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Real Private Aggregate Consumption Determinants in Bangladesh

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Contents

Abstract: *The study analyses the factors affecting Bangladesh's real private aggregate consumption (RPAC). The Autoregressive Distributed Lag Model (ARDL) model has been used to achieve the study's objective by considering the time series data from 1980 to 2021. The study's findings show that, in the case of Bangladesh, wealth and Gross Domestic Product (GDP effects on RPAC are quite similar. Nevertheless, the effect of GDP is vital in the short run, while wealth is prominent in the long run. However, the real interest and unemployment rates have had the same results. The long-term outcomes showed a negative influence of real interest rates on RPAC as a sign of an impact on income. The current income, real interest, and unemployment rates are expected to play a key role in determining the Bangladesh RPAC in the short run.*

Key Words: Unemployment Rate, Autoregressive Distributed lag Model (ARDL) and Real Private Aggregate Consumption

JEL Classification: E32.

Introduction

The Real Private Aggregate Consumption (RPAC) is among the foremost elements of GDP in the developing world. In general, the Average Propensity to Consume (APC) in developing countries is 70 to 80 per cent, whereas, in less developed countries, the APC varies between 80 to 90 per cent Liaqat, S., et al. (2020). Therefore, the RPAC is a single crucial factor for policymakers to expedite economic activity during an economic downturn. Similarly, it is also working in the course of the boom to regulate the potential aggregate demand. Furthermore, to understand the nature of the business cycle in any economy, it is essential to comprehend the makeup of that economy's RPAC. Consequently, knowing the RPAC is a greater concern for policymakers Khan, K. et al., (2020).

Studying private consumption has twofold benefits. First, it supports the concern about the business cycle, and second, it is the basic factor of monetary wellbeing. Furthermore, understanding consumption and savings comprehension since S = Y-C whereas MPS = 1-MPC and saving is one of the most important determinants of capital accumulation Khan et al., (2011).

There are some theories in macroeconomics that can be used to comprehend total RAPC. Various economists have developed these theories to better understand and describe the consumption

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patterns of households. Following the "Great Depression" in 1936, the psychological law of consumption, which also went by the name AIH, marked the beginning of the evolution of consumption theories. The AIH and PIH have divergent perspectives on MPC; the former assumes a high value for MPC while the latter does not. But the multiplier impact greatly depends on the MPC value because a high MPC value predicts a high multiplier effect and vice versa. All through, with a multiplier, the nation's economic activity both can be sped up and managed. Therefore, it is crucial for policymakers to be aware of the MPC's accurate value in each nation and to comprehend consumer behaviour. As a result, the multiplier and MPC values have a considerable influence on economic expansion and employment. The implementation of the consumption hypothesis, however, varies across the economies because each country has a different income level, stage of development, and financial market. However, there is no agreement among economists as to which economy will fulfil which kind of consumption hypothesis.

In Bangladesh, consumer spending accounts for roughly 70% of GDP Ahmed M. et al. (2017). This shows that consumption is a key determinant of macroeconomic variables in Bangladesh. As a multiplier, it is crucial to the expansion and decline of aggregate economic activity and the real business cycle, while the value of the multiplier depends upon the value of MPC. A greater value of the MPC leads to a higher value of the multiplier, and a higher value of the multiplier leads to better aggregate economic activity and, consequently, economic growth and employment too Khan, K. et al. (2012). The objective of the study is to assess the factors that influence RPAC for Bangladesh taking into account its importance for potential demand.

