

THE EFFECTS OF DISCLOSURES AND CORPORATE GOVERNANCE ON BANK RISK: EVIDENCE FROM BANGLADESH

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Abstract

The scenario of the banking sector is articulated by the theoretical background backed up by practical shreds of evidence relying on panel data of thirty-two (32) commercial banks for the period of 2006-2016. The study used two-stage-least-square (2SLS) technique in data processing based upon the preliminary diagnosis of the endogeneity, heterokedasticity, and auto-correlation problem. In fact, the study explores its area of concentration in the banking sector and developed models based on bank risk, disclosures, and corporate governance in the developing country context. It is found that good governance and adequate disclosures practice certainly works for the transparency and the permanency of the banks in the marketplace. The study also confirms that the reciprocal relationship exist among bank risk taking, disclosures practice, and corporate governance model.

Keywords: Bank Risk; Corporate Governance; Quantitative Methods; Panel Data; Bangladesh.

1. Introduction

Now a day's, business is regarded as corporate glass house where insiders and outsiders can take a fair view in their decisions. Undoubtedly transparent reporting can make it possible by providing more and relevant information. Financial information helps the users to take prudent decisions. Though business organizations regularly publish audited financial statements, they should also ensure the transparency of the financial reporting. The shareholder's assertiveness towards business organizations is showed a proactive dissonance due to lack of confidence and growing number of mistrust (Madrigal et al., 2015). To minimize the conflicting situations, stakeholders demand more and better information regarding financial performance, social dimension, and corporate risks.

Numerous studies (Cebenoyan et al., 1999; Fama and Jensen, 1983) have supported that the risk-taking behavior of banks is increasing due to the problem of data inequality. In this case, transparent revelation can alleviate the conflict and confusion of stakeholders in a susceptible economic situation. It was further revealed that the high defaults of credits and the weak disclosures of banks negatively linked (Cordella and Yeyati 1998; Boot and Schmeits 2000) demanded more information

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from shareholders and investors about risky projects. However, research conducted by Baumann and Nier, (2004); Nier (2005) found that the transparency of banks ensures high disclosure and has a significant impact on share price volatility. Roughly, the study argued that the practice of high-level disclosure could be a way to solve the problem of information heterogeneity in financial markets identified as the cause of global financial instability.

In contrast, the behavior of banks is influenced by the corporate culture known as the governance system as strong governance ensures the effectiveness and efficiency of economic operations for prevention economic recessions (OECD, 2004). In general, corporate governance (CG) plays an important role in the growth prospects of an economy, especially in reducing the risk of investors, attracting investment capital and improving the efficiency of the banks (Spanos, 2005). Corporate governance governs the rules of the organization that define the responsibilities and obligations of the board of directors and their commitments to shareholders and stakeholder groups (Pass, 2004). Indeed, corporate governance (CG) is a process by which shareholders influence management to act in their best interests, providing investors with a degree of confidence that is essential for capital markets to function effectively (Rezaee, 2009).

The survey investigates the multi-impact of corporate disclosure and corporate governance (CG) framework on bank risk. Adequate risk disclosures can ensure greater transparency and significantly keep the banking sector stable. The financial crisis in economy is triggered by aggressive disclosures where improved bank disclosures have the opposite effect (Tadesse, 2006; Hoggarth, Jackson, and Nier, 2003). Financial disclosures have increased the importance of higher levels of banking business than non-financial institutions. Typically, users of accounting information are shareholders, credit issuers, regulators, competitors, academics, employees and management who have demanded transparent information for their decisions with less variability in forecasting. Annual reports are considered a reliable source of corporate information. Therefore, many researchers concentration were in the company's annual reports to create disclosure index where they found a positive correlation between disclosures index with volumes of disclosures published through other media (Lang & Lundhome, 1993). However, in addition to transparent disclosure, strong governance measures are needed to control market volatility and economic fluctuations to deal with extravagant risks.

The present survey is conducted on the basis that there is a lack of research evidence on bank risk taking in developing countries like Bangladesh. It is true that the socio-political and economic environment is not conducive enough to persuade a researcher to conduct an in-depth investigation. Also, there are limited opportunities to extract bank-related information from legitimate published sources other than

annual reports. This study critically analyzed the published annual reports of commercial banks and shows the impact of transparency disclosures and governance culture on their risk taking behavior. In addition, it explores the potential relationship between ownership structure, financial viability, and bank risk with the bank's position. The results of the study will enhance the empirical evidence and help policymakers to update their existing regulations to keep the market stable.

