident. Therefore, the source of shock as to whether it is temporary or permanent will become really important. Transitory changes do not affect consumption as much as permanent changes do. Therefore, transitory shock has ignorable impact in determining aggregate consumption. If there is transitory change in taxes it won't affect consumption therefore fiscal policy would be ineffective.

According to AIH, APC is declining which means only short run matters to consumers hence, current income determines the consumption so fiscal policy can be used. However, the PIH, RIH and LCH assume consumption smoothing and consumers are forward looking so permanent changes brought about by monetary policy would be more effective in order to increase the aggregate consumption. Unfortunately, these conflicts are not limited to theoretical hypothesis only. In literature, the standard unit root tests that were applied to check stochastic properties of consumption income ratios also gave controversial results. For instance, Serletis and Krichel (1995), Jin (1995), Romero-Ávila (2009)and Cook(2005)conclude the stationary nature of consumption-income ratios for OECD countries whereas Cerrato, Peretti, & Stewart (2008),Sarantis & Stewart (1999) and Romero-Ávila (2008)argued in favour of non-stationary behaviour of the consumption-income ratios.

The reason behind these controversial results is the low power of unit root tests used in the aforementioned studies (Kapetanios, Shin, & Snell, 2003 and Sollis, 2002).The standard unit root tests such as Dickey & Fuller (1979), Phillips & Perron (1988) and Kwiatkowski, Phillips, Schmidt, & Shin, (1992) are based on linear autoregressive process and did not account for nonlinearities and asymmetries. This study is clearly different from previous researches on checking stochastic properties of APC. This research is considering possible misclassification of integrated nature of APC owing to a failure to allow for nonlinear symmetries and asymmetries together. The study utilizes ESTAR unit root test proposed by Kapetanios, Shin, & Snell(2003) (hereafter KSS)for nonlinear adjustment and asymmetric ESTAR non linearity test proposed by Sollis (2009) in context of emerging economies including Brazil, India, Chile, Colombia, Indonesia, Malaysia, Peru, Philippines, South Africa, Pakistan, Korea, China, Morocco and Thailand.

A Review of Literature

There is vast literature available on testing the stochastic properties of APC as it directly affects empirical modelling as well as understanding of business cycles. The pioneering work in this regard was done by Nelson & Plosser (1982) who investigated the stochastic trends in macroeconomic time series. The non-stationary APC challenges the constancy of APC as well as belief of unit income elasticity of consumption. Moreover, each stochastic shock results in a permanent change as the shock effects keep on accumulating over time. As opposed to that stationary behaviour of APC imply the existence of along run equilibrium relationship between consumption and income and hence, APC converges towards a constant. In that case, effect of shock would be temporary because of consumption smoothing. Empirical studies have shown conflicting results because of difference in unit root tests applied. The empirical examination about stationary of consumption income ratios have been grouped into four categories depending upon econometric methodology used. The first group constitutes of those studies which used univariate Augmented Dickey Fuller (ADF) type co integration and unit root tests. Second group includes studies that employ the panel unit root tests. Third group includes those studies which take structural breaks into account. Then the fourth and final group consists of those studies which give special attention to unit root tests that are based on asymmetries and/or nonlinearities. Taking asymmetries and nonlinearities into consideration, increases the power of unit root tests.The ADF-type unit root tests revealed controversial stochastic properties of consumption-income ratios. Empirical evidences for both stationary APC (Sternberg, 1986; and Serletis & Krichel, 1995) and non-stationary APC (Molana, 1991; Patterson & Hall, 1992; Gil-Alana & Robinson, 2001; and Cook, 2003) are found for UK. Jin (1995)found the stationary APC for 12 OECD countries over the period 1960 to 1988 using univariate Engle-Granger and panel unit root tests.

In contrast to that, Sarantis & Stewart (1999) found completely opposing results for the APC of 20 OECD countries over the period of 1955 to 1994. They employed Im, Pesaran, & Shin (2003) and Taylor & Sarno (1998) panel unit root tests and found out non stationary APC. Due to these conflicting results, a need for newly developed unit root tests aroused. These tests were aimed to increase statistical power in three separate ways.

