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Bangladesh Bank Training Academy
Mirpur-2, Dhaka-1216

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Contents

Editorial Note	VII-VIII
Bangladesh at 50: Does Bank Financing Propel Economic Growth in Bangladesh? Dr. Md. Golzare Nabi Md. Syedul Islam Md. Jasim Uddin Md. Sanaullah Talukder	01-23
Role of Saving and Demographics on Economic Development: A Panel Data Approach Laila Fatin	24-41
Post Deregulation Performance of State-owned banks in Bangladesh: imperative of further reform. Mohammad Abul Kashem	42-74
Effects of Foreign Direct Investment on Income Inequality: Do sector and Mode of Entry Matter? Sk. Mukitul Islam	75-94
Does Market Capitalization Promote Economic Growth?: A Case Study of Bangladesh Md. Mokhlesur Rahman Md. Jasim Uddin Md. Nurnabi Miah Md. Alamin	95-110
Does Remittance Inflow Affect Foreign Exchange Reserve?: A Case Study of Bangladesh Md. SanaullahTalukder Puja Bhattacharjee Md. Nurnabi Miah Asif Ahmed	111-129
Call for Research Papers	130-132
Introduction to Bangladesh Bank Training Academy (BBTA)	133-134

Editorial Note

Bangladesh Bank Training Academy (BBTA) publishes the half yearly journal 'Thoughts on Banking and Finance' containing articles on key economic and financial issues which offer substantial insights to policymakers as well as researchers and academicians. The current issue contains 8 articles which shed light on different economic and financial matters related to Bangladesh and other countries.

The first article 'Bangladesh at 50, Does Bank Financing Propel Economic Growth in Bangladesh?' attempts to explore the role of bank financing in economic growth in Bangladesh during the post-independence period. The article applies Co-integration and Vector Error Correction Model (VECM) to examine the impact of bank financing on Bangladesh GDP during 1980-2020. The empirical results confirm the dominating role of bank financing in spurring GDP in Bangladesh. The paper suggests for choosing bankable projects with proper feasibility study to avoid diversion of funds and keep non-performing loan (NPL) at tolerable limit. It also recommends for developing capital market for long-term financing to lessen the adverse impacts of maturity mismatch in funds of banks. In this case, Islamic Shariah compliant sukuk based financing model can ease the pressure on banks by financing industrial and infrastructural projects in more sustainable way.

The second paper 'Role of Saving and Demographics on Economic Development: A Panel Data Approach' aims to delineate the relationships between saving and economic growth. The study uses secondary data (data series) from the World Bank indicators for 160 countries from the year 1981 to 2017. It focuses on the demographic correlates of saving rooted in the life-cycle hypothesis of Modigliani and tries to confirm the validity of that hypothesis. In addition, the study attempts at estimating the saving function and growth function as a system of equations using three stage least square method. The results show that saving plays an important role in economic growth regardless the economic condition of a country. But the life-cycle hypothesis and the variables related to it explain variation in domestic saving rates of the high-income countries much better than it does that of the low-income countries.

The third article 'Post Deregulation Performance of State-owned Banks in Bangladesh: Imperative of further reform' attempts to conduct a comparative assessment of the deregulation effort on different types of banks in Bangladesh during the period of 1995 to 2020. The author has conducted both statistical analyses and econometric investigations on the comparative performance of the government and other types of commercial banks for the post-deregulated operation period. The study found lower performance of the government banks

compared to the private and foreign commercial banks even though government banks avail additional supports from the government and regulatory authorities of the country. So, the government banks should explore more profitable and technology based banking services, and cost efficient business operations to improve their financial performance in future.

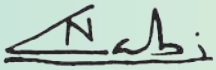
The fourth article 'Effects of foreign direct investment on income inequality: Do Sector and Mode of Entry Matter?' analyzes the effect of Foreign Direct Investment (FDI) on income inequality. The study has used an unbalanced panel dataset. For economic activity wise disaggregated FDI data of 68 countries, the considered period is 1997-2016 (20 years). On the other hand, in case of FDI disaggregated by the mode of entry of FDI, the sample consists of 79 countries and the considered period is 2003-2016 (14 years). The study is conducted from two perspectives- the sectoral composition of FDI and the mode of entry of FDI. From the first perspective, FDI inflow is divided into three major sectors of economic activity namely primary, manufacturing and service sector. From the second perspective, FDI is divided into green field FDI and cross border mergers & acquisitions (M&A) FDI. Two different models have been used to estimate the results. The results show that total and service sector FDI increase income inequality in both short and long run whereas manufacturing and primary sector FDI has no statistically significant effect on income inequality. On the other hand, both green field FDI and M&A FDI increase income inequality in the long run. Moreover, human capital has a strong conditional effect on primary, manufacturing and service sector FDI in reducing income inequality.

The fifth paper 'Does Market Capitalization Promote Economic Growth? A Case Study of Bangladesh' investigates the role of stock market capitalization in promoting economic growth in Bangladesh. The study applied the Unit Root test, Granger causality test, Cointegration techniques, and Vector Error Correction model (VECM) by using yearly time series data from 1990 to 2020. The Granger causality showed a bidirectional causal relationship between the variables. The findings confirm a positive and significant impact of stock market capitalization on GDP growth. Furthermore, the estimated error correction term suggests that the economy will correct the disequilibrium in GDP growth and converge to the equilibrium at a 4.2% rate in a year. Therefore, the study opines that the stock market regulatory body needs to address policy concerns that would encourage new companies to enter the market and increase investors' confidence.

The sixth paper 'Does Remittance Inflow Affect Foreign Exchange Reserve? A case study of Bangladesh' examines the impact of remittance inflow on foreign exchange reserves in Bangladesh during 1988-2022. The study applied ARDL

bound testing approach of cointegration to test the long-run and short-run relationship. The study finds significant positive impact of remittance on the foreign exchange reserves in the long run. However, it reveals negative and insignificant effect in the short run. On the contrary, trade and inflation showed a significant but negative impact on the reserves in the long run.

Finally, I would like to convey my heart-felt thanks and sincere gratitude to all authors, reviewers and members of the Editorial Advisory Board and the Editorial Board of BBTA Journal for their sincere help and support to publish the current issue of the journal. I am also grateful to all associate members of the journal management committee for their hard and dedicated work for publishing the current issue. I appreciate constructive criticism and thoughtful feedback for further improvement of the Journal in future.



Dr. Md. Golzare Nabi
Director &
Executive Editor
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Bangladesh at 50
Does Bank Financing Propel Economic Growth in Bangladesh?*

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ABSTRACT

The current paper attempts to explore the role of bank financing in economic growth in Bangladesh during the post-independence period. To this end, it would apply Co-integration and Vector Error Correction Model (VECM) to examine the impact of bank financing on Bangladesh GDP during 1980-2020. The empirical results confirm the superior role of bank financing in spurring GDP in Bangladesh. The paper suggests for choosing bankable projects with proper feasibility study to avoid diversion of funds and keep non-performing loan (NPL) at tolerable limit. It also recommends for developing capital market for long-term financing to lessen the adverse impacts of maturity mismatch in funds of banks. In this case, Islamic Shariah compliant sukuk based financing model can ease the pressure on banks by financing industrial and infrastructural projects in more sustainable way.

Keywords: GDP Growth, Bank Financing, Sukuk, Bangladesh.

JEL Classification: E01, E21, E22, E23, G21, O4.

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* Views expressed in the article are authors' own and do not reflect necessarily the views of the institution in which they work.

1. Introduction

Bangladesh has reached at 50 years in 2021 after attaining independence in 1971. On the eve of independence, she inherited a war-torn agrarian economy with an array of challenges of abject poverty, high unemployment, weak physical infrastructure and poor condition of social development. Defying all negative projections, Bangladesh has achieved impressive economic growth during the last 50 years with some exceptions. She has drawn attention of economists, development partners, policy makers and academician on robust economic growth earned during the last half century. A number of economists attempted to find out the factors affecting gross domestic product (GDP) in Bangladesh using elegant econometric models (Rahman, M. 2009;Rao, B. B., & Hassan, G. M., 2012; Beyer, R. C. M. & Wacker, K. M., 2022). Some studies like Hossain Altaf et al., (2017) and Paul U C, (2020) examined the role of bank financing in propelling GDP in Bangladesh and found direct association between bank finance and GDP growth. A growing number of empirical studies also supported the bank finance-growth nexus in developed and emerging economies (Levine, R., 2005; Garcia-Escribano, M. M., & Han, M. F., 2015; Durusu-Ciftci, D., et al., 2017). Empirical evidences reveal that though many factors affect GDP growth of a country, bank financing plays significant roles in promoting GDP in countries where capital markets are in initial stages (Khwaja (2009; Lin, 2009). Several factors such as macroeconomic stability, financial deepening, and arrival of new lending instruments along with rising economic growth have also contributed to rapid expansion of bank credit. Bangladesh as a lower middle-income country has experienced robust economic growth and fast expansion of bank credit during the last four decades, particularly since 1990s.

Bangladesh recorded higher GDP growth of 6.7% over the period of 2011-2020 which was 4% in 1974-1980, 3.7% in 1981-90, 4.8% in 1991-2000, 5.8% in 2001-2010. Bank financing also increased to support GDP growth as capital market is in poor condition. The ratio of private sector credit to GDP rose to 39.2% in 2020 which were 7.52% in 1974, 13.67% in 1980, 21.12% in 1990, 21.32% in 2000 and 33.95% in 2010 (World Bank, 2020).

Presently, Bangladesh financial sector consists of commercial banks, specialized banks, non-bank financial institutions, insurance companies, stock markets, microfinance institutions, and merchant banks. However, the banking sector

accounts for lion share of assets of the financial sector which comprises government commercial banks, public specialized development banks, local conventional private commercial banks, domestic Islamic private commercial banks and foreign-owned commercial banks. In fact, commercial banks play dominant roles in Bangladesh banking sector as capital market is underdeveloped. Among 59 banks, 56 operate as commercial banks comprising 6 state-owned commercial banks, 33 domestic conventional private commercial banks, 8 domestic Islamic private commercial banks and 9 foreign commercial banks in 2020. The domestic commercial banks comprising conventional and Islamic commercial banks are the major financial intermediaries in the banking industry accounting for 67.04% assets, 66.00% deposits and 74.94 % loans/advances of the entire banking sector in 2020 (Bangladesh Bank, 2020a).

GDP growth as the most important macroeconomic variable plays vital role to adopt key decisions in investment, trade, revenue, money and prices. Economic growth is also a potent tool for generating jobs, reducing poverty and improving the living standard of the people with the aid of better health, education and shelter (Rahman, M. M., et al., 2019). Bank financing plays as one of the key drivers to promote GDP in Bangladesh which is increasing with the expansion of economic activities particularly since 1990s due to mainly growing Readymade Garments (RMG) industry, construction sector, internal and external trade financing. As capital market is underdeveloped, banking sector has to work as the major player in financing economic activities in the country. The ratio of private sector credit to GDP stood at 39.2% of GDP in 2020 while the ratio of market capitalization of domestic companies to GDP was 24% in 2020 (World Bank, 2020). So, it is imperative to conduct research on bank finance-GDP nexus in Bangladesh with quality method based on long time span. Only a few studies attempted to find out drivers of Bangladesh Gross Domestic Products (GDP)'s growth (Biswas, B. P., & Masuduzzaman, M, 2016). Against this backdrop, the current paper seeks to find out the magnitude of contribution of bank finance on economic growth in Bangladesh during 1980-2020.

The objectives of the paper include (a) analyzing growth trend of gross domestic products (GDP) and bank financing in Bangladesh; (b) investigating determinants of Bangladesh gross domestic products (GDP)'s growth and suggesting for policy

options for sustained economic growth. To achieve the objectives of the paper, the paper would apply Vector Error Correction Model (VECM) based on secondary time series data.

After introduction, the remaining parts of the paper are structured as follows: Section 2 examines growth trends of gross domestic product (GDP) and banking financing in Bangladesh. Section 3 deals with review of literatures. Section 3 is devoted to explain research method. Section upholds empirical results and analysis. Finally, section 5 concludes with policy implications.

2. Growth Trends in Gross Domestic Product (GDP) and Banking Sector of Bangladesh

This section focuses on growth trends in Gross Domestic Product (GDP) and Banking Sector of Bangladesh during 1972-2020.

2.1 Trends in Growth of Gross Domestic Product (GDP) in Bangladesh

Bangladesh, a Muslim majority South Asian country became independent in 1971. With a geographical size of 1,47,570 square kilometers, she started its journey with a weak economy which was heavily dependent on agricultural sector. The economy started picking up during 1990s thanks to restoration of democracy in 1991 and undertaking massive reforms in financial, trade and other sectors. Such policies helped the economy attain higher GDP growth during 2000-2020 which leads to a fall in poverty rate substantially. Bangladesh has achieved significant human and social development even at a very low level of income by combating many constraints (Mujeri, 2014).

The size of GDP stood at USD 324.2 billion in 2020 which was USD 6.29 billion in 1972, USD 18.1 billion in 1980, USD 31.6 billion in 1990; USD 53.4 billion in 2000 and USD 115.3 billion in 2010. GDP per capita grew in the same direction as the size of GDP increased. Per capita income was USD 91.5 in 1972 which increased to USD 227.75 in 1980, USD 306.27 in 1990, USD 418.07 in 2000, USD 718.15 in 2010 and USD 1968.79 in 2020 (Table 1).

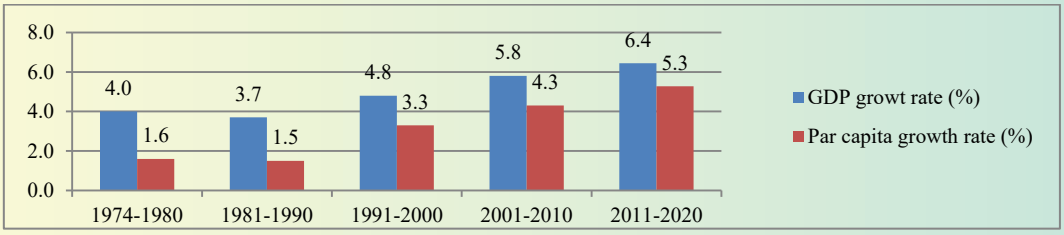
Table 1. GDP and GDP Per Capita in Bangladesh

Items	1972	1980	1990	2000	2010	2020
GDP (USD, billion)	6.29	18.1	31.2	53.4	115.3	324.24
GDP Per capita (USD)	91.5	227.75	306.27	418.07	718.15	1968.79

Source: World Development Indicators, World Bank.

Bangladesh experienced lower 4% GDP growth during 1974-1980 which decelerated further to 3.7% during 1981-90. Since 1990s, GDP growth started picking up due to higher productivity in agriculture and ready-made garments (RMG). It increased to 5.8% in 2001-2010 from 4.8% in the period of 1991-2000 and it further accelerated to 6.7% in 2011-2020. By the same way, per capita GDP increased during the same period (Figure 1).

Figure 1: GDP Growth Trend in Bangladesh (1974-2020)



Source: Bangladesh Bureau of Statistics (BBS).

Higher production in agriculture and export-oriented RMG sector, massive external remittance inflows, increasing banking finance, huge microfinance operations and improved rural infrastructures have contributed to promotion of GDP. Following continued economic growth, Bangladesh has achieved tremendous success in poverty reduction, higher literacy and life expectancy rate. Now Bangladesh economy faces some key challenges such as low productivity of labor, rising pressure in agricultural sector due to declining cultivatable land and unfavorable climate changes, heavy dependence of export sector on few items, price instability, energy supply gaps, increasing inequality and acute unemployment.

2.2 Growth Trends in Banking Sector of Bangladesh

On the eve of attaining independence in 1971, Bangladesh inherited a weak banking system which included 12 Banks owned by West Pakistanis, 2 banks owned by Bangladeshis, 3 foreign banks and 5 inoperative Indian banks. The banking sector had 1191 branches, deposits of BDT 5.24 billion and investment of BDT 4.25 billion in 1971 (Bangladesh Bank, 1973).

Bangladesh undertook rapid steps after independence to revamp banking sector for re-building war-ravaged economy by financing economic activities in line with objectives of the mass people. Bangladesh Bank as Central Bank was established

under Bangladesh Bank Order, 1972 and all commercial banks except foreign banks were nationalized under 'The Bangladesh Banks (Nationalization) Order, 1972'. All commercial banks were re-organized and grouped into 6 nationalized commercial banks. For development of agricultural and industrial sector of the new born country, the two specialized banks were renamed and reorganized under government ownership. Bangladesh Bank as central bank adopted the directed monetary management tools which included fixing interest rates on deposits and loans and undertaking credit control steps for channeling credit to socially desirable sectors, namely Agricultural sector, exports and industries.

During 1970s banking sector was operated to implement the economic development objectives of the Government. Interest was kept at low level that hampered the commercial objectives of bank. Major portion of bank loan became overdue and profit of banks declined heavily. Thus, government-controlled credit policies, underpricing of financial resources and undue intervene created underperforming inefficient banking sector which was also occurred in banking sectors of other countries under financial repression paradigm (Thornton, 1991).

Following poor performance of the banking sector, the Government started undertaking reform measures during 1980s in order to inject competition and bring discipline and momentum in the banking sector. Under paradigm shift towards private sector, the Government allowed 6 private banks including a full-fledged Islamic bank in 1983 and privatized two nationalized commercial banks. Following different reform measures and continued robust economic growth over the years, Bangladesh banking sector grew in terms of number of banks, branches, deposits, loans/investments and financial deepening during 1973-2020. The Progress of Bangladesh banking system achieved during 1973-2020 is illustrated in Table 2.

Table 2: Developments of Banking System in Bangladesh (1973-2020)

(BDT in Billion)

Particulars	1973	1980	1990	2000	2010	2020
1. Number of Banks	**11**	**14**	**24**	**50**	**47**	**59**
SCBs	6	6	4	4	4	6
SBs	2	2	3	5	4	3
PCBs[@]	-	-	10	27	30	41
FCBs	3	6	7	13	9	9

2. Number of Branches	**1295**	**3820**	**5539**	**6056**	**7246**	**10752**
SCBs	1139		3545	3607	3394	3798
SBs	107		1145	1185	1365	1492
PCBs@	-	-	827	1231	2427	5531
FCBs	14		22	33	59	67
3. Total Deposits	**7.02**	**28.07**	**203.67**	**709.81**	**3379.20**	**13791.5**
SCBs	6.14	24.96	136.34	396.18	963.35	3585.28
SBs	0.12	1.27	9.43	42.32	177.94	349.78
PCBs@	-	-	50.48	215.07	1990.36	9250.37
FCBs	0.56	1.83	14.57	56.25	247.55	606.07
4. Total Loan/Advances	**5.54**	**25.64**	**199.09**	**593.61**	**2574.44**	**10963.04**
SCBs	4.47	20.01	103.60	288.05	558.12	2094.6
SBs	1.30	4.49	42.84	101.44	179.29	322.95
PCBs	-	-	40.63	173.11	1682.11	8199.15
FCBs	0.33	1.13	12.02	31.02	154.91	346.34
5. FD Indicators						
M2 to GDP (%)	21.92	24.54	30.23	31.53	45.52	43.3
Private Sector credit to GDP (%)	07.52	13.67	21.12	21.32	33.95	39.2

Source: Annual Report, Bangladesh Bank, Various Issues

Notes: SCB=State-owned Commercial Banks; SBs=State-owned Specialized Banks; PCBs=Private Commercial Banks; FCBs=Foreign Commercial Banks; BDT=Bangladesh Taka (Currency), FD=Financial Development

In spite of having progress during 1973-2020, currently Bangladesh banking industry encounters major problems such as higher financial intermediation cost, increasing non-performing loan (near 10%), concentration of loan in trading sector (34%) and low investment in social sectors such as agriculture, micro and small enterprises (5%) (Bangladesh Bank, 2020a,b,c).

3. Literature Review

Most economists have identified a number of factors affecting GDP of a country based on theoretical and empirical research. The neoclassical growth theory of Solow (1956) postulates that a country attains economic growth over time thanks to changes in the rates of population, saving (capital formation) and technological progress. The endogenous growth theory developed by Paul Romer (1986) and Robert Lucas (1988) stress on investment in research and development (R&D) and human capital (education) and adoption of new technologies for economic growth. Grossman and Helpman (1991) identified productivity factors (technological growth) as the key determinants of economic growth. Fischer (1992) opine that the growth process of a country also depends on efficiency enhancing factors of savings and investment which include macroeconomic stability, good governance and social infrastructures.

Researchers have used different variables in the empirical research for pointing out determinants of economic growth (Udeaja, E. A., & Onyebuchi, O. K. 2015; Rahman, M. M., et al.,2019).The key variables used by researchers include financial development, international trade, government expenditure, energy consumption, savings rate, total factor productivity, investment rate, inflation, education, infrastructure, budget deficit, foreign direct investment and technological progress and diffusion. We examine some relevant studies to explore theoretical framework for finding out role of bank financing (financial development) and other relevant factors which affect Bangladesh GDP over the years.

Garcia-Escribano, M. M., & Han, M. F. (2015) explored the contribution of credit growth and the composition of credit portfolio (corporate, consumer, and housing credit) to economic growth in emerging market economies (EMs). Using cross-country panel regressions, the study found significant impact of credit growth on real GDP growth, with the magnitude and transmission channel of the impact of credit on real activity depending on the specific type of credit. In particular, the results showed that corporate credit shocks influence GDP growth mainly through investment, while consumer credit shocks are associated with private consumption.

Fetahi-Vehapi et al. (2015) attempted to analyze the effects of openness to trade on economic growth of South East European (SEE) countries over the period 1996 to 2012. The authors used pooled Ordinary Least Squares (OLS), fixed effects and first differenced generalized method of moments (GMM) for robust estimation of the model. The estimation results indicate that the positive effects of trade openness on economic growth are conditioned by the initial income per capita and other explanatory variables, otherwise there is not robust evidence between the two variables.

Leon (2016) distinguished the effects of household and enterprise credit on economic growth covering 143 countries over the period 1995-2014. The paper found that overall credit has not been related to growth in the past two decades and household credit tends to be negatively related with growth.

Usman, O.A. and Adeyemi, A.Z. (2017) examined the relationship and direction of causality between financial system development and economic growth in

Nigeria using the data from 1970 to 2013. Johansen co-integration technique was used to test long run relationship among the variables while Granger causality test was used to investigate the direction of causality between financial system development indicators and economic growth. The results showed that there was long run relationship between financial system developments and economic growth. Also, there was unidirectional causality, running from financial system development to economic growth in Nigeria, and there was no feedback effect.

Akinsola, F. A., & Odhiambo, N. M. (2017) surveys the existing literatures on the association between inflation and economic growth in developed and developing countries. The authors found four types of relationships between inflation and economic growth based on empirical studies. The first type of finding reveals no impact of inflation on growth while the second category shows a positive impact of inflation on economic growth. The third kind of finding exhibits negative impact between inflation and economic growth while the fourth category of finding demonstrates that inflation impacts economic growth in terms of certain threshold.

Rahman (2009) re-examined the effects of exports, FDI and expatriates' remittances on real GDP of Bangladesh, India, Pakistan and Sri Lanka during 1976 to 2006. Mixing of stationary and non-stationary variable of sample countries are performed by autoregressive distributed lag (ARDL) model. In case of Pakistan, bi-directional causality is observed. Consequently, VAR model was performed. For the country, Bangladesh, India and Sri Lanka co-integration was found, which is done by VEC model. Findings reveal that close similarities of long-run and short-run dynamics of the variables between Bangladesh and India exist.

Rao, B. B., & Hassan, G. M. (2012) developed a framework to analyze the determinants of the long-term growth rate of Bangladesh. The paper used the Solow (1956) growth model and its extension by Mankiw et al. (1992) and followed Senhadji's (2000) growth accounting procedure to estimate Total Factor Productivity (TFP). The Growth Accounting Exercise (GAE) shows that growth rate in Bangladesh, until the 1990s was primarily due to factor accumulation. Since then, however, TFP has made a small positive contribution.

Hossain Altaf et al., (2017) intended to find important financial factors causing economic growth in Bangladesh during the period 1988-2013 using Factor Analysis on some selected indicators of Bangladesh financial sector. Their paper attempted to check whether the identified financial factors cause economic growth or economic growth causes financial factors using the Granger–Causality test. Being consistent with economic sense, Granger–Causality test shows that no financial factor significantly causes economic growth rather economic growth causes "depth/stability" ('private credit + capitalization' /non-performing loan) factor of financial sector during the period. In summary, on average, financial sector of Bangladesh is being unstably (being increased non-performing loan) deepened with response to the demand of economic growth since 1988.

Paul U C (2020) investigated into the causal relationship between private sector credit growth and economic growth in Bangladesh by using annual time series data over the period of 1976-2017. The author used the Autoregressive Distributed Lag (ARDL) Approach to investigate the relationship. In addition, this paper examined the direction of causality by adopting the Toda-Yamamoto procedure of Granger Causality test. The empirical results showed that the annual growth rate of private sector credit (PC) and industrial production index (IPI) have a positive and significant effect on annual growth rate of GDP in both long-run and short-run. But there is only a short-run positive effect of export (X) and a negative effect of broad money (M2) on GDP growth rate. Finally, the results of the Toda- Yamamoto Granger Causality test found that there is unidirectional causality from GDP growth rate to private sector credit growth rate.

4. Research Method

This sub-section focuses on methodological issues to examine the bank finance-growth nexus in Bangladesh.

4.1 Data and its Sources

We collect data on relevant variables over the period of 1980 to 2020 from World Development Indicators published by World Bank and Annual Report 2020, Bangladesh Power Development Board and Bangladesh Bureau of Statistics. We use data since 1980 as volatility persisted in the economy of Bangladesh during

1971-1979 following economic damage owing to independence war in 1971, oil shock in 1973 and food crisis in 1974.

4.2 Model Specification

We specify the following regression model for determining relationships between GDP growth and its major variables affecting GDP in Bangladesh during1980-2020 after reviewing of literatures on relationship between GDP growth and its key determinates.

$$gdp = f(psc, gc, openness, cpi, powerpc) \text{----------(1)}$$

where gdp, psc, gc, openness, cpi, powerpc indicate nominal gdp, private sector credit by banks, government consumption (expenditure), consumer price index and per capita power consumption.

By taking natural logarithm both sides we get-

$$lngdp = \beta_\circ + \beta_2 lnpsc + \beta_3 lngc + \beta_4 lnopenness + \beta_5 lncpi + \beta_2 lnpowerpc + \acute{\varepsilon}_i \text{---------(2)}$$

As the model is in logarithm form, the coefficient will express the elasticity of the variables. So we focus on the values of β.

