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Do Financial and Economic Development Have an Impact on Income Inequality? A Study on Bangladesh

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Abstract:This research attempts to determine why individuals are unable to achieve their fundamental necessities despite increased financial and economic growth by investigating the relationship between financial and economic development with income disparity.Alternatively, this paper examines, from the viewpoint of Bangladesh, the implications of the Financial Kuznets Curve hypothesis, a theory established in three phases based on Kuznets's seminal 1955 work. The time series data of nine elements over the 28 years from 1993-94 to 2020-21 has been used in the study. The study employs the Autoregressive Distributed Lag method (ARDL)and Granger Casualty Test to identify the effect of financial and economic development on income inequality in Bangladesh. Principal Component Analysis (PCA) has been used to develop indicators for financial development and economic development. The study reveals that financial and economic development affect income inequality in Bangladesh; in fact, they increased income inequality over the years in this country. This indicates that the FKC hypothesis holds in Bangladesh, as FKC states that Financial and economic development constitutes a converse U-shaped relationship with income inequality, meaning that income inequality increases during the primary phase and continues in the medium phase of development. As Bangladesh is going through a development phase, income inequality is increasing.

Keywords: Gini Index, Financial Development, Economic Development, Financial Kuznets Curve, Principal Component Analysis.

1.0 Introduction

Bangladesh has been maintaining impressive high rates of growth of GDP in the range of 6-7 percent annually for a decade. Due to its strong track record of growth and development, Bangladesh reached lower-middle income status in 2015 and it is on track to graduate from the UN's Least Developed Countries (LDC) list in 2026. However, while Bangladesh is one of the most promising economies in the 21st century,growing income inequality in the country remains a matter of concern over the years. According toNational Household Database

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(NHD) report-2021, the richest 5 per cent of the Bangladesh population owned nearly 30 per cent of the national income while the poorest 5 per cent shared less than 0.3 percent.

This study started from the interest generated by observing the above facts and also observing the financial difficulties among a group of individuals despite constant increases in economic growth indices over the years. Undoubtly, the economy of Bangladesh has experienced incredible progress on differenct economic and social indicators, but still, a part of the people of the country face challenges to meet their basic needs properly, which is evidenced by upper poverty rate of 24.3%and marginal poverty rate of 12.9%(World Bank's report) in Bangladesh. So, it raises doubt on real impactof progress of the economy on overall well being of the people and also on the inclusivenes of economic and financial development of Bangladesh. In other words, all these issues pose the question, does economic development increase income inequality, making the poor poorer and the rich richer ? Therefore, this study is trying to find out whether economic development (ED)and financial development (FD)affect income inequality and the disparity in income distribution among the people of Bangladesh.

In fact, income inequality is the major global concern in the recent era, which is rising at an alarming rateThis has long been a topic of discussion worldwide since Kuznets published a groundbreaking research paper on the subject in 1955, and since then has been widely studied for both single countries, regions, and the whole world. However, there are few research papers on income inequality issues from the perspective of Bangladesh'seconomy. There is no existing research showing how ED and FD influence income disparity in Bangladesh or FD or ED is not doing any good for the lower-income people of the country. Wahid et al. (2012) published a research paper on how FD influences income disparity that did not show the impact of ED nor the combined effect of FD and FD. Therefore, this study examines the effects of both FD and ED. In contrast, a study by Uddin et al. (2014) demonstrated the impact of FD on poverty and evaluated causality and cointegration but did not demonstrate the impact of economic growth. This study offers value by demonstrating the impact of both FD and ED on income disparity and the possible causal connection among the variables of FD, ED, income inequality, and control factors.

This study also tries to determine whether the Financial Kuznets curve is working in Bangladesh or not by studying whether FD and ED increase or decrease inequality in income. Again, it tries to find out whether there is any bidirectional or unidirectional causation among the variables used in the study.

2.0 Literature Review

Numerous experts have devoted time and energy to establishing a connection between ED and income inequality. Several of them analyzed the relationship between income inequality and FD rather than ED. Kuznets (1955) analyzed the connection between economic progress and income disparity and identified a converse U-shaped relationship or curve, which became known as the Kuznets Curve. There were three phases in the creation of FKC: the first was the development of the Kuznets curve theory by Kuznets (1955);the second stage was the development of the financial curve hypothesis by other researchers, specifically Clarke, Xu, and Zou (2006); and the third and final stage was theimprovement of the FKC by Nikoloski (2013) through the integration of FD variables (Kavya, and Shijin, 2020).