First type of panel unit root tests allow for cross-sectional dependence. Romero-Ávila(2008) found out the same results as in Sarantis & Stewart(1999) i.e. non-stationary APC for 23 OECD economies for the period 1960 to 2005 by using the univariateNg & Perron(2001), Elliot (1996), Sargan & Bhargava(1983) and KPSS unit root tests. In addition to that they also employed the panel unit root tests of Smith, Leybourne, Kim, & Newbold (2004) and Pesaran(2003) and a bootstrap version of the panel stationarity test of Hadri(2000).Second type of panel unit root tests incorporate structural breaks under cross-sectional dependence.Romero-Ávila (2009) employed controlled cross-sectional dependence panel unit root tests with multiple unknown breaks to the data set used in Romero-Ávila (2008)and on contrary concluded that the APC of OECD countries is stationary. Third type of panel unit root tests considers asymmetries and/or nonlinearities in data generating processes. Tsionas & Christopoulos(2002) gave attention to asymmetries by exploring stochastic properties of APC for 14 EU countries for the period 1960 to 1999. The ADF tests suggested unit root for each country while unit root tests based on threshold auto-regression (TAR) models showed stationary APC in, at least, one regime. APC turned out to be unit root process for each country when symmetric panel unit root tests were employed but when asymmetries were introduced in the analysis then stationary APC is being exhibited in at least one regime. On the other hand, Cerrato, Peretti, & Stewart (2008) gave attention to nonlinearities in data generating processes. They employed heterogeneous nonlinear panel unit root test for 24 OECD and 33 non-OECD countries for the period 1951 to 2003 and found out that 61% of OECD and 68% of non-OECD countries exhibit non stationary APC.

In short, if the economic variables show non-linear behaviour then the standard unit roots tests do not carry that much power (Sollis, Leybourne, & Newbold, 2002 and Kapetanios, Shin, & Snell, 2003). The inability of the conventional tests to incorporate nonlinearities and asymmetries contributed to the controversial results regarding the stochastic properties of APC.

Data and Methodology

Final consumption expenditure and Gross Domestic Product (GDP) from World Development Indicators (WDI) are used to compute consumption-income ratios for the selected countries (table 1).

Table 1: List of Countries and Respective Sample Period

Countries	Sample Period
Brazil, India, Chile, Colombia, Indonesia, Malaysia, Peru, Philippines, South Africa	1960-2013
Pakistan	1986-2013
Korea	1977-2013
China	1978-2013
Morocco	1966-2013
Thailand	1965-2013

Descriptive statistics (appendix: **Table 1**) are evident that the distribution of APC is asymmetric (except for Malaysia) and platykurtic (except for Peru and Brazil).

Appendix:

Table 1: Descriptive Statistics

Country	Mean	Max	Min	SD	Kurtosis	Skewness
Brazil	0.803	0.856	0.703	0.035	3.112	-0.805
India	0.791	0.881	0.679	0.061	1.776	-0.424
China	0.669	0.900	0.492	0.137	1.715	0.195
Chile	0.746	0.942	0.637	0.080	2.328	0.608
Colombia	0.804	0.846	0.752	0.022	2.662	-0.531
Indonesia	0.676	0.768	0.561	0.052	2.223	-0.336
Korea	0.751	0.943	0.628	0.098	2.176	0.576
Malaysia	0.605	0.758	0.484	0.070	2.308	0.066
Morocco	0.807	0.875	0.747	0.035	1.928	-0.262
Peru	0.821	0.900	0.672	0.059	3.656	-1.062
Philippines	0.792	0.855	0.691	0.044	2.353	-0.508
South Africa	0.734	0.877	0.585	0.089	1.627	-0.287
Thailand	0.765	0.938	0.663	0.090	1.603	0.409
Pakistan	0.848	0.883	0.806	0.020	2.310	-0.091

Source: Author's calculations

If asymmetries and nonlinearities arise from data generation process, then it results in violation of white noise assumption of the residuals. To address this issue, KSS employed the exponential smooth transition autoregressive (ESTAR) specification. They test the null hypothesis of a unit root against the alternative hypothesis of non-linear mean reversion but globally stationary by considering the following univariate smooth transition autoregressive of order one, STAR (1) model.