Literature Review

The consumption function is one of the oldest and most important macroeconomic concepts. Therefore, very rich literature is available on the subject. However, we have reviewed the studies that are closely related to us. Initially, Keynes' General Theory in 1936 introduced the association between disposable income and consumption, and later, this relationship was labelled as a consumption function, more specifically known as AIH Ahmed, N. et al. (2020). According to AIH, the fraction of income that is consumed decreases as income increases. Hence, the APC decreases as income rises. If this Keynes's assumption is applied to individuals, then it can be assumed that rich people of society save more than poor people do. Kuznets (1946) empirically analysed the AIH for the United States; its findings showed the inconsistency of the AIH. Hsich et al. (1994) estimated that the MPC of Korea and Taiwan had declined quickly due to fast economic growth, while the MPC of Thailand and India are low due to constant economic growth. A fluctuation in the MPC is likely to help government debt financing internally. For India alone, the impact of interest rates is adverse and significant. Therefore, to encourage savings in India, monetary policy will be useful. Shea (1995) tested LC-PIH for the US economy. He found that the LC-PIH is not valid with aggregate consumption data of the US economy after WWII. He confirmed that the LC-PIH rejection is asymmetric because aggregate consumption reacts more to expected income declines than expected income increases. He rejected the presence of both myopia and liquidity constraints in the US. Rao (2005) applied the C & M consumption model and evaluated the consumption function for Fiji under the PIH. He found that AIH is valid in Fiji.

Dejuan et al. (1997) applied data from 87 economies to verify the authenticity of PIH. He divides the sample of countries into two parts: industrial countries and developing countries. The data of industrial countries supported the PIH hypothesis, while the data of developing countries did not prove the PIH significance. When the sub-samples were created based on the data quality, the higher data quality countries supported PIH while the low-quality data countries did not. Khoon L. et al. (2002) forecasted New Zealand's consumption function. They employed the conventional

OLS method and Stock and Watson's procedure of runs and lags. Furthermore, to describe the impact of remittances, it showed a significant impact on spending in the near term as well as non-commercial wealth, but no long-term consequences., whereas financial wealth only has a long-term favourable effect on RPAC. Lavi (2003) found a robust relationship between the change in RPAC and anticipated income. The research outcomes showed that the expected wage income effect on consumption is approximately 0.5. It means that the consumption of half of the people is based on current income, while the other half of households set their expenditure preferences based on permanent income. He also found that the return on shares has a significant effect on consumption, while its elasticity is comparatively small.

Khan et al. (2015) applied the Keynesian Consumption Function (KCF) and PIH to assess the consumption function of SAARC nations. The empirical findings demonstrate that the marginal propensities to consume (MPCs) of KCF and PIH are relatively different from each other in the short run. However, if MPC based on KCF is comparatively greater than PIH, then it can be concluded that consumers follow current income in the short term for their consumption. Khan K. et al. (2012) used annual data covering the years 1980–2010 to evaluate Hall's PIH. The consumption model based on Campbell and Mankiw's (1989) method revealed that 34% of the population is considered to be forward-looking, and the remaining 46% are considered to be backward-looking, proving the validity of the absolute income hypothesis. Lunfang D. et al. (2018) evaluate the applicability of AIH and PIH in China. The outcomes of the analysis based on Hall's random walk hypothesis disprove the validity of the PIH for China and favour the AIH.

S. Liaqat et al. (2018) looked into the China consumption hypothesis. The findings of the investigation disproved the legitimacy of PIH while bolstering the soundness of AIH for China. Shirvani et al. (2008) examined PIH for five developed economies. They utilised the MVSD detrending method and found that the PIH is reasonable in France, Canada, Italy, the United Kingdom, and the United States. Economists widely tested PIH rather than LCH due to some advantages of PIH over LCH. LCH is based on lifetime income, and it is difficult to estimate lifetime income for households. Likewise, the consumption function for Bangladesh has also been computed in this study.