By evaluating the factors mentioned above, Greenwood and Jovanovich (1990) discovered a link that is diametrically opposed to Kuznets' conclusions; in other words, an inverted-U-shaped association. Destek, Sinha, and Sarkodie (2020) established that the FKC theory holds for the Turkish economy. Ang (2010) shows that the FKC is operational in India utilizing the ARDL approach and data on the Gini coefficient as dependent factors, financial liberalization and economic growth as exposure factors, and trade as control variables. Shahbazand Islam (2011) found the existence of the FKC for Iran utilizing the ARDL and Granger causality tests on almost identical variables to the others except for control variables named globalization. Zhang and Chen (2015) discovered that there is cointegration between the Gini coefficient and ED in China as well and that the FKC hypothesis holds using the SVAR and JJ cointegration methods and data on the income portion of rural people, financial advancement, industrialization, and government investment.

On the other hand, Shahbaz and Islam(2011), based on the data of Pakistan, Baligh and Piraee (2015) based on the data of Iran, Satti et al. (2015) based on the data of Kazakhstan, Sehrawat and Giri (2015) based on the data of India, and Dogan (2018) based on the data of Argentina discovered that while FKC was not applicable in their respective cases, cointegration did exist. In most of the situations discussed above, researchers employed the ARDL technique of regression, and GINI, FD, economic growth, Inflation, and trade were all used as data. Satti et al. (2015) employed Bayer and Hank cointegration, whereas Sehrawat and Giri (2015) used the VECM Granger causality test in addition to the ARDL to validate the link between the variables used. Dogan (2018), on the other hand, was unique in that he employed Maki cointegration and the DOLS technique to test the FKC hypothesis and cointegration in his future scenario. Shahbaz and Islam (2011) included data on government spending and manufacturing sector value-added, while Baligh and Piraee (2013) included data on institutional quality in addition

to the aforementioned common data. One thing that all of the publications cited above had in common was that they were all based on time series data.

The following are a few publications that employed panel data to test the FKC hypothesis in their specific cases. Nikoloski (2013) examined the FKC hypothesis using data of the Gini coefficient, financial advancement, ED, government spending, Inflation, and value addition by the industrial sector for 77 nations. He discovered that the FKC hypothesis is relevant. Akan, Köksel, and Destek (2017) concluded that the FKC is conclusive using data from 20 European Union countries. Based on a study of data from 85 countries, Kavya and Shijin (2020) concluded that FKC is valid only for low-income nations. FKC is applicable in Europe based on the data of 19 member countries of the EU (Baiardi& Morana,2018), also applicable totheUSA based on the data of 50 states of the USA (Bittencourt et al., 2019), and also applicable for BRICS countries (Younsi&Bechtini, 2020). On the other hand, Liang (2006) found that the FKC hypothesis does not hold true based on data from 29 states within Chinese provinces, Jauch and Watzka (2016) found that the FKC hypothesis does not hold true based on data from 138 countries worldwide, and de la Cuesta-González, Ruza, and Rodrguez-Fernández (2020) found that the FKC hypothesis does not hold true based on data from 9 OECD countries. Except for Akan, Köksel, and Destek (2017), who employed Pedronicointegration and the Panel FMOLS technique, all panel studies used the GMM approach. Jauch and Watzka (2016) employed pooled OLS, whereas Baiardi and Morana (2018) and Younsi and Bechtini (2020) used OLS and granger causality as additional methods to corroborate the GMM conclusion. Gini coefficient, financial advancement, economic prosperity, and governmentexpenditure were often employed variables in panel data-based research. Liang (2006) used data on education, unemployment, trade, and employment; Nikoloski (2013) used data on Inflation and value addition by industrialization; Jauch and Watzka (2016) used data on government spending, financial access and value addition by agricultural sector; Baiardi and Morana (2018) and Kavya and Shijin (2020) used data of trade, urbanization, industrialization, government spending along with the above-mentioned data.