We include bank financing to private sector in the model as Bangladesh hinges significantly on it due to underdeveloped capital market and low level of foreign capital inflow following other studies (King, R. & Levine, R. 1993; Levine, R. 2005; Jedidia et al., 2014; Durusu-Ciftci et al., 2017).

As Bangladesh spends significant amount of funds in the Government sector, we incorporate Government expenditure in our model to capture its effects on GDP as suggested by other studies (Cooray, A., 2009; Dao, M. Q., 2012; Churchill, S. A., et al., 2015).

Bangladesh has adopted an export-oriented economic growth strategy in order to reap benefits of globalization. A number of studies cited that trade spurs growth due of enhanced economies of scale and adoption of new technology (Frankel, J.N. and Romer, D., 1999; Fetahi-Vehapi, M., Sadiku, L., & Petkovski, M., 2015). Inspired by other studies, we include trade in the model to find out its impacts on GDP.

We consider inflation in the model to capture its effects of on GDP as recommended by some studies (Akinsola, F. A., & Odhiambo, N. M., 2017; Adaramola, A. O., & Dada, O., 2020).

Consumption of electricity is included in the model in order to capture the effects of electricity on GDP growth as suggested by other studies (Acaravci, 2010; Iyke, 2015).

4.3 Estimation Techniques

Following Elias A. Udeaja & Obi, Kenneth Onyebuchi (2015) and Biswas, B. P., & Masuduzzaman, M (2016), we have used the Cointegration Technique and Vector Error Correction Model (VECM) to estimate the relationship between Bangladesh's GDP growth and its determinants during 1980-2020.

We will choose the Johansen-Juselius cointegration technique as it is robust in case of dealing with variables of the same order of integration. The number of cointegrating vectors is detected through the two likelihood ratio test statistics (trace test and maximum eigen value test). Although cointegration test considers long run dynamics, it does not consider short-run disequilibrium. The Vector Error Correction Model (VECM) is applied to address short-run disequilibrium. In the VEC Model, long run is expressed as the error correction term where the sign must be negative and significant for ensuring long-run equilibrium. The negative sign indicates that any disequilibrium occurred in the short run will converge to long-run equilibrium.

At first step of the estimation, we perform the unit root test to all variable in order to check whether related variables are stationary or not. It is essential to maintain stationary feature of time series in order to avoid spurious result. For testing the nature of time series, we also examine the order of integration to determine the subsequent long-run relationships among the variables. In our study, we have employed Augmented Dickey Fuller (ADF) test developed by Dickey and Fuller (1979) and Phillips and Perron (PP) test promoted by Phillips and Perron (PP) (1988) to check unit root of the variables.

In the next step, we proceed to run test for cointegration among the variables under study. The cointegration is applied to testing for the presence of cointegration among variables of the same order of integration through framing cointegrating equation. This helps us to find out a long-run relationship among variables. In our model, we follow Johansen (1988) and Johansen & Juselius (1990) approach to run cointegration test.

After testing for cointegration, we proceed to specify a Vector Error Correction Model (VECM) which explains the short-run relationships among the variables. With a view to maintaining the stability of equilibrium relationship, we need to have at least one of the Error Correction Terms to be significant as they indicate the coefficients for the speed of adjustment in case of any shock.

5. Empirical Results and Analysis

We use statistical software package E-views 11 to estimate parameters and conduct relevant tests in our study.

5.1 Unit Root Test

With a view to testing for the presence of unit root in the data using both trend and intercept and determining the integrating level of variables, we conduct ADF and PP techniques. The results of ADF and PP test are presented in Table-3 which reveals the behavior of the variables in level and first difference. The results show that all variables are non-stationary in their levels and they are stationary in first difference meaning that they are integrated of order one i.e., I(1).

Table 3: Results of Stationary Tests of Variables

	Augmented Dickey-Fuller Test					**Phillips-Perron test statistic**					
Variables Name	Levels		First Difference		Critical value at 5%	Levels		First Difference		Critical value at 5%	Order
	Intercept	Trend and intercept	Intercept	Trend and intercept		Intercept	Trend and intercept	Intercept	Trend and intercept		
lGDP	-0.619029 (0.8552)	-2.282661 (0.4336)	-4.31711 (0.0081)	-4.278890* (0.0090)	-3.5266	-0.53508 (0.8737)	-2.141299 (0.5083)	-4.23531** (0.0018)	-4.21677* (0.0095)	-2.9369	I(1)
lpsc	-.71451 (0.8318)	-1.84706 (0.6633)	-5.93259* (0.0000)	-5.87838* (0.0001)	-3.5266	0.715136 (0.8316)	-1.938693 (0.6163)	-5.913552* (0.0000)	-5.852277* (0.0001)	-2.9369	I(1)
lGC	1.554689 (0.9992)	-2.547358 (0.3052)	-7.532525* (0.0000)	-7.829413* (0.0000)	-3.5266	2.026477 (0.3182)	-2.518375 (0.3182)	-7.5561225* (0.0000)	-8.737867* (0.0000)	-2.9369	I(1)
lopenness	-1.121954 (0.69818)	-1.422243 (0.8393)	-5.814994* (0.0000)	-5.763667* (0.0001)	-3.5266	-1.122796 (0.6977)	-1.511861 (0.8092)	-5.814493* (0.0000)	-5.764077* (0.0000)	-2.9369	I(1)
lCPI	-2.2798 (0.1830)	-4.3958 (0.0059)	-3.1079** (0.0336)	-3.6350** (0.0387)	-2.933158	-2.2135 (0.2047)	-3.4022 (0.0647)	-3.2034** (0.0268)	-3.8454** (0.0237)	-3.520787	I(1)
lpowerpc	-1.132995 (0.6936)	-2.5180 (0.3183)	-7.3636* (0.0000)	-7.3019* (0.0000)	-3.5266	-0.5335 (0.8738)	-2.7118 (0.2375)	-7.2744* (0.0000)	-7.2245* (0.0000)	-2.9369	I(1)

*Indicates 1% level of significance ** indicates 5% level of significance
Source: Computed by the authors based on statistical software package E-views 11.

5.2 Empirical Results based on Cointegration Test

After deriving the order of integration of variables i.e. I (1), we conduct cointegration test among the series. As the results of Johansen Cointegration Test

are lag sensitive, we used both the AIC and SBC to determine the optimal lag length subject to the condition that residuals follow White Noise Process (Enders 2010). Results of Johansen Cointegration test are reported in Table 4.

Table 4: Results of Johansen Cointegration Test

Cointegration Rank Test						Cointegration Max-Eigen test					
H_0	H_1	Eigenvalue	Trace statistics	0.05 Critical Value	Prob.**	H_0	H_1	Eigen value	Max-Eigen statistics	0.05 Critical Value	Prob.**
r=0	r=1	0.702444*	140.8784	117.7082	0.0008	r=0	r>1	0.702444*	49.69826	44.49720	0.0125
r≤1	r=2	0.532646*	91.18014	88.80380	0.0333	r≤1	r>2	0.532646	31.18740	38.33101	0.2617
r≤2	r=3	0.472325	59.99274	63.87610	0.3920	r≤2	r>2	0.472325	26.21029	32.11832	0.2216
r≤3	r=4	0.344674	33.78245	42.91525	0.2985	r≤3	r>3	0.344674	17.32753	25.82321	0.4305

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level.
Max-eigenvalue indicates 1 cointegrating eqn(s) at the 0.05 level.
*Denotes rejection of null hypothesis at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values.

Results from Table 4 suggest that the null hypothesis of no cointegration among the variables is rejected at 5% level for both Trace statistics and Maximum Eigen statistics. Both trace statistics and maximum eigenvalue provide one cointegrating equation at 5% level of significance.

5.3 Vector Error Correction Model (VECM)

The presence of long-run relationships among the variable scan be shown with the aid of Vector Error Correction Model (VECM). The long-run estimates of co-integrating vectors are shown in Table 5.

Table-5 Long-run estimation

	LPSC(-1)	LGC(-1)	LOPENNESS(-1)	LCPI(-1)	LPOWERpC(-1)	TREND	Constant
Coefficient	-3.05542	-0.52347	-0.61831	-0.08523	-0.46916	0.021734	-12.4817
Std. Dev	0.48354	0.06319	(0.26379	0.09217	0.14007	0.01225	----
t-statistics	-6.31889*	-8.28459*	-2.34392*	-0.92466	-3.34955*	1.77420	----

Note * indicates 5% levels of significant.

The long run equation can be shown in the following way:

$$lngdp = -12.4817 + 3.05542\ ln(psc) + 0.52347ln(gc) + 0.61831ln(openness) + 0.46916\ ln(powerpc)$$

It is evident from Table 5 that long-run coefficients of private sector credit, trade openness and power consumption are statistically significant and these factors affect Bangladesh GDP positively.

The error correction term obtained from long-run equilibrium is mentioned below.

ϕlgdpECt-1=LGDP- 3.05542 l(psc)-0.52347l(gc)-0.61831l(openness)-0.46916 l(powerpc)

Table 6- Error Correction Term

Error Correction Term	Coefficient	Std. Deviation	t-value
EC_{t-1}	-0.176248	0.073447	-2.399668

The coefficient of error correction term that measures the speed of adjustment towards long run equilibrium is negative (-0.176248) at 1% level of significance (Table-6). This implies that the adjustment towards long run equilibrium requires nearly six years when the equilibrium is disturbed due to any shock.

We require VCEM to estimate the short run dynamics among the variables. The results of the Error Correction Model are shown in Table 7. This Table reports the parsimonious regression results for nominal GDP growth and its determinants in Bangladesh during 1980-2020. It is assumed that cointegrating equations follow a linear trend and intercept.

Table 7: Error Correction Estimation

Regressors	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	-0.176248	0.073447	-2.399668	0.0222
D(LGDP(-1))	0.146336	0.118322	1.236758	0.2249
D(PSC(-1))	1.433305	0.348623	4.111329	0.0002
D(LGC(-1))	0.034662	0.056101	0.617855	0.5409
D(LOPENNESS(-1))	-0.003254	0.146204	-0.022258	0.9824
D(LCPI(-1))	0.107874	0.174950	0.616599	0.5417
D(LPOWERC(-1))	-0.019770	0.063946	-0.309168	0.7591
C	0.076560	0.022628	3.383433	0.0019

R-squared	0.745548	Mean dependent var	0.115925
Adjusted R-squared	0.691573	S.D. dependent var	0.034124
S.E. of regression	0.018951	Akaike info criterion	-4.920699
Sum squared resid	0.011852	Schwarz criterion	-4.586344
Log likelihood	108.8743	Hannan-Quinn criter.	-4.798945
F-statistic	13.81291	Durbin-Watson stat	2.063515
Prob(F-statistic)	0.000000		

The empirical findings showed that financial development measured by private sector credit affects GDP growth positively and heavily with 1% level of significance. The result implies that 1% increase in private sector credit will generate 1.43 percent growth in GDP. The strong relationship between private sector credit and GDP is also corroborated by other studies conducted in other countries (Cojocaru et al., 2016; Durusu-Ciftci et al., 2017). The result is not a surprise for Bangladesh as she depends on bank credit heavily for financing economic activities due to poor capital market performance and low level of foreign financing. The ratio of private sector credit by banks to GDP has increased over the year. The ratio stood at 39.2 in 2020 which increased from 13.675 in 1980, 21.12% in 1990, 21.32% in 2000 and 33.95% in 2010 (World Bank, 2020). The higher relationship between GDP and private sector credit by banks is also found by some other studies done on Bangladesh economy (Biswas & Masuduzzaman, 2016; Paul U C, 2020).

The result revealed that GDP is positively associated to the growth of GDP in the past period. However, the relation is not statistically significant. We found that GDP is positively related to Government consumption. However, the relation is not statistically significant. The result exhibited that trade (exports plus imports) has negative impact on GDP. However, the relation is not statistically significant. We also found that the impact of inflation on GDP is positive. However, it is insignificant.

The result also showed that the impact of electricity consumption on GDP is insignificant. This may be explained by low level of production and distribution of electricity during initial years that has dampened economic activities leading to retardment in economic growth in Bangladesh.

We found that the coefficient of adjusted R-square is 0.69 implying that all explanatory variables used in the study explained 69% variations in GDP growth. The omitted variables not considered in the study can explain the remaining 31% variation in GDP growth. The omitted variables may include FDI, technology, infrastructure and liberalization policy.

5.4. The Robustness Test

We conduct several diagnostic tests to check robustness of the Error Correction Model as shown in Table 8. These tests include Jarque-Bera test for normality, LM test for Serial Correlation and White Heteroscedasticity Test for Heteroscedasticity. The Jarque-Bera test is usually run for large data set and it matches the skewness and kurtosis of data to check whether it possesses a normal distribution. The Breusch-Godfrey (B-G) test also known as Lagrange Multiplier (LM) is used to conduct Serial Correlation test. White Heteroscedasticity Test is applied to check Heteroscedasticity in the residuals from a least square regression.

Table 8: Summary of Robustness Check

Test	t-statistics (probability)
Jarque-Bera Test	11.52462 (0.4846)
Breusch-Godfrey (B-G) Test (Serial correlation LM Test)	0.77745 (0.6779)
Heteroskedasticity Test (No cross term)	322.0028 (0.1256)
Heteroskedasticity Test (include cross term)	756.8347(0.2805)

Note: Probability values are given in the parenthesis.
Source: Computed by the authors applying E-Views 11.

It is evident from the results as shown in Table 8 that the VEC model has passed the diagnostic test or robustness successfully. The JB test for normality is satisfied implying that the residuals are normally distributed under null hypothesis. The result of Breusch-Godfrey (B-G) test showed no Serial Correlation. The white Heteroscedasticity Test confirms the absence of Heteroscedasticity. Thus, the results of all tests suggest that the model is well-specified and it provides consistent results.

6. Conclusions, Policy Implications and Direction for Future Research

The current paper aims to find out the role of bank financing and other key factors affecting Bangladesh GDP during 1980-2020 by employing Co-integration and Vector Error Correction Model (VECM). We select bank financing (private sector credit), Government consumption, trade, consumer price index and

electricity per capita as potential variables in the model. The empirical results find that bank financing is the most important factor to stimulate the GDP in Bangladesh in the long run. Government consumption (expenditure), trade openness and power consumption also affect Bangladesh GDP positively in the long run. The strong relationship between private sector credit and GDP is also found in the short run. The impacts of other factors are statistically insignificant in the short run.

Our study suggests for proper selection of projects with appropriate feasibility study so that credit flows to unproductive sectors can be avoided. It also recommends for developing capital market for long-term financing to lessen the adverse impacts of maturity mismatch in funds of banks. In this case, Islamic Shariah compliant sukuk based financing model can play vital role in financing projects, infrastructure projects in particular.

The policy implications based on the findings of the paper may be summarized in the following ways.

i. We found that private sector credit has emerged as the most important factor to stimulate the Bangladesh's GDP during the period under study. It is essential to select proper projects with appropriate feasibility study so that credit flows to unproductive sectors can be avoided and non-performing loans can be confined to a tolerable limit. Focus should be paid on cottage, micro, small and medium enterprises (CSMES) so that credit disbursement can ensure equity and avoid concentration of loans among few people.

ii. Despite achieving marked success in case of GDP growth and poverty reduction, one-fourth people still live below poverty line in Bangladesh. For further reduction of poverty, she requires to raise GDP growth over 8%. To this end, Bangladesh needs to increase private investment-GDP ratio to over 32% from the present level of 24 percent for which financial sector, banks in particular must be efficient and well-performing for augmenting saving-investment process toward higher GDP growth and poverty elimination.

iii. It is imperative to develop capital market for long-term financing to lessen the adverse impacts of maturity mismatch in funds of banks. The ratio of market capitalization of Bangladesh capital market to GDP stood at 11.6

percent at the end of June, 2020, which is very low compared to our neighbor countries (Bangladesh Bank, 2020d). In this case, Islamic Shariah compliant sukuk based financing model can play vital role in financing projects, infrastructure projects in particular. Recently, Bangladesh Government has issued sukuk al Ijara worth BDT 80 billion for safe drinking water project which has received massive response (Bangladesh Bank, 2021). The maiden sukuk issue was oversubscribed by 8 times. Beximco group, a large corporate house has issued Ijarah Istisna sukuk for the first time to purchase textile machineries and implement solar plant project. Some other big corporate houses have also adopted steps to issue sukuk.

iv. Our model has been able to explain 69 percent of variation of GDP in the long run in Bangladesh (adjusted R2, 69%). This implies that there are some omitted factors which can also affect GDP. The future research on GDP growth needs to include other variables in the model such as environmental and equity issue, labor productivity, innovation, infrastructure other than electricity. Special attention is required to conduct research to find out factors which can promote sustainable development based on economic, social and environmental issues.

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Role of Saving and Demographics on Economic Development: A Panel Data Approach

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ABSTRACT

This paper aims to delineate the relationships between saving and economic growth. It also focuses on the demographic correlates of saving, rooted in the life-cycle hypothesis of Modigliani and tries to confirm the validity of that hypothesis. This study attempt at estimating the saving function and growth function as a system of equations using three stage least square method with data from 1981-2017. It also attempts to differentiate the responses of the developed and developing countries.

The results show that, saving plays an important role in economic growth regardless the economic condition of a country. But the life-cycle hypothesis and the variables related to it explain variation in domestic saving rates of the high-income countries much better than it does that of the low-income countries.

Keywords: Saving, Economic Growth, Life Cycle Hypothesis.

JEL Classification: E01, E21, E22, E23, G21, O4.

1. Introduction

Saving has always been a crucial part of economic development for all nations. Saving translated into investment is a precondition for economic growth in classical economics. There exists much research on the role of saving. But at the present era of globalization, the role of saving seems blurred because of easy access to international funds. Opening of national economies and the increase in cross-border flows of capital, goods, services and people has overshadowed the predominance of domestic saving as the necessary condition for domestic investment.

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Feldstein and Horioka (1980) suggested that, in the presence of perfect capital mobility in world, there will be little or no relationship between the saving generated in a country and the domestic investment in that country. But imperfect capital mobility among countries causes considerable financing constraints for investment. They observe that, empirically, domestic saving rates and domestic investment rates are highly correlated, in contrast to standard economic theory. Aghion, Comin, Howitt, and Tecu (2009) argue that domestic saving matters for innovation, therefore matters for growth. Specifically, it plays a key role for the entrepreneurs in developing countries for adapting new technology. It enables them to put equity into cooperative ventures and attract foreign investors by mitigating agency problems. That confirms the relevance of domestic saving even in presence of globalization.

Last, the age composition of a country may be related to saving and therefore have consequences on economic growth. The process of changing a young aged population structure (high birth and death rates) to an old aged population structure (low birth and death rate) is defined as demographic transition. This process is expected to have significant consequences for developing countries. Agarwal et al (2015) suggest the channels through which the age structure affects economy. The reduced dependency burden can allow for increased household saving which, in turn, could lead to productivity gains through increased capital per worker (capital deepening). At the same time, with declining fertility rates, households will be more likely to invest in human capital, which can favorably impact labor productivity, research, innovation, and technology. Reduced fertility rates will also have a positive impact on female labor force participation. Besides, increasing wealth and saving will help develop entrepreneurial and risk-taking capacities of economic agents and contribute to economic growth. Also, there are considerable gains from longevity and increased investments in health.

Given the context**,** the goal of this paper is to investigate the role of saving in present-day economies. Moreover, it tries to address how the demographic changes have affected saving and how that differs from country to country. This paper attempts at estimating determinates of domestic saving rates and growth rates in per-capita GDP as a system of two equations using the three-stage least square method.

The organization of this paper is as follows: a brief discussion on Solow growth model and life-cycle hypothesis of saving and previous empirical studies in section 2 titled as Literature Review. Section 3 is devoted for data and methodology- explaining model specification, data and variables. Estimated results are discussed in section 4. Finally, Section 5 concludes the paper.

2. Literature Review

The "growth theorists" (such as Harrod 1939, Domar 1946, Romer 1986 and Lucas 1988) assumed that all saving is automatically invested and translated to growth. Thus, saving leads to growth. However, the "consumption theorists" (Modigliani 1970, 1986; Deaton 1989; Carroll and Weil 1994) argued that income and its growth determines consumption, and therefore determines saving. Lewis (1954) and Rostow (1960) emphasized that a higher rate of saving would lead to higher economic growth.

On the other hand, Solow's (1956) celebrated growth model, which assumes decreasing marginal returns to capital and allows substitution between capital and labor, concludes that growth eventually stops but an economy with a higher saving rate enjoys a higher steady-state income (though not a higher growth rate). The endogenous growth models (Romer1986; Lucas 1988), which return to the Harrod-Domar assumptions of constant returns to capital, again conclude that higher saving and investment rates lead to higher growth rates of output. Thus, growth theories imply that higher saving rates should lead to higher growth rates, at least if the economy is below the steady-state rate of output.

Consumption theories, such as the permanent-income and life-cycle hypotheses, imply that people choose their consumption (and hence also their saving) depending on current and (expected) future income levels. Modigliani (1970) argued that the simple version of the life-cycle hypothesis implies a positive relation between aggregate saving and income growth. He notes that if there were no income and no population growth across generations, the saving of the young would exactly balance the dissaving of the old and the aggregate saving rate would be zero. Because income growth makes the young richer than the old, the young will be saving more than the old will be dissaving, resulting in a positive association between saving and growth. However, Carroll and Weil (1994) have

argued that, ceteris paribus, an exogenous increase in the aggregate growth will make forward looking consumers feel wealthier and thus consume more and save less-thus implying that the impact of income growth on saving could be negative. On the other hand, if consumption is habit based and changes slowly in response to changing income, a larger fraction of increases in income may be saved resulting in the saving rate increasing with income increases (Carroll and Weil 1994).

Both of the school of thoughts, growth theories and consumption theories agrees to the fact that, saving and economic growth is related but may differ in the causality direction. Therefore, this study sought to analyze the relationship between saving and growth in line with the life-cycle hypothesis. It argues that, saving and economic growth is associated with each other and the main determinants of savings rate are the real income, life expectancy and the age dependency ratio.

There is a vast literature including many empirical studies that have dealt with saving and economic growth. In the case of economic growth, studies have followed varied approaches and theories to rationalize and validate many determinants using different econometric specifications. Similarly, saving and its determinants occupy a vast number of studies as well. Some of the studies follow a particular country or group of countries. Others are broader in scope. Macro and micro approaches have also been employed.

Mohan (2006) addresses the relationship between domestic saving and economic growth for economies with different income levels. For the high-income countries (HIC) and low-and-middle-income countries (LMC), he finds causality to run from economic growth to saving rates. Upper-middle-income countries (UMC) and low-income countries (LMC) show bi-directional causality. He concludes that, income class of a country plays a vital role in determining the direction of causality between its saving rate and growth rate.

Krieckhaus (2002) argues that high level of national savings lead to higher investment and thus contribute to higher economic growth. He supports his argument with some cross national statistical evidence and a Brazilian case study, both of which suggested that public savings substantially influence economic growth rate.

Agrawal (2007) examines the causality between GDP and saving using Error Correction Model (ECM) and Dynamic Ordinary Least Square (DOLS) method for five South Asian countries (India, Pakistan, Bangladesh, Sri Lanka and Nepal). He concluded that all of the five countries showed causality flowing from income or growth to the savings rate, while Bangladesh showed bi-directional causality.

Aric (2015) examines the determinants of saving in the APEC countries. Panel data analysis was used for sixteen APEC member countries during the period of 2000-2013. According to the results, income, age dependency ratio, young population, rural population and urban population affect saving positively. Financial depth affects saving negatively. Inflation and old population have no significant effect on saving in APEC countries.

Callen and Thimann (1997) applied cross section and panel estimation for 21 OECD countries over the period 1975-95.The results indicate that, there is an important role for public and corporate saving, growth and demographics in influencing household saving. Inflation, unemployment, the real interest rate and financial deregulation also has some role. Social security, tax and welfare system have important impact on household saving as well. It also suggests that, direct income tax lowers saving and higher government transfer to households are also associated with lower saving. Income growth has a strong positive impact and old age dependency has a negative impact on household saving. Bloom et. el. (2002) include health and longevity in a standard model of life-cycle saving and show that, under reasonable assumptions, increases in longevity lead to higher saving rates at every age, even when retirement is endogenous. The results also could explain the boom in saving in East Asia during 1950-90 as a combination of rising life expectancy and falling youth dependency, though they predict that saving in the region will return to more normal levels as population age. They also find that falling life expectancies in Africa are associated with declining saving rates.

Zhang et. el. (2007) justify the related yet independent roles of longevity and old-age dependency rates in determining saving and growth using a growth model that encompasses both neoclassical and endogenous growth models as special cases. They find that longevity has positive effects on domestic saving and investment and age-dependency has negative effects. The estimates indicate that differences

in the demographic variables across countries or over time can explain some of the differences in aggregate saving rates. They also find that both population age structure and life expectancy are important contributing factors to growth.

Cervellati and Sunde (2009) investigate the causal effect of life expectancy on economic growth, accounting for the role of demographic transition. They find that life expectancy affects income per capita, but the size of the effect varies depending on the economic and demographic development of each country.

3. Data and Methodology

The study assumes reverse causality between saving and economic growth. So there are two equations to explain the whole phenomenon - one for growth and another for saving. Therefore, two equations are solved as a system. In case of growth regression, we focused on the neoclassical growth model of Solow (1956) and the main independent variable is gross domestic saving (GDS). Subsequently, other control variables have been added to look for the relevant ones. Following are the equations,

$$GR\_GDPPC = \beta_0 + \beta_1 GDS + \beta_i X_i + u_1 \quad \text{.....(1)}$$

$$GDS = \gamma_0+\gamma_1 AGEDEP + \gamma_2 LIFEEXP + \gamma_3 SC + \gamma_4 PSE + \gamma_5 GR\_GDPPC+ \gamma_6 IR+\gamma_7 GDPPC+u_2 \quad \text{.....(2)}$$

where, X_i= additional control variables

GR_GDPPC = growth of GDP per capita

GDS= gross domestic saving

INITIAL: Initial level of real per capita GDP

TRADE: Trade openness

FDI: Foreign direct investment

BORBANK: Borrowers from commercial banks (per 1000 adults)

COMBANK: Commercial bank branches (per 100,000 adults)

SC: Social Contribution

ST: Subsidiaries and other transfer

PSE = primary school enrollment rate

IR = real interest rate

AGEDEP= age dependency ratio

LIFEEXP = life expectancy at birth

GDPPC = GDP per capita

This study uses secondary data (data series) from the World Bank indicators for 160 countries from the year 1981 to 2017. In all, 13 variables have been used for the model specification of both growth and saving equations. The dataset contains annual observations for each variable but not all variables, especially the demographic ones and a few countries have missing data for various reasons. Variables are averaged over successive five year intervals to smooth out business cycle effects and to avoid low frequency movements.