2. Literature review

Recent economic downturn took attention of the researcher in financial arena specifically in risk exposures of banks. In South-Asian region, the regulators and the policy makers give priority in corporate governance and financial reporting system after the financial crisis of 1997 and onwards. This financial crisis greatly influenced the decision of the investor, as a development partners, and fall the ongoing project in threat and in vulnerable situation. The situation revives positively by taking proactive role of IMF where they forced to enact transparency in reporting system of the banks (Fung, 2014). Moreover, the practicing firms understood the need of the change and they are mostly focused on the firms level transparency or practicing a culture of transparency rather than satisfying regulatory disclosures (Bennis and O' Toole, 2009). Baumann and Nier (2004) identified that bank risk proxied by stock market volatility has a negative relationship with financial disclosures. Banks with enough financial disclosures reciprocally reduce the inconsistent market prices. Stakeholder theory assumes that investors are rational and have homogeneous expectation where they rely on published sources of information and can eliminate stock price volatility. Poskitt (2005) confirms that the disclosures relating to market volatility or riskiness greatly influenced investor's choices by reducing information heterogeneity. Furthermore, the transparency of disclosures depends on the usefulness of the information (Linsley and Shives, 2005). Basically accounting information give signals to the users about the financial position and performance of the firms which can helps the investor's in taking prudent decision. Therefore, the question of the quality of information is raised in the existing market condition. It is advised that only higher quality of accounting information can mitigate the conflict and confusion of the users which can be ensured by the true and fair view of the presentation. The study conducted by Oliveira et al., (2011) concludes that investors can reduce market risk following the market signals by taking corrective actions immediately. The time lag may cause market inconsistency but it will be corrected automatically within a short period taking the appropriate adjustments.

Financial disclosures play a vital role in the modern capital market development. Healy, P.M. and Palepu, K.G. (2001) found that there is a functional relationship between financial disclosures and market efficiency. In fact, the forms of market efficiency depend on the immediate adjustment of past information. Information

asymmetry misguided the investors in taking their economic decisions and ultimately increases the funding cost. The cause of higher cost of capital is the premium charged for investment in risky projects. Investors who have enough information about the financial position and performance of firms may claim lower benefit rather than investment in little disclosing firms.

The risk related information should be published more by the entity for the sake of mandatory and voluntary compliance of the Pillar 3 of Basel norm. The adequate risk disclosure can minimize the conflict between agents and shareholders. In general, adequate disclosure practice may increase the stability of banks as it create good image in the investors mindset permanently. However, some of the evidences opposed the scenario and got arbitrary relationship. It is found that financial disclosures may initiate moral hazard problem based on the perspective of ownership and control (Jensen and Meckling, 1976). The shareholders have the right to gather all available information of the respective firm that may affect their economic decisions. The investors may hold the share or release it based on their judgments. The most probable solution of the agency problem is the adequate disclosures that may reduce the mental distance between shareholders and management. The above situation similarly applicable for banking institutions where the depositors can take their decisions based on banks stability and riskiness. The major portion of liability of banks is short-term-deposits. Therefore, the depositors are willing to take the information regarding bank's risk taking behavior so that they can secure their deposits. The deposit or withdrawal decision of customer may cause the change of funding cost and vice versa (Cordella and Yeyati, 1998, Botosan & Plumlee, 2002; Francis, Khurana, Levine, 2004; Pereira, 2005; Bertay, Demicgüç-Kunt & Huizinga, 2013).

The studies conducted by Fischer, (1999); Nier, (2005); Tadesse, (2006) evidenced that the information asymmetry initiated due to the lack of transparency in financial reporting and also caused by the absorption of extravagant risk in the banking sector. Baumann and Nier, 2004 also revealed that banks can secure their stable position in the market place those have disclosed adequate information the general public regarding their risk exposures. Furthermore, Nier (2005) found that transparency in financial reporting can reduce both the financial anomalies and the riskiness of banks that create a permanent image in the capital market to control price. The study used composite disclosure index as the proxy of transparency with four (4) broad heads under (i) Assets (ii) Liabilities (iii) Memo lines and (iv) Income Statement.

Based on the empirical study (Nier and Baumann, 2006), it is assumed that adequate disclosures are the means of strong market discipline and ensure transparency that ends with reluctant risk taking behavior of banks. In some cases,

government took support of the failure banks as they disbursed funds to unproductive sectors for the sake of establishing their political agendas. In this scenario, bank disclosures will not work properly to mitigate the risk taking behavior of banks. In fact, State-owned Commercial Banks (SCBs) served prioritizing government intentions rather than economic consequences. However, the cost of disclosure may exceed the benefit received, and then the management became reluctant to publish all the information to the general public. Moreover, the studies conducted by Hyytinen and Takalo, (2003) found that firms disclosure raised uneven competition among the participants or the businessmen and make a battle field in setting strategic decisions. Against the criticism of adequate disclosures, Tadesse, (2006) argued that adequate disclosures are not only represents the transparency of banks in the market place but also keep the stability of banks in the future. The disclosure fragility perspective assumed that any misrepresentation of information misguided the investors and depositors and also works as a threat of public confidence. Banking business run only on the ground of public trust and reliance. Some researcher (Gilbert and Vaugan, 1998; Kaufman and Scott, 2003; Gorton & Huang, 2006) showed that any negative disclosure may create a panic in the market and can cause irrelevant behavior in the stock market which provoked price fluctuation. Tadesse, (2006) revealed that distorted facts or intentional misrepresentation may create a negative image in the market and can decrease public confidence that indulge the banking section and moved towards bank failure. That is why, adequate disclosure can be used as a monitoring tool in the governance framework. In psychological point of view people reacted more with the bad news rather than good news. As people always consider probable loss as a loss in their daily life but didn't count probable gain as a gain in the present time. Bushee and Noe (2000) found that the monitoring cost of the firms can be reduced by providing all the necessary information to the users specially the institutional investors. It is assumed that higher disclosure decreases the price volatility by reducing asymmetric information. In fact, investors are mostly kept their eyes on low volatile shares as a risk averse which ends with lower cost of capital. The study conducted by Healy and Palepu, (2001); Hassan & Marston, (2010) investigated that people mostly depend on public information as it is cheap rather than private information due to limited access. Thus, investors choose those banks that provide more information in the public source rather than private place.