Patric(1966) explored which one of FD and ED caused the other one. In addition to the previous supply-leading hypothesis (SLH) and demand-following hypothesis (DFH), he assessed two elements of the relationship between these two variables and proposed the phases of development hypothesis as a new theory. The Supply-leading hypothesis states that the development of financial markets and institutions causes an increase in the supply of financial services, which in turn causes the economy to grow automatically. This supply-leading hypothesis happens in OECD countries based on data from thirteen sectors in fourteen OECD nations from 1970 to 1991 (Neusser and Kugler, 1998). Data from 109 countries, including 87 developing countries and 22 developed countries, indicate

that FD drives economic growth; however, when a causality test was performed on the data separating developing and developed countries, it was found that there exists a bidirectional connection between FD and ED, meaning that both factors influence each other, and FD has a greater impact on ED. Other scholars, such as Agbetsiafa (2004) for Sub-Saharan Africa and Mckinnon (1982) for their respective regions, contend that the supply-led hypothesis applies. However, Adeyeye et al. (2015) assert that there exists a bidirectional connection between ED and FD in Nigeria.

Based on data from 35 countries, including 19 industrialized and 16 developing nations, Goldsmith (1969) suggested a demand-following hypothesis, which Jung (1986) later endorsed. Nevertheless, Patric (1966) claimed that the direction of the connection varies depending on the stage of development; this theory is known as the stages of development hypothesis. In the early phases of an economy, FD encourages ED, but as the economy develops, the relationship flips, indicating that economic success impacts the prevalence of FD.

3.0 Research methods

3.1 Variable Selection and Preparing

3.1.1 Income Inequality

The Gini index, which can be visually represented using the Lorenz curve, was employed as a referential of income disparity or to determine the amount of income discrepancy. It indicates how unevenly distributed income is throughout a population. Numerous scholars, including Clarke, Zou and Xu (2006); Jauch and Watzka (2016); Seven (2021), have employed the GiniIndex to measure income inequality.

3.1.2 Financial Development

Financial development may affect the income distribution of a country by increasing or decreasing the income gap across the population of the country. There is a significant challenge with selecting variables for FD since there is now no strong, direct, reliable, and universally acceptable index for FD. While certain FD indices, such as the IMF FD Index Svirydzenka (2016), have been produced lately, they are only accessible for a few years, which may not be adequate for drawing conclusions using regression. Therefore, for the purposes of this research,an index of FD was developed in accordance with Seven (2022) and Ang and McKibbin (2007) using the PCA approach. To construct an index for FD variables namely the amount of credit extended to private organizations (DCPS), Broad money (BMAPG), and total market capitalization as a portion of GDP (MCG), have been used.

DCPS: DCPS is the amount of credit extended to private organizations through FIs and saved by households. It is a comprehensive measure of both bank and non-bank financial intermediaries'efficiency in allocating funds and credit to the private sector. Another reason for considering it as a variable for FD Index is that it increases the overall efficiency of the financial market, as private organizations are efficient in utilizing those funds and increasing overall productivity, which will further FD. Clarke, Xu and Zou (2006) also used DCPS as an indicator of Financial Development.

BMAPG: Broad money, as the name implies, is the broadest measure of an economy's money supply.It encompasses both liquid assets and less liquid but excludes equity shares. Seven and Coskun (2016) pointed out BMAPG as an indicator of Financial Development. Board Money is used as a percentage of GDP to determine the financial systems' altitude as a share of the whole economy by indicating the amount of money supply flowing through financial system.

MCG: Total capitalization of the market of all the firms has been calculated as a portion of GDP to illustrate how theinevitable role the capital market has in capital creation and resource allocation compared to the total economy. Seven (2021) used MCG as an indicator of financial development in their study.

3.1.3 Economic Development

Economic growth may have an effect on a country's income distribution disparity. Again, to create an index for ED, the PCA approach has been used. To construct the index for ED using PCA, trade as a percentage of GDP (denoted by TAG) and per capita GDP growth (denoted) by PCGD have been used in this study.

GDP Growth Per Capita: Baiardi and Morana (2018) figured out that as a determinant of ED, GDP growth has a substantial effect on incomeallocation. GDP growth has the potential to alter FD and income discrepancy by boosting or lowering the income of lower-income individuals.

Trade as a percentage of GDP: It is the amount of aggregate export and import as a portion of total GDP. To determine the importance of a company's trade-in economic growth and also to assess an economy's openness and its role in lowering income inequality throughout the nation, trade as a percentage of GDP is considered.

3.1.4 Control Variables

GFCEAG: It includes the government's expenses for obtaining products and services, compensating government personnel, and defense and national security expenditures other than military expenditures. Itwas added as a control variable because it has the potential to affect income distribution by raising the income of

low-income individuals via development projects or by widening the income gap through corruption in such projects.