Three datasets have been constructed for the study. The first one tries to includes almost the whole set of countries in the world. But it excludes those data not recorded and having missing values for more than consecutive five years. This sample consists of 160 countries and is referred as the "whole set". Next we constructed two subsets from the main data set depending on their per-capita GDP. Countries having GDP per capita more than $ 12,056 are categorized as "High Income Countries" and countries less than that as "Low and Middle income Countries". The country classification is in accordance with World Bank.

There are 57 countries in the subset of high income countries and 103 countries in the subset of low and middle income countries.

4. Estimated Results

4.1 Growth Regression

The growth regression uses the whole dataset for 160 countries. A Panel data is used to investigate as many as 13 relevant variables to estimate their effect on economic growth. At first we use the fixed-effect model for the estimation. Here our main variable on which to focus is gross domestic saving (GDS). But in order to check for the variables effectiveness, we added more and more variables to see whether GDS still remains significant.

We started with gross domestic saving and initial GDP which are well established for conditional convergence. Subsequently we add other independent variables. The results are shown below:

Table 1: Growth regression estimation

	(1) GR_GDPPC	(2) GR_GDPPC	(3) GR_GDPPC	(4) GR_GDPPC	(5) GR_GDPPC
INITIAL	-0.000***	-0.000***	-0.000***	-0.000***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDS	0.076***	0.099***	0.099***	0.242***	0.087
	(0.012)	(0.017)	(0.017)	(0.035)	(0.084)
COMANK		0.039*	0.037*	0.042	0.173**
		(0.022)	(0.022)	(0.026)	(0.080)
IR		0.012***	0.012***	0.025***	-0.040
		(0.003)	(0.003)	(0.005)	(0.045)
TRADE			-0.004	0.015	0.043
			(0.006)	(0.012)	(0.027)
FDI			0.005	0.004	0.106*
			(0.008)	(0.008)	(0.059)
AGEDEP				-0.047	0.038
				(0.042)	(0.120)
LIFEEXP				-0.237**	-0.560
				(0.106)	(0.419)
SC				0.070	0.016
				(0.043)	(0.112)
BORBANK					-0.001
					(0.005)
ST					0.018
					(0.053)
PSE					-0.089
					(0.055)
FRATE					-0.228
					(1.883)
CONSTANT	1.955***	2.628***	2.991***	17.391**	44.159
	(0.326)	(0.679)	(0.895)	(8.380)	(29.828)
Obs.	961	440	440	243	98
R-squared	0.087	0.256	0.258	0.479	0.412

Standard errors are in parenthesis *** p<0.01, ** p<0.05, * p<0.1

We added upto 13 variables following different literature. GDS seems to be significant for model (4) with a positive coefficient, which is compatible with our

main objective. Initial GDP also remained significant with a negative sign. That means the lower the initial GDP, the higher is the growth rate. When a country starts in a poor condition, the return of capital can be higher and it helps the catching up with the high income countries. Other than that, interest rate with a lagged value is also significant with a positive coefficient. The number of commercial bank branches also remains significant.

Several regression models, such as OLS, a fixed effect and a random effect, were estimated, the Hausman specification test was applied to determine between a fixed effect and a random effect. The coefficients of the variables in both the models are almost similar. But based on the results, the fixed-effect model has been chosen. A fixed-effect model is particularly helpful here to deal with unobserved, time-invariant omitted variables.

Table 2: Regression results (Fixed Effect Model)

GR_GDPPC	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
INITIAL	0.000	0.000	-7.27	0.000	0.000	0.000	***
GDS	0.099	0.017	5.70	0.000	0.065	0.133	***
COMBANK	0.037	0.022	1.70	0.091	-0.006	0.080	*
IR	0.012	0.003	3.58	0.000	0.005	0.018	***
TRADE	-0.004	0.006	-0.66	0.511	-0.016	0.008	
FDI	0.005	0.008	0.61	0.542	-0.010	0.019	
Constant	2.991	0.895	3.34	0.001	1.229	4.752	***

Mean dependent var	2.468	SD dependent var	2.396
R-squared	0.258	Number of obs	440.000
F-test	17.320	Prob> F	0.000
Akaike crit. (AIC)	1537.576	Bayesian crit. (BIC)	1566.184

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

One noteworthy thing is we suspected an endogeneity problem between saving and GDP growth as both play important roles in fostering each other. While economic growth is supposed to increase the ability to save, saving translated into investment is an important source of growth. The causality direction is not well established as the existing literature shows ambiguous results. To deal with the endogeneity problem, instrumental variables were used. The two-stage least square method was employed to overcome the problem. Age dependency ratio and life expectancy has been used to instrument for GDS. The results are shown below.

Table 3: Instrumental variables (2SLS) regression

GR_GDPPC	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
GDS	0.098	0.019	5.24	0.000	0.061	0.134	***
INITIAL	0.000	0.000	-8.25	0.000	0.000	0.000	***
COMBANK	0.026	0.008	3.39	0.001	0.011	0.041	***
IR	0.005	0.004	1.21	0.225	-0.003	0.012	
TRADE	-0.001	0.002	-0.50	0.620	-0.006	0.003	
FDI	0.017	0.009	1.96	0.051	0.000	0.034	*
CONSTANT	1.121	0.340	3.30	0.001	0.454	1.787	***
Mean dependent var			2.461	SD dependent var			2.401
R-squared			0.058	Number of obs			437.000
Chi-square			70.170	Prob> chi2			0.000

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

As shown here, after taking account of the endogeneity problem, GDS still remains statistically significant.

4.2 Simultaneous Equation

Finally, we used the three-stage least square method to simultaneously estimate both the saving and growth equation as a system of equation rather estimating them individually. At first, we used the method for the whole set of 160 countries, eventually dividing them into two groups: High-Income countries (comprising 57 developed countries) and Low and Middle Income Counties (comprising 103 least-developing and developing countries).

In the system of equations, the first one is the growth equation and the second one is the saving equation. All the results are presented below:

Table 4: Three stage least square model estimation

Variable	Whole Set (160)	High Income countries (57)	Low and Middle Income Counties (103)
Eqn1 : growth equation			
GDS	.21264308***	.13468407**	.25173359***
FDI	0.055	-0.119	-0.073
COMBANK	0.002	-0.011	0.010
TRADE	-0.012	0.030	0.002
PSE	0.019	-0.086	0.057
INITIAL	-.00009349***	-.00007053**	-.00055971***
IR	.0113191*	0.013	0.011
CONSTANT	-1.911	8.029	-5.217

Eqn2 : saving equation			
AGEDEP	-.2099546**	-.67078393***	-0.072
LIFEEXP	-.34510251*	1.2054689***	-0.258
SC	-0.023	-0.030	-0.019
PSE	-0.079	.40483736***	-0.189
GR_GDPPC	2.9530738***	1.9850631***	3.0005194***
IR	-.04976997**	0.064	-.04571212*
GDPPC	.00038571***	.00016684***	.00171792**
CONSTANT	52.79295**	-87.634186**	43.798477*

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

Here, GDS is statistically significant for all the groups, but the effect is larger in case of low and middle income countries, which means domestic saving plays a greater role in the case of low-and-middle-income countries. For high-income countries the role is lower due to availability of capital and well-developed capital markets. Initial GDP having a negative sign confirms conditional convergence across all the sample groups. Other macroeconomic variables like trade, numbers of commercial bank branches and FDI are not significant. Primary school enrollment rate is used as proxy variable for human capital is also insignificant.

The second equation uses GDS as the dependent variable. The choices of the independent variables are influenced by the life-cycle hypothesis. Age dependency shows negative sign throughout all the samples. Results are also statistically significant except for low- and middle-income countries. It confirms the hypothesis that, a large dependency ratio puts pressure on the working population and tends to lower the saving. Life expectancy poses a significant negative sign for the full sample, a significant positive sign for the high-income countries and insignificant result for the low-and-middle-income countries. It means that, the effect of life expectancy varies depending on the income level or transitional situation of a country. Social contribution shows a negative coefficient for all the samples, though not significant. Primary school enrollment rate, proxy for human capital, only shows positive impact for high income countries. GDP per capita both in growth and level form affect GDS positively for all the datasets and are statistically significant. Lagged values of real interest rate show a statistically significant negative result for the low- and middle-income countries and for the whole set. It means for the given set of countries, with the

increase in interest rate, consumers feel wealthier and increase their consumption level, leading to a lower saving ratio. In that case, the income effect dominates the substitution effect in case of decision making regarding saving.

5. Conclusion

Saving is a perennial issue in economic growth and development. But with the advent of globalization, the role of saving seems to have waned. But a changing pattern of age structure and life expectancy is now in action and still affects saving. The age composition of a country may be related to its saving rate and therefore may have consequences for its economic growth. One explanation for such an association is that the saving tends to be relatively high for countries with larger share of working age population. Saving from young cohort will surpass the dissaving of the old generation, thus contributing in economic growth. This makes life cycle savings hypothesis appealing, and economists and demographers tries to explore implications of the hypothesis.

This study tries to explain the existing relationship between domestic saving and economic growth by connecting them with the life-cycle hypothesis. According to this study, the changing pattern of demographics plays a crucial role in explaining the relationship between domestic saving and economic growth.

This study uses a panel data for 160 countries and 13 variables to explain the relationship. A fixed-effect model and three-stage least squares model have both been estimated. Solving the equations simultaneously provides better outcome as it accounts for the endogeniety problem. The whole set of data then is divided into two subsets for high-income countries and low-and-middle income countries to compare the effect separately.

Evidence from the study shows that, saving is still important for growth of a country regardless of its income level. Whereas, life expectancy and age dependency ratio are effective for high income countries only. One vital difference between these two broad categories is the difference in financial market development. In absence of better investment opportunity, idle saving will fail to contribute in growth. This suggests that, it is important to have a fully developed financial market to reap the benefit of the demographics.

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Appendix 1:

A summary of the statistical properties of the variables are given below:

Table 5: Descriptive Statistics

Variables	Obs	Mean	Std.Dev.	Min	Max	Skew.	Kurt.
GDPPC	1175	12347.92	17387.63	151.102	108000	2.092	7.829
GDS	1112	19.354	15.959	-103.711	84.128	-.523	8.341
AGEDEP	1246	65.701	19.818	16.847	112.842	.403	2.016
LIFEEXP	1261	67.701	9.9	29.873	84.252	-.777	2.882
FDI	1123	3.807	10.052	-17.505	269.072	17.591	439.341
COMBANK	579	17.505	17.18	.374	110.939	2.031	8.571
BORBANK	280	186.767	212.819	.018	1191.276	1.72	6.296
SC	530	19.075	14.31	0	62.364	.378	2.223
ST	642	37.079	21.002	.015	82.643	.085	2
TRADE	1138	81.081	51.736	.218	425.158	2.62	13.928
TOT	977	-3.14e+12	5.46e+13	-1.19e+15	2.79e+14	-14.97	279.704
PSE	1155	99.167	18.086	14.653	165.645	-1.517	7.364
RIR	807	7.184	26.911	-87.447	614.745	16.82	356.783
FRATE	1263	3.337	1.816	.867	8.373	.773	2.365
INITIAL	1019	11886.54	16880.24	151.102	106000	2.113	7.972
IR	700	7.133	28.764	-87.447	614.745	15.882	315.347

Appendix 2:

Table 6: Pairwise correlations

Variables	GDPPC	GDS	AGEDEP	LIFEEXP	FDI	COMBANK	SC	TRADE	PSE	RIR
GDPPC ($)	1.000									
DS(%)	0.430*	1.000								
AGERDEP (%)	-0.531*	-0.485*	1.000							
LIFEEXP (years)	0.599*	0.411*	-0.829*	1.000						
FDI(%)	0.138*	0.034	-0.141*	0.148*	1.000					
COMBANK (no.)	0.508*	0.195*	-0.468*	0.562*	0.170*	1.000				
SC (%)	0.295*	0.105*	-0.400*	0.386*	0.005	0.173*	1.000			
TRADE(%)	0.303*	0.246*	-0.329*	0.309*	0.421*	0.233*	0.080*	1.000		
PSE(%)	0.090*	0.171*	-0.362*	0.436*	0.045	0.034	0.058	0.121*	1.000	
RIR (%)	-0.065*	-0.121*	0.086*	-0.090*	-0.007	-0.075	-0.090*	-0.032	0.085*	1.000

* shows significance at the .1 level

Appendix 3:

Detailed definition of variables

Indicator	Definition
GDP per capita (constant 2010 US$)	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2010 U.S. dollars.
Gross domestic saving (% of GDP)	Gross domestic saving are calculated as GDP less final consumption expenditure (total consumption).
Age dependency ratio (% of working-age population)	Age dependency ratio is the ratio of dependents--people younger than 15 or older than 64--to the working-age population--those ages 15-64. Data are shown as the proportion of dependents per 100 working-age population.
Life expectancy at birth, total (years)	Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.
Foreign direct investment, net inflows (% of GDP)	Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP.
Borrowers from commercial banks (per 1,000 adults)	Borrowers from commercial banks are the reported number of resident customers that are nonfinancial corporations (public and private) and households who obtained loans from commercial banks and other banks functioning as commercial banks. For many countries data cover the total number of loan accounts due to lack of information on loan account holders.
Commercial bank branches (per 100,000 adults)	Commercial bank branches are retail locations of resident commercial banks and other resident banks that function as commercial banks that provide financial services to customers and are physically separated from the main office but not organized as legally separated subsidiaries.

Indicator	Definition
Social contributions (% of revenue)	Social contributions include social security contributions by employees, employers, and self-employed individuals, and other contributions whose source cannot be determined. They also include actual or imputed contributions to social insurance schemes operated by governments
Subsidies and other transfers (% of expense)	Subsidies, grants, and other social benefits include all unrequited, non-repayable transfers on current account to private and public enterprises; grants to foreign governments, international organizations, and other government units; and social security, social assistance benefits, and employer social benefits in cash and in kind.
Trade (% of GDP)	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.
Terms of trade adjustment (constant LCU)	The terms of trade effect equals capacity to import less exports of goods and services in constant prices. Data are in constant local currency.
School enrollment, primary (% gross)	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Primary education provides children with basic reading, writing, and mathematics skills along with an elementary understanding of such subjects as history, geography, natural science, social science, art, and music.
Laborforce participation rate, total (% of total population ages 15-64) (modeled ILO estimate)	Labor force participation rate is the proportion of the populationages 15-64 that is economically active: all people who supply labor for the production of goods and services during a specified period.
Fertilityrate, total (births per woman)	Total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year.
Real interest rate (%)	Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator. The terms and conditions attached to lending rates differ by country, however, limiting their comparability.

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Post Deregulation Performance of State-owned Banks in Bangladesh: Imperative of Further Reform.

Mohammad Abul Kashem[1]

ABSTRACT

State-owned banks have always raised questions by their business performance in Bangladesh since its inception in 1971. Therefore, the country has implemented a massive reform in the mid-1990s to increase the financial performance of all banks by switching to a greater deregulated and market based banking sector. This paper attempts to conduct a comparative assessment of this deregulation effort on different groups of banks in Bangladesh. We have conducted both statistical analyses and econometric investigations on the comparative performance of the government and other types of commercial banks only for their post-deregulated operation period. The study has found an overwhelming support of lower performance by the government banks compare to the private and foreign commercial banks even though government banks were doing business not only in a level playing field but also with additional supports from the government and regulatory authorities (i.e. central bank etc.) of the country. Thus, the findings of this study indicate that reform for shifting in a deregulated market based banking regime has not improved the financial performance of the government banks in Bangladesh. So, the government banks in this country should contemplate in cost reduction, explore more profitable and technology based banking services, and cost efficient business operations to ameliorate their financial performance in future.

Keywords: Bank Performance, Financial Reform, Bangladesh.

JEL Classification: B 26, D 53, & E 44.

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Views expressed in the paper is authors' own only and does not represent the stand of Bangladesh Bank.

1. Introduction

As a developing country Bangladesh is trying to eradicate poverty level in a rapid speed. Keeping this target as its main goal, the country is trying to be an Upper Middle Income Country (UMIC) and High Income Country (HIC) by 2031 and 2041 respectively. These targets are ambitious but not impossible. However, there are many challenges in achieving this target as well. There are number of sectors those to be reformed immediately to make the economy congenial to the development trajectory as versioned and, of course, banking sector is one them that demands high priority. Without a dynamic and lively banking sector, monetary and exchange rate policies by central bank cannot be properly implemented, and therefore, targets of these policies would not be achieved. So, if the country really has a vision to be a HIC, banking sector cannot stay lag behind and thus remain inefficient. None has any doubt that besides of having efficiency in financial policy formulation and implementation by the central bank, having high efficiency of banking sector is a major precondition for becoming a high income country. However, still banking is not well developed in Bangladesh (Sadiq, 2020). Thus, to ensure an effective financial intermediation process an urgent priority for the country is to establish a robust, competitive and sustainable banking sector.

In literature, banking sector is recognized as one of the important determinant of economic development of a country (McKinon and Shaw, 1973). Therefore, hundreds of studies later have emerged based on their hypothesis to highlight the importance of this sector in economic development. The sector works as a major catalyst in the growth of a country by expedition of the investment and resource mobilization. In the present world, since global economic environment is highly interconnected, financial sector of a country cannot lag behind in uncompetitive and inefficient stage which persistently incurs loss and, hence, subsidy by the government. In particular, banking sector which keeps economy spirited by resource mobilization which is tantamount to the blood circulation of human body. A significant level of the financing in Bangladesh is still provided by the government banks (Table 1).

In recent times, Bangladeshi government banks are entangled with many further problems like increased default culture, frequent writing-off bad loans, constant increase of Nonperforming Loans (NPLs), and consequently needs to recurrent capital injection by the government from tax revenue, unable to fulfill the central bank requirement in keeping Cash Reserve Ratio (CRR), Statutory Liquidity Reserve (SLR), Advance-Deposit Ratio (ADR), provision against NPLs, etc. These failures are not only making trouble in protecting the depositors' interest, and keeping financial intermediation process viable, but also seriously hampering monetary policy target achievement by the central bank.

The rest of this paper arranged as follows. Section 2 reviews structure of banking sector in Bangladesh. Section 3 critically analyses the present condition of banking sector and government banks of Bangladesh. Section 4 reviews the existing literature particularly on bank performance and subsequently, identifies the existing lacuna. An elaborated narrative of estimation methodology of this study is presented in section 5. Data issues are presented the section 6. Estimated Results and their analyses are placed in section 7. Section 8 gives the concluding remarks and policy suggestion.

2. Structural changes of the banking sector of Bangladesh:

In Bangladesh after independence all domestic banks were in the hand of government. Although private banks were allowed to run since mid-1980s, this utter dominance of government banks in the sector was effective until 2000. In January, 1996 banking sector was suddenly allowed to operate in a deregulated mode with a motive to more market based financial system. The central bank abolished its past interest rate settings strategy and sectoral directed lending practices. From that point of time all banks in Bangladesh can impose prices of their products, interest rates on credits, charges or fees for services etc. by themselves, and central bank does not interfere on such issues. After deregulation in 1996 the change of structure of the banking sector has got its momentum considerably. In the year 2000, major indicators like income and profit by the govt. banks were superseded by the private banks (Table 1).

Table 1: Total Income, Profit, and Branches of Government, Private, and Foreign Banks in Bangladesh

Year	Income in Hundred Million Taka			Profit in Hundred Million Taka			Number of Branches		
	Govt. Bank	Private Bank	Foreign Bank	Govt. Bank	Private Bank	Foreign Bank	Govt. Bank	Private Bank	Foreign Bank
1975	109.01	14.3	5.6	6.41	1.21	0.55	1442	169	14
1980	264.93	46.64	21.01	14.13	3.24	2.61	3376	445	19
1985	680.46	192.17	98.67	43.49	22.19	15.03	3837	1106	20
1990	1406.12	617.71	180.39	54.12	56.56	17.65	3545	1994	22
1995	1982.08	943.89	335.65	88.52	121.16	90.76	3611	2202	25
2000	3726.27	3267.62	967.51	112.37	309.97	220.46	3607	2449	30
2005	4836.34	9140.17	1367.59	365.93	954.71	470.18	3388	2930	37
2010	10260.46	32873.14	2632.77	945.63	6032.03	645.62	3394	3852	46
2015	20782.27	64033.43	5407.47	1176.26	6145.79	1692.81	3669	5462	51
2020	24064.51	94759.71	6782.25	49.26	8023.22	2313.30	3798	6883	71
2021	26872.24	91769.50	5595.46	429.25	6687.22	1538.70	3801	5421	67

Source: Monthly Economic Trends, various issues, Bangladesh Bank

Gradually, private banks have taken over the banking sector and since 2000 financial sector of the country is private bank intensive. Consequently, competition among intra and inter (like government, private, foreign & specialized) ownership of banks have intensified (Table 1 and Table 2).

Table 2: Deposits taken and Advances given by Government. and Private Banks in Bangladesh

Year	Deposits in Billion Tk.		Deposits in Percentage		Loans in Billion Tk.		Loans in Percentage	
	Govt.	Private	Public	Private	Public	Private	Public	Private
1995	342	168	67	33	231	137	63	37
2000	400	213	65	35	382	166	63	37
2005	544	515	51	49	387	420	48	52
2010	599	2768	16	84	737	1837	29	71
2015	1757	5967	23	77	1291	4070	24	76
2020	3193	8498	22	78	1802	6668	21	79
2021	3904	9533	22	78	1921	6854	20	80

Source: Monthly Economic Trends, various issues, Bangladesh Bank

In 1995, government and private banks have gleaned 67 and 33 percent of the total deposits of the banking sector respectively. However, in 2020 the structure

of the banking sector has drastically changed. Government and private banks have collected 22 and 78 percent of the total deposits of the banking sector respectively. Same paradigm shift has also been taken in case of loan distribution by the banking sector.

Table 3: Structure and spread of banking business in rural and urban area of Bangladesh.

Year	Percentage of Branches		Total Branches	Percentage of Deposits		Total Deposits in Billion Tk.	Percentage of Loans		Total Loans Billion Tk.
	Rural	Urban		Rural	Urban		Rural	Urban	
2000	59.80	40.20	6119	22.68	77.32	710	59.80	40.20	6119
2005	58.79	41.21	6402	15.40	84.60	1416	58.79	41.21	6402
2010	57.36	42.64	7658	12.93	87.07	3379	57.36	42.64	7658
2015	56.76	43.24	9397	19.84	80.16	7940	56.76	43.24	9397
2020	48.51	51.49	10588	20.72	79.28	12642	10.34	89.66	10487
2021	48.50	51.50	10793	21.29	78.71	14398	10.90	89.10	11389

Source: Bangladesh bank Annual Reports (Various Issues)

Deregulation policy has also have direct impacts on rural – urban banking setup. Before 2000 branch and loan distribution were greater in rural areas. However, in now formation of banking sector's changed and presently banking business is totally urban based. In present, concentration of the banking sector is mostly in the capital city Dhaka and major port city Chittagong.

From the above table 1, 2 and 3 it is revealed that banks business in Bangladesh is gradually shifting to the private sector from the government sector. It is seen that the key market share indicators like income, profit, branches, deposits, and loans-advances etc. were higher in the hand of government owned banks than privately owned banks in pre-deregulation period. However, scenery is totally opposite in the post-deregulation period. Further, the structure of the market is also changes in post-deregulation period. Rural-urban branch combination, share of loans and advances disbursement between rural and urban areas, share of credit distribution among agriculture, service and manufacturing sectors also changed considerably. In post deregulation phase, besides above changes, phenomenal changes have come in the other front of financial issues too. Exponential growth is visible in the areas of broad money, private sector credit (and thus private sector investment),

number of bank branches, number of bank account holders or financial inclusions etc. have contributed and snatched by the privet sector banks. Also more macroeconomic changes regarding increasing financial deepening, customer service, financial product innovation, jobs in financial sector, industrial credit, etc. are discernible. Constant increase is seen in the mobile banking, agent banking, SME financing, and microcredit distributions as well. Further, decrease of central bank regulation regarding money, credit and foreign exchange markets, etc. are noticeable. It means that government banks have failed to keep up with such rapid changes occurred financial market. But private banks have been successful to earn the advantage of this changing situation.

Consequently, in this new financial environment private banks outperform than government banks in all aspects of operations. In short, deregulation has incurred changes and opportunities in the multiple fronts of banking business in Bangladesh but the existing data reveals that government banks have failed to capitalize these newly emerged advantages.

3. A Critical Analysis of the Government Bank Conditions in Bangladesh

It is true that banking sector of Bangladesh is afflicted with high level of NPLs both in regulated and deregulated period. However, government run banks are more affected by this curse than private sector banks (Table 5). Still they are staggering in above 20% loans as NPL. Table 5 shows that government banks loan portfolios are seriously affect by NPL among all type of banks in the sector. Private Bank's NPLs were also in alarming level though they have got over in a better position now due to the relaxation of NPL rules.

Table 4: Progress with Capital Adequacy (Percentage)

Bank Type	1995	2000	2005	2010	2015	2020	2021(Jun)
SCBs	6.6	4.4	5.2	8.9	6.4	6.9	6.8
PCBs	8.3	10.9	9.2	10.1	12.4	13.3	13.3
FCBs	16.7	18.4	17.1	15.6	25.6	24.4	28.5
Total	7.5	6.7	7.3	9.3	10.8	11.6	11.6

Source: Bangladesh Bank Annual Report, Various Issues

Such misery of public sector banks is actually due to weak management, continuous political interference, politically directed and motivated loans, adverse selection and moral hazards by themselves. In 2020 government banks offered only 21% of total loans in the economy. However, they have constituted 43% of total classified loans in the financial system which actually confirms that they are not financially solvent to run the business. Financial health of the government banks are now in very critical condition and their survival is dependent on to the boon of government intermittent capital injection. Thus, as state organizations both government bank themselves and judiciary system failed to protect depositors and credible clients' interests.

Table 5: Trend in NPL as Percent of Total Loans 1995-2020(Entire Sector)

Bank Type	1995	2000	2005	2010	2015	2020	2022(Sept)
SCBs	39.8	39.1	25.2	11.3	21.5	22.7	23.04
PCBs	31.2	22.1	4.2	2.9	4.9	5.9	6.20
FCBs	4.3	3.2	2.1	3.2	7.3	5.5	4.77
Total	37.1	35.1	11.4	6.1	8.8	9.2	9.36

Source: Bangladesh Bank Annual Report, Various Issues

NPLs in the banking sector of Bangladesh arises basically from the political maelstrom. Besides of political dimension there are some other associated arms which are deteriorating and intensifying this problem. There are inadequacy and weakness of financial law and judicial system of the country, weak supervisions and monitoring capacity of the central bank which is also partly as a result of the political reluctance and fiscal dominance, non-incentive for better bank management, lack of professional commitments by the staffs, enough efficient staffs, poor standard of services and products by the government run banks.

