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An Analysis of Consumption Function: A Case Study of Upper Middle Income Economies

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ABSTRACT

This paper draws on evidence of consumption function from four-country group case-studies of upper middle-income economies (together termed as developing economies). The ARDL model is applied to the time series data from 1985 to 2017 to understand the major components of the aggregate consumption function. The result reveals that labor income and wealth impact in all economies are similar and have a significant positive impact on real private aggregate consumption. Similarly, the real interest rate and unemployment have an analogous effect on real private aggregate consumption. The real interest rate has a negative effect on aggregate real private consumption supporting income effect. In the short run real GDP and wealth have a positive impact on aggregate real private consumption while real interest rate and unemployment rate have a negative effect on aggregate real private consumption for selected economies. Moreover, overall PIH is valid for long-run, while AIH is valid for short-run in the selected countries.

Keywords: Aggregate Real Private Consumption, Gross Domestic Product, Absolute Income Hypothesis, Permanent Income Hypothesis

1. INTRODUCTION

Since the evolution of consumption function in 1930, the researchers, philosophers, and economist have been involved in the determination of important factor that may have an impact on shaping the other key components in an economic model. Aggregate real private consumption (ARPC) has received greater importance due to its foremost contribution in an economy. In developing economies, the share has been

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recorded at around 60 and 70 percent, while in the low-income economies; the contribution has gone beyond 75 percent¹. Thus, the component has an important policy implication to determine the direction of economic activities. Policy makers have the used this important component to accelerate the economic growth as well as control the economy as and when needed.

Economies with respect to their gross national income (GNI) behave differently in terms of their economic contributors. Therefore, it is not necessary that every economy satisfies similar consumption hypothesis (a brief on consumption hypothesis is provided in the theoretical section) in their economic model. Therefore, it is important to identify the consumption hypothesis in different income economies for better understanding and relevant and effective policy measure to sustain the economic growth.

According to the classification of economies, there are three categories i.e. developed, developing and under-developed economies. The latter one is also termed as the least or less developing economies. Developed economies are mainly comprised of high-income economies having per capita GNI of more than \$12,736 or more.² The upper middle income economies (UMIE) - focus of this paper are collectively termed as 'developing economies'. Globally, developing economies are considered diverse in terms of their population and income and are spread in every region of the developing world.

From the population perspective, developing economies account for more than two third i.e. 69.5 percent of the total world population.³ Of this, China alone has almost one-fifth (1/5th or 19.1 percent) of the total world population. Developing economies are considered a growth engine for the world economy as their noteworthy contributions in the world economy. The annual average growth rate during the period 2000-2017 was considerably higher at 6.3 percent vis-à-vis annual average world growth rate of 2.7 percent. The share of developing economies in the world economy for GDP is 35 percent (2005), FDI receipts⁴ 39.2 percent (2012), emigrant remittance 66.9 percent (2012) and trade (exports and imports) share stood at 21 percent (2005). The significant foreign inflows and trade characteristics of developing economies reveal the potential and

¹ World bank (2017) country classifications

² World bank (2017) country classifications

³ World Development Indicators, World Bank (2017)

⁴ FDI receipts are excluding portfolio equity receipts.

enthusiasm in growth by developing economies. The domestic growth and aggregate demand in real private consumption contribute on an average around 60 percent of GDP. Beside this, capital accumulation has been observed in developing economies indicates the direction of economic growth and prosperity, going forward. Capital accumulation is an important indicator of savings in an economy which is a counterpart of a consumption function. Thus, a better understanding of consumption function would reveal the better policy making for savings and investment in an economy.

Thus, considering the importance of developing economies, the study is an attempt to understand the determinants of aggregate consumption in upper middle economies. Moreover, it is important to understand the consumption behavior in the selected economies to understand the determinants of robust economic growth. Keeping in view the importance of the developing economies and the role of ARPC, the objective of the study is to test the PIH and AIH with the help of time series data for selected UMIE countries. The empirical model investigates the short-run and long-run relationship among the aggregate real private consumption, income and wealth by using appropriate economic model and technique to co-integration. Following the introduction section, a selective and brief literature on the subject is provided in detail with some critical analysis. Empirical results and discussion are followed by detailed explanation of data and methodology. Finally, results are discussed, and the study is concluded with the conclusion.