Inflation: Inflation has been included as a control variable because it has a major effect on the income gap by deteriorating the country's financial stability, which affluent people can mitigate by hedging the riskbut poor people cannot, as Easterly and Fischer (2001)demonstrate.

IRS: The interval of depositsand lending rates is referred to as IRS. It should be optimum to incentivize both savers and intermediaries to contribute to the financial system's health. IRS also has an influence on the capital market since businesses will choose to raise money via the issuing of stock rather than bonds or loans, owing to the higher lending rate.

3.2 Data and Sampling

A total of 28 years of data was gathered for nine variables including one showing income disparity, three indicating financial development, two indicating economic development and three control variables. Initially, data for 50 years were planned, but data for all variables were not available for 50 years. As a result, the database's range has been restricted to 1993-2021 considering the availability of data for all variables. Data for all the variables was power transformed to make the data more normally distributed.

3.3 Model Specification

The majority of the literature reviewed here used the (Autoregressive Distributed Lag) ARDL method, which is widely used for long-run relationship identification based on time-series data. Considering the nature of the data and existing literature, this study usedthe ARDL approach to investigate how ED and FD affect income inequality and to observe cointegration as a whole. The Granger causality test will be used to determine whether independent variables, financial development, economic development, and control variables -Interest Rate Spread, Inflation, and Government Spending have individually influenced the dependent variable (GINI) and to what amount.

Firstly, Augmented Dicky Fuller is to be done to test the stationarity of the data using the following equation:

$$\Delta y = \mu + \delta y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta y_{t-i} + e_t$$

After testing the stationary of data, the following model will be used to achieve the objectives of the study

For the ARDL model,

$$\lambda GINI_{it} = \alpha + \beta_1 \lambda ED_{it} + \beta_2 \lambda FD_{it} + \delta \lambda GFCEAG_{it} + \delta \lambda IRS_{it} + \delta \lambda I_{it} + \varepsilon_{it}$$

For Granger Causality

$$Y_1(t) = \sum_{i=1}^{L} A_{11} Y_1 (t-i) + \sum_{i=1}^{L} A_{12} X_1 (t-i) + E_1(t)$$

Here, in the 2nd equation, λ is denoted as a sign for power transformation, which usesLambda, and λ is attached to ED, FD, and CV because all of them are power transformed, and Furman, Wang, and Zitikis (2017) used Lambda as notation for power transformation. describes the GINI Index of during the , where α describes the intercept or constant and describes the coefficient of ED or how much GINI is changing for each unit of change in ED.denotes the power-transformed value of ED. denotes how much of can be described by FD and denotes the power transformed value of FD of during the . denotes the combined effect of the control variables on the GINI index and , and denotes the power-transformed control variables of GFCEAG,IRS, andInflation of the consecutively during the .denotes the error terms with zero means. as a whole indicates the long-term sensitivity of income equality to the change in Financial and ED.

In the equation for granger causality, the count of lags used in the model is described by and denotes the coefficient of the first lag, which describes the extent of the effect of the first lag on the prediction or causation of for the time selected. denotes the coefficient of the second lag, which describes the extent of the effect of the second lag on the prediction or causation of for the time selected and denotes the error terms. If the is reduced after the inclusion of that means granger causes .

4.0 Analysis and Findings

4.1 Descriptive Statistics

Table 1: Descriptive Statistics

	GINI	IRS	DCPS	BMAPG	MCG	Inflation	GFCEAG	TAG	PCGD
mean	33.90	4.36	31.97	47.23	17.44	6.21	5.23	34.72	4.17
std	0.69	1.06	10.77	14.92	13.97	2.35	0.43	7.65	1.54
min	32.40	1.87	15.29	25.63	1.40	2.01	4.63	22.87	1.69
25%	33.20	3.66	21.38	29.75	4.43	5.37	5.00	28.04	2.92
Median	34.30	4.48	31.17	50.28	12.79	6.11	5.12	35.30	4.39
75%	34.50	5.04	42.74	61.07	32.69	7.56	5.35	40.02	5.28
max	34.50	6.19	47.58	65.85	39.60	11.40	6.36	48.11	7.05

