STRATEGIC HANDOUT OF ECONOMIC SIDES TO ECONOMIC EXTENSION IN BANGLADESH: AN ARDL BOUND TEST APPROACH

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ABSTRACT

Agriculture, manufacturing and service sectors are the major components of the economic growth for any country. This study examines the contribution of agriculture, manufacturing, and services sectors to the economic growth in Bangladesh. The time series data stationary at first difference are shown by the ADF and PP unit root tests. Subsequently, an indication that each economic sector has a strong co-integrating relationship among variables is analyzed through the co-integration. In the long run model, agriculture and service sector converge with GDP but in a negative direction and ECM term converges significantly. Long run coefficient although reveal negative but short run coefficient stimulates economic vehicle. So, this study may create a pipeline for policymakers as well as investors.

Keywords: Contribution, Economic Growth, Agriculture, Manufacturing, Service, Bangladesh.

JEL Classification: 010.

INTRODUCTION

The economic health of any nation is prognoses through the contribution of the sectors-agriculture, manufacturing, and service. The highest ever growth achieved considering the new base year of 2005-06 for estimating national accounts in Bangladesh. Contribution of agricultural sector is around 14.23% in 2017-18 fiscal years but once it was around 40 percent after independence and 16% in 2014-15 fiscal years. One sharp observation is in manufacturing, 20% from 2014-15 is now 22.85% (BBS, 2018). As the economy is changing, the proportion of manufacturing is also shifting. According to the Bangladesh Bureau of Statistics (BBS), the contribution of the manufacturing sector is the highest in Gross Domestic Product (GDP). It is the basis of GDP for any developing societies, is almost half of its total. This study examines the contributions of Agriculture (AGR), Manufacturing (MAN) and Services (SER) sector on annual growth of GDP of Bangladesh. Also, this study tries to grasp the direction of short run and long run towards economic growth.

LITERATURE REVIEW

Ahmad et al. (2016) examined a relationship in Pakistan for the period from 1989 to 2012 and study found that GDP of Pakistan will be positively influenced due to growth in agricultural

and manufacturing sectors. Rahman et al. (2011) scrutinized Granger causality in their study and long run equilibrium relationship also found in this study. Azer et al. (2016) after using correlational and multiple regression analysis on the time series data for the year 2000 until 2010, suggested that manufacturing and service sectors are significantly related to GDP per capita in Malaysia. Gaspar et al. (2015) used co-integration and causality data analysis techniques for investigating the links between agriculture and non-agricultural sectors in Portugal for the period 1970-2006.The study found that in Portugal, agriculture has no influence on the expansion of service and industry sector in the long-run. On the other hand, agriculture also receives no influence from the growth in other sectors. Uddin (2015) found unidirectional Granger causality in Bangladesh by examining industry, service sector and agricultural contribution to Bangladesh economy. The study follows this paper but using updated data. Because over time period sectoral contribution also changes as the size of Bangladesh economy is becoming larger and more diversified. Sectorial factors-agriculture, manufacturing, and service are accounted for this study from 1990 to 2017. Also; it tries to grasp the direction of short run and long run towards economic growth. For this, the ARDL method is implicated.

METHODOLOGY

This study used an annual time series data covering the period from 1990 to 2017 of Bangladesh. The data were retrieved from the online version of World Development Indicators (WDI), the World Bank database. The variables are measured in millions, US$ dollar in current price. Secondary data is appropriate here, as this study scrutinizes the contributions of AGR, MAN and SER sector on annual growth of GDP of Bangladesh. After unit root test, we examine the long-run relationship among gross domestic product (LNGDP), agriculture (LNAGR), manufacture (LNMAN) and service (LNSER). We employed ARDL bound test to analyze where there is a long run relationship or not. Hence, the ARDL model is:

$$GDP_t = \alpha_1 + \sum_{i=1}^{p} \beta_i \, \Delta GDP_{t-i} + \sum_{i=1}^{p} \vartheta_i \, \Delta LNAGR_{t-i} + \sum_{i=1}^{p} \kappa_i \, \Delta LNMAN_{t-i} + \sum_{i=1}^{p} \theta_i \, \Delta LNSER_{t-i} + \psi_1 ECT_{t-1} + u_{1t}$$

$$(1)$$

The ARDL bound test tells us that if F-value surpasses the tabulated value at 5% level of significance, then there is a co-integration of study variables. On the model, it is significant also for 1 percent level of significance, so it can be conclude that there is a strong relationship of economic growth and defense spending.