2. LITERATURE REVIEW

To test the PIH for the US economy, Dejuan et al. (1999) used microdata. They found that the consumption behaviour of individuals is consistent with PILCH. They did not find any evidence showing that current income movement “cause” changes in total consumption. Also, their result did not support the liquidity constraints hypothesis.

Drakos et al. (2002) investigated the aggregate consumption for Greece. He was interested in the rejection reason(s) of PIH. He concluded that the individuals’ consumption response to the expected income is asymmetrical. The empirical evidence suggested that failure of LCPIH in Greece is due to liquidity constraints rather than

myopia. Several theories have been developed considering the pioneering ‘Psychological Law of Consumption’ also known as Absolute Income Hypothesis (AIH) by J. M. Keynes. Of them, theories got popularity and attention include Relative Income Hypothesis (RIH), Life Cycle Hypothesis (LCH), Permanent Income Hypothesis (PIH) and Hall’s Random Walk Hypothesis (REH). Kuznets’s paradox was the first argument that builds to point out the inconsistency in the long-run consumption function.

Keynes’s psychological law of consumption proved as a milestone for the economists afterward to develop their own consumption hypotheses. The majority of the researchers tested AIH empirically, however, the most significant contribution has been made in the form of Kuznets paradox, RIH, LCH, and PIH by extending Keynes’s work. Generally, RIH, LCH, and PIH are called post-Keynesian consumption hypothesis. Since, these theories have been discussed in detail in the existing literature and also have been discussed in detail in the author’s own publications (Khan et. al, 2011), no further detail explanation is needed here. Apart from theories, there is substantial literature available on the empirical testing of the consumption function. The following sub-section is an attempt to filter out the relevant literature with respect to ARPC (Khan et al, 2015).

Flavin (1981) investigated the role of current income for the determination of future income. For this purpose, he developed the structured econometric model with time series data and revised the PIH induced by the innovations and other changes in current income. The results of the study rejected both REH and PIH in his case study. The study also estimated the excess sensitivity of consumption to current income and the hypothesis: ‘consumption exhibits no excess sensitivity to current income’ is rejected.

Campbell and Mankiw (1990) investigated the consistency of PIH with United States of America postwar data. The study applied a new approach for testing of PIH hypothesis. Through this approach, the study estimated the proportion of households that follow the PIH and AIH. The results of the study indicated that about 50 percent of households’ consumption choices are based on PIH, reveals a substantial departure from PIH. Gali (1991) developed a simple model for analysis of consumption through time-series data, following the assumption of inter-temporal budget constraint. Furthermore, the estimators of this study have some advantages over other estimators already exist in

the literature. The empirical results of this study showed that post-war United States data of consumption smoother than PIH predicted.

Phillips (1992) used the Bayesian methodology which provides a very informative result in regard to classical consumption hypothesis. The study estimated the short and long-run consumption function for the Australian economy. Both consumption expenditure and household disposable income are not co-integrated in real and nominal terms. The study found a strong correlation with inflation and relative capital loss measures in consumption function. Grades (1996) estimated the income elasticities for Canada with the help of cross-section and time-series data. Income elasticities estimate with the help of cross-section data were not useful to forecast changes in consumption over time. The results of time series and cross-section income elasticities are different from each other due to measurement and specification error.

Dejuan and Seater (1999) tested the Life Cycle Permanent Income Hypothesis (LCPIH) against the alternative hypothesis of AIH on developing and industrial economies. Moreover, he also tested the liquidity constraints for households in the sample. The results from industrial economies support PIH while developing economies consumption pattern do not support the pattern. The result of the study shows that the total consumption of non-durable goods and services are not caused by changes in the current income. The study further highlights that consumption is not affected by liquidity constraint significantly.

Lek Goh and Downing (2002) investigated the consumption function for New Zealand following the LCH and PIH. The study used the econometrics method i.e. ECM, the conventional ordinary least squares method as well as the Stock and Watson model of leads and lags. Moreover, they used the actual data of a wealth variable in case of New Zealand rather than proxies. Thus, it represents the wealth variable in disaggregated form. Besides, mortgages of households, immigration is also included as an explanatory variable in a consumption function. Migrant transfers have an effect on consumption while mortgage withdrawal has no clear impact on consumption. Similarly, the financial wealth has a short-run impact but no long-run.