If we look at the above table, which contains descriptive statistics for the raw data prior to any transformationand PCA for indicators of ED and FD. GINI has a median of 34.50 and a mean value of 33.90, with a standard deviation of 0.69, which indicates that the value of the GINI Co-efficient isn't too much spread out from the mean. GINI Co-efficient has a maximum and minimum value of 34.50 and 32.50, respectively,from 1993-94 to 2020-21. The average interest rate spread is 4.36% for the considered period, with a standard deviation of 1.06%, and the maximum and minimum interest rate spread was 6.19% and 1.87%, respectively. During the considered period, on average Domestic Credit extended to the private sector was 31.97% of the total GDP with a standard deviation of 10.77%, and Maximum and minimum DCPS are 15.29% and 47.58%, respectively. BMAPG was 47.23% of the total GDP with a standard deviation of 14.92%, and maximum and minimum BMAPG were 65.85% and 25.63% respectively. Market capitalization was 17.44% of the total GDP over the period, and the Maximum MCG during that period was 39.60% in 2014, and the lowest was 1.40% in 1993-94 as the number of listed companies fewer then. During 1993-94 to 2020-21, the average Inflation was 6.21% whereas maximum Inflation was 11.40% and the lowest Inflation was 2.01%. Trade was 34.72% of the GDP on average during the period and the Per Capita GDP Growth rate was 4.17% for the considered periods.

4.2 Multicollinearity

As seen in Table 10 of the Appendix, the VIF for all variables is between 1-6, and the tolerance level for each variable is more than 0.10, showing that no multicollinearity exists.

4.3 Augmented Dicky Fuller Test

Before applying the ARDL model for long-term relationship identification, stationary time series data is to be tested by Augmented Dicky Fuller Test. The summary of the results of the ADF test is given below:

Table 2: Summary of Augmented Dicky Fuller Test

Variable	Unit Root Test in	Results of test constant without trend	Results of the test constant with trend	Stationary or non-stationary
GINI	Level	-1.501 (0.5530)	-0.505(0.9832)	Non-Stationary
	1st difference	-4.607(0.0001)	-4.876(0.0003)	Stationary
IRS	Level	-1.614(0.4757)	-2.104(0.5440)	Non-Stationary
	1st difference	-4.786(0.0001)	-4.628(0.0009)	Stationary
ED	Level	-1.320(0.6201)	-2.242(0.4665)	Non-Stationary
	1st difference	-6.439(0.0000)	-6.493(0.0000)	Stationary
Inflation	Level	-3.949(0.0017)	-3.886(0.0127)	Stationary
	1st difference	-6.397(0.0000)	-6.276(0.0000)	Stationary
GFCEAG	Level	-0.697(0.8476)	-2.491(0.3326)	Non-Stationary
	1st difference	-4.184(0.0007)	-4.119(0.0059)	Stationary
FD	Level	-1.307(0.6260)	-2.6260(0.2707)	Non-Stationary
	1st difference	-5.774(0.0000)	-5.752(0.0000)	Stationary

For all the variables, ADF has been run with 0 lag difference. As the summary table shows, all the variables except Inflation are non-stationary at the level and stationary in the 1st difference, both with and without trend. So, there is a higher possibility that there exists cointegration among the variables at order one and long-term cointegration prevails among the variables. Accordingly, this study implements the ARDL approach to investigate whether FD and ED have an impact on income inequality or not. The Granger causality test will be used to determine whether independent variables such as FD and EDhave individually influenced the dependent variable (GINI) and to what amount. Although the granger causality test examines the bilateral relationship, here only one side of the relationship will be explained i.e. causation from FD and ED to GINI as the study focuses on impact of ED and FD on income inequality.

4.4 Regression Model (ARDL model)

As the summary of augmented Dicky Fuller Test in the table -1 shows that all the variables are stationary at 1st difference, we can run the Johansen cointegration test.

Table 3: Johansen Cointegration test

Johansen Tests for cointegration

Trend:	Constant				Number of obs =	28
Sample:	1993-2021				Lags =	1
Maximum Rank	Parms	LL	eigenvalue	trace statistics	5% critical value	1% critical value
0	42	-68.757294		133.9724	94.15	103.18
1	53	-41.675663	0.88543	79.8092	68.52	76.07
2	62	-24.707975	0.74267	45.8738*1*5	47.21	54.46
3	69	-10.312892	0.68387	17.0836	29.68	35.65
4	74	-4.1892893	0.38731	4.8364	15.41	20.04
5	77	-2.230534	0.14504	0.9189	3.76	6.65
6	78	-1.7710726	0.03609			

As the results show in both 5% and 1% significance in ranks 0 and 1, which means we have enough evidence to reject the null hypothesis at the rank 0 and 1 and there are two cointegration equation or two cointegration model indicating there exists long term relationship among the variables. To put it alternatively, there is a long-term association between GINI, ED, FD, GFCEAG, Inflation, and IRS. As the variables are cointegrated, we can run VECM now to identify short-term and long-term cointegration.