$y_t = \beta y_{t-1} + \gamma y_{t-1}\Theta(\theta, y_{t-d}) + \varepsilon_t$ (1)

where$\Theta(\theta, y_{t-d}) = 1 - \exp(-\theta y_{t-d}^2)$ is an exponential transition function bounded between zero and one with symmetrical U-shape around zero. This exponential transition function yields the exponential STAR (ESTAR) model,

$y_t = \beta y_{t-1} + \gamma y_{t-1}[1 - \exp(-\theta y_{t-d}^2)] + \varepsilon_t$ (2)

$\Delta y_t = \emptyset y_{t-1} + \gamma y_{t-1}[1 - \exp(-\theta y_{t-d}^2)] + \varepsilon_t$ (3)

where $\emptyset = \beta - 1$. The parameter θ(if positive) determines the speed of mean reversion. Imposing $\emptyset = 0$ ($y_t$is a unit root process) and d=1 gives the specific ESTAR model.

$\Delta y_t = \gamma y_{t-1}[1 - \exp(-\theta y_{t-1}^2)] + \varepsilon_t$ (4)

Testing the hypothesis $H_0: \theta = 0$ against$H_a: \theta > 0$ is not possible through conventional methods because γ is not identified. KSS solved this identification problem by computing the first-order Taylor series approximation of ESTAR model under null. The resulting auxiliary regression is

$\Delta y_t = \delta y_{t-1}^3 + e_t$ (5)

where$\delta = \gamma\theta$,$e_t = \varepsilon_t + R_t$ and $R_t$is remainder from the Taylor expansion. To allow for higher order dynamics Eq. (5) can be rewritten as

$\Delta y_t = \delta y_{t-1}^3 + \sum_{i=1}^{p} \rho_i \Delta y_{t-i} + e_t$ (6)

with$H_0: \delta = 0$vs.$H_a: \delta < 0$. To test the unit root null hypothesis, the proposed t statistic is:

$t_{NL} = \hat{\delta}/\text{se}(\hat{\delta})$

where$\hat{\delta}$is the OLS estimate of $\delta$and se ($\hat{\delta}$) is the standard error of δ.

KSS modified this model for dealing with linear deterministic trend and/or non-zero mean. Prior to estimation, raw data is replaced with demeaned data

$$y_t^* = y_t - \bar{y}$$

and demeaned and de-trended data

$y_t^* = y_t - \hat{\mu} - \widehat{\emptyset}$t

where$\bar{y}$ corresponds to sample mean and $\hat{\mu}$&$\widehat{\emptyset}$ are the OLS estimates. The asymptotic critical values of t-stat for raw data, demeaned data and demeaned and de-trended data have been calculated by Kapetanios, Shin, & Snell (2003) through simulations. Sollis(2009) extended the ESTAR test to account for asymmetry with null hypothesis of unit root against alternative allowing (a)symmetric non-linear mean reversion. Assuming y_{t-1} as transition variable, Sollis(2009) proposed AESTAR model.

$\Delta y_t = G_t(\gamma_1, y_{t-1})\{S_t(\gamma_{2,} y_{t-1})\rho_1 + (1 - S_t(\gamma_2, y_{t-1}))\rho_2\}y_{t-1} + \varepsilon_t$ (7)

where:

$G_t(\gamma_1, y_{t-1})$= (1-exp (-$\gamma_1(y_{t-1}^2)$) $\gamma_1 \geq 0$

$S_t(\gamma_{2,} y_{t-1}) = [1 + \exp(-\gamma_2 y_{t-1})]^{-1}$ $\gamma_2 \geq 0$

whereε_t is *iid* normal and $G_t(\gamma_1, y_{t-1})$ is the transition function. However, the parametersγ_2, ρ_1 and $\rho_2$are unidentified. To cater this problem, Sollis (2009) replaced $G_t(\gamma_1, y_{t-1})$ in Eq. (7) with a first-order Taylor expansion around $\gamma_1 = 0$ gives