Table 6: NPL as percent of Total Loans 1995-2020 (of own loans)

Bank Types	1995	2000	2005	2010	2015	2020	2021(Jun)
SCB	37	39	25	11	22	23	20.6
PCBs	31	22	4	3	5	6	5.4
FCBs	4	3	2	3	8	6	3.9
Total	37	35	11	6	8	9	8.2

Source: Bangladesh Bank Annual Reports, various Issues

Throughout the post deregulation period, NPL of state-owned banks is higher than private and foreign commercial banks. Assets quality of government banks is inferior to private and foreign commercial banks. So, default risk of government banks is higher than private and foreign commercial banks. It also indicates that efficiency of government banks management is lower than private commercial banks. In a same financial market, though it is told that there is a level playing field for all organizations government banks are enjoying some extra benefit by having government deposits, negotiation of government high priced import LCs, etc. performance of government banks is persistently lower than other type of banks means that overall financial health of government banks is permanently inferior to others.

Table 7: Progress with Provision Adequacy with Required (in Percentage)

Bank Type	2000	2005	2010	2015	2020	2021(Jun)
SCBs	18.9	25.1	98.9	96.5	78.4	64.6
PCBs	82.1	86.8	99.1	100.9	103.1	112.7
FCBs	114.3	137.5	119.4	107.1	121.1	128.2

Source: Bangladesh Bank Annual Report, Various Issues

Government bank is also always fail to fulfill regulatory requirements like preserving capital requirements, CRR, SLR, AD ratio etc. as mentioned above. Further, for perpetual insolvency of their financial positions they also fail to keep required level of provisions and capital against risk weighted assets and NPLs. In maintaining such regulatory requirement, in Bangladesh government banks are always under performer than private and foreign commercial banks (Table 7). It means that they have been enjoying favoritism from the government and the central bank all along in maintaining regulatory obligations.

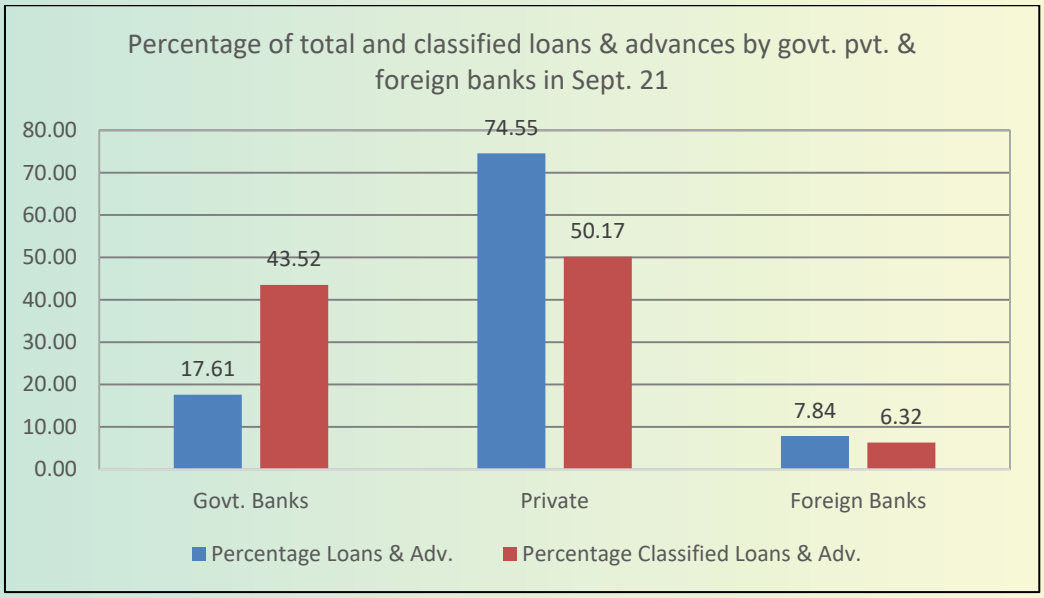
Table 8: Expenditure - Income Ratio by Types of Banks

Bank Type	1997	2000	2005	2010	2015	2020	2021
SCBs	99.4	98.8	101.9	80.7	84.5	85.8	86.99
PCBs	90.8	93.1	89.3	67.6	75.5	82.6	75.81
FCBs	77.7	80.3	70.8	64.7	47.1	45.5	43.79
Total	99.3	93.9	92.1	70.9	76.1	84.1	82.2

Source: Bangladesh Bank Annual Report, Various Issues

Expenditure – income ratio of government banks is almost always higher than private commercial banks means that cost efficiency of government bank is sustainably lower than private and foreign commercial banks. They have unnecessary cost and employees those are not spent or used for productive purpose. It also means that government banks have much scope to reduce cost in their business by using alternative combination of inputs. Further, it also shows that deregulation did not improve government banks financial health and competitive power by operation cost minimization in the industry which showed urgency of their further reform.

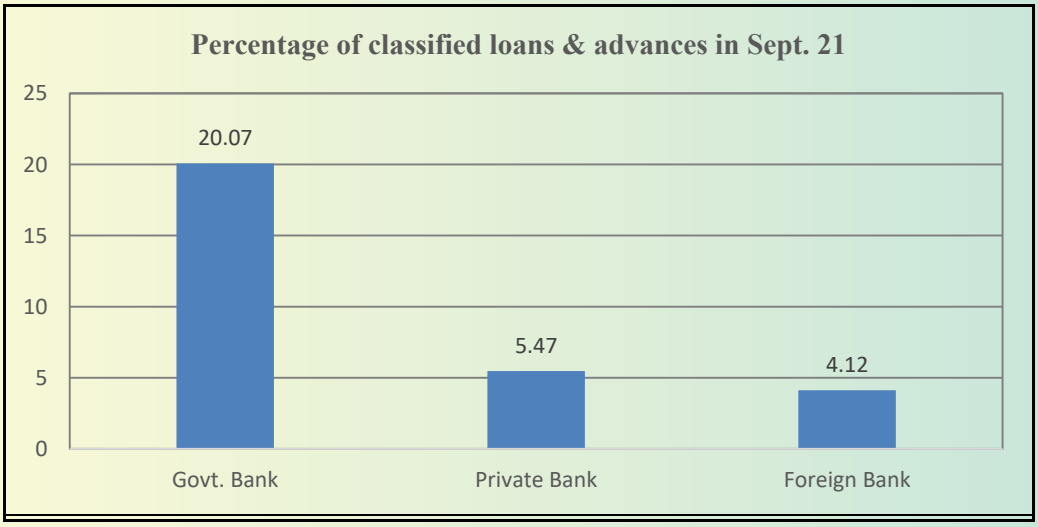
Figure 1: Present contribution of Bangladeshi banks in the total and classified loans



Source: Monthly Economic Trends, Bangladesh Bank

Contribution of government banks in total loans and advances of the economy is only 17.61 percent. However, contribution of classified loans and advances by government banks is 43.52 percent (figure 1).

Figure 2: Ratio of classified loans to the own total loans and advances



Source: Monthly Economic Trends, Bangladesh Bank

With respective to own loans and advances government banks have currently (Sept. 2021) highest rate classified loans (figure 2). They have endowed highest level of percentage of classified loans. They are the lowest contributor in credit supplying in the market. However, they are the highest producer of classified loans and advances in the market. Precisely, figure 1 and 2 postulate that asset quality of government banks are overwhelmingly poor than private and foreign banks.

4. Literature Review

After searching related papers, this author perception is that banking sector of Bangladesh is terrifically under researched. Reason of such gigantic research gap may be due to non-availability of data on Bangladesh banking sector on Bankscope. However, we shall discuss here about the papers we have got on impact factor journals only. They are chronologically as follows:

The status of NPLs in the banking sector of Bangladesh of 1990s has been examined by Adhikary (2006). His analysis indicates that over the years an alarming amount of NPLs is accumulated in Nationalized Commercial Banks (NCBs). The study concludes that, although the country has made progress in terms of classifying of loan standards, loan classification, and provisioning systems, the overall management of NPL is utterly unsuccessful.

Beck and Rahman (2006) concluded that, to ensure a sustainable expansion of the financial system, the present role of the government of Bangladesh is not acceptable, and the government should play the role of a watchdog not as the owner of banks. To this end, they suggested that, de-politicization of the certificating process, and following of an international standard and market-based bank failure resolution framework, concentration to the market oriented intermediation process is imperative to restore market discipline.

According to Beck (2008), fragility in the banking sector in Bangladesh over the period of his review was not related to deregulation of the sector rather it was related to both supervisory and management failure. Therefore, the author viewed that Bangladesh needs to establish essential institutional frameworks in its financial sector not market liberalization. According to him where there is a weak institutional framework, disbursing loan by political consideration can lead to a very fragile banking sector which is the actual case of Bangladesh. As a remedy he pointed out that the government should emphasize improving the institutional environment of the banking sector not merely deregulation.

Nguyen and Ali (2011) emphasized the ongoing challenges of the financial sector of Bangladesh and observed that the key challenge in case of the financial sector's lack of competition and market discipline. So, they underscored the excessive government and political intervention as well as managerial inefficiencies as the basic causes of various problems in Bangladeshi banking sector.

Iqbal et al. (2012) have got that government banks are in the most vulnerable position in Bangladesh whereas the foreign commercial banks are in the best performer.

Further, Hossain (2012), using data of individual banks and applying panel regression technique attempted to explain a relevance of persistent of unusually high IRS of Bangladesh. Moreover, he explained the reason behind the multiple IRS across the banks which hint serious market imperfection in financial sector. In his view, the main causes of high IRS across the sector are high operating costs due to unnecessary staffs of banks, persistently growing and unaffordable NPLs, lower market demand, and uncompetitive deposit markets in the country.

Mansur (2015) identified the lack of corporate governance of the banks in Bangladesh which is, as far as his understanding, directly related to political will only. Though he expressed anxiety over the rapid increase of NPLs, he believed NPLs of public sector banks to be a greater threat to the economy and stability to the banking sector of Bangladesh.

Exploring the determinants affecting the performance of banks, Rahman et al. (2015) found that lower capital strength and loan intensity have a positive and significant impact, and cost-efficiency and off-balance sheet activities have a negative and significant impact on bank performance in Bangladesh.

Relying on stochastic frontier approach (SFA), Robin et al. (2017) assessed twelve largest banks of Bangladesh by the bank-level data for the period of 1983–2012 to demystify the efficiency and productivity performance of the banking sector of Bangladesh. Their findings disclosed the positive effect of banking sector deregulation on costs efficiency. Their investigations further revealed that cost efficiency could be negatively affected by the politically appointed directors.

Considering the above discussion we can reach in the decision that there is no quality research regarding the relationship between bank ownership and bank performance, and about the tremendous literature gap on Bangladeshi banking sector are as follows: (a) there is no research on ownership issue of Bangladeshi banking sector, (b) no study is done by the data set that covers the full deregulated period, and (c) no study is done by the data of entire banking sector of the country rather they have conducted some studies for the partial data set of the sector.

To fill up the above gaps in literature the purpose of this study is to evaluate how bank performance is affected in Bangladesh by ownership. The results based on panel data estimation technique will answer a much discussed query that whether the state ownership of major banks in Bangladesh really making any trouble in the banking sector of Bangladesh in the post deregulated period or deregulation really incurs any improvement in the performance of state-owned banks in Bangladesh. Since government banks have been enjoying some additional facilities by government (such keeping government deposits in these banks on priority basis) and regulatory bodies (like relaxation of supervisory and regulatory requirements), their performance should have not inferior to other types of

banks like private and foreign banks. But the literature is revealing that non-government banks are persistently outperformer than government banks in Bangladesh. What are the determinants that led underperformance by the government banks in Bangladesh? The results will provide an answer of the question whether any necessity for further reform of state-owned banks of the country. Besides of filling up the gigantic literature gap the study will provide some policy suggestions on ownership, management performance, regulators and government future policy setting issues.

5. The Model

The aim of this article is to examine the impact of ownership of banks in Bangladesh on bank performance. To this end, we have followed used government owned, private and foreign bank data, where they worked in a same financial environment and almost in a level playing field. Since the used data are panel, which have both time series and cross section properties, we have considered stationarity, auto correlation and cross section dependence problems of the used data. We have assumed linear functional form about the bank performance function derived from the traditional industrial organization theory of the structural performance (SP) paradigm to investigate the relationship between the bank performance and ownership for detecting ownership impact on bank performance along with some other theoretically suggested control variable like concentration ratio or market concentration, market share, capital-assets ratio, loan-deposit ratio, asset size etc. of the government, private and foreign. Ownership variation is capture by the dummy variable technique. We are going to use very panel data model which are pooled OLS, Fixed Effect Model (FEM), and Random Effect Model (REM). To select the model suitability we have relied on Hausman test. In short, we have relied on vary typical and sophisticated methods of panel data estimation technique.

5.1 Basis of dependent variable selection

Bank is a business organization. Performance of a business organization is measured by its profitability. This profit making capacity is gauged by famous indicators like Return on Asset (ROA) and Return on Equity (ROE), Net Interest Margin (NIM) etc. Therefore, traditionally in the course of bank performance

evaluation researchers rely on these indicators. To this end, we have selected the most widely used two performance indicators namely ROA and ROE. ROA is the ratio of net profit and total asset of the bank. It reflects the ability of the bank management to earn profit using the existing assets of the bank. On the other hand, ROE is calculated dividing net profit by the total shareholders' equity. ROE helps to measure the efficiency of the bank management is in using its equity to generate profits for the bank. So, following the existing literature and the text book theories, ROE and ROA are considered as two different measure or indicator as shareholders' equity equals to total asset minus total debts of the bank. Since mode of operation, industry structure, economy where the banks are operating, and business motives are not uniform, similar performance indicators may not be useful for all banks of all countries in the world. So, third indicator we have used is Net Profit (NP) after tax, not the Net Interest Margin (NIM). NIM does not always indicate the profiting capacity of the bank as net interest (interest earned on loans minus interest paid on deposits) is not the sole source of profit for the bank. A substantial amount of profit by the Bangladeshi banks is come from non-interest earning sources. Bangladeshi banks have a tendency to increase and to shift to non-interest based income when interest based income shrinks (Kashem, 2022). Further, from the side of regulatory perspective increase of NIM or so-called Spread Rate (SR) (lending rate minus borrowing rate) is considered as inefficiency of financial system as it increases the burden of borrowers and depositors, and dead-weight-loss of the economy (Kashem and Rahman, 2017). Hence, we have decided to use Net Profit (not NIM) of the bank as the third true representative performance indicator of the banks operating in Bangladesh.

5.2 Connectivity Between Dependent and Independent (or control) Variables

Market concentration ratio (CR): Bank concentration is an industry related determinant of bank performance (Robin, et. al. (2018). Bourke (1989) points out that higher concentration in banking markets inspires banks to hold less risky assets. This implies that an increased level of concentration is linked with higher profit of banks originated from the lower risky asset portfolios. Additionally, link between bank performance and concentration is probable as banks with higher concentration can enjoy greater market power and thus may earn higher profit in a concentrated market. However, he argues that the nexus between profitability

and concentration relationship is a confused one as this relationship can be overrun by other market factors. Empirically, Bourke (1989) finds a negative relationship between concentration and profitability once the other effects, (for example, efficiency and market share) are controlled. Likewise, Kosmidou (2008) also finds a statistically significant negative relationship between bank concentration and ROA in Greek banking. Pasiouras and Kosmidou (2007) find that no significant relationship between profitability and bank concentration. However, Williams (2003) finds that concentration increases profitability of banks. So, empirical findings are mixed in this issue. Therefore, effect of concentration on bank profitability can be either positive or negative. In our case, concentration is measured by the ratio of total asset of the bank and the total assets of the sector.

Measure of market share (MS) Huljak (2015) suggests that there is a positive relationship between performance or profitability and market share of the bank. Similarly, Wang et. al (2014) the difference in profitability between bank is not the results of differences in the quality of the management, but due to discrepancies of the market share at which the bank is operating. Following Robin et. al. (2018) in this paper ratio of total loans of the bank and total loans of the sector is used as a measurement of market share.

Capital - Assets ratio (CAPASS): Capital assets ratio simply measures the degree of solvency of a bank. A bank can incur losses due to its bad loans or other unhealthy assets. Thus, this ratio shows loss absorbing capability or power of the bank in question. Banking literature (Kosmidou, 2008) advocates that a bigger capital ratio may lessens the necessity of the external funding, so high cost associated with such emergency funding, and thus increases profitability of the concerned bank.

Loans - deposit ratio (LDEP): A ratio between loan and deposit is used as a measure of liquidity risk (Eric and Baimba, 2013). A higher value of this ratio implies that the bank is in higher illiquidity position which may incur higher fund management costs. So, if the value is higher there is a probability of lower profit. At the same time, since a higher value of this ratio indicates that the bank has more earning assets (if the given loan performs well) and, thus, the bank has

higher probability of higher interest earning from the paid loan. Therefore, relationship between bank performance and loan-deposit ratio can be either positive or negative.

Asset size (LTA): Total assets is considered as a measurement of size of the bank. Size of the bank can work as determinant of cost reduction if economies of scale is valid in its case. Berger (1995) argues that profit of the bank is realized through economies of scale. Further, Large banks may have a large comparative advantage in lending to large customers as smaller banks are unable to finance them But it is also true that if size increases the bank can be less efficient for over staffing, poor management of the fund and other assets, beaurueacratic complexity and unnecessary time killing for decision making, weak supervision and control etc. That's why existing banking literature has mixed views over the impact of size of the bank.

5.3 Panel Unit Root Tests

The existence of non-stationarity or unit root is an unacceptable flaw for the data that have time series dimension as it provides spurious estimated results. This problem generates low standard error and thus, inflated coefficients or elasticities, and ultimately corresponding p-values. To detect whether our data set suffering from this wicked problem we have conducted five very widely used panel unit root tests suggested by literature. Specifically, they are Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher ADF, and Fisher PP and Hadri (2000) panel unit root tests. Among them predominantly, Levin, Lin and Chu (2002), Breitung (2000) are thought very convenient as panel unit root tests as they are estimated considering individual autoregressive structure for each of the series used in the model.

5.4 Pooled Ordinary Least Squares (OLS)

Assuming all coefficients and intercepts are uniform or fixed for all years and regression can be estimated for panel data which is called as pooled model. In this case, all effects of time and bank type variation are reflected in the error terms of the model. The following equation (1) derived from the traditional industrial organization theory of the structural performance (SP) can be such model for our assumed bank performance function:

μ_{it}or ROE_{it} or $ROA_{it} = \alpha_0 + \alpha_1 CR_{it} + \alpha_2 MS_{it} + \alpha_3 CAPASS_{it} + \alpha_4 LDEP_{it} + \alpha_5 LTA_{it} + \alpha_6 OWNER_{it} + \varepsilon_{it}$ …. (1)

Where

μ_{it} = Performance based on $Profit_{it}$, or

ROE_{it} = Return on Equity; or

ROA_{it}= Return on Assets

Here Profits or ROA or ROE are dependent variable, and three distinct measures of bank performance.

CR = concentration ratio representing the measure of market concentration,

MS = a measure of market share of the bank.

CAPASS = the capital to total assets ratio, and

LDEP = ratio of loans to deposits, and

LTA = asset size of banks.

Here, CR and MS act as proxy for the market structure. If $\alpha 1 > 0$ and $\alpha 1 = 0$, which implies that profitability is the result of a monopoly behavior measured by concentration and profitability is not affected by the monopoly behavior measured. Similarly, if $\alpha 2 > 0$ and $\alpha 2 = 0$, the market share does and does not affect a bank's profitability respectively. That is, the efficiency structure hypothesis holds if$\alpha 2 > 0$. This implies that firms with a large market share are more efficient to perform better than their rivals and thus earn higher profits. It is expected that CAPASS would be negatively related to three dependent variables (i.e., $\alpha 3 < 0$) and LDEP would be positively related ($\alpha 4 > 0$). The asset size of banks (LTA) is included to take account of differences brought about by size, such as scale economies. The LTA variable is expressed in logarithmic form and expected to be both negative and positive depending on the bank condition. The last variable is the dummy variable, Ownerships, which accounts whether bank is run by government or private or foreign ownership. Where the ownership of ith bank is represented by the binary value 1 for publicly (government) owned banks and 0 for all other commercial banks.

This prototype pooled OLS model is estimated by ignoring time and bank type variations. It will be just a pooled OLS regression model considering that intercept terms and slope coefficients are same over the years from 1995 to 2020, and across three types of banks considered in our model. This is the simplest and possibly naive approach that disregards any sort of variation arises from the

changes of time and individual bank. Therefore, obviously all such variations are absorbed by the error terms of the estimated econometric functions.

Therefore, error term can be segregated into two parts dedicated to time and bank types as follows:

$\varepsilon_{it} = \theta_i + u_{it}$.....(2)

where, $u_{it} \sim (0, \sigma^2_u)$

Here $u_{it}$is considered as part of the ε_{it}originated from time varying factors of the panel data. Further, $\theta_i$surrogates unobserved heterogeneity arises from bank categories and other factors.

5.5 Fixed Effect Model (FEM)

The FEM described in equation one is a special type of model that does not reflect the true FEM where individual bank and year needs to have a separate constant and slope coefficient. In this case each to represent each type of bank and year we need to include a dummy variable. In a true FEM, each individual bank type and years have to have an individual intercept term but we do not consider those as introducing them in the model will incur very high level of costs in terms of degrees of freedom. As the intercepts and slope coefficients are fixed effects over the whole considered period, this model is also called as least-squares dummy variable (LSDV) model.

5.6 Random Effect Model (REM)

Since the fixed effect or LSDV model needs to use an individual dummy variable for all types of banks and years, such model is highly expensive model in terms of degrees of freedom. To overcome this unbearable cost of degrees of freedom, REM or Error Component Model (ECM) is suggested by econometricians. The basic idea of this model stands is as follows:

$\text{Performance} = \alpha_i + \alpha_1 CR_{it} + \alpha_2 MS_{it} + \alpha_3 CAPASS_{it} + \alpha_4 LDEP_{it} + \alpha_5 LTA_{it} + \alpha_6 OWNER_{it} + v_t$ .....(3)

In this model we have that instead of treating α as fixed, it is assumed that α_i is a random variable with a mean value of α_0. And the intercept value for an individual bank type can be expressed as

$\alpha_i = \alpha_0 + w_i$.....(4)

where i = 1, 2, ..., n. In our case n = 3 (type of banks), and w_i is a random error term with a mean value of zero and variance of σ_w^2.

Now equation (3) stands as

$$\text{Performance} = \alpha_0 + \alpha_1 CR_{it} + \alpha_2 MS_{it} + \alpha_3 CAPASS_{it} + \alpha_4 LDEP_{it} + \alpha_5 LTA_{it} + \alpha_6 OWNER_{it} + w_{it} + v_{it}$$

$$\text{So, Performance} = \alpha_0 + \alpha_1 CR_{it} + \alpha_2 MS_{it} + \alpha_3 CAPASS_{it} + \alpha_4 LDEP_{it} + \alpha_5 LTA_{it} + \alpha_6 OWNER_{it} + \Omega_{it} \ldots..(5)$$

Where $\Omega_{it} = w_{it} + v_{it}$

The composite error term Ω_{it} consists of two components, w_{it} which is the cross-section, or bank type-specific, error component, and v_{it} is the combined time series and cross-section error component.

The usual assumptions made by Error Component Model are that

$w_{it} \sim N(0, \sigma_w^2)$ and $v_{it} \sim N(0, \sigma_v^2)$

Further, covariance between w_{it} and v_{it} is also zero which means that the individual error components are not correlated with each other and are not auto correlated across both cross-section and time series units.

5.7 Model Selection

To select the suitable model for our data avoiding all econometric complications we have relied on famous Hausman (1978) test. Precisely, this test infers if the potential results of FEM and REM estimators have any substantial difference. The test statistic of this famous test follows the chi-square distribution. In this test if the null hypothesis is rejected, FEM is preferable to REM.

6. Data

Keeping the view with the objective of the study we have collected data from the various issues of Annual Reports and Monthly Economic Trend published by Bangladesh Bank (which is the central bank of Bangladesh). Subsequently, they have been compiled in the Microsoft Excel sheets to make series full for the period of 1995 to 2020. Since no data is missed from the constructed series our data is a balanced panel. In this study we have considered only the post

deregulation period of banking history of Bangladesh. In 1990 Bangladesh has launched a Financial Sector Reform Project (FSRP) to unveil the way to deregulate the financial sector. It is believed that in the 1970s and 1980s banking sector of the country was plagued due to the massive financial repression due to the highly regulated nature of the governance by the central bank and ministry of finance (MoF). Such utter regulation of market caused misallocation of the resources. So, shifting to market based unregulated financial regime was the imperative. It is widely believed that from 1995 a major shift of financial market of Bangladesh was done since directed lending tradition and credit rationing to various sectors were abolished, and market based interest rate system was restored as per the suggestion of FSRP committee report. Therefore, 1995 is considered as the point of inflexion or the dismissal year of regulated banking system in Bangladesh. So, the data period is chosen keeping consistency with the motive of the study of focusing only on the post-deregulated banking history of Bangladesh.

6.1 Summary Statistics:

Table 9: Summary Statistics of the variables used.

Summary Statistics for the Sample period: 1995 2020							
	CAPASS	LDEP	LNLTA	LNNETPR	MS	ROA	ROE
Mean	0.587321	0.901758	1.981661	6.436826	0.186378	0.481591	6.839015
Median	0.691755	0.961705	1.942279	6.818224	0.265000	0.600000	9.150000
Maximum	0.699970	1.404780	2.235964	8.990095	0.440390	2.100000	26.20000
Minimum	0.348330	0.427280	1.795378	2.819592	4.00E-05	-1.300000	-29.60000
Std. Dev.	0.136957	0.257240	0.133781	1.912095	0.156708	0.692529	11.95905
Skewness	-0.524079	-0.169434	0.319434	-0.290484	-0.217027	-0.086020	-0.618710
Kurtosis	1.445056	2.226619	1.894695	1.885209	1.282619	2.822485	3.369704
Jarque-Bera stat	6.446887	1.307075	2.988063	2.897184	5.752630	0.112034	3.057793
Probability	0.039818	0.520202	0.224466	0.234901	0.056342	0.945523	0.216775
Sum	25.84211	39.67734	87.19310	283.2203	8.200630	21.19000	300.9167
Sum Sq. Dev.	0.806557	2.845404	0.769588	157.2125	1.055973	20.62265	6149.816
Observations	66	66	66	66	66	66	66

Source: Authors own calculation.