Methodology

We consider the utility function of a representative household that lives in pried 'T'. The lifetime utility function of that household is given below:

$U = \sum_{t=1}^{T} u.(C_t), u'(\bullet) > 0, .u''(\bullet), < 0$ (1)

$\sum_{t=1}^{T} C_t \leq A_0 + \sum_{t=1}^{T} Y_t$ (2)

$u'(\bullet) > 0$ = Marginal utility

C_t = Consumption in period t

Y_t = Labor income of $Y_{1,}, Y_2, Y_3, \ldots\ldots\ldots, Y_T$

A_0 = Initial wealth

T= Periods of individual life

The above utility function assumed that interest rate is determined exogenously, and on the given interest rate, the representative household can choose freely between borrowing and saving. However, for simplicity, we set discounts, and interest rates are equal to zero. We know that the MU of consumption is always positive. Thus, the Lagrangian multiplier of maximisation for representative households is:

$\zeta = \sum_{t=1}^{T} U(C_t) + \lambda(A_0 +, \sum_{t=1}^{T} Y_t - \sum_{t=1}^{T} C_t)$ (3)

Therefore, for consumption, C_t the first order condition is as under:

$u'(C_t) = \lambda$ (4)

Consequently, $C_1 = C_2 = C_3 = \ldots\ldots\ldots\ldots = C_T$ replacing this information into the budget constraint.

$C_t = \frac{1}{T}(A_0 + \sum_{t=1}^{T} Y_t)$ (5)

The term in parentheses is the household's complete lifespan assets. Therefore, equation

(5) shows that the household divides the assets equally among different periods of life.

Consumption Function Modeling

Considering Keynes, J.M. (1936), Friedman, M. (1947), Modigliani, F. and Brumbergh, R. (1954), a typical consumption function can be represented as follow:

$$C_t = f(Y_t, W_t, X) \qquad (06)$$

Where:

(C) = RPAC

(Y)= National Income

(W) = Wealth

However, X represents the rest of the short-run determinants of aggregate consumption. Nevertheless, a typical consumption model, in the long run, can be anticipated:

$$log\ C_t = \beta_0 + \beta_1\ log\ Y_t + \beta_2\ log\ W_t + \varepsilon_t \qquad (07)$$

Similarly, the aforementioned equation (07) is established in light of PIH & LCH as households have the ability to split their consumption choices between intertemporal depending on their wealth situation.

Data for the Variables in the Model

The study has been spread over time series data from 1980 to 2021. Furthermore, GDP, RPAC, quasi money, unemployment rate, and discount rate are used as proxies for labour income, households' consumption, household wealth, the uncertainty of income, and interest rate, respectively. The data is obtained from International Financial Statistics (IFS). The GDP, aggregate private consumption, and discount rate are all converted from nominal to real terms. Moreover, all nominal variables are converted to their real form by using the GDP deflator and Consumer Price Index (CPI).

There are numerous techniques to estimate economic relationships that are based on univariate and multivariate analysis and are covered in the econometrics literature. Engle-Granger's (1987) techniques are based on univariate analysis, while the techniques for multivariate analysis developed by Johansen (1988), Johansen's (1995), and Johansen and Juselius (1998) are generally called the conventional approaches to co-integration. Since the ARDL method was created by Pesaran et al. (2001) as a fresh method for co-integration, this approach has become popular among economists, researchers, and econometricians due to its advantages over the conventional approaches. First, the conventional co-integration approaches applied a system of equations to assess the long-term relationships, while the ARDL approach applied a one-reduced form equation. Second, in standard co-integration tests, it is not possible to use various optimum lags for numerous variables. However, the ARDL technique uses various optimum lags for each variable in the model. Third, the ARDL approach gives much better results in the case of a small sample, i.e., from 30 observations to 80 observations (as in this study). For this purpose, the critical values are developed by Narayan (2004). Fifth, the ARDL method assesses simultaneously the long and short-run elements of the model by eliminating the challenges connected with autocorrelation and omitted variables. Sixth, in the long run, when several of the regressors are endogenous, the ARDL technique usually provides us with unbiased estimates Harris and Sollis (2003).

Before that, we can choose any econometric method. Initially, we need to check the stationarity of the variables. For this purpose, the ADF test was applied to explore the stationarity of the variables applied in the model. The results of the ADF test are depicted in Table 01, which implies that RPAC, GDP, quasi-money, and the unemployment rate are stationary at the first difference while the discount rate is at its level. Therefore, since the variables are integrated at a level and first difference, in certain situations, the ARDL method can be employed to evaluate the short and long-run relationships of variables. To estimate the above question, the study applied the ARDL model because ARDL has specific econometric advantages over other co-integration methods.