$\Delta y_t = \rho_1\gamma_1 y_{t-1}^3 \mathrm{S_t}(\gamma_2, y_{t-1}) + \rho_2\gamma_1 y_{t-1}^3\big(1 - \mathrm{S_t}(\gamma_2, y_{t-1})\big) + n_t$ (8)

where $n_t = e_t + R_t$ andR_t is remainder from the Taylor expansion. But the parameters are still unidentified. Sollis (2009) presented a solution to this problem and the resulting AESTAR regression is

$\Delta y_t = \emptyset_1 y_{t-1}^3 + \emptyset_2 y_{t-1}^4 + n_t$ (9)

The augmented version of equation (9) is

$\Delta y_t = \emptyset_1 y_{t-1}^3 + \emptyset_2 y_{t-1}^4 + \sum_{i=1}^{p} \rho i \, \Delta y_{t-i} + n_t$ (10)

The null hypothesis of the auxiliary model (Eq. 10) becomes:

$$H_0: \emptyset_1 = \emptyset_2 = 0$$

To test the unit root null hypothesis Sollis (2009) proposes a simple F-test and denotes the calculated test statistics with F_{AE}, $F_{AE,\mu}$ and$F_{AE,t}$, for the zero mean, non-zero mean and deterministic trend cases respectively.If the unit root hypothesis is rejected, the null hypothesis of symmetric ESTAR nonlinearity can be tested against the alternative of asymmetric ESTAR nonlinearity by testingH_0: $\emptyset_2 = 0$ vs H_0: $\emptyset_2 \neq 0$with a standard F-test.

Results and Discussions

First, the conventional linear unit root tests are applied to examine the stationary properties of consumption income ratios and then, nonlinearities and asymmetries are taken into account. This allows the comparison of results from both the linear and nonlinear classes of unit root tests.

The results presented in table2 clearly highlight the disagreement among the conventional unit root tests regarding the stochastic properties of consumption-income ratios for the selected set of countries. This re-emphasizes the need of incorporating the nonlinearities and asymmetries while testing the stochastic properties of the aforementioned time series.

Table 2: Comparison of Linear Unit Root Tests Results[1]

Linear Unit Root Tests	Stationary APC
ADF Test	Colombia, Pakistan
PP Test	Colombia, Peru
KPSS Test	Brazil, Colombo, Indonesia, Morocco and Pakistan

Source: Author's calculations

The KSS ESTAR test allows non-linear data generation process. Before applying this test, the data was demeaned and de-trended. This data was obtained by saving the residuals from regression of each APC series on a constant and on both the constant and trend of each country, respectively. The ESTAR test results are furnished in Table 3.

Table 3: KSS ESTAR Unit Root Test Result

Country	Demeaned Data	Demean and De-trended Data
Brazil	-2.10	-2.36
India	-1.37	-2.12
China	-1.08	-2.00
Chile	-3.61*	-3.92**
Colombia	-2.46	-2.58
Indonesia	-2.24	-2.51
Korea	-0.93	-2.35
Malaysia	-1.61	-0.09
Morocco	-3.08**	-2.23
Peru	-3.37**	-3.46**
Philippines	-2.06	-2.36
South Africa	-0.41	-2.71
Thailand	-1.58	-1.04
Pakistan	-2.59	-2.68

Source: Author's calculations. ***, **,* denote rejection of null hypothesis at 10%, 5% and 1% significance levels respectively.

Contrary to the findings of ADF, the ESTAR test results (table 3) show non-linear stationary consumption-income ratios forChile, Morocco and Peru. Moreover, in case of Chile, the ESTAR test rejects the null hypothesis of unit root for both the demeaned and demeaned and de-trended data which is contradictory to the findings of all conventional unit root test results (Appendix:

).