The summary statistics says that except ROE all other variables have no much ups and downs in the data. All the selected variables are hovering around the mean values meaning that the variable has fair level of variability and perhaps estimation will not be unreliable. Difference between maximum and minimum values and standard errors are also small which confirms that our selected data is not suffering from the sudden shocks or outliers.

6.2 Correlation Matrix

Table 10: Correlation Matrix of variables used.

	CAPASS	CR	ROA	ROE	LNNETPR	MS	LNLTA	LDEP
CAPASS	1.000000							
CR	**-0.898071**	1.000000						
ROA	**-0.737966**	**0.610644**	1.000000					
ROE	**-0.554746**	0.450724	**0.922499**	1.000000				
LNNETPR	0.416028	-0.474424	-0.250299	-0.348769	1.000000			
MS	**0.948527**	**-0.764137**	-0.678125	**-0.537858**	0.383901	1.000000		
LNLTA	-0.39282	0.405299	0.074312	-0.118614	0.428383	-0.404966	1.000000	
LDEP	-0.278547	0.106915	0.373839	0.247203	**0.519517**	-0.333102	**0.639686**	1.000000

Source: Author own compilation

Correlation matrix says that capital assets ratio (CAPASS = market risk) is highly negatively correlated with market concentration ratio (CR), Return on Assets, and Return on Equity. However, this market risk indicator has utter positive correlation with market share (MS). Obviously, market concentration ratio is moderately positively correlated with ROA, ROE and Assets size (LNLTA) of the bank. But it is negatively related with loan-deposit ratio, and market share. Further, ROA and ROE show their usual relationship and are highly positively correlated. However, ROA and ROE are negatively correlated with market share and loan deposit ratio. Additionally, loan-deposit ratio is moderately and positively related with assets size and net profit. This net profit is also positively related with loan deposit ratio. It means that correlation matrix shows largely expected bi-variate relationship among the variables.

7. Econometric Investigation of Comparative Performance of Govt. and Private Banks

7.1 Unit Root Test

Results of our unit root tests are presented in the following table 10.

Table 11: Results of Unit Root Test

Name of the test	CAPASS	CR	ROA	ROE	G (NETPR)	G(MS)	G(LTA)	DEP
Levin, Lin & Chu (2002)	I(0)	I(0)	I(0)	I(1)	I(0)	I(0)	I(0)	I(0)
Breitung (2000),	I(0)	I(0)	I(0)	I(1)	I(0)	I(0)	I(0)	I(0)
Im, Pesaran and Shin (2003)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)
Fisher ADF	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)
Fisher PP	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)
Hadri (2003)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)

Unit Root Test at 10 % level of significance

It is seen that except ROE all the variables are in stationary at level by all types of test statistic considered by us. Since we have all variables have unit root at level by maximum test method we can rely on OLS method for estimation the impact of explanatory variables on dependent variable. The result of such estimation is postulated in the results section of table 12.

7.2 Results Analysis

Since Hausman test (where null hypothesis is that random effect model is appropriate) suggests that when ROA and ROE are the dependent variable as performance indicator of banks random effect model is effective and when growth of net profit is dependent variable as performance indicator fixed effect model is suitable. We have followed this recommendation Hausman test. The results of the proposed models are shown in the following table 12.

Table 12: Results of the fitted models

Variable Names	ROA (REM.)	ROE(REM)	Growth of Net Profit (FEM)
Constant (C)	10.38720***	100.0350*	22.18132***
Concentration Ratio (CR)	3.046255*	84.47827**	-9.020070**
Growth of MS	-5.117823	*-87.40360	-8.255392
Capital-Asset Ratio (CAPASS)	-3.911958	-60.22579	-25.43455***
Loan-Deposit Ratio (DEP)	1.447274***	29.18513***	2.191460***
Growth of Asset or Size (LTA)	-4.280063***	-84.82811***	3.265130
Ownership Dummy	-1.924459*	-2.844020**	-9.887795***
R-Squared	0.763435	0.653272	0.866226
Adjusted R-Squared	0.731893	0.607042	0.844533
DW Statistic	2.115713	2.064459	1.952341
F-Statistic	24.20380***	14.13082***	39.93103***
Haussmann Statistic	5.633824	9.413220	27.432776
P-value of Hausman Test	0.4654	0.1516	0.0001

Following the literature we have chosen three dependent variables ROA, ROE, and growth of net profit as performance indicators for all three types of (government, private, and foreign) banks in Bangladesh and fitted them in the traditional industrial organization theory of the structural performance model to find out the determinants of banking sector performance. After numerical and tabular analysis we relied on the panel data techniques of estimation to figure out

the relationships between dependent and independent variables. The results in each three models including statistical analysis say that concentration ratio, loan-deposit ratio, size, and ownership status of the banks are key and significant determinants for bank performance in Bangladesh. Ownership is considered the target variable and remaining all others are control variables of this research. Relevant diagnostic tests (Appendix A) also have confirmed that our estimation is econometrically reliable.

Our result has both agreement and disagreement with the past researches. In case of concentration this result is opposite of Bourke (1989) and Kosmidou (2008). However, our result supports the findings of Williams (2003). However, in case of market share, the findings of this research do not support the conclusion drawn by Wang et, al. (2014) and Huljak (2015). Similarly, findings related to capital - asset ratio also does not match with the findings of Kosmidou (2008). However, result of this research regarding loan - deposit ratio and size of the bank support the finding originated by Eirc and Biamba (2013) and Berger (1995) respectively.

If we look at the past researches regarding Bangladeshi banks ownership discussed in the literature review section, they can be divided into two parts where one part is based on data of pre-deregulation period, and others are based on the data of both pre- and post-deregulation periods. Almost all of these past researches have given disappointing results regarding the banks in Bangladesh under government ownership. One of the fundamental differences of this paper over past researches is that it considers only the data of post deregulation period. However, result of this paper based on such updated data is also giving us the evidence that the situation of the government banks in Bangladesh did not improve in post deregulation period. Result of this study is similar to the findings of Adhikari (2006), Beck and Rahman (2006), Nguyen and Ali (2011), Iqbal et. al. (2012), and Mansur (2015) whose researches concern were also banking sector of Bangladesh.

This study includes the data only for the post deregulated banking period of the country. Thus, it also indicates that the financial deregulation does not perceptibly help the government banks to improve their performance. In Bangladesh ownership significantly matters to bank performance in post deregulation period. Here, banks run by private sector are outperformer compare to the government

run banks. Government banks are less efficient and, thus, less profitable. Moreover, government banks are the less profitable perhaps due to less productive, less efficient bank staffs, less business oriented, appointment of politically motivated management and directors, insider lending for political reasons. This study provides evidence in support of the privatized and ongoing deregulated banking system. It is an essential strategy for the country's long march to switching to the less regulated, market based, and privatized banking system. The findings of this paper reiterated the evidence that commercial banks in Bangladesh should be operated based on business ideologies to be profit oriented. Government intervention on the business decision process should be detrimental for banking business, and therefore, government should gradually retreat from all sorts banking business in the future. Lower profitability by government banks also means that the higher level of government guarantee cannot help government banks to reduce borrowing costs, deposit collection, and increase revenue those in turn improve banks performance in general.

Government bank managers may have lack of incentive to make the bank better performed and lack of knowledge of the market. Besides, scarcity of the managerial skill and knowledge may also hamper their business decision and activities, which constrains their earnings, profitability and ultimately performance. Lower profitability may be caused also by the fact that government run banks suffer to attract customers who have failed to make a good business relationship with the lenders. Moreover, limited facilities and customer services, lower number loan products and in time services, unavailability of enough ATM booths, credit and debit (cash) card services, single counter utility bills accepting services etc. make them less performed. Domestic private and foreign banks exhibit very good performance relative to the government owned banks, implying that they may have superior human resources with higher motivations, expertise, experience, technological knowledge, and bank governance.

Other facets of this result are also not ignorable. Private Banks play an increasingly important role in the funding of SME businesses. Government banks are more interested to finance in large projects only. They do not glean the SME and retail banking potentials. So, government banks should switch and broaden their business networks to make them better performed. Additionally, it is true

that Bangladesh has been showing impressive records in the economic development across last two and half decades (Mahmud et. al, 2010).The finding further suggests that strong economic growth can lead to significant efficiency gains for banks in Bangladesh but government banks seem to fail to keep up their business with this economic progress. Looking at differently, country's progress speed in urban areas is bit quicker and have relatively more mature private sector economies than rural areas(Warren, 2007). Private and foreign commercial banks are more interested to set up their branches and business installations in the urban areas than agriculture based rural areas. Therefore, in their business activities privately owned banks may enjoy this urban based economic development financing advantage relatively in a higher scale than rural based branch networks of government run banks. Perhaps this is also one of the reasons for private banks for their exhibition of better performance. Thus, economic status of the geographical area in which the bank is located plays a role in determining its performance in Bangladesh. It also suggests that bank performance is positively related to the level of economic development in the region in which they are located (Clarke, 2004, Alam et. al. 2021). That is why government banks should postpone their economically unviable branches in remote hinterlands of rural Bangladesh to reduce loss incurring business networks.

It is argued that the government can influence the financial intermediation activities, and, thus, performance of government banks by manipulation of business opportunities (Like, government LCs, securities, etc.) distribution. Besides, as a largest legal authority of the country, government can play very big role as a big depositor and/or a big borrower of the country which ultimately defines the performance of the banks. As a developing country, scenario of Bangladeshi banking industry is not out of this trend. In this country, government-owned banks can enjoy more facilities than privately-owned banks. Further, relaxation of regulatory requirements for government banks is a very common and pervasive in here (Table 4 and 7). This is in other way partly reasoned as not having independence of central bank of the country. Given this all facilities for the government-owned banks in Bangladesh fails to perform reasonably well. In this bleak backdrop, government should rethink whether it would keep so large number of banks in its hand or handover them to the more efficient private sector?

Last, but not least, the finding of this paper has important policy implications and message for the government of Bangladesh. Continuous and intermittent capital injection or bailouts by the government revenue fund to keep these banks alive is not an economically viable option for the lung-run. This suggests that government, policy makers and regulators should be cautious about such strategies, as the performance level is not improved by the multiple recapitalization in past. Such funding provides an insurance to the government bank managements as an enduring job security but no incentive to improve the performance of their banks.

8. Conclusion

The interrelationship between ownership and financial performance of banks is proved an empirical issue in the literature particularly for the developing countries. In some countries government banks are better but in other countries they do not perform well. Therefore, along with other factors this study investigates predominantly the relationship between the ownership and business performance of the banks in Bangladesh for the deregulated financial period using the panel data estimation technique in the traditional industrial organization theory of structural performance. We have conducted a thorough investigation resorting statistical and tabular analysis of performance related indicators, and graphical presentation of the latest performance scenarios. Additionally, we have conducted an econometric investigation using a suitable model. Along with all other examinations, the econometric analysis confirms that financial performance of the banks was strongly influenced by concentration ratio, loan-deposit ratio, size of the banks, and ownerships.

Bangladesh has implemented various projects (Money, Banking and Credit Commission of 1980, Bank Reform Committee of 1990, and, Financial Sector Reform Project (FSRP)of 1995) of banking reform and subsequently deregulation since early to mid-1990s. Among many others one of the intension of such reform works is to improve government banks performance by letting them to compete with ever expanding private and foreign banks of the country. However, our results show that reform and deregulation actions have less impact in improving public sector banks performance. This result reiterates and reinforces the constant

demand by the researchers that government banks in Bangladesh should be overhaul by massive reformor hand over them to the private sector for making them economically viable.

This result has important policy implications. Government banks are under performer even though they are getting multiple supports from government and regulatory authorities. Our analysis reveals that government banks can improve their performance by massive reform in operational and management issues, avoiding appointment of political directors and managements, improving human resources, using upgraded banking technology, withdrawing bank branches from economically unfeasible locations etc. Government banks can individually identify their losing leaks and faucets. Due to the constant capital erosion government occasionally needs to inject fresh fund as bailout to keep them alive with a hope that they will turn around in future. But past history indicates that the potential of such positive upshot is very low. So, it would be economically prudent decision if government stops such recapitalization and searches alternative solution based on established financial rules.

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Appendix A

To check the robustness of the conducted econometric investigations it is needed to test the normality, autocorrelation, cross section dependence, and Heteroscadasticity test of the residual terms. Simply, if residual terms are passed by such diagnostic tests it can be assumed that performed examinations are econometrically reliable. In our case, the results of these necessary tests are as follows:

Test for the residuals Normality

In lest square (LS) regression models it is assumed that residuals are normally distributed. A violation of this assumption may give inflated standard error which may beget a high value of t-statistic, and thus lower the corresponding p-values. So, having normality of residuals are necessary in LS models. For this test this paper relied on Histogram Jarque-Bera (JB) normality test. The test results of our three regression models are as follows:

Normality Test when ROE, ROA and Net Profits are dependent variables:

Co-efficients Name	Dependent Variables		
	ROE	ROA	Ln(Net Profit)
Mean	-0.54405	-0.3822	-0.1851
Median	0.2619	0.0304	310.2200
Maximum	34.6257	3.6309	2017.8941
Minimum	-39.4639	-4.7973	-6808.786
Standard Deviation	14.5558	1.6802	1004.029
Skewness	-0.3561	-0.2723	-1.7484
Kurtosis	3.0057	3.0904	7.9083
JB Stat.	2.1119	1.2709	151.3226
Probability or (P-Value)	0.3479	0.5299	0.0000

In the JB Normality test, the null hypothesis is residuals are normaly distributed. From the above table null hypothesis is not rejected when dependent variables are ROE and ROA the corresponding P-values are greater than 10 percent level of significance. So, in these cases, results are very robust.

Test of Serial Correlation

If the data has time dimension serial or autocorrelation of residual term is highly important. Simply, if the residuals suffer from autocorrelation, LS estimates

would not be BLUE and their standard error would be small and computed R-squared will be higher than it would be. Thus, the hypothesis tests done by the regression model ultimately will not be reliable. In this regard, we have relied on Correlogram test for autocorrelation for the residuals when ROE, ROA, and Net Profit are the dependent variables in level form up to 10 lags inclusion since data length is 26 years only. The counted Autocorrelation (AC) and Partial Autocorrelation (PAC) values for all residual series were within borders fixed by 95 percent confidence interval. It means that residuals are not suffering from any serial correlation. Further, since R-squared is less than DW-statistic and all DW-statistic are very close to 2.00, it may be inferred that perhaps no variable included in the model is suffering from autocorrelation.

Cross Section Dependence Test

According to Baltagi (2005) cross section dependence among variables used in the panel and times series data can incur similar consequence of autocorrelation for estimated regression coefficients in LS method. So, testing cross section dependence among the residuals generated from the four types of banks is necessary for the econometric examination used in this study. We relied Pesaran CD test method for this investigation. The results are as follows:

Residual Cross Section Dependence Test

Null Hypothesis: No Cross Section Dependence (i.e. Correlation) in Residuals.

Alternative Hypothesis: There is Cross Section Dependence (i.e. Correlation) in Residuals

Dependent Variable	Test Name	Statistic	Degrees of Freedom	Probability
ROE	Pesaran CD	-0.6892	6	0.4907
ROA	,,	-0.2581	6	0.7964
Net Profit	,,	1.1368	6	0.2551

From the outcome of the test it is seen clearly that null hypothesis is not rejected meaning that Pesaran CD test say that there is no cross section dependence among the residuals.

Heteroskadasticity Test

In case of HK test we have relied on White HK test to detect whether the error terms or residuals are homoscedastic or not. In our case Auxiliary regression has 6 degrees of freedom and 10 percent level of significance the Chi-Square (χ^2) statistic is 10.645 meaning that any value of the χ^2 less this critical value the model is Homoscedastic. In case, White HK test our findings are as follows:

Dependent Variable	Test Name	Chi-Squared Statistic	Degrees of Freedom	Probability
ROE	White Test	5.6892	6	0.4907
ROA	,,	3.2581	6	0.7964
Net Profit	,,	7.1368	6	0.2551

From the above table P-values for regressions are less than critical value of χ^2 statitic. So, perhaps the model is not suffering from any HK Problem.

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Effects of Foreign Direct Investment on Income Inequality: Do Sector and Mode of Entry Matter?

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ABSTRACT

This paper analyzes the effect of Foreign Direct Investment (FDI) on income inequality from two perspectives- the sectoral composition of FDI and the mode of entry of FDI. From the first perspective, FDI inflow is divided into three major sectors of economic activity namely primary, manufacturing and service sector. From the second perspective, FDI is divided into greenfield FDI and cross border mergers & acquisitions (M&A) FDI. Two different models have been used to estimate the results. The first model is controlled for Kuznets Hypothesis and the second model is controlled for technology, globalization and other relevant macroeconomic variables. Both the models have been estimated using OLS & Fixed Effect estimation method. The results show that total and service sector FDI increase income inequality in both short and long run whereas manufacturing and primary sector FDI has no statistically significant effect on income inequality. On the other hand, both greenfield FDI and M&A FDI increase income inequality in the long run. Moreover, human capital has a strong conditional effect on primary, manufacturing and service sector FDI in reducing income inequality.

Keywords: Foreign Direct Investment, Sectoral FDI, Greenfield FDI, Cross Border Mergers & Acquisitions FDI, Income Inequality.

JEL Classification: B27, D30, E22.

1. Introduction

Worldwide foreign direct investment (FDI) flow experienced an upsurge since the mid-1980s. It got accelerated by unprecedented technological advancement and ongoing liberal market-oriented reforms at that time. This in turn facilitated the integration of countries into the global economy and resulted in global economic growth. However, the economic growth throughout this period has not been shared equally by all segments of the economy. As a result, rising income

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inequality, in this era of financial globalization, has become a major issue of discussion to economic policymakers all over the world. FDI works as a channel of transferring not only physical capital but also intangible capital, such as technology and skills, to the host countries. On the other hand, income inequality is often found to be linked with skill gap among workers. Therefore, FDI is assumed to play a key role in affecting income inequality in the host country by widening the income gap between workers of different skill levels. Under these circumstances, an intense debate has emerged, in both academic and policy circles, on the effects of financial globalization on rising income inequality.

In comparison to the extensive body of work examining the effects of FDI on economic growth, little work on the effect of FDI on income inequality is found in the existing literature and empirical study on the effect of sectoral FDI on income inequality is even scarcer. This paper attempts to focus on this specific research gap in the existing literature. The main purpose of this paper is to empirically investigate the effects of different sector and mode of entry-wise FDI inflow on income inequality. It attempts to find answer to the following research questions:

1. Does different sectoral FDI inflow (primary, manufacturing and service sector FDI) affect income inequality in the host country differently?
2. Does different mode of entry (greenfield and mergers & acquisitions) of FDI have differential impact on income inequality in the host country?
3. Can human capital put any conditional effect while assessing FDI's impact on income inequality?

The rest of this paper is organized as follows: following the introduction in section 1, review of the literature is given in section 2, section 3 discusses the methodology and data, section 4 illustrates the estimation results and discussion on the findings and in the last section some policy implication of the study is given along with the conclusion part.

2. Literature Review

2.1 Literature on Total FDI & Income Inequality

In the literature, there are mainly two hypotheses about the consequences of FDI on income inequality. The first one is the 'developmental/ modernization hypothesis' and the second one is the 'world system/dependency hypothesis'.

According to the modernization hypothesis, foreign capital and domestic capital are homogenous goods (Tsai, 1995). This hypothesis states that inequality is a necessary precondition for the eventual enhancement of everyone's income level and sufficient output must be first produced before it can be redistributed. The inflow of foreign capital fosters economic growth by increasing the gross investment. The ongoing growth increases employment, expands the economic middle class and increases the savings rate of the poor which altogether result in reducing income inequality (Adams, 2008). On the other hand, the world system /dependency hypothesis mainly proposes that FDI increases income inequality in the host country by generating large disparities between capital and labor share of income. FDI mostly flows to capital intensive industries where utilization of labor is lower. Moreover, governments of developing countries tend to implement policies that lower the bargaining power of labor and eliminate provisions that encourage wage enhancement (Beer & Boswell, 2002).

Empirical literature shows that Velde (2003) found that FDI increased wage inequality in four economies in Latin America during 1978-2000. Many other country specific studies support this finding that FDI is associated with greater wage inequality, especially in developing economies. Feenstra and Hanson (1997), Figini and Görg (1999) and Taylor and Driffield (2005) used industry level data for Mexico, Ireland and the UK, respectively, and found a linkage between wage inequality and FDI.

Using panel studies, Choi (2006) found a statistically significant positive relationship between FDI stock and income inequality. A similar result is observed in the work of Basu and Guariglia (2007) and Tsai (1995). Jaumotte, Lall and Papagerogiou (2013) found that trade reduces income inequality, while FDI inflow increases it. Moreover, they suggest that technological progress has a greater impact on income inequality than that of trade or financial globalization. Wu and Hsu (2012) found that FDI is likely to be detrimental to the income distribution of those host countries with lower levels of absorptive capacity.

There are some empirical studies of Milanovic (2003), Sylwester (2005) and Bhandari (2007) that found no evidence of a positive relationship between FDI and inequality. In short, most of the findings of the empirical literature show that FDI increase income inequality of the host country.

2.2. Literature on Sectoral FDI & Income Inequality

The existing literature does not provide sufficient in-depth studies on the relation between sector specific FDI and income inequality. This area is comparatively unexplored mainly due to lack of availability of data regarding sector specific FDI. Suanes (2016) has analyzed the relationship between FDI and income inequality in Latin America from a sectoral perspective. Using panel data for 3 economic sectors of 13 Latin American economies for the 1980-2009 periods, he found empirical evidence of a positive effect of service and manufacturing sector FDI on income inequality and no significant effect of agricultural sector FDI. In a more recent study, Bogliaccini and Egan (2017) have used error correction models to analyze sectoral FDI data from 60 middle-income countries for the period 1989-2010 and found that FDI in services is more likely to be associated with inequality than FDI in other sectors. They argue that skill bias and changes in employment patterns associated with the service sector are the reasons behind their findings.

2.3 Study on Mode of Entry of FDI & Income Inequality

In the existing economic literature, studies regarding the impact of greenfield FDI and mergers & acquisitions FDI on income inequality is also scarce. Most of the studies focus on their impact on economic growth. In the field of inequality, the study of Zhuang and Griffith (2013) found that M&A FDI has an insignificant impact on income inequality, while FDI in greenfield projects shows a significant positive effect on income inequality. However, they also found that, in case of Latin America and Caribbean region, greenfield FDI decreases income inequality.

2.4 Research Gap

The literature study reveals that the empirical studies on the effect of sectoral FDI on income inequality and the effect of mode of entry of FDI on income inequality are scarce compared to the studies on the relationship between total FDI and income inequality. The few papers that are available on the sectoral analysis have focused only on a few countries and the time period of the studies is also limited. So, there is scope to widen the number of observation and broaden the time horizon of the study. Moreover, there is gap in the literature related to the study on finding out conditional effects of sectoral FDI on income inequality. This study has attempted to fill in these gaps.

3. Methodology & Data

3.1 Model Specification

Two different regression models are used in this estimation process. The regression models are to be controlled for relevant variables. The study by Sarel (1997) suggests some key macroeconomic factors that affect income distribution. On the other hand, the study by Jaumotte et. al (2008) focused on the technology and globalization variables which affect income inequality. Thus, in addition to the main explanatory variable, the two models include a set of control variables based on the review of the literature.

The first model is controlled for the Kuznets' curve effect and the second one is controlled for effect of globalization, technology, institution, human capital, level of financial development, unemployment rate, inflation rate and trade openness.

3.1.1 Model 1

According to Kuznets' hypothesis, inequality would follow an inverted "U" shape as it rises and then falls again with the increase of income per-capita. The first model is developed controlling for this Kuznets' effect.

$$GINI_{it} = \beta_0 + \beta_1 FDI_{Xit} + \beta_2 lnGDPPC_{it} + \beta_3 lnGDPPCSQ_{it} + \beta_4 X_{it} + \varepsilon_{it} \quad .....(1)$$

where $GINI_{it}$ represents the disposable income Gini coefficient, FDI_{Xit} represents the net inflow of FDI to sector X as a percentage of GDP (in the case of analyzing the effect of sectoral FDI on income inequality) and net inflow of FDI through mode of entry X as a percentage of GDP (in the case of analyzing the effect of mode of entry FDI on income inequality) , $lnGDPPC_{it}$ *and* $lnGDPPCSQ_{it}$ are the natural logarithm of GDP per capita and its square, respectively. X_{it} is the vector of control variables which include human capital, rule of law and natural log of population, and ε_{it} represents the error term.

3.1.2 Model 2

The second model is specified, with some modification, following the study of Jaumotte et al. (2008).

$$GINI_{it} = \beta_0 + \beta_1 FDI_{Xit} + \beta_2 Institution_{it} + \beta_3 Human\ capital_{it} + \beta_4 Technology_{it} + \beta_5 Trade_{it} + \beta_6 Financial\ development_{it} + \beta_7\ Unemployment_{it} + \beta_8\ Age\ Dependency_{it} + \beta_9 Inflation_{it} + \delta_{it} \quad \ldots.(2)$$

Where FDI_{Xit} represents net inflow of FDI to sector X as a percentage of GDP (in the case of analyzing the effect of sectoral FDI on income inequality) and net inflow of FDI through mode of entry X as a percentage of GDP (in the case of analyzing the effect of mode of entry FDI on income inequality), $Institution_{it}$ is the quality of institutions proxied by rules of law, $Human\ capital_{it}$ is derived from the Human Capital Index based on years of schooling and returns to education, $Technology_{it}$ proxies for technological change, measured by the share of information and communication technology capital in the total capital stock, $Trade_{it}$ is trade globalization, calculated by the sum of exports and imports as a percentage of a country's GDP, $Financial\ development_{it}$ is proxied by the ratio of private credit to GDP, $Unemployment_{it}$ is the unemployment rate, $Age\ Dependency_{it}$ is the ratio between number of non-working-age population to working-age population, and $Inflation_{it}$ is a proxy for macroeconomic stability measured by the consumer price index.

Two different estimation methodologies are used to test each of the two models. The first methodology is Pooled Ordinary Least Squares (Pooled OLS) and the second one is Fixed Effects estimates (Hausman test indicates that fixed-effects estimates are preferred to random effects estimates in this case). Both the models are estimated using heteroskedasticity consistent standard errors to address the issue of heteroskedasticity. An additional estimation, including interaction variables between sectoral FDI and different measures of human capital is also done.