Table 1. Stationarity Results of the Variables

Variables	Results at level		Results at 1st Difference
RPAC	Without Trend	1.53	-4.57**
	With trend	-2.5900	-4.7900***
GDP	Without Trend	4.3500	-0.3011
	With trend	-1.1700	-3.2900*
QM	Without Trend	-0.1380	-4.2300**
	With trend	-1.6200	-4.1800**
RIR	Without Trend	-3.9500*	----
	With trend	-3.9200*	---
UR	Without Trend	-0.5100	-7.2006***
	With trend	-2.6200	-7.5100**

*Note: coefficients with ***, **, and * are statistically significant at the conventional P-value of 0.01, 0.05, and 0.10 respectively.*

The ARDL method is applicable in two steps. In the first step, all the variables in the model were analysed to establish the long-run association among the variables. Once when we established the relationship among variables, then an ARDL Error Correction Model (ECM) was projected. Following the ARDL arrangement, equation (2) can be characterised as follows:

$$\Delta \ln C_t = \alpha_0 + \sum_{i=0}^{n} \beta_i \ln Y_{t-i} + \sum_{i=0}^{n} \delta_i \Delta \ln W_{t-i} + \sum_{i=0}^{n} \eta_i \Delta \ln C_{t-i} + \sum_{i=0}^{n} \psi_i r_{t-i} + \sum_{i=0}^{n} \rho_i ur_{t-i} + \gamma_1 ln Y_{t-1} + \gamma_2 ln W_{t-1} + \gamma_3 ln C_{t-1} + \gamma_4 r_{t-1} + \gamma_5 ur_{t-1} + u_t \quad (08)$$

Whereas: the short-run information incorporates the coefficients $\beta_i, \delta_i, \eta_i, \psi_i$and ρ_i, while long-run information keeps by $\gamma_1, \gamma_2, \gamma_3, \gamma_4$and $\gamma_5$and (u) random error term. Consequently, the following co-integration hypotheses can be investigated for equation (08) $H_0 = \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4, = \gamma_{5,} = 0$(no co-integration) $H_1 = \gamma_1 \neq \gamma_2 \neq \gamma_{,3} \neq \gamma_4 \neq \gamma_{,5} \neq 0$(co-integration). The following model can be anticipated after the verification of the long-term connection between the variables.

$$\Delta ln C_t = \alpha_0 + \sum_{i,=0}^{n} \beta_i \Delta ln Y_{t-i} + \sum_{i,=0}^{n} \delta_i \Delta ln W_{t-i} + \sum_{i,=0}^{n} \eta_i \Delta ln C_{t-i} + \sum_{i=0} \psi_i r_{t-i} + \sum_{i=0}^{n} \rho_i ur_{t-i} + u_t \quad (09)$$

After confirming the variables' long-term relationship, we can now assess the ECM equation (10), which reinforces the correction rate from divergence to convergence.

$$\Delta ln C_t = \phi + \varphi(ECM)_{t-1} + \sum_{i\prime=0}^{n} \beta_i \Delta ln Y_{t-i} + \sum_{i\prime=0}^{n} \delta_i \Delta ln W_{t-i} + \sum_{i=0}^{n} \eta_i \Delta ln C_{t-i} + \sum_{i=0}^{n} \psi_i r_{t-i} + \sum_{i,=0}^{n} \rho_i ur_{t-i} + \varepsilon_t \quad (10)$$

Additionally, to make sure of the firmness of the model, the diagnostic tests for ARDL have been applied to the model. Table 02 presents the results of the ARDL method. The Schwarz-Bchwarz Criterion is employed for the lag selection of the model. It shows that apart from the unemployment rate, all of the variables have a considerable impact on RPAC.