From the above discussion, the study showed mixed evidence where the effect of disclosure and corporate governance on bank risk raised a debate and somehow conflicting. Moreover, the agency theory holds that the conflict between shareholders and agents can be mitigated only by providing adequate disclosure in the market place that make the corporate as transparent/glass house. The nature of the bank is intermediary and trustworthiness which motivated to disclose more information to

the users to increase public confidence. According to “Disclosure Stability” theory, banks that provide more information and keep them transparent in the market place can sustain in the long run with good image. The elimination of asymmetric information affect in the share price volatility and keep market stability.

Investors can judge accurately based on published information regarding financial position and performance of banks. The banks with higher probability of default have more funding cost rather than less risky banks, in terms of volatility. It is evidenced that banks have taken lower risk strategies those provide higher disclosures and practice good governance system. The controversy arises when bank provide all information to the public then the users are overwhelming by the unimportant information. The value of information is decreased as over information create noise in the investors mind.

In fine, the study draws a summary that financial disclosures have a positive as well as negative effect on bank risk. Furthermore, corporate governance is negatively associated with disclosure as financial reporting is the subset of governance system and can jointly affect the risk taking behavior of banks.

3. Methodology

The study followed logical sequences and appropriate procedures in research process to confirm the reliability of the research. The findings of the research are extracted from the statistical analysis of secondary data in a quantitative fashion. The study mainly rely on published annual reports of the different commercial banks of Bangladesh, as it is the most reliable source compared with other sources (Akhtaruddin, 2005; Chau & Gray, 2010). Moreover, the study conducted research on Bangladesh as a focus group due to prioritizing the socio-economic cultur of Bangladesh. Prior research support that the cultural differences make a huge change in the social and economic patterns which ultimately affect the sensitivity of the model. Besides, there is a tiny scope of research in Bangladesh due to lack of moral and economic support.

3.1 Data and sample

The data set are constructed based on panel data consists of 11 years (2006-2016) time series data and 32 commercial banks longitudinal data. The total number of observation is 346. In 2006, there are 48 banks operated in Bangladesh consists of Four (4) categories of scheduled banks: i.e. State Owned Commercial Banks (SCBs), Development finance institutions (DFIs), Private commercial banks (PCBs) and Foreign Commercial Banks (FCBs). The structure of the banking sector with a breakdown by type of banks is shown in below:

Table 1: Banking System Structure in Year 2006 and Year 2016

Bank by types	2006				2016			
	Number of Banks	Number of Branches	% of Industry Assets	% of Deposits	Number of Banks	Number of Branches	% of Industry Assets	% of Deposits
SCBs	4	3384	32.7	35.2	6	3710	27.60	28.40
DFIs	5	1354	7.8	5.4	2	1407	2.60	2.80
PCBs	30	1776	47.7	51.3	40	4267	65.00	64.80
FCBs	9	48	11.8	8.1	9	70	4.80	4.00
Total	48	6562	100	100	57	9453	100	100

Source: Bangladesh Bank (<https://www.bb.org.bd>)

3.2 Model Selection

The study formed econometric models based on empirical evidences and preliminary diagnosis. It is found that the bank risk taking, corporate governance and financial disclosures are simultaneously determined in the model given below:

$$Y_{i,t} = \alpha_1 X_{it} + \alpha_2 Z_{it} + \beta_0 + \sum_{j=1}^7 \beta_j \text{Controls}_{it} + \varepsilon_{i,t} \text{-----(1)}$$

$$X_{i,t} = \alpha_1 Y_{it} + \beta_0 + \sum_{j=1}^6 \beta_j \text{Controls}_{it} + \varepsilon_{i,t} \text{-----(2)}$$

$$Z_{i,t} = \alpha_1 Y_{it} + \beta_0 + \sum_{j=1}^6 \beta_j \text{Controls}_{it} + \varepsilon_{i,t} \text{-----(3)}$$

$$\varepsilon_{it} = v_{it} + u_{it}$$

Here,

Y= Bank Risk Taking;

X= Financial Disclosures;

Z= Corporate Governance;

i= Cross section;

t = Time periods

The study established the model using panel data with cross-sections of different commercial banks with subscript “i” and longitudinal time series “t”. The unobserved values represented by random error “ε_{it}” and the models are normally distributed, i.e. N (0, σ²). Equation (1), (2), and (3) are established to judge the relationships among bank risk taking, disclosures and corporate governance in Bangladeshi perspective.

3.3 Measurement of variables

This section describes both the dependent variable and independent variables of banks risk determinants evaluation as well as the effect of disclosures, governance and multiple effects of disclosure and governance on banks risk from the different point of view that is designed for this study. This section also provides the beneath factors related to disclosures and governance measurements of banks under that is the burning question in the contemporary scenarios.