Peersman and Pozzi (2004) investigated the determinants of liquidity constraints

i.e. business cycle, government debt ratio, unemployment rate, personal wealth and financial liberalization. The study analyses that whether these determinants have any effect on consumption smoothing of households. The study used the United States of America quarterly data from 1970 to 2000. The result of the study indicates that the households consumption smoothing decreased with a rise in government debt ratio during the recession period. Furthermore, the study also noted that the excess sensitivity of consumption to disposable income is also due to uncertainty faced by households about their future consumption.

Culture (2004) tested the LCH for Hong Kong using average pay and employment in labor income. The study found a stable relationship between consumption, income, and wealth which indicates the validity of LCH. Sanz, B. (2006) tested the instability of Spanish consumption function parameters. The study used a new test with conventional tests. The results of the study indicate the stability of the parameters in the short-run. Carrol et al. (2005) argued that Friedman's PIH offers the best explanation for impatient households with labor income uncertainty to achieve the optimal consumption.

Liu et al. (2007) used the Hong Kong data and tested the relationship between consumption, income, and wealth. The result indicates weak supports to the implication of PIH for Hong Kong data before 1997 as it does not support for the period after 1997. The study used annual data from 1984 to 2006. Besides that, the results also show both anticipated and unanticipated income effects on consumption, while temporary tax change has an impact on durable consumption only.

Souse (2008) showed that non-stock market wealth effect is significantly greater than the stock market wealth effect in the case of the United States of America. Further, he showed that the impact of indirectly held stock market wealth on consumption is greater than direct property.

Motaqad (2011) estimated nonlinear Marginal Propensity to Consume (MPC) for the Iranian economy and also tested the consistency of nonlinear consumption function. The study, therefore, has applied the nonlinear model to estimate MPC for Iran i.e. Nonlinear Least Squares (NLS) method. However, the MPC is derived from Keynes's

consumption function and PIH. To select the most appropriate model, Davidson-Mackinnon J-test was used. The results of the study supported nonlinearity of MPC for the Iranian economy. It is also revealed that current income is the basic determinant of consumption in Iran.

Khan et. al. (2012) tested Hall's PIH for Pakistan using time series date from 1992 to 2010. He used two models for testing the PIH; Hall's basic model of consumption and Campbell and Mankiw (1990) consumption model. The result of the basic model of PIH shows that AIH is consistent with Pakistan data. The results of the Campbell and Mankiw consumption model indicates that 68 percent of the household consumption decisions are based on a rule of thumb while the remaining households are forward-looking. The study applied OLS, 2SLS and Instrumental Variable Non-Linear Least Square (IV-NLLS) econometrics techniques and in all three models, the real interest rate is statistically insignificant with an incorrect sign.

3. RESEARCH METHODOLOGY

This paper is an attempt to discover the determinants of aggregate real private consumption patterns in developing economies. According to countries classification, the developing economies are divided into two broad categories i.e. Upper Middle-Income Economies with per capita GNI ranging between \$4,126 and \$12,735, and Lower Middle-Income Economies having per capita GNI from \$1,046 to \$4,125 (World Bank, 2015). The study randomly selected four developing economies. Thus, developing economies from UMIE include China, Peru, Tunisia, and Venezuela.

Table 1: Characteristics of all Randomly Selected Countries			
China	UMIE	B	Developing
Peru	UMIE	B	Developing
Tunisia	UMIE	B	Developing
Venezuela	UMIE	B	Developing

The empirical model was applied to the time series data from 1985 to 2017. The variables used in the model are GDP, aggregate real private consumption, quasi-money, unemployment rate, discount rate. Data of GDP, aggregate real private consumption and discount rate were taken in the real terms and converted from nominal, where needed.

The GDP and aggregate real private consumption are corrected through GDP deflator and Consumer Price Index (CPI) respectively while discount rate is corrected by subtracting inflation rate from discount rate.

GDP in the model is used as a proxy for labor income and aggregate real private consumption is used as a proxy for households' consumption. Household wealth is determined by the variable quasi-money as a proxy and income uncertainty is proxied by the unemployment rate. Discount rates are used in place of interest rates in the selected economies. The data of the variables are extracted from different issues of International Financial Statistics (IFS) and World Development Indicators (WDI).