[1]See Appendix for complete unit root results.

Table 2: Linear-Unit Root Tests Results

	ADF		PP		KPSS	
Country	intercept	intercept & trend	intercept	intercept & trend	intercept	intercept & trend
Brazil	-2.283(0)	-2.892(0)	-2.330(1)	-2.801(4)	0.337(5)	0.117(5)
India	-0.593(0)	-2.007(0)	-0.649(1)	-2.007(0)	0.789(6)*	0.178(5)**
China	-1.213(1)	-2.437(1)	-0.921(1)	-1.833(2)	0.696(5)**	0.097(3)
Chile	-1.998(0)	-2.208(0)	-1.998(0)	-2.208(0)	0.351**(5)	0.123(5)***
Colombia	-2.971(0)**	-3.000(0)	-3.006(2)**	-3.069(2)	0.333(5)	0.065(5)
Indonesia	-2.207(0)	-2.353(0)	-2.378(2)	-2.570(2)	0.330(5)	0.052 (5)
Korea	-1.420(0)	-2.346(1)	-1.731(8)	-1.948(4)	0.705(5)**	0.129(5)***
Morocco	-1.953(0)	-2.005(0)	-2.085(3)	-2.148(3)	0.242(5)	0.160(5)
Malaysia	-1.909(0)	-0.049(0)	-1.933(4)	-0.200(2)	0.611(5)**	0.167(5)**
Peru	-2.710(0)	-2.501(0)	-2.705(1)**	-2.558(5)	0.216(5)	0.212(5)**
Philippines	-1.161(0)	-1.642(0)	-1.283(2)	-1.766(2)	0.474(5)**	0.145(5)**
South Africa	-0.101(0)	-2.227(0)	-0.035(2)	-2.489(3)	0.840(6)*	0.138(5)**
Thailand	-1.412(0)	-1.566(0)	-1.452(8)	-1.460(3)	0.868(5)*	0.159(5)**
Pakistan	-2.796 (0)**	-3.542(3)**	-2.811(2)***	-2.726(1)	0.197(2)	0.068(2)

Source: Author's calculations.

***, ** &* denote rejection of null hypothesis at 10%, 5% and 1% significance levels respectively. Numbers of augmentations are indicated in parenthesis.

In case of Morocco & Peru, the KPSS test results partially validate the results of KSS ESTAR test. To conclude, among all the fourteen emerging economies, the KSS ESTAR test proved the non-linear stationary APC for Chile, Morocco and Peru.

To cater for asymmetries in the data generating process, the AESTAR test is applied proposed by Sollis (2009). The results are presented in Table 4 for demeaned ($F_{AE,\mu}$) and demeaned& de-trended data ($F_{AE,t}$). Additional F statistics ($F_{as,\mu}$,$F_{as,t}$) are calculated only when null hypothesis of unit root is rejected against the alternative hypothesis of stationary (a)symmetric ESTAR nonlinearity for demeaned and demeaned & de-trended data respectively.

The AESTAR test rejects the null hypothesis of unit root for Peru against the alternative of stationary (a)symmetric ESTAR non-linearity. This leads to the calculation of the $F_{as,\mu}$ and $F_{as,t}$ statistics to test the null hypothesis of symmetric ESTAR non-linearity for demeaned and demeaned and de-trended data respectively. The results show that null hypothesis of symmetric ESTAR non-linearity is rejected for Peru. Hence out of all the fourteen emerging economies only Peru has asymmetric nature of consumption income ratios.