The lists of variables are shown in the table below:

Table 2: List of variables used in the Models

Variables	Description	Source
Dependent Variable:		
Z Score	Return on Assets (ROA) plus capital adequacy ratio (CAR), divided by standard deviation of last three-year ROA	Annual Report
Z Score 1	The ratio of equity to total assets is divided by the standard deviation of last three year ROA	Annual Report
Independent Variable:		
BDI	Bank Disclosure Index [See Appendix]	Author's Construction
CGI	Corporate Governance Index [See Appendix]	Author's Construction
BDI*CGI	Multiplication of bank financial disclosures and governance disclosures	Author's Construction
Control Variable:		
<i>Bank level:</i>		
CREG	Capital Regulation	Annual Report
BGROWTH	Bank growth rate	Annual Report
PROFIT	Bank profitability	Annual Report
PVB	Market value to book value of equity	Annual Report
TIER 1	Tier 1 capital	Annual Report
INEFFIC	Bank Inefficiency	Annual Report
BAGE	Bank Age	Annual Report
SMDEV	Stock Market Development	WDI
<i>Macroeconomic level:</i>		
GDPG	Yearly GDP Growth rate	WDI
INFLA	Yearly rate of inflation	WDI

3.4 Preliminary diagnosis

3.4.1 Unit Root Test

The panel data unit root tests have become popular during the recent years. It is argued that it is one way of obtaining more observations and solving the low power problem of unit root tests (Maddala, 2001). The most commonly used tests are the Levin-Lin (LL) tests, followed by the Im-Pesaran-Shin (IPS) test, and Maddala-Wu (MW) test. Consider $y_{it} = \rho y_{i,t-1} + e_t$, $i = 1, 2, \dots, N$ for N banks. The test for a unit root, say, for banks 1 is based on

$$H_0: \rho_1 = 1 \quad \text{vs.} \quad H_1: \rho_1 < 1$$

It is argued that this test has low power. The panel data LL unit root test is based on a test of

$$H_0: \rho_1 = \rho_1 = \dots = \rho_N = 1 \quad \text{vs.} \quad H_1: \rho_1 = \rho_1 = \dots = \rho_N < 1$$

In statistics, unit root test determines whether a variable is stationary or non-stationary and possesses a unit root. The null hypothesis is the presence of unit root and the alternative hypothesis is stationary. The **Table 03 (a) and Table 03 (b)** below showed that all the variables are stationary and fit for further processing.

Table 3(a): Levin-Lin-Chu Unit Root Test for Dependent variables

Ho: Panels contain unit roots; Hi: Panels are stationary

Variables	Statistic*	P-value
Overall Risk		
Z Score	-17.8062	0.0000
Z Score 1	-12.5766	0.0000
Z Score 2	-8.1859	0.0000

*Adjusted t value

Table 3(b): Levin-Lin-Chu Unit Root Test for Independent variables

Ho: Panels contain unit roots; Hi: Panels are stationary

Variables	Statistic*	P-value
Independent Variables		
BDI	-12.6049	0.0000
CGI	-19.9764	0.0000
BDI*CGI	-12.8173	0.0000
Control Variables		
Bank		
CREG	-12.4873	0.0000
BGROWTH	-6.0272	0.0000
PROFIT	-11.2241	0.0000
PVB	-8.6016	0.0000
TIER 1	-15.6382	0.0000
BAGE	-6.0272	0.0000
SMDEV	-6.3086	0.0000
GDPG	-4.5377	0.0000
INFLA	-7.1022	0.0000

*Adjusted t value

3.4.2 Test of Endogeneity

Heteroskedasticity Test: White										
H₀ : Errors are Homoskedastic					H₁: Errors are Heteroskedastic					
Obs*R-squared	310.3670	310.5663	312.4730	295.2218	341.9086	343.7895	336.9634	345.9817	345.1030	341.4773
Prob. Chi-Square (35)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Scaled explained SS	8639.938	8547.998	8817.162	7623.273	5540.815	6885.556	3102.369	21122.41	7191.240	3666.533
Prob. Chi-Square (35)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

3.4.4 Test of Auto-correlation

The error terms are said to be autocorrelated if and only if $Cov(u_i, u_j) \neq 0$, for $i \neq j$. The presence of serial correlation is tested through Breusch-Godfrey test. The idea of this test is originated from Lagrange multiplier that is why it is called LM test for serial correlation. Equations reject the null hypothesis that there is no serial correlation in the error term and are statistically significant ($p < 0.05$).

Table 6 : Auto-Correlation Test for Bank Risk, Disclosure, and Governance model

Breusch-Godfrey Serial Correlation LM Test										
H₀: There is no serial correlation					H₁:There is serial correlation					
	Overall Risk				Bank Disclosures			Corporate Governance		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Obs*R-squared	177.8235	168.3854	176.5220	181.4916	171.5967	182.8263	181.3231	191.5607	195.9621	190.9664
Prob. Chi-Square (2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

3.5 Data processing Methods

In the above diagnosis tests, advocates for the selection of specific method to show the effect and validity of the model based on the nature of the data.

Table 7: Selection of research method for the models

Diagnosis	Result	Research method
Is there any endogeneity problem?	Yes	Two-Stage Least Square (2SLS)
Is there any heteroskedasticity problem?	Yes	
Is there any autocorrelation problem?	Yes	

To run the final regression of the equation, the study Two-Stage Least Square (2SLS) method in data processing to reveal the accurate result.