3.2 Data

This study has used an unbalanced panel dataset. For economic activity wise disaggregated FDI data of 68 countries, the considered period is 1997-2016 (20 years). On the other hand, in case of FDI disaggregated by the mode of entry of FDI, the sample consists of 79 countries and the considered period is 2003-2016 (14 years). Definition and sources of the data can be found in the Appendix A and the summary statistics of all the variables can be found in Appendix B.

4. Estimation and Analysis of the Findings

For all of the estimated results, the standard errors are reported in parentheses and, the coefficients are estimated using heteroscedasticity robust estimations to address heteroscedasticity.

4.1 Estimation Based on Model 1 (Controlled for Kuznets' hypothesis variables)

Table 1. Estimation of relationship between (a) total FDI and income inequality; (b) sectoral FDI and income inequality and (c) FDI entry mode and income inequality (controlled for Kuznets hypothesis)

	OLS Estimates (20 years average)			**Fixed Effects Estimates (Annual)**		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Inequality	Inequality	Inequality	Inequality	Inequality	Inequality
FDI $_{Total}$	**1.7022*** (0.9434)			**0.4602***** (0.1362)		
FDI $_{Primary}$		-1.7970 (50.0487)			4.7418 (6.5654)	
FDI $_{Manufacturing}$		15.7121 (51.5519)			-0.07085 (0.6609)	
FDI $_{Service}$		**1.6607*** (0.9563)			**0.4461***** (0.1317)	
FDI $_{Greenfield}$			13.5350 (25.6179)			0.9169 (1.1407)
FDI $_{M\&A}$			31.9805 (37.1784)			-0.3405 (0.4832)
Ln(GDPPC)	**28.5478*** (14.6045)	**30.2067**** (14.4174)	-1.7235 (9.0619)	0.5427 (19.7584)	1.0355 (19.7726)	2.5169 (10.0429)
Ln(GDPPCSQ)	**-1.5847*** (0.8554)	**-1.6765**** (0.8370)	0.2201 (0.4937)	0.0601 (1.0036)	0.0330 (1.004)	-0.2603 (0.5147)
Human Capital	-3.5109 (2.5136)	-3.6286 (2.5811)	**-4.9091**** (1.6818)	-1.960 (2.4615)	-1.988 (2.466)	0.5692 (1.6631)
Rule of Law	**-16.197***** (6.0331)	**-15.950**** (6.0612)	**-25.006***** (4.3277)	1.4262 (1.6071)	1.3920 (1.6160)	0.6612 (1.9892)
Ln (Population)	**0.8689**** (0.3940)	**0.8988**** (0.4032)	**1.2289***** (0.3761)	-8.6337 (4.5525)	**-8.6044*** (4.5254)	**-5.5541**** (2.5258)
Constant	-83.6290 (65.3386)	-91.5074 (64.4380)	41.9562(45.0 878)	174.2763 (104.5465)	171.639 (103.7514)	127.157** (62.2757)
Observations	61	61	75	674	674	874
R-squared	0.6648	0.6671	0.6142	0.1521	0.1509	0.1276
Number of country	61	61	75	61	61	75

Standard errors in parentheses

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

The results from table 1 show that there is a positive relationship between total FDI and income inequality and the relationship is statistically significant with 90% confidence level under the OLS method and with 99% confidence level under the fixed effects estimation method.

In case of the FDI disaggregated by sectors of economic activity, only service sector FDI is found to increase income inequality but the relationship is statistically significant with 90% confidence level under OLS method and with 99% confidence level under the fixed effects estimation method. Primary FDI and manufacturing FDI hold no statistically significant relation with income inequality.

The results show that there is no significant relation between greenfield FDI or M&A FDI with income inequality for both OLS and fixed effects estimator.

4.2 Estimation Based on Model 2 (controlled for technology, globalization, and other macroeconomic variables)

Table 2. Estimation of relationship between (a) total FDI and income inequality; (b) sectoral FDI and income inequality and (c) FDI entry mode and income inequality (Controlled for technology, globalization, human capital, financial development, institutions and other macroeconomic variables)

	OLS Estimates (20 years average)			**Fixed Effects Estimates (Annual)**		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Inequality	Inequality	Inequality	Inequality	Inequality	Inequality
FDI_{Total}	-0.0325 (1.1610)			**0.3997***** (0.1527)		
$FDI_{Primary}$		37.2202 (56.6095)			14.3433 (10.0623)	
$FDI_{Manufacturing}$		-35.3277 (57.1362)			-0.0210 (0.3922)	
$FDI_{Service}$		-0.2089 (1.2521)			**0.3925**** (0.1530)	
$FDI_{Greenfield}$			**74.0858**** (33.0917)			1.9929 (2.0513)
$FDI_{M\&A}$			**75.9036**** (35.0365)			-0.6360 (0.5292)
Rule of Law	**-26.149***** (5.8383)	**-26.405***** (5.9002)	**-30.319***** (4.9062)	1.6071 (1.3857)	1.4696 (1.3826)	2.0142 (1.6606)

Human Capital	**-4.8121*** (2.5855)	**-4.8386*** (2.7178)	**-4.9412***** (1.7286)	**-5.1031**** (2.1499)	**-5.1505**** (2.1644)	**-3.7225**** (1.7905)
Technology	83.0635 (167.2609)	108.7615 (185.938)	19.7928 (89.3598)	**125.869***** (39.1659)	**124.6298***** (38.8328)	**55.2958*** (29.6602)
Unemployment	-0.3849 (0.2407)	-0.3447 (0.2731)	-0.1610 (0.2352)	**0.1148**** (0.0432)	**0.1167***** (0.0427)	**0.0741**** (0.0335)
Inflation Rate	-0.0100 (0.1598)	-0.0139 (0.1716)	**-0.1638**** (0.0711)	**0.0458***** (0.0122)	**0.04316***** (0.0133)	0.0174 (0.0148)
Age Dependency	-0.1384 (0.0932)	-0.1314 (0 .0998)	-0.1410 (0.0990)	0.0595 (0.0797)	0.0604 (0.07993)	**0.1510***** (0.0473)
Financial Dev	0.0101 (0.0263)	0.0106 (0.0276)	**0.0488**** (0.0230)	0.0014 (0.0085)	0.0010 (0.0082)	0.0008 (0.0042)
Trade	-0.0099 (0.0201)	-0.0033 (0.0235)	-0.0230 (0.0147)	-0.0158 (0.01189)	-0.01538 (0.0114)	0.0030 (0.0058)
Constant	77.7325*** (11.9270)	76.7022*** (12.9339)	76.1540*** (8.8101)	45.6081*** (7.2937)	45.6654*** (7.3654)	36.4958*** (6.2195)
Observations	49	49	68	513	513	761
R-squared	0.6396	0.6436	0.6617	0.3470	0.3356	0.2363
Number of country	49	49	68	49	49	68

Standard errors in parentheses

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

Table 2 shows that there is no statistically significant relationship between total FDI and income inequality under the OLS method whereas under the fixed effects estimation method, a statistically significant positive relationship between total FDI and income inequality is found.

In case of the FDI disaggregated by sectors of economic activity, no statistically significant relationship between sectoral FDIs and income inequality is found under the OLS method. However, when the fixed effects estimator is used, we find a statistically significant positive relationship between service sector FDI and income inequality. For primary FDI and manufacturing FDI, we don't find any statistical significant relation with income inequality.

In case of FDI disaggregated by mode of entry, using OLS method we find that both the greenfield FDI and M&A FDI increase income inequality. This result also suggests that strong rule of law and human capital in the host country help to reduce income inequality. On the other hand, when we use fixed effects estimation technique for the same data and model, we find no significant relationship for both greenfield FDI and M&A FDI with income inequality.

Table 3. Robustness Check for Fixed Effects Estimates (controlling for Technology, Trade, Institution and other Macroeconomic variables)

	(3 years average)	(5 years average)	(3 years average)	(5 years average)	(3 years average)	(7 years average)
Variables	Inequality	Inequality	Inequality	Inequality	Inequality	Inequality
FDI $_{Total}$	**0.5984**** (0.2589)	**0.6159***** (0.2202)				
FDI $_{Primary}$			31.7122 (22.5491)	28.3931 (25.686)		
FDI $_{Manufacturing}$			-1.0451 (1.4002)	-2.4072 (1.7077)		
FDI $_{Service}$			**0.5483**** (0.2538)	**0.4148**** (0.1855)		
FDI $_{Greenfield}$					5.9662 (4.6410)	**20.7663**** (8.9940)
FDI $_{M\&A}$					-2.5056 (2.0483)	**-24.6249***** (8.5638)
Rule of law	1.5692 (1.4515)	2.0519 (1.4445)	0.9767 (1.4926)	1.6191 (1.5023)	3.3698 (2.5937)	2.0299 (3.2925)
Human Capital	**-5.4209*** (2.8067)	**-4.6382*** (2.4983)	**-5.4561*** (2.7680)	-4.5332 (2.4209)	**-3.8688**** (1.8585)	**-3.4866*** (2.0577)
Technology	**98.9212***** (36.2287)	**97.9106***** (33.2693)	**94.9118*** (35.2795)	**93.6838*** (32.8774)	**68.1503**** (29.2706)	**53.5942*** (27.8433)
Unemployment	**0.1586**** (0.0738)	**0.1588**** (0.0752)	**0.1593**** (0.0716)	**0.1643**** (0.0740)	**0.0839**** (0.0385)	**0.0938*** (0.0516)
Inflation Rate	**0.0516***** (0.0174)	**0.03067***** (0.0247)	**0.0461***** (0.0193)	**0.0278***** (0.0248)	0.0295 (0.0326)	-0.0203 (0.0148)
Age Dependency	0.0521 (0.0733)	0.0531 (0.0592)	0.0611 (0.0760)	0.0531 (0.0589)	**0.1451***** (0.0486)	**0.1349***** (0.0455)
Financial Dev	0.0042 (0.0107)	0.0038 (0.0093)	0.0021 (0.0096)	0.0008 (0.0082)	0.0006 (0.0050)	0.0039 (0.0068)
Trade Openness	-0.0175 (0 .1356)	-0.0093 (0.1744)	0.0010 (0.1393)	-0.0082 (0.1759)	0.0019 (0.0069)	-0.00005 (0.0064)
Constant	47.2695*** (13.0121)	43.5572*** (16.4524)	45.4263*** (13.3517)	43.4918*** (16.5285)	36.0082*** (6.6539)	36.3711*** (6.9522)
Observations	212	165	212	165	260	132
R-squared	0.3442	0.2765	0.2971	0.2772	0.1714	0.2154
Number of country	49	49	49	49	68	68

Standard errors in parentheses

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

To measure the robustness of the estimated results the estimation is again done using 3 years and 5 years average data for total FDI and sectoral FDI. 3 years and 7 years average data is used in the case of mode of entry of FDI. Table 3 shows the result of all the 6 estimations.

The results show that total FDI and service sector FDI have positive relationship with income inequality. Among the other control variables, technology, unemployment rate and inflation rate also show a positive relationship with income inequality whereas human capital shows a negative association with income inequality.

In case of the effect of FDI based on the mode of entry, greenfield FDI shows a positive relation with income inequality for the 7 years average data but the relationship is not supported by 3 years average data. On the other hand, M&A FDI shows a negative relationship with income inequality only for the 7 years average data. Among the control variables, technology, unemployment rate and age dependency ratio increase income inequality, while human capital reduces income inequality.

4.3 Estimation for the Interaction Effects

Table 4 shows the conditional effects of the sectoral FDI on income inequality estimated under OLS method. The interaction term of human capital and sectoral FDI is negative with 95% confidence level for primary FDI, 99% confidence level for manufacturing FDI and 90% confidence level for service sector FDI. This result suggests that with the presence of higher human capital, FDI inflow in all the sectors lowers income inequality. It is because the benefits of foreign capital spread more broadly where host country is equipped with higher level of human capital.

Table 4. OLS estimates of interactional effects

	(1)	(2)	(3)
Variables	**Inequality**	**Inequality**	**Inequality**
FDI $_{Primary}$	**377.3415** ** (157.3561)	**207.5998***** (70.8652)	127.4737 (81.5770)
FDI $_{Secondary}$	33.0336 (44.3761)	**328.9731**** (114.6593)	-140.3194 (89.5215)
FDI $_{Service}$	0.1021 (1.3811)	-0.1590 (1.3576)	**61.1013*** (34.4550)
Human Capital	**-6.1664** ** (2.6974)	**-5.1409**** (2.3829)	**-5.3773** ** (2.7758)
FDI $_{Primary}$ *HC	**-122.4237** ** (50.0714)		
FDI $_{Manufacturing}$ *HC		**-185.5524** *** (55.6088)	
FDI $_{Service}$*HC			**-16.7311*** (9.4435)

Technology	-2.3466 (170.9003)	115.3279 (153.5971)	180.9584 (193.013)
Rule of Law	**-17.4671**** (7.9635)	**-18.8259*** (6.3755)	**-23.1581 ***** (6.4965)
Unemployment	-0.4116 (0.2544)	-0.2919 (0.2550)	-0.3772 (0.2750)
Inflation Rate	-0.0701 (0.1897)	-0.0514 (0.1599)	-0.0225 (0.1763)
Age Depend	**-0.1879 *** (0.0988)	**-0.1768**** (0.0833)	-0.1366 (0.1059)
Financial Dev	0.0015 (0.0278)	0.0029 (0.0256)	0.0040 (0.0289)
Trade Openness	-0.0230 (0.0267)	-0.0248 (0.0257)	-0.015632 (0. 0236)
Constant	80.2427 *** (11.8547)	75.4042*** (10.4177)	76.7884 *** (13.4279)
Observations	49	49	49
R-squared	0.6906	0.7159	0.6692

Standard errors in parentheses

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

4.4 Discussion on the Findings

For both the models, fixed effects estimate for annual, three and five years average data show that total FDI increases income inequality. This result is in line with previous studies in the literature (Tsai, 1995; Basu and Guariglia, 2007; Choi, 2006; Herzer, Hühne and Nunnenkamp, 2012).

According to Velde (2003), one of the main causes of income inequality generated by FDI is that foreign firms tend to invest in skill-sensitive sectors of the economy. These sectors absorb most of the benefits of FDI namely technology transfer, knowledge transfer and higher productivity. As a result, the wage gap between skilled and unskilled workers widens, and thus income inequality increases in the host economy. Skill biased technological change (SBTC) is playing a key role in defining the FDI and income inequality relationship. Table 2 demonstrates that the level of technological development (proxied by share of ICT capital in the total capital stock) is strongly associated with income inequality for all types of FDI inflow. This finding is in line with the findings of Dao et al. (2017). Their findings show that in the case of advanced economies, technological progress explains for about half of the overall decline in labor share of income (i.e. increase of income inequality between the wage earners and the capital owners) with a large negative impact on the middle-skilled

labor force. Due to technological advancement, middle-skilled labors in advanced countries are being replaced by automation contributing to job polarization toward high skill and low skill occupations. The expansion of global value chains has allowed firms to divide production process into many tasks and offshore labor-intensive tasks to emerging economies to exploit cheap labor. This process also reduces the bargaining power of the labors in the advanced economies. Thus, it contributes to reduction of labor share of income in advanced countries. On the other hand, those off-shored tasks are relatively capital intensive and skill-sensitive for the emerging economies compared with their existing tasks and thus it creates a wage gap between workers of different skill level.

In the sectoral analysis, the findings presented in Table 1, 2 and 3 show that, for both the models, only service sector FDI is strongly associated with increasing income inequality and the result is robust. This result is in line with the finding of Bogliaccini and Egan (2017).

The probable reason why the primary sector FDI is not associated with income inequality is that primary sector is mainly extractive in nature. This sector is mostly capital intensive and the scope for linkages between foreign companies and the rest of the economy is often limited. Moreover, the amount of FDI movement in this sector is insignificant in comparison with the other two sectors.

In the estimated results, the manufacturing sector FDI is not found to have any significant relationship with income inequality though most of the studies regarding FDI and income inequality focus on the skill bias in the manufacturing sector as the key source of income inequality. One possible reason why manufacturing FDI is not found to increase income inequality is that the skill gap mechanism is not working for the sample countries. This can happen if the incoming FDI is matched with the general working people's skill level or unskilled workers are given training facilities to upgrade their skill level. Another reason may be that the skill gap effect is being offset by the effect of an overall upgrade in the income level of both the skilled and unskilled workers which in turn reduces the gap between capital share and labor share of income.

Service sector FDI is found to be positively associated with income inequality and the result is robust. Literature suggests that one of the probable reasons why service sector FDI inflow increases income inequality is that this sector has the most polarized income structure among all the sectors. Moreover, this sector is heterogenous in terms of skill bias. Service sector includes both highly capital-

intensive subsectors such as telecommunications, and information technology etc. and less capital-intensive sectors like retail business, tourism, restaurants etc. Service sector FDI mainly affects income inequality through wage premium for skilled workers along with incorporating the skill biased technological changes in their operation. This sector is the most sensitive to human capital and so, skill gap plays the most influential role in raising income inequality in this sector. Another reason is that service sector workers are more vulnerable to automation and outsourcing as services are easier to be automated and outsourced. Moreover, service sector has less unionization rate compared to other sectors as the firm sizes are smaller in this sector. Thus, workers in service sector has less bargaining power which also contributes to the rising income inequality in this sector. These are all contributing factors towards the positive relationship between service sector FDI and income inequality.

In the case of greenfield FDI and M&A FDI, the result in Table 1 shows that greenfield FDI and M&A FDI do not have any significant relationship with income inequality and they do not follow Kuznets' hypothesis. Table 2 shows that both greenfield FDI and M&A FDI increase income inequality when controlled for technology, trade and institutional variables. Furthermore, the result of the fixed effect estimation based on seven years average data in Table 3 shows that M&A FDI decreases income inequality, while greenfield FDI increases income inequality. Additionally, when the annual and three years average data is used the results are no more significant.

Human capital is found to have a significant conditional effect with incoming FDI on income inequality, mainly for primary sector FDI (at 95% confidence level) and manufacturing sector FDI (at 99% confidence level). The literature suggests that greater investment in human capital results in a reduction in income inequality, especially in developing economies (Basu and Guariglia, 2007). It is understandable because increase of human capital means an increase of supply of skilled labor that are more able to get benefitted from the skill biased technological changes occurring in the worldwide production and service delivery process.

5. Conclusion and Policy Implications

5.1 Summary of Findings

One of the major findings of this study is that both in short run (estimation based on annual data) and long run (estimation based on 3 years, 5 years and 20 years

average data), total FDI increases income inequality in the host economy. In case of sectoral FDI, only services sector FDI is found to have a positive relationship with income inequality in both short and long run. FDI inflows in the other two sectors have not shown any statistically significant relationship with income inequality. On the other hand, both greenfield FDI and M&A FDI increase income inequality in the long run (estimation based on 3 & 7 years average data). Among other variables, the rule of law and human capital tend to reduce income inequality whereas technology tends to increase it. Moreover, an interaction effect analysis suggests that in the presence of better human capital FDI inflow in all the sectors, more specifically in the manufacturing sector, help reduce income inequality in the host country.

5.2 Limitations of the Study

One of the major limitations of this study is the unavailability of sector specific FDI data which limits the study to only 68 countries. Moreover, the lack of subsector data limits this analysis to only three major sectors of economic activity. Another major setback regarding the data is that most of the countries classify some portion of the total FDI to unallocated sectors when the sector of economic activity cannot be appropriately identified. Those data are excluded from this analysis.

5.3 Policy Implication for Developing Countries Like Bangladesh

This study suggests that policymakers should focus more on attracting FDI in primary and manufacturing sectors in Bangladesh. Since skill gap is one of the major causes of income inequality, government should invest more on human capital development with a focus on technology based education. This will boost up the adaptive capacity of the country and allow spillover effect of FDI to play its positive role. This technology and skill transfer in manufacturing industry can play a key role in industrial development in developing countries like Bangladesh. So, incentivizing FDI in manufacturing sector will enable technology and skill transfer from developed countries which will increase GDP growth. The policymakers may set different incentive/disincentive structures towards attracting/limiting FDI inflow to different sectors. Broader access to quality education and improvement of rule of law are to be ensured to allow a greater segment of working population to receive the benefits of FDI.

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Appendix A.

Variable definitions and Data Sources

Variables	Description	Data sources
Income Inequality	Estimate of Gini index of inequality	The Standardized World Income Inequality Database (SWIID), Version 6.1.
FDI_{Total}	The net inflows of FDI as a percentage of GDP (current dollars)	Organization of Economic Cooperation and Development (OECD) database and country sources
$FDI_{Primary}$	FDI inflow in primary sector as a percentage of GDP (current dollars)	
$FDI_{Manufacturing}$	FDI inflow in manufacturing sector as a percentage of GDP (current dollars)	
$FDI_{Service}$	FDI inflow in service sector as a percentage of GDP (current dollars)	
$FDI_{Greenfield}$	FDI inflow in greenfield project as a percentage of GDP (current dollars)	World Investment Reports(WIR), The United Nations Conference on Trade and Development (UNCTAD)
$FDI_{M\&A}$	FDI inflow through merger & acquisition as a percentage of GDP (current dollars)	
Ln(GDPPC)	GDP per capita PPP (constant 2011 international $)	World Bank's World Development Indicators Database
Ln(GDPPCSQ)	The square of GDP per capita PPP (constant 2011 international $)	
Trade Openness	The sum of exports and imports as a share of GDP	
Age Dependency	The ratio of population size aged below 15 and above 65 to the working age population	
Financial Development	The percentage of domestic credit to private sector in GDP	
Unemployment	Unemployment rate	
Population	Natural logarithm of the total population	
Inflation rate	Inflation as measured by the consumer price index.	

Human Capital	Human capital index, based on years of schooling and returns to education	Penn World Table, Version 9.0
Rule of law	This index comprises of various indicators which capture the extent to which different agents of society have confidence in and abide by its rules	International Country Risk Guide (ICRG)
Technology	Share of information and communication technology capital in the total capital stock.	Jorgenson and Vu (2005). Data including updates for recent years is generously provided by Associate Professor Vu Minh Khuong (National University of Singapore).

Appendix B.

Summary statistics of all the variables used in the estimation.

Variables	Obs	Mean	Std. Dev.	Min	Max
Gini	1232	36.45	8.5838	21.2	54.60
FDI $_{Primary}$	951	0.0096	0.0357	-0.0203	0.3171
FDI $_{Manufacturing}$	951	0.0146	0.0503	-0.7460	0.7191
FDI $_{Service}$	951	0.0885	0.4421	-0.6442	7.1356
FDI $_{Total}$	951	0.1048	0.4472	-0.6429	7.1333
FDI $_{M\&A}$	792	0.0097	0.0354	0	0.8104
FDI $_{Greenfield}$	792	0.0304	0.0630	0.8	0.8824
Unemployment	1340	7.9406	5.2967	0.8	37.3000
Inflation rate	1345	5.7783	9.6333	-7.11	109.6800
Age Dependency	1340	54.5846	12.7943	34.5215	109.7423
Human Capital	1170	2.7838	0.6026	1.1200	3.7343
Ln(GDPPC)	1355	9.6118	1.0214	6.2054	11.4913
Ln(GDPPCSQ)	1355	93.4299	18.9138	38.5071	132.0508
Financial Dev.	1226	68.6272	51.2267	0.1858	312.1179
Rule of law	1056	0.6748	0.2288	0.17	1.0000
Technology	950	0.0108	0.0076	0.0009	0.0601
Population	1360	16.5095	1.7630	12.3086	21.0444
Trade Openness	1345	85.5631	58.9212	0.1674	441.6038

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Does Market Capitalization Promote Economic Growth? A Case Study of Bangladesh

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ABSTRACT

The expansion of trade and industry significantly impacts an economy, ultimately influenced by the capital market. A country's central bank, government advisors, and business organizations closely monitor stock market activity. The main objective of this paper is to investigate the role of stock market capitalization in promoting economic growth in Bangladesh. To attain the goal, this study applied the unit root test, Granger causality test, Cointegration techniques, and Vector Error Correction model (VECM) by using yearly time series data from 1990 to 2020. The granger causality showed a bidirectional causal relationship between the variables. The findings confirm a positive and significant impact of stock market capitalization on GDP growth. Furthermore, the estimated error correction term suggests that the economy will correct the disequilibrium in GDP growth and converge to the equilibrium at a 4.2% rate in a year. Therefore, this study advocates the stock market regulatory body to address policy concerns that would encourage new companies to enter the market and increase investors' confidence.

Keywords: Market capitalization, Economic growth, Cointegration, VECM.

JEL Classification: O40, C22, O16.

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1. Introduction

Economic growth is the ultimate goal of any country to achieve sustainable development. Economic growth requires a safe and sound financial system to serve as a transmission mechanism that transfers funds from savers to entrepreneurs seeking capital for productive investments (Barth et al. 2006). Generally, capital formation takes place in the financial system of a country, and this capital can be accumulated for effective economic growth through the capital market. In this case, a country's economic growth is affected mainly by the capital market, as it plays a significant role in mobilizing and allocating savings from the savers to the entrepreneurs. The stock market offers an opportunity to investors to collect capital at an affordable cost through market-based financing instead of bank-based financing, thereby positively influencing economic growth. Stock markets, in general, facilitate investment and economic growth by reducing the saving-investment gap and ensuring capital utilization. Well-functioning stock markets are expected to influence growth through increased capital accumulation and by influencing the efficiency of capital allocation (Levine, 2001). Being the important pillar of the economy, the stock market plays a pivotal role in promoting economic growth through the growth of industry and commerce, acting as a mediator between savers and borrowers.

According to Levine and Zervous (1998), certain factors can be used as a measurement of the stock market's performance, and as such, they have a direct relation with the economic growth of the country as well. These factors are mainly the size and liquidity of the stock market. Stock market capitalization and turnover of stocks, respectively, represent the size and liquidity of the stock market. Bangladesh's stock market is gradually growing in terms of market capitalization and turnover. Apart from having major crashes in 1996 and 2010, Bangladesh's stock market development has been noticeable since the early 1990s. Presently, the Bangladesh stock market is contributing significantly to the economy, which indicates the soundness of the stock market resulting in optimism among the stakeholders.

Many studies support the positive influence of the development of the stock market on its economic growth. Stock market development refers to its expansion depth and breadth. Market capitalization is one of the significant indicators of any stock market, representing the health of the capital market. Currently, the market

capitalization to GDP ratio is gradually growing up. Our study is disparate from all other studies by sample size and data types. This paper investigates the contribution of market capitalization to economic growth in Bangladesh using a time series analysis.