Table 4: AESTAR Unit Root Test Results

Country	$F_{AE,\mu}$	$F_{as,\mu}$	$F_{AE,t}$	$F_{as,t}$
Brazil	1.646	NA	2.147	NA
India	0.976	NA	1.978	NA
China	2.236	NA	2.731	NA
Chile	3.607	NA	4.790	NA
Colombia	2.064	NA	2.409	NA
Indonesia	1.762	NA	2.357	NA
Korea	1.156	NA	2.312	NA
Morocco	2.761	NA	2.297	NA
Malaysia	1.636	NA	1.430	NA
Peru	4.214***	3.4402**	3.723	NA
Philippines	1.609	NA	2.357	NA
South Africa	0.602	NA	2.567	NA
Thailand	2.597	NA	1.995	NA
Pakistan	1.879	NA	2.146	NA

Source: Author's Calculations

Since the consumption income ratios for most of the countries including Brazil, Thailand, Malaysia, Indonesia, India, China, Colombia, South Africa, Philippines, Pakistan and Korea are found as non stationary, these countries appear to be conguent with the Absolute Income Hypothesis, the Involuntary Savings Theory and the Marxian Undercompensating Theory. It can be concluded that policy shocks would likely have permenant effects on the average propensity to consume in all these countries as suggested by Baykara & Telatar (2012). However, the remaining three countries including Chile, Morocco and Peru showed that the APC is stationary. For these three countries results are congruent with theoretical frameworks of the Relative Income Hypothesis, the Permanent Income Hypothesis and the Life Cycle Hypothesis which all assume a forward looking consumer. For these three countries, the policy shocks would have temporary effect.

From the policy making point of view, the fiscal policy would be more effective for those 11 emerging economies that showed non-stationary APC. As the Keynesian consumer considers the current income as the only determinant of current consumption and care about the short run only hence, fiscal policy would be more effective in that case. Private consumption can be increased by cutting down the taxes so there is no significant role for interest rate, money and exchange rate as suggested by Abeysinghe & Choy (2004).Moreover the external factors such as terms of trade shocks, global interest rates and government expenditures could also have permanent shifts in consumption income ratios of these countries and influence the empirical results as suggested by Gomes & Franchini (2009). In contrast to this for the other three countries, with stationary APC, monetary policies would be more effective. The consumers in these three countries are forward looking and try to smooth their consumption so permanent changes brought about by monetary policy would be more effective to stimulate the aggregate consumption as suggested by Brady (2008).

Conclusion

For fourteen emerging economies, this study investigates the stochastic properties of consumption income ratios. Whether the APC is stationary or not will affect empirical modelling of consumption functions and our understanding of impact of economic policy. Therefore, while examining the stochastic properties of APCs, this study has taken care of the possible misspecification in the conventional linear unit root testing procedures in terms of nonlinearities and asymmetries. The KSS ESTAR and AESTAR unit root testsproposed by Kapetanios, Shin & Snell (2003) and Sollis (2009) are called in to take care of nonlinearities and asymmetries in data genearting process. In addition to that conventional linear and symmetrical unit root tests (ADF, PP & KPSS)are also applied.

Empirical findings from conventional linear unit root testsare more favorable to the unit root case. The evidence of staionary APC is found only for the three countries namelyColombia, Peru and Pakistan. However, the ESTAR test results show non-linear stationary consumption-income ratios for Chile, Morocco and Peru. Furthermore, ESTAR test rejects the null hypothesis of unit root for Chile which does not corroborate with the findings of conventional unit root tests. This clearly shows the disagreement between the linear conventional tests and the ESTAR test. The AESTAR test results reveal that the consumption-income ratio for Peru exhibits a nonlinear stationary and asymmetric behaviour.

The consumption income ratios for Brazil, Thailand, Malaysia, Indonesia, India, China, Colombia, South Africa, Philippines, Pakistan and Korea are found non stationary implying the consumption behaviours in these countries appear to be conguent with the Absolute Income Hypothesis, the Involuntary Savings Theory and the Marxian Undercompensating Theory and hence the fiscal policy would be more effective. However, the stationary APC for Chile, Morocco and Peru is congruent with theoretical frameworks of the Relative Income Hypothesis, the Permanent Income Hypothesis and the Life Cycle Hypothesis which all assume a forward looking consumers who try to smooth their consumption. So, permanent changes brought about by monetary policy would be more effective to stimulate the aggregate consumption as suggested by Brady (2008).

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