4. Analysis and findings

The descriptive statistics are presented below which consists of the minimum, maximum, average and standard deviation values of 32 (32) commercial banks of Bangladesh from 2006 to 2016. The descriptive statistics of the risk taking banks are given below:

Table 8: Descriptive statistics: Dependent Variables

Risk	Proxy	N	Minimum	Maximum	Mean	Std. Deviation
Overall Risk	Z-score	346	-21.60	1344.00	75.57	138.56
	Z score 1	346	-0.18	8.69	0.45	0.84

Source: Author's Calculation

In the overall risk it is found that the Z score has a higher value deviation with an average value of 75.57 where the lowest and highest values are -21.60 and 1344 correspondingly. This suggests that some banks are unstable in maintaining their profit-to-capital adequacy ratio over time. Z Score 1, however, has an average value of 0.45 with a minimum -0.18 and a maximum range of 8.69. The risk deviation is comparatively less than the option which is 0.84. These three proxies are used to measure the tendency of the bank to be insolvent during the period and are considered as the overall risk of the banks. The survey considers the three major risks of banks as credit risk, market risk and liquidity risk as dependent variables.

Table 9: Descriptive statistics: Independent Variables

	N	Minimum	Maximum	Mean	Std. Deviation
BDI	346	0.52	1.00	0.88	0.11
CGI	346	0.70	1.00	0.96	0.07
BDI*CGI	346	0.50	1.00	0.85	0.13

Source: Author's Calculation

In this study, variables of interest are Bank Disclosure Index (BDI), Corporate Governance Index (CGI) and Multiple Impacts of Bank Disclosure and Corporate Governance (BDI * CGI). From the descriptive statistics (Table 09) it found that the average value of the Bank Disclosure Index (BDI) is 0.8 and the minimum and maximum values are 0.52 and 1.00 accordingly. However, the standard deviation of 11% indicates that most banks tried to follow the prescribed reporting standards with slight differences. In the case of the Corporate Governance Index (CGI), the minimum and maximum values are 0.70 and 1.00 with an average value of 0.96. This indicates that most banks perform well in reporting information related to the governance in their annual reports. In Bangladesh, the first corporate governance rules was published in 2006 and it was revised again in 2013. So, there is a very low

standard deviation which is 0.07. In the case of multiple effects of the Bank Disclosure Index and the Corporate Governance Index (BDI * CGI), it has been found that the minimum and maximum values are 0.50 and 1.00 respectively with an average value of 0.85. This indicates that some banks are lagging behind in reporting equally in financial and governance factors in their annual reports even though it is mandatory by the regulatory body. The standard deviation of multiple effects of BDI and CGI is 0.13.

Table 10: Descriptive statistics: Control Variables

	N	Minimum	Maximum	Mean	Std. Deviation
CREG	346	-17.58	20.92	11.34	3.03
BGROWTH	346	0.00	66.69	9.37	9.88
PROFIT	346	-13.52	6.05	1.29	1.40
PVB	346	-0.11	1.77	0.09	0.12
Tier 1	346	-31.47	88.65	8.96	5.60
BAGE	346	5.00	44.00	20.11	10.09
SMDEV	346	4.81	34.33	19.87	8.50
GDPG	346	5.05	7.11	6.28	0.59
INFLA	346	5.67	8.16	6.87	0.82

Source: Author's Calculation

Regulatory capital (CREG) is characterized by capital based on the risk that is governed by the rules set by the supervisor in a country. This capital is measured as the ratio of capital to risk-weighted assets and is also known as the risk-based capital adequacy ratio. It was found that the lowest and highest value of CREG is -17.58 and 20.92 respectively and the average value is 11.34. Most of the state-owned commercial banks keep their regular capital in low amount by violating of existing BASEL rules. According to Basel III, all banks should hold at least 10 percent of their risk-weighted capital (Tier 1 plus Tier 2 capital). It also found that Standard Deviation is 3.03 meant that not all banks were paying equal attention to maintaining equal capital adequacy ratios.

Bank growth (BGROWTH) means increase in assets during this period. It has been observed that the minimum and maximum values of asset growth are 0.00 and 66.69 with an average value of 9.37. The figure indicates that the average growth of banks during this period is not significant whether a few banks are in a good position with significantly higher growth rates. This creates an unequal competition in the market and persuades poor performers to take extravagant risks by matching the standards of the loan recipients. The deviation of the growth events is 9.88 which clusters the bank's good performers and bad performers in the mindset of the investors and reflects the consequences on the share price.

The profitability of banks (PROFIT) is calculated by net profit before tax divided by total assets which actually refer to the return on average assets. It was found that the lowest and highest values are -13.52 and 6.05 whereas the average value is 1.29. The result indicates that a few banks are doing very poorly during periods and waiting for liquidation. The average value reflects not only the lower limit, but also the upper limit; both are in extreme positions. The standard deviation is 1.40.

In the case of Market to Book Value of Equity (PVB) it is seen that the lower and upper limits are -0.11 and 1.77 with an average value of 0.09. This is not good for the banking industry as well as the country. This signals to the concerned parties that banks are losing their image in the market by lowering their prices. However, the Standard Deviation is 0.12.

TIER 1 capital is also called the core capital of banks according to BASEL rules. Statistics show that the lowest and highest values are -31.47 and 88.65 with an average value of 8.96. Serious violations of the BASEL rules were found in this case. This proves that the governance system is not efficient in the banking customs and it is inconsistent. Over this Period, the deviation is 5.60.