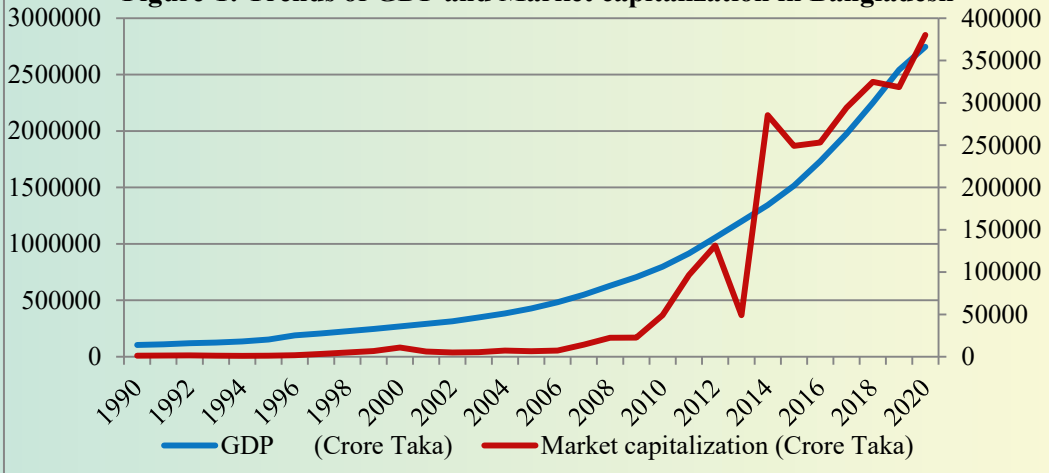
The rest of the paper is organized as follows: Section II provides an overview of Bangladesh's capital market. Section III presents the empirical studies related to the paper. Section IV contains data analysis and model specification. Section V includes empirical results and section VI presents diagnostic tests. Finally, section VII presents concluding remarks and policy implications.

2. An Overview of Bangladesh Capital Market

The capital market is regarded as the second-largest component of the financial system of Bangladesh. It contributes significantly to the financial sector by funding long-term investment plans and development projects that help hasten economic growth. This market is generally well known for facilitating capital inflows and improving the efficient mobilization of savings for investment. As a source of financing, the stock market plays a significant role in the economy of Bangladesh by contributing to economic growth. The market is comprised of the Dhaka Stock Exchange (DSE), the Chittagong Stock Exchange (CSE), and its subsidiaries. The stock market of Bangladesh is gradually growing in terms of depth and breadth, turnover, and market capitalization, which resulted in optimism among the stakeholders. By increasing the effectiveness of financial intermediaries, raising the marginal productivity of capital, and raising the savings rate, stock markets are crucial for boosting productivity (Jalloh, M.2015). Market capitalization refers to how much a company is worth as determined by the stock market. A firm's market capitalization is the sum of its outstanding shares' financial values. It is determined by dividing the share price by the number of outstanding shares (Omodero, C.O.2020). Market capitalization has a positive and significant link with the sustainable economic development of Bangladesh.

The following figure shows the trends of GDP and market capitalization of Bangladesh over the last four decades.

Figure-1: Trends of GDP and Market capitalization in Bangladesh



Source: WDI and BSEC

In figure-1, the data of GDP and market capitalization of DSE from 1990 to 2020 is plotted. The figure gives the impression that Bangladesh's economic growth is positively related to the amount of market capitalization, with a few ups and downs. The amount of market capitalization did not appear to change significantly until 2007. Afterward, it demonstrated an upward trend. It reached its highest amount in 2019 and continued with the increased market capitalization by maintaining a relationship with economic growth.

3. Literature Review

The stock market plays a vital role in the economy of any country. Since 1990s, studies on the relationship between the stock market and economic growth have been conducted in Bangladesh and other countries. Some studies have been conducted in the last decade. Using quarterly GDP and BET (index of MCAP) data, Barna, F., & Mura, P.O. (2010) found a positive bidirectional relationship between the stock market and economic growth in Romania. However, a stronger linkage is found between economic growth and the capital market. The author concluded that capital markets play an essential role in the economic development of emerging capital markets. The study by Nazir et al. (2010) also concluded the same result indicating that the economic growth of Pakistan can be attained through increasing the size of stock markets and market capitalization of the

country. The authors applied econometric analysis using data (1986-2012) of market capitalization ratio, turnover ratio, HDI of Pakistan, and FDI (% of GDP) corresponding to per capita GDP.

Jahfer, A., & Inoue, T. (2014) investigated the relationship between stock market development and economic growth in Sri Lanka using quarterly data from 1996 to 2011. They used stock market capitalization as a proxy of stock market development and applied the Johansen Co-integration test, Augmented Dickey-Fuller (ADF) test, and Vector Error Correction model (VECM). The result indicates the long-run unidirectional relationship between stock market development and economic growth, only directing from stock market development to economic growth.

A slight variation is observed in the study by Mia, A.H., Qamruzzaman, M., & Ara, L.A. (2014). In this study, the authors found a long-run bidirectional relationship between stock market development and economic growth and a short-run unidirectional relationship running from stock market development to economic growth. The authors used six independent variables in the study: market capitalization, turnover, foreign direct investment (FDI), initial public offering (IPO), Remittance, and local investment, and applied advanced econometric techniques of Unit Root Tests Co-integration test, Granger causality test, and Robust regression analysis.

Jalloh, M. (2015) carried out a study using various indicators of stock market capitalization and other financial indicators from a cross-section of 15 African countries over the period 2001-2012 and found a positive and significant relationship between stock market capitalization and economic growth. This study reveals that raising stock market capitalization on average by 10% will induce economic growth of approximately 5.4% in the countries studied. Considering the positive and significant relationship between stock market capitalization and economic growth found in the study, the authors draw the attention of policymakers to the implementation of necessary policy measures encouraging the development of the stock market to promote economic growth.

Employing the bounds testing co-integration procedure and ARDL-error correction model, Hasan, M.A (2018) examines whether stock market

development promotes the economic growth of Bangladesh or not. The author used time series data covering 37 years (1981 to 2017) using independent variables of the market size (market capitalization) and market liquidity (turnover ratio) from the Dhaka Stock Exchange (DSE). The test result shows highly-significant long-run causality from stock market development to real economic growth and no short-run causality between the two.

Almost all the researchers from home and abroad found a positive correlation between capital market development and economic growth. However, the direction and time horizon link varies from researcher to researcher and country to country.

Using time series data (1993-2016) and applying ARDL Bounds testing approach, Mamun et al. (2018) found a direct impact of stock market development on economic growth both in the short-run and long-run together with financial depth, interest spread, and real effective exchange rate. Along with GDP as a dependent variable, the author used four independent variables: stock market capitalization ratio as a proxy of stock market development, financial depth (broad money divided by GDP), interest rate spread (the difference between lending and deposit rate), and Real effective exchange rate. The Granger causality test result of the study confirms a bidirectional relationship between stock market development and economic growth.

Hossin et al. (2019) found both short-run and long-run relationships between the stock market and economic growth in Bangladesh by applying the Augmented Dickey-Fuller test, Co-integration test, Error-Correction Modeling, and Granger Causality test. The study covers time series data from 1989 to 2012 using GDP growth rate as a proxy of economic growth and market capitalization as a proxy of stock market development. The evidence from the result indicates that the long-run causality runs from stock market development to economic growth with no reverse relation.

Using a time series data from 1998 to 2019, ARUMONA et al. (2020) investigated the effect of stock market capitalization on Nigerian economic growth. Analyzing the results from VECM model, they concluded that stock market capitalization has a significant effect on Nigerian economic growth. The

study suggested that the Nigeria government should place priority on the development of the stock market through formulated effective monetary and fiscal policy management.

Using information on market capitalization, stock turnover, and GDP growth from 2001 to 2018, Hossin et al. (2021), assess the impact of capital market performance on Bangladesh's economy. The unit root test, Johansen co-integration test, vector error correction model, autoregressive distributed lag model, non-linear autoregressive distributed lag model, Granger causality test, and Toda-Yamamato Granger non-causality test were all used in this study to investigate this effect. The outcome of the vector error correction model showed that market capitalization and stock turnover, which are independent variables of GDP, have a long-term relationship. Again, the outcomes of both the non-linear autoregressive distributed lag model and the autoregressive distributed lag model demonstrated that there is a sizable positive association between Bangladesh's stock market and its GDP. Finally, the unidirectional causation connecting the capital market to GDP is confirmed by the Toda-Yamamato Granger non-causality test.

Adegun et al. (2022) looked at how Nigeria's market capitalization was affected by the country's economic recovery. The study's precise goals include investigating the relationship between market capitalization and the growth rate of the gross domestic product (GDP), figuring out the impact of inflation on market capitalization, and evaluating the influence of exchange rates on market capitalization. The hypotheses were tested using multiple regression analysis through compiling the necessary data from secondary sources. According to the research, market capitalization is positively impacted by GDP growth but negatively impacted by inflation and currency rates. The report suggests that the Nigerian government come up with a strategy for accelerating the rate of growth of the country's GDP through efficient use of its budgetary and revenue allocations. The research also suggests that the Nigerian government make sure that inflation is kept to a minimum while the country's economy is recovering. Market capitalization in Nigeria may decrease due to inflation, which is the main economic component that might be impeded by an economic downturn.

Most of the studies reveal that the development of the capital market tends to promote economic growth as the capital market plays a very crucial role in the growth of commerce and industry. Despite the fact that a good number of studies have broadly attempted to examine the relationship between stock market development and economic growth, there seems to be a space for more research to determine the impact of stock market developments on the economic growth of Bangladesh. Almost all the studies have concluded a long-run positive relationship between stock market development and economic growth. Some studies found bi-directional causation between stock market developments and economic growth, whereas others found unidirectional causation between the two. Besides, some studies also found a short-run relationship between stock market development and economic growth, whereas others did not. Most researchers used yearly data; some used quarterly data, and others used monthly data. In this study, yearly data (1990-2020) is used from World Development Indicators (WDI) and Bangladesh Security Exchange Commission (BSEC) to investigate the impact of stock market capitalization on economic growth in Bangladesh.

4. Data and Model Specification

4.1 Data

This study attempts to investigate the relationship between stock market capitalization and the economic growth of Bangladesh using secondary data from different sources for the period 1990 to 2020. GDP, the dependent variable, is used as a proxy to measure the economic growth of Bangladesh and market capitalization is used as independent variable. The market capitalization of Dhaka Stock Exchange (DSE) is used as the proxy of stock market capitalization since it is the major contributor in Bangladesh capital Market. The data of GDP was collected from world development indicators and the data of market capitalization of DSE was collected from various issues of annual report of the Bangladesh Security Exchange Commission (BSEC). Fiscal year data is used in this study and GDP is considered at current prices as the data on market capitalization are available at current prices only.

4.2 Model Specification

A regression analysis has been undertaken to show the relationship between stock market capitalization and the economic growth of Bangladesh. Based on the study of Hossin et al. (2019) and ARUMONA et al. (2020) we specify the following relationship.

GDP= f (DSEMC)

Where, GDP= Gross Domestic Product (as a proxy of economic growth)

DSEMC = Dhaka Stock Exchange Market Capitalization

A log-linear time series specification for studying the effect of stock market capitalization on economic growth is given by:

$\ln(GDP)= \beta_0 +\beta_1 \ln(DSEMC)+ \varepsilon_t$

Where, β_0 is the constant, β_1 is the co-efficient of the DSEMC and ε_t indicates error term with zero mean and constant variance.

5. Empirical Results

5.1 Stationarity Test Result

Both the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test are adopted to check the stationarity of the variables with a view to avoiding spurious results. The ADF and PP test statistic results of the variables are presented in table-1.

Table-1: Unit Root Test

Variables	ADF				PP			
	Level		First Difference		Level		First Difference	
	Constant	Constant and Linear Trend	Constant	Constant and Linear Trend	Constant	Constant and Linear Trend	Constant	Constant and Linear Trend
lnGDP	1.57	-0.97	-4.01*	-4.18*	1.42	-1.15	-4.03*	-3.92**
lnDSEMC	-1.51	-3.34***	-7.61*	-7.58*	-1.46	-3.41***	-7.82*	-7.78*

Note: *, **&*** indicate significant at 1%,5%& 10% level respectively.

The above results show that both variables are stationary at first difference at 1% and 5% level of significance, which means both variables are I(1) and it permits

us to go for a VECM model in case any cointegration is found among the variables of interest.

5.2 Granger Causality Test

Granger causality test is used to examine the causality between DSEMC and GDP. Based on this test, it's possible to determine the direction of causality between two variables. Table-2 displays the results of the pair-wise causality test developed by Engel and Granger.

Table-2: Granger Causality Test

Null Hypothesis	Observation	F-Statistics	Probability
lnDSEMC does not Granger Cause LGDP	31	3.52	0.03*
lnGDP does not Granger Cause LDSEMC		15.88	0.00*

Note: *indicate5% level of significance

The results shown in the above table indicate that the null hypotheses are rejected and there is bidirectional causality between lnDSEMC and lnGDP. This finding implies that a change in market capitalization does cause a movement in GDP and vice-versa.

5.3 Selection of Optimal Lag

Prior to estimating any cointegration among the variables in this model, the optimal lag length must be selected. Various information and probability criteria can do it easily and the result of all the available criteria is presented at Table-3. Most of the criteria hint for 3 as the optimal lag for this model.

Table-3: Optimal Lag selection

Lag	LogL	LR	FPE	AIC	SC
0	-79.02	NA	0.64	5.23	5.32
1	35.66	207.16	0.00	-1.91	-1.64
2	47.15	19.28	0.00	-2.40	-1.93
3	54.40	11.22*	0.00*	-2.61*	-1.96*

* indicates lag order selected by the criterion

5.4 Johansen Test of Cointegration

The Johansen cointegration test procedure uses two tests to determine the number of cointegration vectors: The Maximum Eigen value test and the Trace test. To investigate the existence of possible long-run relationship among the variables, Johansen test of cointegration is performed with 3 lag and the results (Presented at table-4) suggest that both λ_{max} and λ_{trace} statistic rule out the possibility of no cointegrating relation at 5% level of significance. The trace statistic tests the null hypothesis that there is no cointegrated equation. Therefore, a rejection of the null hypothesis means that there are cointegrating equations. From the table above the trace statistic of 16.73 clearly exceed the critical value of 15.41 at 99 percent confidence interval, hence, we are rejecting the null hypothesis and conclude that there is at least one cointegrating relationship and therefore, a long run equilibrium relationship exists between the variables. The eigen value test also supported this claim of long run equilibrium relationship between the variables. The maximum eigen value statistics of 15.54 exceed the critical value of 14.07 at 99 percent confidence level, thus, we are rejecting the null hypothesis of no cointegrating relationships between the variables.

Table-4: Johansen Test of Cointegration

Null Hypothesis	Trace Statistics			Max-Eigen statistics		
	λ_{trace}	5% Critical Value	1% Critical Value	$\lambda_{\max}$	5% Critical Value	1% Critical Value
r =0	16.73*	15.41	20.04	15.54*	14.07	18.63
r ≤1	1.19	3.76	6.65	1.19	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5% (1%) level.

5.5 Vector Error Correction Model (VECM) Test

VECM technique is handy in estimating the required level or period for bringing back to equilibrium state after some shock, foreseen or unforeseen, to any or some of the variables of the model. So, this model captures the underlying long-run and, most importantly, short-term dynamics among the dependent and independent variables. As one of the preconditions i.e. existence of at least one cointegrating relation among the variables of interest, is met, we can proceed to the VECM model. The long run relationship between the variables can be shown in the following equation-

$$lnGDP_t = 8.18 + 0.79\, lnDSEMC_t \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

According to this equation, market capitalization significantly affects GDP. More specifically, if everything else stays the same, a 1% rise in market capitalization will cause the GDP to rise by 0.79 %.Since LDSEMC and LGDP are cointegrated, a short run equation of vector error correction model representation could have the following form:

$$\Delta lnGDP=\beta_0+\sum_{J=1}^{M}\beta 1j\Delta lnDSEMC_{t-j}+\alpha\, EC_{t-1}+\mu_t \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where, Δis the first difference and ut is the error term with mean zero.

As stated previously, this short run dynamics depicts the convergence path, if any, following any sort of shock that caused temporary disequilibrium. The coefficient of ECt-1 (i.e. -0.042) which is termed as the speed of adjustment and the negative sign indicates that the short run dynamics act to converge to the long run equilibrium. The fact that absolute value of less than one indicates its convergence path will be not be oscillatory in nature and the absolute value of 0.042 of the error correction signifies that approximate 4.2 percent of the shock of any particular year will disappear in the very next year requiring more than 20 years to bring the system into the steady state once it is disturbed. Last but not least, the adjusted R2 of 0.40 points out that approximately 40 percent variation in the dependent variable is explained by the independent variable included in the model.

The short run dynamics of the VECM model is presented in table-5.

Table-5: Error Correction Equations

Dependent Variable: ΔGDP			
Regressors	**Coefficient**	**Std. Dev.**	**t-statistic**
Constant	0.218	0.040	5.413
EC_{t-1}	-0.042	0.011	-3.839
ΔlnGDP(-1)	0.025	0.180	0.141
ΔlnGDP(-2)	-0.488	0.265	-1.844
ΔlnGDP(-3)	-0.542	0.258	-2.098
ΔlnDSEMC(-1)	-0.008	0.010	-0.758
ΔlnDSEMC(-2)	0.009	0.007	1.224
ΔlnDSEMC(-3)	0.008	0.006	1.341
$R^2 = 0.54$			
Adjusted $R^2 = 0.40$			
F-Statistics = 3.82			

6. Diagnostics tests

To test the health of the estimated model, roll out and data or model related misspecification as well as the possibility of spurious correlation, relevant statistical tests namely the normality test, serial correlation LM test and heteroscedasticity test have been performed. The finding from normality test, performed using Jarque-Bera, ensures that error terms are normally distributed. The Serial Correlation LM test confirms that there is no serial correlation in the residuals of the ECM regression up to ten lags. The heteroscedasticity test result shows that the test cannot reject the null hypothesis that there is no heteroscedasticity.

7. Conclusion and Policy Implications

In this study, Johansen cointegration technique as well as VECM approach has been applied to analyze the effect of market capitalization on Economic growth of Bangladesh using yearly data covering the period of 1990 to 2020. The findings from the empirical results indicate that market capitalization has long term positive impact on economic growth. But this relationship is not statistically significant. The estimated results from the paper indicate that there is a bi-directional relationship between market capitalization and Economic growth in Bangladesh. The findings imply that economic growth in Bangladesh can be achieved by raising stock market capitalization levels. The bidirectional relationship between market capitalization and economic growth indicate that development of stock market results in economic growth and at the same time economic growth also works for the betterment of stock market in Bangladesh. The significant error correction term showed the disequilibrium will be disappeared by 4.2 percent a year.

Market capitalization is the total value of a company's shares of stock which allows investors to size up a company based on how valuable the public perceives it to be. Large market capitalization typically indicates lower volatility and a steady dividend stream. It helps investors to predict the future performance of the stock of a company. Market capitalization, one of the instruments of keeping a steady market, is positively linked with the economic growth in Bangladesh. Therefore, the stock market regulatory body should address policy issues to

encourage new companies to enter the market and increase investors' confidence through improved policy formulation.

Some initiatives must be undertaken in this regard. Ensuring the smooth operation of the primary and secondary markets; increasing financial literacy among investors; minimizing market volatility, creating both individual and institutional investors; improving brokerage house efficiency; initiating knowledge-based trading; rationalizing the cost of generating funds and costs of funds; reducing formalities involved and required documents are all suggested here to increase the total value of trade significantly, thus raising stock market capitalization, which ultimately will increase economic growth at an expected level .

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Does Remittance Inflow Affect Foreign Exchange Reserve? A Case Study of Bangladesh*

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ABSTRACT

The inflow of remittances in foreign currency increases the supply of foreign exchange in the domestic market, leading to an increase in the foreign exchange reserve of the country. In Bangladesh, remittance inflow plays a significant role in the country's economy, as it is one of the top recipients of remittances globally. The main objective of this study is to investigate the impact of remittance inflow on foreign exchange reserve in Bangladesh. To fulfill this objective the study applied ARDL bound testing approach of cointegration to test the long-run and short-run relationship by using the data from 1988-2022. The paper finds significant positive impact of remittance on the foreign exchange reserve in the long run, while negative and insignificant effect in the short run. On the contrary, trade and inflation showed a significant but negative impact on the reserve in the long run. Furthermore, the estimated error correction term suggests that the economy will correct the disequilibrium in reserve and converge to the equilibrium at a 58% rate in a year.

Keywords: Foreign Exchange Reserve**,** Remittance inflow, ARDL.

JEL Classification: F31, F24, P33, C32.

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1. Introduction

Bangladesh, like other import-dependent countries in Asia, has become more attentive to increasing foreign exchange reserve to cope with sudden external economic shocks, balance of payment deficits and import costs. Moreover, countries hold foreign exchange reserves to maintain exchange rate stability and safeguard other economic activities (Kashif, Sridharan, & Thiyagarajan, 2017) to reduce external debt risks and mitigate the adverse shocks of an unanticipated waning of capital inflow or capital flight (Yongzhong & Freeman, 2013).

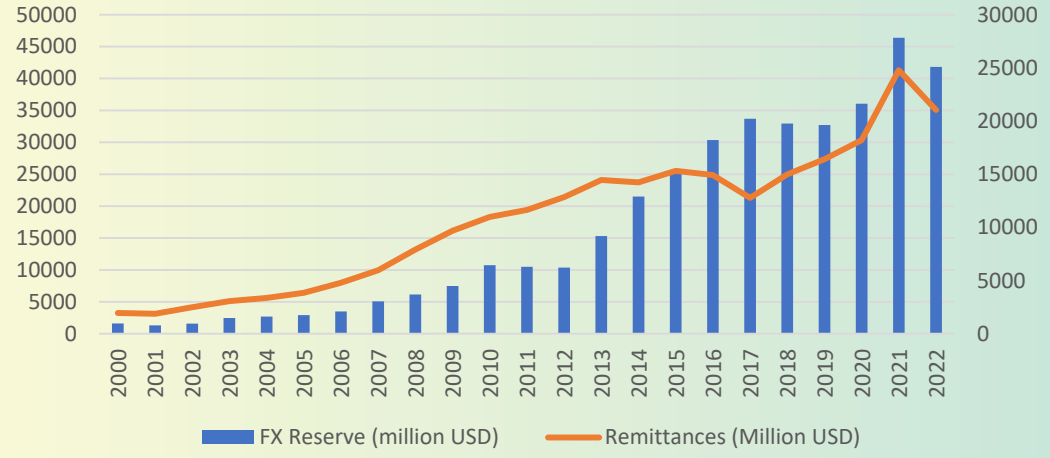
Bangladesh has experienced phenomenal progress in achieving the continuous acceleration of growth over the last four decades, and the remarkable expansion of growth is primarily propelled by Readymade Garments (RMG), exports and remittances (Bourguignon & Raihan, 2020). Although the RMG sector has historically provided the nation's foreign exchange reserves, remittance accounted for 5.52 percent of the country's GDP and 54.06 percent of all export earnings in FY20[5]. Besides, it becomes more prominent than foreign aid which helps in reducing reliance on foreign assistance.

A country's accumulation of foreign exchange reserves can be clearly illustrated by the Balance of Payments (BoP). A surplus in BoP means the central bank is building up the foreign exchange reserve; a deficit means the reserve is falling or the government is borrowing from overseas. As a result of Bangladesh's persistent trade imbalance, the country's current account balance has consistently deteriorated over time. However, the overall balance of payment in FY'21 witnessed a healthy surplus, supported by a relatively low current account deficit mainly due to record high of inward remittances from the Bangladeshi nationals working abroad.

The number of remittances received ranged from USD 758 million in 1990 to USD 1949 million in 2000 to USD 10987 million in 2010 to USD 18205.01 million in 2020. Additionally, this inflow increased from FY20 to FY21 by 36.10 percent, or USD 24777.71 million and USD 21031.68 in FY22. The following figure represents reserve-remittance trend of the last two decades in Bangladesh.

[5] Bangladesh Economic Review, BBS

Figure-1: Remittance inflows and Foreign Exchange Reserve in Bangladesh



The more grounded inflow in the worker's remittances in FY21 was the consequence of government's supportive policy measures like sending remittances through formal banking channels preventing the informal channels by allowing 2% cash incentives to the beneficiaries of the overseas wage earners. According to the World Bank (2020) statistics, steady remittance inflow have driven Bangladesh to become the world's 8th largest remittance-recipient economy.

However, remittance alone cannot build up the reserve. It contributes to reserve accumulation just like other factors do. But the importance of remittances lies in the fact that remittances alone can contribute to accumulating reserves even when other factors do not work during economic crisis as seen in Covid-19 period. As the pandemic unfolded in 2020, all major economies announced lockdown and put restrictions which drastic impact on foreign exchange reserve along with some pre-existing economic fragilities, especially in emerging economies. This is because the source of foreign exchange reserve in most of the developing nations are generally export earning, remittances and in few cases foreign assistances. Surprisingly, unlike most emerging countries, Bangladesh showed an increasing trend in the foreign exchange reserve during the pandemic reaching to historically high level of USD 46391.44 million in FY21. In the year 1990 the foreign exchange reserve was USD 588.69 million, USD 1602.10 million in 2000, USD 10749.70 million in 2010, USD 36037 million in 2020 and USD 41826.70 million

in FY22. The background of the study showed that remittance has always a significant effect in foreign exchange reserve.

However, the recent spike in reserves, which occurred despite a decline in exports, was caused by a rise in remittances has attracted the attention of the researchers. Although even after the pandemic Bangladesh is still dependent on the workers remittances for increasing the reserve of the country. Therefore, the main objective of this study is to determine if the impact of remittance inflows on the accumulation of foreign exchange reserves in Bangladesh is consistently higher than that of other variables. This study investigates the situation with the most recent data.

The rest of the paper is organized as follows: Section 2 provides the empirical studies related to the paper, Section 3 contains data, methodology and estimation process, section 4 discusses empirical results and diagnostic tests. Finally, section 5 presents the concluding remarks.

2. Literature review

In the last couple of decades, after the collapse of the Bretton woods system, the trend of increasing the foreign exchange reserve has been rising as a precautionary motive during the financial crisis. Therefore, researchers became interested in the foreign exchange reserve and its determinants. Moreover, scholars are more interested in this topic as the global foreign exchange reserve has become double during the shortest possible time (IFS 2005).