Table 4: VECM model

Vector Error-Correction Model

Sample	:1993-2020			Number of Obs	: 28
Equation	Parms	RMSE	R-sq	Chi2	P>Chi2
GINI	9	0.155272	0.6002	22.51713	0.0074
IRS	9	0.742452	0.2225	4.2914	0.8912
ED	9	.331272	0.7123	37.13587	0
Inflation	9	0.68002	0.802	60.75822	0
GFCEAG	9	0.499829	0.4243	11.05355	0.2721
FD	9	.423214	0.6558	28.57998	0.0008

The R^2 and P values of GINI, ED, Inflation, and FD explain that there is the possibility of significant casualty. All the variables are automatically converted to 1st difference to see the changes from one year to another year and expressed as GINI, IRS, ED, Inflation, GFCEAG, and FD. Hence, the relationship can be explained as changes in ED and FD may have an influence on the changes in GINI.

Table 5: VECM model for both long-term and short-term cointegration

		Coef.	Std. Error	z	P>|z|	[95% Conf.	Interval]
D_GINI	_ce1 L1.	0.254323	0.166426	1.53	0.126	-0.071867	0.5805123
	_ce2 L1.	0.010963	0.021649	0.51	0.613	-0.0314693	0.0533948
	GINI	-0.29952	0.283181	-1.06	0.29	-0.8545455	0.2555042
	IRS	0.104961	0.045977	2.28	0.022	0.014848	0.1950749
	ED	0.065991	0.085316	0.77	0.439	-0.1012253	0.2332077
	Inflation	0.038494	0.04079	0.94	0.345	-0.0414526	0.1184395
	GFCEAG	0.059733	0.073757	0.81	0.418	-0.0848289	0.2042945
	FD	0.106604	0.080979	1.32	0.188	-0.0521116	0.2653191
	_cons	0.084977	0.04685	1.81	0.07	-0.0068469	0.1768

Results from Table -5 shows that both coefficient equation 1 and coefficient equation 2 have positive error correction term (coefficient) and the p-value is greater than 5% which indicates no long-term casualty running from IRS, ED, Inflation, GFCEAG, and FD to Gini, and there are no short-run casualties also as the coefficient of all the variables IRS, ED, Inflation, GFCEAG, and FD are positive and have p value>0.05. However, results from Table- 2 and 3 suggest that there may exist cointegration among the variables. So, to avoid conflict, let's check the long-term relationship stated by the Johansen normalization restrictions-imposed method.

Table 6: Johansen Normalization for a long-term relationship

Beta	Coefficient	Std. Error	Z	P>Z	[95% Confidence Interval]	
ce1GINI	1.000					
ED	-0.312	0.039	-7.980	0.000	-0.388	-0.235
Inflation	-0.295	0.040	-7.410	0.000	-0.373	-0.217
GFCEAG	-0.067	0.047	-1.430	0.154	-0.160	0.025
FD	-0.328	0.058	-5.690	0.000	-0.441	-0.215
cons	0.077					

Results from Table - 6shows that GINI is normalized to 1 and there exist long-term relationship among GINI, ED, FD, Inflation and GFCEAG. Moreover, relationship of GINI with ED, FD and Inflationarestatistically significant as each of them has. Therefore, according to Table 5 above, the long term relationship of GINI with ED, FD and inflation can be expressed as follows:

So, according to Johansen's normalization restriction method, financial development and economic development are having an impact on income inequality of Bangladesh which signifies that the gradual growth in financial and economic development is resulting in increased income disparity among the people of the country. This finding confirms that Financial Kuznets Curve is applicable to Bangladesh also as FKC implies that at the initial to middle stage of development of a nation, income inequality increases as ED and FD increaseand at the later stage, income inequity decreases as ED and FD increase. As Bangladesh is in the growth stage of Financial and Economic Development,income inequality is rising.

4.5 Granger Causality

Granger causality is generally used to assess the extent of variables' predictability. Table 7 presents the outcome of the granger causality test.