The year of experience refers to the age of the bank (BAGE) with the time calculated from their inception. It was found that the minimum and maximum age ranges are 5 and 44 with an average value of 20.11. This indicates that the data collected in 2006 and the minimum age of banks was five years and the limitation period was 2016 and the maximum value here was 44. Moreover, in the data structure, both young and old banks are considered to be given equal importance as both banks perform in the same situation.

However, in the case of stock market development (SMDEV), the figure produced by stock market capital is the percentage of gross domestic product (GDP). The lowest and highest values were found to be 4.81 and 34.33 with an average value of 19.87. It was revealed that the capital market is not strong enough to earn more and it could make a higher contribution to the economy. The standard deviation is 8.50 means that the contribution of industry is not increasing continuously during this period.

Gross Domestic Product (GDP) is an indicator of a country's economic growth. It has been observed that the minimum and maximum values of the period are 5.05 and 7.11 with an average value of 6.08. Although some systematic and unsystematic risk is associated with this macroeconomic variable, the growth position is still not good. In the case of inflation, the lowest and highest values are 5.67 and 8.16 with an average value of 6.87. It point out that there is inflationary difficulty in this economy even though currency devaluation is very regular in third world country. Here, the Standard Deviation is 0.82.

4.1 Univariate Analysis

Table 11 shows the results of correlation between the variables that have been used for this study. Pearson's correlation coefficient was used to show the degree of relationship. This correlation matrix demonstrates that BDI, CGI, BDI*CG, CREG, INEFFIC, TIER 1, and GDPG are positively and considerably related with Z-score which are .036,.082, .066, .150, .151, .060, .049 respectively and considered significant at 1% level. On the contrary, BGROWTH, PVB, and INFLA are significant but negatively connected to Z-score with coefficients of -.021, -.027 and -.039 accordingly. Conversely, Z score 1 is positively and significantly related to BDI, CGI, BDI*CG,CREG, BGROWTH, TIER 1, and GDPG with .061, 0.96, .092, .131, .001, .062, and .042 respectively at 1% level of significance. To conclude, it is found that bank disclosure index and corporate governance index are highly correlated with multiple effects of bank disclosure and corporate governance with coefficients of .909 and .648 and also significant at 1% level. It suggests that there is a multicollinearity problem and to construct the model considering each variable separately.

Table 11: The relationship between disclosures and corporate governance with bank risk

	Z-score	Z score 1	BDI	CGI	BDI*CG	CREG	BGROWTH	PROFIT	PVB	Tier 1	GDPG	INFLA
Z-score	1	.948**	.036	.082	.066	.150**	-.021	-.024	-.027	.060	.049	-.039
Z score 2		1	.061	.096	.092	.131*	.001	-.019	-.011	.062	.042	-.040
BDI			1	.276**	.909**	-.034	.244**	-.085	.074	-.040	-.027	.063
CGI				1	.648**	.056	.206**	-.086	.031	.042	-.060	.017
BDI*CG					1	-.004	.282**	-.109*	.070	-.014	-.042	.047
CREG						1	.138*	.391**	.130*	.515**	.016	-.069
BGROWTH							1	.006	.018	.066	.149**	-.098
PROFIT								1	.349**	.354**	-.245**	.067
PVB									1	.101	-.150**	.039
TIER 1										1	-.003	.048
GDPG											1	-.130*
INFLA												1

** Correlation is significant at the 0.01 level (2-tailed); * Significant at the 0.05 level (2-tailed)

4.2 Multivariate Analysis

The overall risk model is decomposed by the Z score and the income volatility with support to the previous work of Setiyono and Tarazi (2014), Cordella and Yeyati (1998), Fischer (1999) and Neir and Baumann (2006). The consecutive studies established that bank disclosure is positively associated with Z scores and negatively effects on income volatility.

In Model I, it is found that financial disclosures have a positive impact on overall bank risk and are statistically significant ($P < 0.01$). It indicates that the risk-taking