Despite various researches, few studies have differentiated the impact of different factors on reserve in developed and developing nations. In the year 1978, Frenkel in his paper stated the determinants of the foreign exchange reserve considering the sample of both developed and less developed countries. Measuring a country's marginal propensity to imports (MPI) as the ratio of imports over GDP, he also argued that if the foreign exchange reserve were hold as a precautionary motive, then MPI will be positively related to the foreign exchange reserve.

In 2007, Fukudan and Kon showed that an increase in foreign exchange reserve accumulation will have a permanent influence in depreciation of REER (Real Effective Exchange Rate) and decrease in consumption in developing countries.

Using the monthly data from 1980 to 2002, Narayan and Smith (2006) examined the long run and short run relationship of China's real exchange rate, foreign exchange reserves and the real interest rate differential between China and United States. Applying ARDL bound test approach they asserted a long-run cointegration relationship among real exchange rate, foreign exchange reserve and real interest rate differential. Furthermore, in the short-run non-monotonic relationship has been found among the variables.

Cheung and Ito (2009) have showed that the relationship between the foreign exchange reserve and its determinants significantly varies between developed and developing countries using the data for more than 100 countries from 1975 to 2005.

For Pakistan Arize, Malindretos and Grivoyannis (2004) used various co-integration techniques and explored one linear relationship among real import, real income, relative prices of import and foreign exchange reserve. In addition, they also showed that, long run equilibrium relation emerge for Pakistan only when a constant parameter is accounted for foreign exchange reserve and long run unit income homogeneity.

The impact of remittances on reserves was investigated by Akram et al. (2012) emphasizing the importance of remittances and reserves as well as the implications for reserves in three countries: Pakistan, India, and Bangladesh. For the years 2000 to 2009, the study discovered that remittances had a considerable and statistically significant impact on reserve growth in all three countries.

Kaphle (2021), using time series data from 1975 to 2018, primarily examined the impact of foreign exchange reserve on economic growth in Nepal. Using Vector Error Correction Model (VECM), he confirmed in his study that historical foreign exchange values had a favorable impact on economic growth and that foreign exchange reserves had a beneficial impact on Nepal's economic growth.

However, there exist very few studies in Bangladesh regarding this issue. Alam et al (2013) studied impact of exchange rates on foreign exchange reserves in Bangladesh by employing both primary and secondary data. A systematic questionnaire was used to collect primary data from 50 respondents. Bangladesh foreign exchange reserves, current account balance, capital and financial account

balance, and exchange rates are among the secondary data sources. This study included data from 01 July 1996 to 30 June 2005 as well as quarterly data from 01 July 2005 to 30 June 2012. The findings of this study illustrated that exchange rates were the most important of the 16 factors determining foreign exchange reserves.

An econometric examination by Chowdhury, Uddin, and Islam (2014) was conducted using Engle-Granger cointegration technique. The empirical findings showed that foreign exchange reserves, exchange rate, remittance, home interest rate, broad money, UPI (Unified Payments Interface) of export and import, and per capita GDP all had a strong link with the reserve. The coefficients changed smoothly as a function of seven threshold variables out of nine choices, six of which are statistically significant. Inferring from these findings, it is possible to conclude that the exchange rate, robust remittance-related policies, high-quality exports, and a stable GDP can all play a significant and viable role in maintaining a healthy level of foreign exchange reserves for a host country like Bangladesh.

Chowdhury (2015) focused on the reserve position and its prospects for FY2005-2006 to FY2014-2015. According to her study, foreign reserve holdings were significantly higher, indicated that the amount of money was equivalent to seven months of import payments and sufficient to cover the country's import bills for more than seven months. Different approaches to foreign reserve adequacy level suggest taking immediate steps to put the money to the best possible usage unless it will result in a large liability in Bangladesh.

Khan and Amin et al (2021) investigated the relationship between Bangladesh's foreign exchange reserve, remittances, exchange rate, and trade balance for the period 1986 to 2019. Using the ARDL approach, the study found that remittance inflows and trade balance have a statistically significant positive impact while the insignificant impact of exchange rate on foreign exchange reserves over time. Moreover, remittance inflow to foreign exchange reserve and remittance inflow to exchange rate have a unidirectional connection.

From the above discussion, it can be inferred that most of the studies demonstrate the positive impact of remittance inflow to the foreign exchange reserve. Even

though a good number of studies have attempted to examine the relationship between remittance inflow and foreign exchange reserve, there are very few studies in Bangladesh on this topic. There seems to be a space for more researches in this area in Bangladesh. Our study is different in terms of sample size, number of variables and time horizon. In this study, we focus on the impact of remittance inflow on foreign exchange reserve in Bangladesh considering other factors like inflation, trade, and exchange rate. Some researchers used yearly data and some others used monthly data. In this study, we used yearly data (1988-2022) from World Development Indicators (WDI) and Bangladesh Bank to investigate the impact of remittance inflow on foreign exchange reserve in Bangladesh.

3. Data and Methodology

Although we attempted to investigate the impact of remittances on reserve, we have used other control variables as well. This is because reserve is not only affected by the remittance but also by some other variables. In this study, the foreign exchange reserve is considered the dependent variable, while remittance, inflation, exchange rate, and trade are treated as independent variables. The selection of these variables is based on their causal relationship with the foreign exchange reserve.

Foreign exchange reserves can be increased by remittances, which help in exchange rate stability. The cost of imported items can affect inflation, thereby influencing the exchange rate. Exchange rate is the controversial aspect of international macroeconomics which affects international trade, balance of payments, and macroeconomic performance (Abbas et al. 2002). A country with significant foreign exchange reserves can utilize its reserves to intervene in the foreign exchange market through buying or selling its currency. The central bank can influence the supply and demand dynamics, thereby exerting an impact on the exchange rate, while higher reserves can play a role in stabilizing or strengthening the domestic currency against other currencies. However, when a currency depreciates against other currencies, it makes imported goods more expensive. This increase in import costs can lead to higher prices for goods and services in the domestic market, contributing to inflation. Conversely, if a currency appreciates, it makes imports cheaper, which can reduce inflationary pressures.

Overall, remittances can influence foreign exchange reserves, which in turn can affect the exchange rate. The exchange rate along with other factors like import dependence can influence inflationary pressures within the economy. However it is important to note that, the relationship among these factors can be intricate and subject to influence from various other economic factors and policies. Here, a time series data for the period of 1988 to 2022 is used because of the adaptation of the extended structural adjustment policy by the government of Bangladesh facilitated by the IMF and the World Bank as a condition of stringent policy conditionality for structural adjustment loans (Rahman 1992). The descriptions of the variables are shown in the table 2.

Table 2: Description of the variables

Variables Name	Description/ Definition	Time Period	Source
rem	Personal remittances, received (% of GDP)	1988-2022	WDI
trade	Trade (% of GDP)	1988-2022	WDI
fxr	FX Reserve (million USD)	1988-2022	BB
excp	Exchange Rate (Percentage)	1988-2022	BB
inf	Inflation (Rate)	1988-2022	BB

3.1 Methodology:

Model Specification:

A regression analysis has been undertaken to show the relationship between reserve and remittance. Moreover, other than remittance there are some variables that affect the foreign exchange reserve of a country. By following Chowdhury, Uddin, and Islam (2014) we specify the following relationship:

$$\textit{Foreign Exchange Reserve} = f(\textit{Remittance, Exchange rate, Trade, Inflation})$$

The econometric specification of the model is as follows

$$fxr_t = \beta_0 + \beta_1 rem_t + \beta_2 excp_t + \beta_3 trade_t + \beta_4 inf_t + \varepsilon_t \text{----------(1)}$$

Taking logarithmic form of the dependent variable the equation 1 is as follows

$$logfxr_t = \beta_0 + \beta_1 rem_t + \beta_2 excp_t + \beta_3 trade_t + \beta_4 inf_t + \varepsilon_t \text{----------(2)}$$

Here, t represents time for the period of 1986 to 2020. The endogenous variable $logfxr_t$ represents the logarithmic form of foreign exchange reserve while the exogenous variables rem_t, $excp_t$, $trade_t$, and inf_t are the logarithmic form of remittance, exchange rate, trade, and inflation, respectively. The coefficients β_1, β_2, β_3 and β_4 show the elasticity of all those exogenous variables. β_0 and ε_t represents the intercept and white noise error term, respectively. Although the sings of the coefficients are intrusive in nature, our focus will be on the magnitude of the coefficients.

Stationarity test:

First of all, we conduct stationary test to ensure that none of the variables are 2nd difference stationary or I(2). Among various unit root test in this study, we are using Augmented Dickey Fuller test (ADF) as it is considered most popular because of its easy applicability. By adding lagged difference term of the dependent variable, this process also takes care of possible autocorrelation in the error term. Furthermore, for more accurate result we are also applying Philips Perron test.

Cointegration Test:

The theoretical discussion shows that there is a long-run association between the variables used in this study. In other words, the mean and variance of the variables are not depending on time that is they are constant. In order to keep the properties of long-run relationship intact we use cointegration, establishing a statistical and economic basis for empirical error correction model that brings short run and long run information among the variables. Therefore, the main estimation method of the study is Auto Regressive Distributed Lag (ARDL) approach using time series data for the period of 1986 to 2020.

Now, for the ARDL approach the equation 2 can be written as model used by Pesaran, Shin and Smith (1999) and Pesaran et al (2001)

$$\Delta logfxr_t = \beta_0 + \sum_{k=1}^{n} \beta_1 \Delta rem_{t-k} + \sum_{k=1}^{n} \beta_2 \Delta excp_{t-k} + \sum_{k=1}^{n} \beta_3 \Delta trade_{t-k} + \sum_{k=1}^{n} \beta_4 \Delta inf_{t-k} + \lambda_1 \Delta rem_t + \lambda_2 \Delta excp_t + \lambda_3 \Delta trade_t + \lambda_4 \Delta inf_t + \varepsilon_t \text{----------(3)}$$

Where n represents the maximum lag order, β_0 represents drift component whereas Δ shows the first difference and $\varepsilon_t$is the white noise. Here, β_1 –β_4 corresponds to long-run relationship, while λ_1- λ_4 represent the short-run dynamics of the model. Two sets of critical value have been developed by Pesaran et al (2001) for F-test. One set is for lower bound and other is for the upper bound. If the value of the F-test is smaller than the lower critical bound, then there will be no long-run relationship in the model. On the other hand, if F-test value is higher than the upper critical bound then it can be concluded that there will be a long-run relationship among the variables. However, if the value lies in between upper and lower critical bound the result will be inconclusive.

If there is evidence of cointegration, then the next step is the estimation of long-run relationship of the ARDL model. However, it is necessary to determine the optimum lag length by proper model order selection criteria such as Akaike Information criterion (AIC), Schwartz Bayesian Criterion (SBC) or Hannan-Quinn Criterion (HQC) in order to select the appropriate model of the long-run underlying equation.

The Long-run association among the variables can be written as following

$$\Delta\ logfxr_t = \beta_0 + \sum_{k=1}^{n} \beta_1 \Delta rem_{t-k} + \sum_{k=1}^{n} \beta_2 \Delta excp_{t-k} + \sum_{k=1}^{n} \beta_3 \Delta trade_{t-k} + \sum_{k=1}^{n} \beta_4 \Delta inf_{t-k} + \varepsilon_t \text{----------(4)}$$

Here, *n* is the optimum lag length.

Lastly, to find out the short-run dynamics the error correction model can be formulated below in the equation 5

$$\Delta\ logfxr_t = \beta_0 + \sum_{k=1}^{n} \beta_1 \Delta rem_{t-k} + \sum_{k=1}^{n} \beta_2 \Delta excp_{t-k} + \sum_{k=1}^{n} \beta_3 \Delta trade_{t-k} + \sum_{k=1}^{n} \beta_4 \Delta inf_{t-k} + \phi ECM_{t-1} + \varepsilon_t \text{----------(5)}$$

Where, Δ represents the first difference as before while ϕ is the coefficients of the error correction term for short run dynamics. ECM_{t-1} describes the speed of adjustment that is how much disequilibrium will be corrected. The coefficient of the ECM is expected to be between -1 to 0. The negative sign indicates the degree of correction.

In this study we used the ARDL approach instead of Johansen Juselius (1990) cointegration procedure as there is a single long-run relationship equation for each variable and so it assumes that only a single reduced form equation relationship exists between the endogenous and the exogenous variables (Pesaran, Smith and Shin 2001). However, this approach will not be applicable if the variables are integrated in I(2). To forestall the effort in futility, at the very beginning of the analysis we will check the stationarity of the variables.

4. Empirical Results and Discussions

4.1 Unit Root Test Results

In order to check the stationarity of the variables used in this study we have done Augmented Dickey Fuller test (ADF) and Philips-Peron Test (PP). The results of these two tests are shown in the Table 3 below

Table-3: Unit Root Test results

Test		Logfxr	rem	excp	inf	trade
ADF	Level	-0.94	-1.55	-0.07	-3.96*	-1.74
	1st difference	-4.26*	-3.39*	-5.12*	-	-4.09*
PP	Level	-0.11	-1.40	-0.96	-3.94*	-1.74
	1st difference	-4.27*	-3.99*	-7.32*	-	-4.99*

*,**denotes significant at 1%,5%level respectively.

It can be seen from the table, the time series variables logfxr, rem, excp and trade are stationary in their first difference form that is I(1) in both ADF and PP test. However, in case of inf are stationary in the level form in both ADF test and PP test.

Therefore, the combination of I(0) and I(1) confirms that we can use ARDL estimation method in this study.

4.2 Lag Selection Criteria

For the lag selection criterion, we selected the automatic selection criterion in the Eviews-10 and used Akaike Information criterion (AIC) for choosing the length with a maximum lag of 4. The optimal combination according to Akaike Information criterion (AIC) is ARDL (2,4,4,4,4). The model selection according to AIC is shown in the annex 1.

4.3 ARDL estimation Result

The calculated F statistics and critical values of upper and lower bounds are shown in the table 4 where the computed F-statistics (11.95) is higher than the upper bound critical value I(1) at the 1% level of significance implying that the null hypothesis cannot be accepted. Thus, there is a long run cointegration relationship among the variables.

Table-4: Result of ARDL Bound test

Null Hypothesis: No levels Relationship				
Test statistics	Value	Significance	I(0)	I(1)
F-statistics	11.95	10%	2.2	3.09
		5%	2.56	3.49
k	4	2.5%	2.88	3.87
		1%	3.29	4.37

4.4 Long-Run and Short-Run Relationship

Long-Run relationship

The confirmation of the existence of the long run relationship in the model allows us to estimate the long run form of equation. Using ARDL approach the estimated long-run relationship are described in the table below:

Table-5: Long-run results

	Dependent variable: Logfxr		
Variables	**Coefficients**	**Standard error**	**Probability**
rem	0.60*	0.10	0.00
inf	-0.11**	0.04	0.02
trade	-0.23*	0.03	0.00
excp	0.07*	0.00	0.00

Note: * p<0.01, ** p<0.05, *** p<0.1

From the table above, remittance has a positive and significant impact on the foreign exchange reserve, i.e. if the remittance increases by 1 percent then the foreign exchange reserve will increase by 6 percent in the long-run. Exchange rate also has a positive and significant result meaning that there is a long-run association between exchange rate and reserve.

Furthermore, the coefficients of both inflation and trade are showing negative but significant impact on foreign exchange reserve. Inflation coefficient is -0.11 meaning that 1 percent decrease in inflation will raise the reserve by 0.11 percent. Because the reserve requires stabling the value of the foreign exchange rate to keep inflation low, if the inflation is high, it will have an impact on foreign exchange reserves as more funds will be necessary to stabilize the foreign exchange reserve. However, if the inflation is stable in the country, then it can have a positive impact on the reserve as the domestic products can compete in the foreign market.

The impact of trade in reserve is also negative that is if trade increases by 1 percent, then the reserve will decrease by 0.23 percent. The demand for foreign currency is also consistently high since import volumes are high in comparison to export revenues. This has led to rising inflation throughout the nation.

Short-run relationship

From the table-6 we can see that remittance have a positive and significant effect on reserve in the short-run. Though, trade and exchange rate depict a negative relationship with reserve in the short run. However, trade showed a significant effect while exchange rate showed an insignificant effect on reserve in the short run. That is, there is no short-run relation among exchange rate and reserve as well.

Table-6: Short-run results

Dependent variable: D(logfxr)			
Variables	**Coefficients**	**Standard error**	**Probability**
D(rem)	-0.03	0.22	0.2
D(excp)	-0.02***	0.01	0.08
D(trade)	-0.03*	0.00	0.00
D(inf)	0.02**	0.00	0.04
cointEq(-1)*	-0.58	0.05	0.00
R^2	0.97		
Adjusted R^2	0.92		

Note: * p<0.01, ** p<0.05, *** p<0.1

The coefficient of error correction term is significant at 1% level. Highly significant negative sign of the error correction term strengthens the presence of

long run relationship among the variables. The estimated coefficient on the ECM is -0.58 suggesting the speed of adjustment from previous year's disequilibrium in reserve added to current year's equilibrium is 58 percent. Furthermore, the linear model showed that, approximately 97 percent of the foreign exchange reserve movements can explain by this short-run model.

Therefore, we can conclude that remittance has an insignificant and positive impact on foreign exchange reserve in short run. However, Trade showed a negative impact during both cases, mainly due to the trade deficit. That is because import is always higher than export in Bangladesh.

On the other hand, exchange rate and inflation showed a significant relation in both long run and short run relations.

4.5 Diagnostic Tests

To check the competencies of the ARDL model several diagnostics test have been performed which are shown in the table 7:

Table-7: Diagnostic tests results

Name of the Test	F-statistics/ Jarque Bera	Obs* R-squared	P- value
Breusch-Godfrey Serial Correlation LM Test:	4.10	24.92	0.10
Heteroscedasticity Test: Breusch-Pagan-Godfrey	0.81	21.36	0.68
Test of Normality	0.73	-	0.69

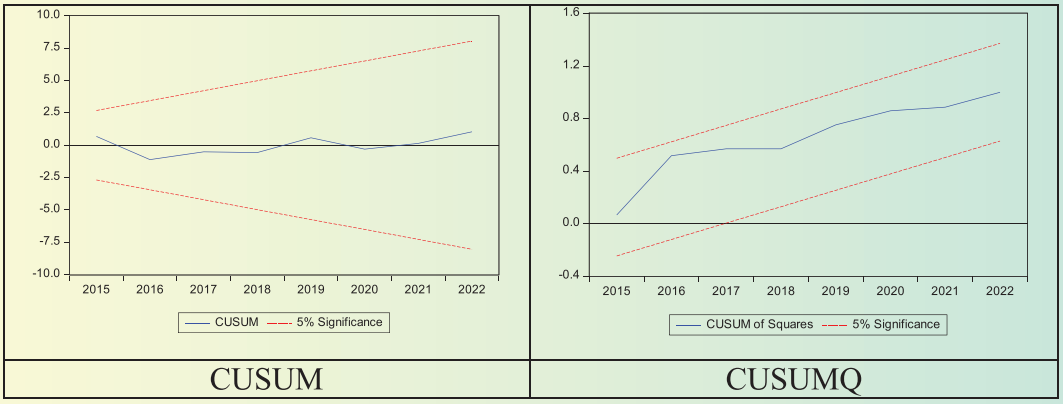
The P- value of Breusch-Godfrey serial Correlation LM Test, Heteroscedasticity test: Breusch-Pagan-Godfrey and normality test is greater than 5 percent which is desirable. So, this model is free from autocorrelation and heteroscedasticity. The residuals are normally distributed.

Stability Test

CUSUM and CUSUMQ test allowed us to analyze the structural stability of the long run parameters together with the short run movement. The test results suggest that all the coefficients in the given regression will be stable if the plots of

the CUSUM and CUSUMSQ residuals stay within the critical bounds of 5% level of significance. The tests are conducted and plotted in the Figure-2.

Figure-2: CUSUM and CUSUMQ Test of Stability



CUSUM | CUSUMQ

As per the plots in the Figure-2 the lines are between the 5% critical bounds implying that this model is robust and stable in both short run and long run over the study period.

5. Conclusion and Policy Implications

Remittances boost the amount of foreign exchange available on the domestic market, increasing the nation's foreign exchange reserve. Being one of the top recipients of remittances globally, Bangladesh's economy is greatly benefited from remittance inflow. The objective of the study was to analyze the impact of remittance inflow on foreign exchange reserve in Bangladesh. It finds that, there is a positive and significant relationship between remittance and foreign exchange reserve in long run. On the other hand, in short run the remittance showed an insignificant relation with foreign exchange reserve.

Moreover, this study also shows that there is negative but significant long run relationship among trade, inflation, and reserve, while exchange rate has a positive and significant relationship which is related to the current economic condition of Bangladesh which is different from the other studies.

The results indicate that, remittance is an important determinant of foreign exchange reserve in Bangladesh although it is not the sole indicator. The importance of remittance in crisis period like COVID-19 is that when all other

indicators fail to contribute in foreign exchange reserve in Bangladesh, remittance alone can mitigate the balance of payment contributing in foreign exchange reserve. Furthermore, in recent times when the country is facing a trade deficit, remittance has also the highest impact on reserve other than the trade.

Although having a pandemic situation worldwide, remittance inflow was at increasing trend in Bangladesh. This might be happened because of government stimulus package of 2% cash assistance on remittance taken on 1st July, 2019. Government initiative of such stimulus package has brought the flow of remittances from informal channel to formal channel which helped boosting up the remittance. Following the positive impact of the stimulus package, the Government of Bangladesh has extended the term of the package from 1st January 2022 and decided to increase the existing rate of cash assistance to 2.5% considering the importance of remittance which is ongoing till the date. Furthermore, it is challenging for Bangladesh to maintain the rising trend of remittance inflow although it is sensitive to the GDP of the country. To address this issue, the government may focus on sending skilled labor forces abroad, as they tend to contribute higher remittances. Additionally, both the government and the central bank should collaborate to control exchange rate fluctuations. By implementing appropriate measures, such as intervening in the foreign exchange market, when necessary, they can help in maintaining a stable exchange rate. This stability, in turn, assists in meeting targeted inflation rates and safeguard the foreign exchange reserves of the country.

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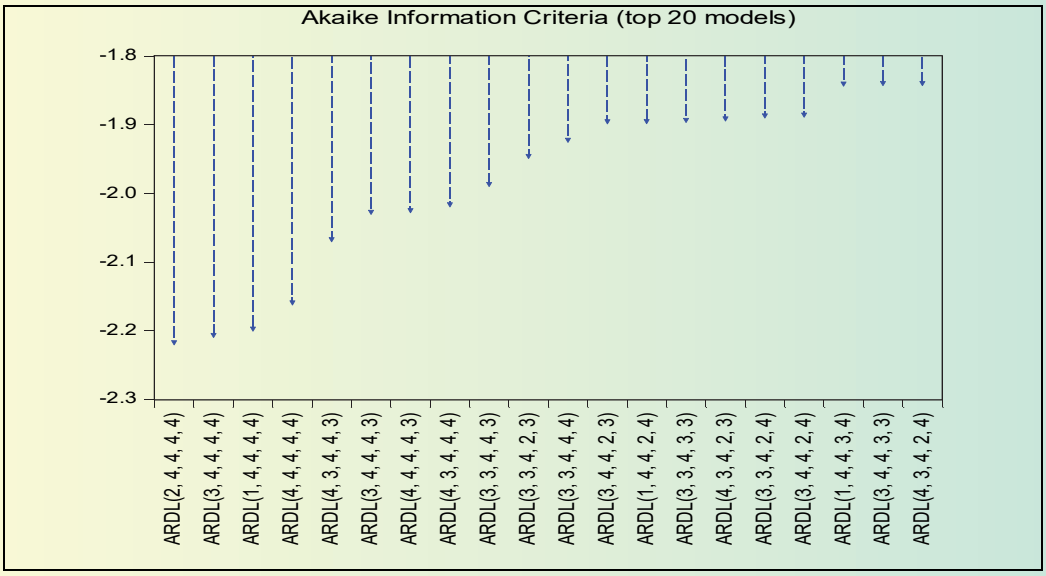
ANNEXURE-1

Model Selection Summary



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Introduction to Bangladesh Bank Training Academy (BBTA)

Bangladesh Bank Training Academy (BBTA) is a training wing of central bank of Bangladesh, Bangladesh Bank pursues tasks of capacity building and human capital development in order to prepare skilled human resources in central bank as well as for commercial banks. BBTA organizes different training courses, training workshops, conferences, seminars and other related activities on main topics of economics, banking and finance, financial sector development, human resources development and 'macroeconomic management. It was established in 1977.

BBTA's Mandate

'The purpose of the Academy is to undertake training activities for enabling the officials of central bank and the banking sector to perform their jobs efficiently well-equipped with the latest knowledge of economic, financial and banking developments. To this end, BBTA extends its all-out efforts to facilitate training to personnel engaged in the financial sector. It also works to modemize its library and information center to collect, systematize and disseminate information in the financial arena. Recently, a plan has been adapted to reorganize BBTA library as a Knowledge Management Centre (KMC). This new role puts more weight on BBTA for knowledge creation and application. Since information is important to create new knowledge for educating staff and professionals, 'we hope that it would contribute to the creation of knowledge and disseminate knowledge for use by others.

BBTA's Strategic Objectives

Bangladesh Bank has adopted its 5-year Strategic Plan 2020-2024 and bestowed responsibilities upon BBTA (Strategic Goal # 7) to adopt all-out efforts to enhance professional excellence and grooming of the officers of Bangladesh Bank. To fulfill the target of the plan document, BBTA has been employing its full capacity to provide need- 'based training to the officials both from central bank and commercial banks; continuously striving to diversify the contents of its courses in order to ensure their consistency with evolving training needs; facilitating the practical application aspects of knowledge of 'economics, banking and finance; and developing training as a scientific discipline.

In order to achieve the above mentioned strategic objectives, BBTA has introduced the following initiatives.

1. Building and enhancing training capacities of the trainers;
2. Improving quality, efficiency, impact and cost-effectiveness of training programs;

3. Linking training with real-world cases and experiences;
4, Building training partnership programs with the public and private sector domestic and overseas training institutions;
5. Building and maintaining the BBTA financial institutions information system;
6. Utilization of the Internet for dissemination of the Academy's biannual Journal 'Thoughts on Banking and Finance';
7. Building a database on trainers and training institutions in the field of banking and finance; as well as
8. Facilitating the digitization of BBTA documents.

Organization

'The Executive Director is the head of the Academy. There are seven wings to look after the administration, training and research programs of the Academy.

Location

The Academy is located in Mirpur2, Dhaka 1216, Bangladesh.

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