3.1. Empirical Framework

Unit Root Test

Table A1 and Table A2 in the appendix, reports the result of Augmented Dickey-Fuller (ADF) at the level and first order. The result shows that some variables in selected countries are stationary at level 1 while are integrated of (1). Thus, all of the variables under the study are not integrated into the same order, mixed on both $I(0)$ and $I(1)$. Therefore, we have estimated of consumption model with help of ARDL approach to cointegration. Since the households' consumption function in the long-run and short-run are;

$$CONS_t = f(Y_t, W_t, R_t, UR_t),$$

Where; Y is a real gross domestic product, W is wealth, R is real interest rate and UR is unemployment rate. Thus, to estimate the long run and the short run relationship among the variables of interest, we applied the ARDL approach to co-integration, the ARDL representation of consumption function is as under:

$$\Delta \ln C_t = \beta_0 + \sum_{i=0}^j \beta_{1i} \Delta \ln Y_{t-i} + \sum_{i=0}^j \beta_{2i} \Delta \ln W_{t-i} + \sum_{i=0}^j \beta_{3i} \Delta \ln C_{t-i} + \sum_{i=0}^j \beta_{4i} \Delta \ln r_{t-i} + \sum_{i=0}^j \beta_{5i} \Delta \ln UR_{t-i} + \alpha_Y \ln Y_{t-1} + \alpha_W \ln W_{t-1} + \alpha_C \ln C_{t-1} + \alpha_R \ln R_{t-1} + \alpha_{UR} \ln UR_{t-1} + u_t, (4.46)$$

Where: β_i , are short-run coefficients while $\alpha_Y, \alpha_W, \alpha_C, \alpha_{UR}$ are long-run coefficients. The null hypothesis for co-integration

is: $H_0 = \alpha_Y = \alpha_W = \alpha_C = \alpha_R = \alpha_{UR} = 0$, while the alternative hypothesis is: $H_1 \neq \alpha_Y \neq \alpha_W \neq \alpha_C \neq \alpha_R \neq \alpha_{UR} \neq 0$, to test this hypothesis for this purpose we used the bounds test proposed by Pesaran et al. (2001).

Test of Co-integration

Before the estimation of short-run and the long-run relationship among the variables, first, we are interested to apply the ARDL bound approach to test the null and alternative hypothesis of co-integration. The null hypothesis supposed that there is no long run association among the variables in the model; however, the alternative hypothesis supposed the existence of long run association among the variables. The results of the ARDL bound test which shows that in all cases the calculated F-statistics are greater than the upper and lower bound values at 90 percent and 95 percent. Therefore, we reject the null hypothesis of no co-integration and accept the alternative hypothesis of the existence of co-integration. Thus, after the existence of co-integration among the variables in the model, now we can apply the ARDL approach to co-integration, to estimate the long-run and short-run determinants of aggregate real private consumption in selected countries UMIE.

4. RESULTS AND DISCUSSION

Long Run Results

Table 2 below offers the long-run relationships among the variable specified for both categories. The coefficients of real GDP for China and Tunisia are higher at 0.62 and 0.63, respectively. This indicates that the labor income in these countries has a significant positive and relatively high impact on real private aggregate consumption. While Peru and Venezuela have reported an increase of 0.56 and 0.59 with respect to a 1 percent increase in labor income.

Table 2: Long Run Results of ARDL for UMIE and LMIE

Country	$\ln GDP$	$\ln W$	$\ln RIR$	$\ln UR$	Model
Upper Middle Income Economies					
China	0.627**	0.170**	-0.0160**	-0.0080**	ARDL(1,0,1,1,0)
Peru	0.56***	0.207**	-0.0505	-0.0361*	ARDL(1,0,0,0,0)
Tunisia	0.6324***	0.111*	-0.0012**	-0.0012*	ARDL(1,0,0,0,0)

Venezuela	0.578***	0.176*	-0.0306*	-0.00933	ARDL(1,0,0,0,1)
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Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

The coefficients of wealth in the model for all countries have relatively less impact on households' aggregate real private consumption. Nevertheless, the coefficients have correct sign and statistically significant at a different level of significance specified in the table note.

The real interest rate and unemployment have a similar effect in all countries. The real interest rate has a negative effect on aggregate real private consumption for China, Peru, Tunisia, and Venezuela by supporting income effect. The coefficients of real interest rate show that a 1 percent rise in interest rate tends to decrease the real private consumption by 0.016, 0.05, 0.001 and 0.03 percent respectively. All of the coefficients of real interest rate are statistically significant apart from Peru, in the same way; the coefficients of the unemployment rate are statistically significant for China, Peru, and Tunisia apart from Venezuela. This indicates that in the case of the Peru interest rates, while in the case of Venezuela unemployment rates do not have any significant alteration in the aggregate real private consumption.