behavior of banks demands for more disclosures for the concern parties for their prudent decisions. It is also found that corporate governance index (CGI) also positively changes with the riskiness of banks. The banks which are vulnerable in position and aggressively taking the risk should strengthen their governance system to tackle unexpected occurrences. Good governance system and sufficient disclosure can reduce the agency problem (Samaha and Khlif, 2016; Scott, 2012; Al-Akra et al., 2010; Samaha and Stapleton, 2009; and Jensen & Meckling, 1976). It is also found that among the control variables regulatory capital (BREG), Bank growth rate (BGROWTH), and gross overall bank th rate (GDPG) have positive impact on bank risk whereas return on average assets (PROFIT), price to book value ratio (PVB), tier 1 capital ratio (TIER 1), and inflation rate (INFLA) have negative impact on bank overall risk. Capital adequacy ratio (CREG) has positive effect on risk (Z Score) and also statistically significant ($P < 0.01$). At present, the minimum capital adequacy is 10% which is promulgated by the central bank circular in 2007. However, few banks overlook the rules and keep their CREG less the stipulated rate which increases the risk of the bank. The perceived result is supported by the results of Shrieves and Dahl (1992), Blum (1999), Rime (2001), Lin et al. (2005), Altunbas et al. (2007) but opposite to the results of Jacques and Nigro (1997), Zhang et al. (2008), Agoraki et al. (2011), Lee and Hsieh (2013), Lee and Chih (2013). Bank assets growth has a coefficient of 0.0001 that impact on risk but is statistically insignificant. The findings are supported by the concept of “Too-Big-To-Fail (TBTF)” by De Nicolo (2000) in the ground that banks with higher assets or in the larger volume are positively associated with risk due to lower control. It is also found that the profitability of banks which is proxy by ROA has a negative effect on bank risk (Z score) at slope -0.1219 and is significant ($p < 0.01$). In accordance to our expectation, there is a significant negative relation between risk (proxied by Z Score) and profitability which supports the findings of Kwan and Eisenbies (1997), Lin et al. (2005), Zhang et al. (2013) but does not support the findings of Naceur and Omran (2011). The significant relation indicates that banks with low profitability take more risk. Market to book value of equity (PVB) has a negative impact on risk with the coefficient of -0.1234 which contradicts the findings with Setiyono and Tarazi (2014). In the case of TIER 1 capital ratio, the coefficient is -0.0044 which indicates that the banks whose keep more capital are lower chance of liquidation. In macroeconomic variable, gross domestic product growth rate (GGDP) has a positive impact on bank risk which is 0.0965 and is significant at 1% level. Lee and Hsieh (2013) argued that when the inflation is high, customers may be charged more by banks. Due to changes in the structure or the volume of loan demand, banks’ capital and credit risk choices may be affected by GDPG (Hussain and Hassan, 2005). GDPG is assumed to be significant because Ayuso et al. (2004) and Jiménez and Saurina (2006) shown that due to cyclical factors the credit risk and capital have a tendency to be determined. On the other hand, inflation rate (INFLA) is negatively associated with bank risk and

are significant ($p < 0.01$) that contradicts with the studies conducted by Hussain and Hassan (2005). Chaibi and Ftiti (2015) suggest that the relationship between inflation and risk can be positive or negative.

In the case of Model II, III & IV, the response of the control variables showing the effect on the same direction. It also found that bank disclosures index (BDI), Corporate governance index (CGI) and the multiple effect of BDI and CGI are positively associated with bank risk and are statistically significant ($P < 0.01$). The findings support that the risky banks needed to provide more disclosures relating to statements and governance system so that the user might be aware of the position of banks and can take their prudent decision.

Table 12: Effect of bank disclosures and governance on Bank Risk: Dependent (Z Score)

	Model I	Model II	Model III	Model IV
BDI	1.0209*** (0.3945)	1.0594*** (0.3842)		
CGI	0.2042 (0.3860)		2.7460*** (0.5909)	
BDI*CGI				0.8020*** (0.3177)
CREG	0.0809*** (0.0126)	0.0822*** (0.0121)	0.0600*** (0.0100)	0.0762*** (0.0107)
BGROWTH	0.0001 (0.0037)	0.0007 (0.0039)	-0.0016 (0.0032)	0.0004 (0.0041)
PROFIT	-0.1219*** (0.0500)	-0.1239*** (0.0490)	-0.1240*** (0.0460)	-0.1233*** (0.0499)
PVB	-0.1234 (0.1458)	-0.1161 (0.1393)	-0.2362 (0.1894)	-0.1477 (0.1613)
TIER 1	-0.0044*** (0.0014)	-0.0043*** (0.0014)	-0.0063*** (0.0016)	-0.0049*** (0.0015)
GDPG	0.0965*** (0.0240)	0.0925*** (0.0263)	0.1107*** (0.0253)	0.0932*** (0.0268)
INFLA	-0.0785*** (0.0205)	-0.0762*** (0.0183)	-0.0689*** (0.0175)	-0.0728*** (0.0150)
CONST	1.9058*** (0.5202)	2.0574*** (0.5743)	0.5023*** (0.7129)	2.3634*** (0.4979)
No. of Banks	32	32	32	32
Observations	346	346	346	346
Adj. R- Squared	44.98%	45.05%	41.47%	44.93%
F -Value	7.9278***	8.1260***	7.3501***	7.8791***
Hansen J stat. (overid test)	0.3424	0.3434	0.3311	0.1983

(***) indicates significance at 1% level; (**) indicates significance at 5% level and (*) indicates significance at 10% level. The reported p-values are all two-tailed except intercept. All variables are defined in previous sections.

Z Score 1 is calculated by equity to total assets divided by standard deviation of return on assets (Setiyono and Tarazi, 2014). The study found that bank disclosure index (BDI), corporate governance index (CGI) and the multiplier effects of BDI and CGI have a positive impact on bank leverage risk. In fact, the use of debt in the capital structure is called the leverage. This is proved that the proper mixture of debt strengthen the capital structure and increase the firm value due to the tax shield (MM Hypothesis, Proposition II)¹. However, the aggressive behavior of banks by taking higher debt policy, vandalize the capital structure and increase risk. The study found the same phenomena concerning bank's disclosure and governance policy. It showed that bank disclosure index (BDI) in the Model V and VI have a positive impact on bank leverage risk and are statistically significant ($P < 0.01$). It indicates that if the leverage risk of bank increase the disclosure of banks should be increased and also published to the concerned parties. On the same ground, corporate governance index (CGI) showed a positive effect on bank risk mentioning in the Model V and VII. It also found that the multiplier effect of bank disclosures and corporate governance (BDI*CGI) affect the leverage risk in a positive direction and even statistically significant at 1% level. That means banks which hold higher risk must provide adequate information consisting of financial and governance structure to the users for their decision making. Otherwise, the investor will lose their money in investing a risky project and will negatively affect the capital market of the country. In bank level variable, it is found that only the capital ratio (CREG) has a positive impact on leverage risk but BGROWTH, PROFIT, PVB, and TIER1 have negative effect. In macroeconomic variable, GDPG has positive and significant ($P < 0.01$) effect on bank leverage risk whereas INFLA has negative effect on risk and also significant at 1% level.