Table. 2. Result of the ARDL Model for RPAC

Variables	Parameters	TV	PV
$(RPAC)\_(t-1)$	0.3801	3.8990	0.001
Y	0.6010	3.8901	0.001
Y_{t-1}	-0.3012	-1.8100	0.078
W	-0.3410	-2.9001	0.006
W_{t-1}	0.7500	4.7000	0.000

Variables	Parameters	TV	PV
r	1.8300	3.5010	0.001
ur	-1.920	-1.0125	0.419
R^2	0.8261	Ad: R^2	0.8060
AIC	-891	SBC	-791
DW	1.8945	F-Sat (7,32)	52(0.000)
Whereas: T-test Value (TV), P-Value (PV)			

Table 3 reports the bound test's critical values. In our estimation, the F-statistic is 9.1782, indicating that the calculated F-statistic is larger than the upper limit of all significant values reported in Table 3. As a result, the null hypothesis of the long-run relationship is rejected, and it is established that there is a long-run link between the variables.

Table 3. ARDL Co-Integration Test

CV	LB	UB
1%	2.425	3.574
5%	2.850	4.049
10%	3.817	5.122
Whereas: Critical Value (CV), Lower Bond (LB), and Upper Bond (UB). Moreover, the calculated F statistics is $F_c = 12.3201$		

The model's long-run coefficients are reported in Table 04. It seems that the labour income and wealth parameters are statistically significant. Both variables have a positive relationship with household consumption. However, the interest rate coefficient and the unemployment rate are not statistically significant even though they have the exact sign and magnitude.

Table 4. Long Run Results of ARDL

Variables	Coefficient	TV	PV
Y	0.6801	3.9101	0.005
W	0.1017	2.0122	0.040
R	-0.0015	-0.3910	0.501
Ur	0.0017	0.7019	0.481
Whereas: T-test Value (TV), P-Value (PV)			

Table 05 shows the results of ECM in all the connections explained in Table 04. The ARDL-based ECM indicates that only unemployment is statistically insignificant in the model. However, the rest of all variables are statistically significant and carry the correct sign and magnitude. In other words, the model is a good predictor of future events. The parameter of ECM is statistically significant and has a negative sign. This shows the speed of convergence to a steady position. The coefficient of ECM (-0.58) indicates that divergence from long-term stability is adjusted by 58% every single year.

Table 5. ECM Results of the ARDL Model

Variables	Coefficient	TV	PV
ΔY	0.6910	2.0198	0.000
ΔW	-0.4190	-2.0120	0.003
Δr	1.3100	2.0129	0.002
Δur	-2.0123	-1.0012	0.419
$ECM(-1)$	-0.4100	-4.1002	0.000
R^2	0.7201	Ad: R^2	0.6710
AIC	-091	SBC	-510
DW	1.890	F-Sat (4,35)	18(0.000)
Whereas: T-test Value (TV), P-Value (PV)			

The study employed various diagnostic tests on the ECM to confirm the econometric problems in the model like serial correlation, heteroscedasticity, and the ARCH effect. However, there was no indication of these problems. Besides, for the normality test, Jarque-Bera has employed, which suggests that the stochastic terms of the model are normally distributed.

Conclusions

The results emerge that both GDP and wealth are having a crucial impact on the RPAC of Bangladesh in the short and long runs, respectively. The coefficient of GDP is 0.68, while the parameter of long-term assets is 0.10. This reveals that in the short run, almost GDP is the most vital determinant of RPAC as compared to others, as the coefficient of expected income is fairly small. In contrast, real interest and unemployment rates have a greater impact on RPAC in the short term than in the long term. The real interest rate has a detrimental effect on Bangladesh. The unemployment rate has a similar negative impact. Furthermore, the results of the study also indicated that AIH is legitimate for Bangladesh as current income is a crucial determinate of RPAC in the short run. It is further simply that in Bangladesh, consumers' choices are largely dependent on their current income, with less weight given to wealth, employment opportunities, and other factors.

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