Table 7: Granger Causality

Equation	Excluded	Chi^2	df	$Prob>Chi^2$
GINI	IRS	9.1357	2	0.010
GINI	ED	0.67766	2	0.713
GINI	Inflation	5.363	2	0.068
GINI	GFCEAG	1.2389	2	0.538
GINI	FD	2.5053	2	0.286
GINI	ALL	23.366	10	0.009

Table -7depicts thecausality among the variables. As the p-value of ED is 0.713 and FD is 0.286, and p values of both of the variables are greater than 0.05, which indicates that the causation of the FD and ED to GINI is statistically insignificant. However, if all the variables are considered, the results become statistically significant as p-value (0.009) is less than 0.05 which demonstrates that FD and ED with the controlled effect of IRS, GFCEAG and inflation cause GINI.

5.0 Conclusion

The major challenge throughout the globe is to reduce or control economic inequality and this economic inequality arises through the distribution of income, consumption, wealth or assets. As Bangladesh is going through a development phase in terms of financial and economic development, rising of income inequality became a matter of concern over the years which is supported by FKC hypothesis where it is stated that the income gap shows an inverted U-shaped feature of early expansion and then reduction. Household level information of Bangladesh also suggests that the distribution of income is much more unequal than the

distribution of consumption. The study investigated the effect of financial and economic development on the income disparity of Bangladesh. To achieve the objective of study, this study usedthe ARDL approach to investigate how ED and FD affect income inequality and to observe cointegration as a whole because this is widely used for long-run relationship identification based on time-series data. There was a significant challenge while selecting variables for FD and EDsince there are no strong, direct, reliable, and universally acceptable index for FD and ED. Therefore, PCA approach has been used to construct indices for FD and ED.

The study found that Financial Development and Economic Development have an impact on income inequalityin the long run while FD and ED have no effect on GINI in the short run. Furthermore, with the controlled effect of other variables, FD and EDcause income inequality. These findings signifies that Financial Kuznets Curve is applicable in Bangladesh as Bangladesh is going through the primary phase of progress. Income inequality is thriving with respect to an increase in Financial and Economic Development and inverted U-shaped curve in FKC implies exactly the same thing stating that the primary phase of development could cause income inequality to rise with respect to increase in financial and economic development and at the mature stage of financial and economic progress, income inequality decreases. It also implies that in future when economic and financial growth will enter into the mature stage, income inequality in Bangladesh will fall.Thus considering the findings of the study, government should initiate policy measures to reduce income inequality while focusing on overall development of the economy as development leads to income inequality. Or government should accelerate its overall development to its maturity level so that income inequality might decline as Financial Kuznets Curve hypothesis suggest.

This study fills the gap on the literature regarding the analysis of impact of both economic and financial development on income inequality in the perspective of Bangladesh economy and also sheds light on the issue to be considered by policy makers while focusing on accelerating the progress of economy. The findings of the study revealed that the growth centric development of Bangladesh economy is widening the income inequality to some extent. This growing income inequality might pose challenges to achieving the goal of reduction of poverty and to achieve the country's vision of attaining upper middle-income status by 2031 and developed country by 2041.