Short Run Results

Short run empirical results of all selected economies show that the coefficients of real GDP, wealth, real interest rate and unemployment rate are having correct signs as postulated by AIH and PIH. Moreover, all of the coefficients are statically significant except the real interest rate coefficient in the case of China and Venezuela and the coefficient of the unemployment rate in the case of Venezuela. As exhibited in Table 3, a 1 percent increase in real GDP will amplify the aggregate real private consumption by 0.571 percent, 0.48percent, 0.80 percent, and 0.56 percent, in case of China, Peru, Tunisia, and Venezuela respectively.

Table 3: Short Run Results of ARDL for UMIE				
Upper Middle Income Economies				
Country	China	Peru	Tunisia	Venezuela
$\Delta \ln GDP$	0.5710***	0.4800*	0.8012**	0.5618*
$\Delta \ln W$	0.1006*	0.1290**	0.2744**	0.1601*
$\Delta \ln RIR$	-0.1201	-0.0689**	-0.0516*	-0.10502

$\Delta \ln UR$	-0.071**	-0.0447*	-0.0533*	-0.4854
ECT(-1)	-0.4100**	-0.1200**	-0.4270***	-0.4321**
$\ln CON$	0.91	0.42	0.59	0.572
DW	1.880	2.48	1.71	1.674
F- Stat:	53.61	4.76	8.43	7.498
χ^2_{LM}	9.2254(0.208)	1.924(0.165)	0.515(0.473)	0.95009(0.335)
χ^2_{RESET}	0.842 (0.219)	1.856 (0.135)	0.7622(0.816)	0.714 (0.239)
$\chi^2_{Normality}$	0.0432(0.324)	0.641(0.0426)	0.7231 (0.527)	0.8126 (0.218)
$\chi^2_{Hetro.}$	0.6255(0.429)	0.4744(0.491)	0.00344(0.953)	0.0407(0.845)

The coefficients of the real interest rate are -0.120, -0.069, -0.052 and -0.105 for China, Peru, Tunisia, and Venezuela. The result reveals that a 1 percent rise in interest rate tends to reduce the aggregate real private consumption by 0.069 percent, and 0.105 percent for Peru and Venezuela, respectively in the short run. The real interest rate does not have any significant impact in the short run for China and Tunisia. Similar interpretations of reduction in aggregate real private consumption with respect to the unemployment rate for UMIEs. The insignificance of the unemployment rate is noted in the short run for Venezuela.

The ECT term illustrates the speed of adjustment in the next period from disequilibrium to equilibrium. ECT values of China, Peru, Tunisia, and Venezuela is quite high which are; -0.4100, -4270 and -0.4321 respectively while the ECT for Peru is not high (-0.120). The ECT gives an idea about the speed of convergence from disequilibrium to equilibrium in the next period. Thus, apart from Peru, the speed of adjustment is quite good in the case of China, Tunisia, and Venezuela.

The results of the diagnostic tests revealed that our estimated model is free from respective econometric problems. Furthermore, we applied CUSUM and CUSUMsq to test the stability of the coefficients of our estimated model. An appendix presents the figures (Figure 1 to Figure 8) of CUSUM and CUSUMsq for all the selected countries qualify the test of stability.

5. CONCLUSION

This study used annual data from 1985 to 2017 and investigated the validity of

PIH and AIH for upper middle and lower middle income economies. The results of the ARDL model show that real GDP and wealth have a significant effect on aggregate real private consumption both in the short-run and long-run. Thus, the ARDL approach to co-integration reveals the most important determinants of aggregate real private consumption i.e. real GDP and wealth. However, real interest rate and unemployment have a significant effect on aggregate real private consumption in the short run rather than long run. The effect of the real interest rate is mixed across the sample while the effect of the unemployment rate is negative for all countries.

For China, Peru, and Venezuela the coefficients of wealth are relatively small in the short run as compare to the long run. Thus, it shows that in the short run households of these selected economies follows the rule of thumb while in the long-run they respond to their expected future income and follow PIH. Consequently, it provides evidence for the validity of AIH in the short run for these countries; however, they also supported the validity of PIH in the long run. Further, the coefficient of GDP and wealth are significantly different from each other. This draws a conclusion that PIH is weakly supported by the empirical results of these countries in the short-run and long-run. It is expected that the results of this study will support additional work on microdata for testing of PIH and AIH subject to different income groups of consumers.

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