RESULTS AND DISCUSSION

In the study, we employ both Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979: 1981) & PP (Phillips-Perron) test for 4 variables (Table 1). To solve hetero-scedasticity, we consider natural log form of all variables. Though service (LNSER) reveals stationary in the ADF test, it doesn't stationary at the level in PP test. Hence, all are stationary at first difference that is, all variables are I (1) series. ARDL bound testing approach to long run level relationship

among the variables requires the determination of the optimal lag for the co integrating equation based on the assumption of serially uncorrelated residual.

Table 1 UNIT ROOT TEST						
	ADF Test			**PP Test**		
Variable	**Constant**	**Trend and Constant**	**Decision**	**Constant**	**Trend and Constant**	**Decision**
LNGDP	3.2258	-0.6451	Unit Root	2.8263	-0.6738	Unit Root
D(LNGDP)	-3.1816**	-3.7645**	Stationary	-3.1191**	-3.6613**	Stationary
LNMAN	-1.5091	-2.1456	Unit Root	-1.5091	-2.1456	Unit Root
D(LNMAN)	-3.5888**	-3.8822**	Stationary	-4.4072***	-4.3956***	Stationary
LNSER	-14.4776***	-6.6079***	Stationary	-1.0694	-2.0188	Unit Root
D(LNSER)	-6.8966**	-7.964**	Stationary	-7.2668***	-21.4443***	Stationary
LNAGR	-0.4368	-2.8182	Unit Root	-0.1876	-2.7328	Unit Root
D(LNAGR)	-6.5883**	-6.5486**	Stationary	-7.0462***	-7.8828***	Stationary
Note: (*) Significant at the 10%; (**) Significant at the 5%; and (***) Significant at the 1%.						

Source: Estimated.

The lag length that minimizes the value of the AIC, SC, HQ and SBC and at which the model does not have autocorrelation is the optimal lag. The Schwarz Information Criterion (SC) was used to select the optimal lag length (Table 2).

Table 2 LAG LENGTH SELECTION						
Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
1	338.3115	176.8579	1.05E-16	-25.4649	-24.48982	-25.1945
2	363.1589	31.80465	5.78e-17	-26.17271	-24.4175	-25.68590
3	379.1312	15.3334	7.95E-17	-26.1705	-23.6352	-25.4673

Source: Estimated.

Table 3, discloses that we cannot take lag order more than 2 in case of annual data. The OLS employ with unrestricted regression. Maximum order as 3 for ARDL procedure is chosen for the required data set. The critical value that reported together in the same table was based on critical value suggested by (Narayan, 2004). Since our F-statistic is 20.05509 with degrees of freedom (3,24), which surpasses the upper bound critical value at 1% level of significance using unrestricted regression with constant. So it rejects the null hypothesis of having no co integration. So we can conclude that there is a strong co-integrating relationship among variables.

Table 3 F-STATISTIC OF CO-INTEGRATION RELATIONSHIP					
Test Statistic	**Value**	**Lag**	**Level of Significance**	**Bound Critical values(restricted Constant and no trend)**	
				I(0)	**I(1)**
F-Statistic	20.05509	3	10%	2.72	3.77
			5%	3.23	4.35
			2.50%	3.69	4.89
			1%	4.29	5.61

Source: Estimated.

The long-run model (Table 4) reveals significant using ARDL (1, 2, 0, and 2) model. Except for manufacturing (LNMAN), all are significant at 1% level of significance. That means

GDP will decrease 6.13 units if agricultural input will increase 1 unit. Seemingly, GDP will decrease 13.66 units if input of service industry will increase 1 unit. So, in long run model, agriculture and service are converges with GDP but negative direction.

| Table 4 LONG RUN CO-EFFICIENT FOR ARDL (1, 2, 0, 2) MODEL				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNAGRI	-6.132117	0.767748	-7.987151	0
LNMAN	-0.424507	0.878938	-0.482978	0.6353
LNSER	-13.66234	2.348452	-5.817593	0

Source: Estimated.

In case of short run for ARDL (1, 2, 0, and 2) model (Table 5), the coefficient of each variable at first difference is significant at 1% level of significance. Also, ECT, error correction mechanism term reveals significant short-run adjustment of GDP with respect to others In addition; the ECM term means GDP is converged to other variables to the long run equilibrium by 24.105% in one period with speed of adjustment. Also, each variable is a significant but positive relationship with GDP. But there's an interesting view that the long run model reveals negative with study variables.