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Appendix

Table 8: Raw Data Before Any Transformation and PCA analysis

Date	GINI	IRS	DCPS	BMAPG	MCG	Inflation	GFCEAG	TAG	PCGD
2020-21	34.50	2.228	39.1611	57.7631	24.0099	5.6911	5.9712	26.2714	2.2711
2019-20	34.500	2.781	45.313	63.696	21.290	5.592	6.271	36.759	7.045
2018-19	34.500	2.993	46.939	64.305	28.241	5.544	6.357	38.245	6.733
2017-18	34.500	3.934	47.583	65.686	34.511	5.702	5.996	35.304	6.136
2016-17	34.400	4.210	45.280	65.848	31.804	5.514	5.892	37.954	5.947
2015-16	34.500	3.465	44.407	64.507	33.568	6.194	5.404	42.086	5.367
2014-15	34.400	3.145	43.736	63.338	39.597	6.992	5.338	44.514	4.856
2013-14	34.500	1.872	41.795	61.400	34.108	7.530	5.116	46.296	4.795
2012-13	34.500	3.728	43.001	60.742	36.722	6.218	5.039	48.111	5.299
2011-12	34.500	4.484	42.470	59.812	37.080	11.395	5.097	47.421	5.254
2010-11	34.500	5.008	40.961	58.746	36.101	8.127	5.075	37.803	4.391
2009-10	34.500	5.513	36.191	54.882	20.423	5.423	5.094	40.093	3.879
2008-09	34.400	5.343	34.042	51.188	12.792	8.902	5.178	42.621	4.806
2007-08	34.400	5.642	32.043	50.282	10.969	9.107	5.359	39.942	5.753
2006-07	34.300	5.679	31.166	50.476	5.361	6.765	5.440	38.112	5.245
2005-06	34.200	5.081	29.344	47.421	4.752	7.047	5.180	34.397	4.966
2004-05	34.100	4.598	27.913	45.623	9.045	7.588	5.174	26.858	3.553
2003-04	33.900	4.933	26.039	43.989	3.256	5.669	5.128	27.658	2.942
2002-03	33.600	4.702	26.208	42.740	27.213	3.333	5.023	28.967	1.960
2001-02	33.400	3.667	24.180	40.267	1.812	2.007	4.846	32.098	3.114
2000-01	33.200	4.068	21.779	30.554	4.108	2.208	4.973	29.322	3.257
1999-2000	33.200	3.662	20.987	27.885	3.046	6.107	5.040	28.388	2.574
1998-99	33.200	3.631	20.497	26.233	4.060	8.402	5.126	27.880	3.015
1997-98	33.100	3.789	19.987	25.937	5.742	5.306	4.903	26.326	2.307
1996-97	33.100	4.731	18.912	25.634	15.895	2.377	4.727	26.076	2.320
1995-96	32.900	6.137	20.882	28.828	5.077	10.298	4.630	28.209	2.901
1994-95	32.700	6.193	16.271	28.952	3.020	5.314	4.883	22.866	1.690
1993-94	32.400	4.644	15.294	26.205	1.399	3.015	4.954	23.122	2.466

Sources- World Bank, IMF, Frederick Solt

Table 9: Data with power transformation and with FD and ED Index under PCA approach

Year	GINI	IRS	ED	Inflation	GFCEAG	FD
2020-21	0.993	-1.314	1.752	-0.1615	1.6423	1.532
2019-20	0.993	-1.483	1.699	-0.247	1.888	1.482
2018-19	0.993	-1.297	1.986	-0.268	1.951	1.495
2017-18	0.993	-0.437	2.214	-0.199	1.637	0.998
2016-17	0.722	-0.174	2.056	-0.281	1.519	1.161
2015-16	0.993	-0.874	1.994	0.014	0.709	1.272
2014-15	0.722	-1.163	2.028	0.355	0.554	1.249
2013-14	0.993	-2.239	1.745	0.583	-0.071	1.360
2012-13	0.993	-0.630	1.828	0.024	-0.335	1.714
2011-12	0.993	0.092	1.769	2.173	-0.132	1.643
2010-11	0.993	0.612	1.631	0.833	-0.208	0.484
2009-10	0.993	1.127	0.847	-0.320	-0.145	0.444
2008-09	0.722	0.952	0.301	1.156	0.124	1.076
2007-08	0.722	1.261	0.070	1.241	0.606	1.254
2006-07	0.475	1.300	-0.324	0.259	0.787	0.885
2005-06	0.250	0.685	-0.604	0.378	0.129	0.428
2004-05	0.043	0.203	-0.455	0.607	0.112	-0.993
2003-04	-0.317	0.536	-1.088	-0.213	-0.031	-1.214
2002-03	-0.748	0.306	-0.018	-1.254	-0.396	-1.621
2001-02	-0.976	-0.688	-1.545	-1.875	-1.140	-0.663
2000-01	-1.166	-0.310	-1.779	-1.779	-0.586	-0.873
1999-2000	-1.166	-0.692	-2.045	-0.024	-0.334	-1.331
1998-99	-1.166	-0.721	-2.025	0.948	-0.040	-1.151
1997-98	-1.248	-0.573	-1.920	-0.372	-0.878	-1.708
1996-97	-1.248	0.334	-1.470	-1.699	-1.751	-1.729
1995-96	-1.392	1.783	-1.811	1.729	-2.341	-1.175
1994-95	-1.511	1.842	-2.336	-0.368	-0.966	-2.487
1993-94	-1.652	0.249	-2.748	-1.401	-0.663	-1.999

Table 10: Multicollinearity

Model	Variable	Collinearity Statistics	
		Tolerance	VIF
A	IRS	0.786	1.272
	Inflation	0.914	1.094
	GFCEAG	0.803	1.245
B	IRS	0.715	1.399
	Inflation	0.656	1.524
	GFCEAG	0.472	2.119
	ED	0.197	5.079
	FD	0.172	5.829