Table 5 SHORT RUN COEFFICIENTS FOR ARDL (1, 2, 0, 2) MODEL				
Variable	Coefficient	Std. Error	t-Statistic	P-value
C	8.363361	0.85777	9.750119	0.0000
D(LNAGRI)	0.101729	0.270714	0.375779	0.7117
D(LNAGRI(-1))	1.399771	0.302756	4.623435	0.0002
D(LNSER)	0.49277	0.419278	1.175282	0.2561
D(LNSER(-1))	2.065365	0.490679	4.2092	0.0006
ECT(-1)	-0.24105	0.024813	-9.71478	0.0000

Source: Estimated.

From Figure 1, both CUSUM and CUSUMSQ tests indicate that the ARDL model is steady and specified appropriately.
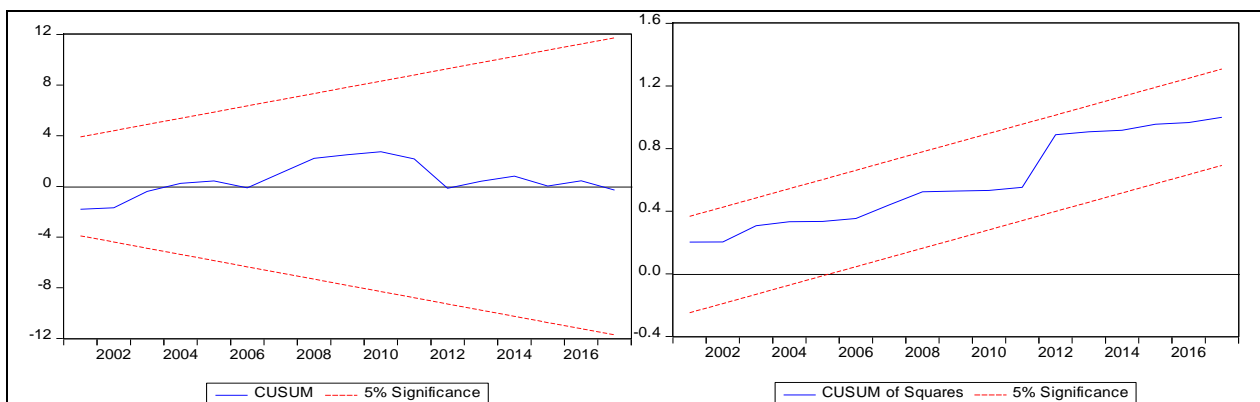
Source: Estimated.

FIGURE 1
STABILITY TEST (CUSUM &CUSUMSQ TEST)

Also, diagnostic test (Table 6) is employed for hetero-scedasticity, autocorrelation, model specification, and normality test.

Table 6 DIAGNOSTIC TEST			
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.792	Prob. F(8,17)	0.6172
Obs*R-squared	7.057	Prob. Chi-Square(8)	0.5305
Heteroscedasticity Test: ARCH			
F-statistic	0.31	Prob. F(1,23)	0.5832
Obs*R-squared	0.332	Prob. Chi-Square(1)	0.5643
Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.788	Prob. F(2,15)	0.4729
Obs*R-squared	2.471	Prob. Chi-Square(2)	0.2907
Jarque-Bera Test			
Test statistic	1.500553		
Prob.	0.472236		
Reset Test			
	Value	df	Probability
t-statistics	0.20296	16	0.8417
p-value	0.04119	(1,16)	0.8417

Source: Estimated.

CONCLUSIONS AND POLICY IMPLICATIONS

This study adorned the ARDL model from 1990 to 2017 to revisit sectoral contribution on GDP. Yetiz & Özden (2017) and Uddin (2015) examine same work employing Johansen co-integration and Granger Causality. This study revealed the significant relationship in the short run of economic growth with three sectoral inputs. In the short run, ECM (Error Correction Mechanism) postulates that GDP is converged to control variables to the long run equilibrium by 24.105% in one period with speed of adjustment. In long run, manufacturing retards significant long-run relation with economic growth. But other sectoral variables display a significantly negative relationship with economic growth. Nevertheless, the study coincides some negative relationship of economic growth with explanatory variables. This study helps policymakers to reexamine their step for promoting the service sector more, but not lagged behind our agricultural feedback. Like as a developing country, Bangladesh stands on the basis of three pillar- agriculture, service, and manufacturing. Except one, other will be loose down and hamper our economic stability optimization. To snap about economic health, government, as well as private think tankers, should be updated with contemporary research. This paperwork also revisits and rethinks about the contribution of donors or government sides.

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