Table 13: Effect of bank disclosures and governance on Bank Risk: Dependent (Z Score 2)

	Model V	Model VI	Model VII	Model VIII
BDI	3.4693*** (0.5690)	3.6084*** (0.4106)		
CGI	0.2850 (0.4099)		7.2165*** (0.7921)	
BDI*CGI				2.5766*** 0.2514
CREG	0.0726*** (0.0145)	0.0746*** (0.0131)	0.0475*** (0.0169)	0.0601*** 0.0111

¹Modigliani–Miller was the proponent of capital structure irrelevance theory published in their first paper in 1958 where they advocated that levered firms get more advantages due to tax shield. The proposition II (with taxes) of the theorem showed that:

$$r_E = r_0 + \frac{D}{E} (r_0 - r_D) (1 - T_C)$$

	Model V	Model VI	Model VII	Model VIII
BGROWTH	-0.0107*** (0.0040)	-0.0108*** (0.0040)	-0.0090*** (0.0036)	-0.0103*** 0.0033
PROFIT	-0.0689 (0.0516)	-0.0689 (0.0510)	-0.0746 (0.0693)	-0.0705 0.0473
PVB	-0.3087** (0.1570)	-0.3026** (0.1535)	-0.4956** (0.2599)	-0.3724** 0.1656
TIER 1	-0.0054*** (0.0016)	-0.0052*** (0.0017)	-0.0104*** (0.0027)	-0.0069*** 0.0019
GDPG	0.1091*** (0.0268)	0.1060*** (0.0283)	0.1350*** (0.0411)	0.1137*** 0.0261
INFLA	-0.0715*** (0.0158)	-0.0711*** (0.0158)	-0.0288* (0.0170)	-0.0550*** 0.0144
CONST	-5.4457*** (0.4180)	-5.3039*** (0.5300)	-9.1473*** (1.1043)	-4.2791*** 0.3993
No. of Banks	32	32	32	32
Observations	346	346	346	346
Adj. R- Squared	49.90%	49.74%	38.55%	49.07%
F -Value	9.1273***	9.3557***	7.5554***	9.0343***
Hansen J stat. (overid test)	0.8853	0.8840	0.9765	0.9784

(***) indicates significance at 1% level; (**) indicates significance at 5% level and (*) indicates significance at 10% level. The reported p-values are all two-tailed except intercept. All variables are defined in previous sections.

In the reverse position, bank disclosure index (BDI) is working as a dependent variable where the proxies of overall risk are justified based on statistical criteria. The study showed that the independent variables Z score and Z score 2 have a negative impact on bank disclosures and are statistically significant at 5% level. It indicates that the more risky banks regarding default risk, asset risk, and leverage risk, disclosure less information to their users and oppress the prudent users. In bank level variable, it is found that corporate governance index (CGI) negatively affect the bank disclosures. That means, banks with a higher level of governance practice gain the trust of the principals (Shareholders) to the agents (Management) and can disclosure less in the annual reports. Another, bank-level variables, bank growth (BGROWTH) and age of bank (BAGE) have a positive effect and also significant at 1% level. The industry level variable stock market development (SMDEV) is positively affecting the bank disclosures because the efficient market demands more disclosure to help the investors in on time decision. In macroeconomic variable, GDP growth rate (GDPG) and inflation rate (INFLA) significantly affect the disclosures. Higher GDP growth has positive effect whereas inflation has negative consequences on bank disclosures.

Table14: The effect of Overall risk on bank disclosures

	Model IX	Model X
Z Score	-0.00005** (0.00002)	
Z Score 1		-0.00726** (0.00316)
CGI	-0.13323*** (0.05039)	-0.13372*** (0.05044)
BGROWTH	0.00107*** (0.00017)	0.00107*** (0.00017)
BAGE	0.01782*** (0.00108)	0.01776*** (0.00109)
SMDEV	0.00161*** (0.00023)	0.00167*** (0.00022)
GDPG	0.00907*** (0.00203)	0.00882*** (0.00203)
INFLA	-0.01882*** (0.00170)	-0.01868*** (0.00174)
CONST	0.67153*** (0.03630)	0.67235*** (0.03631)
No. of Banks	32	32
Observations	346	346
Adj. R ²	83.92%	83.80%
F value	48.3712***	47.9457***
Sargan test	0.8002	0.7332

(***) indicates significance at 1% level; (**) indicates significance at 5% level and (*) indicates significance at 10% level. The reported p-values are all two-tailed except intercept. All variables are defined in previous sections.

In the Model XI and XII confirm the previous analysis that higher risk occurred in the case of lower governance systems and validated the negative association. In this study, it is found that overall bank risk, represented by Z score, and Z score 1; has negative effect on corporate governance index (CGI). In bank level variable, bank disclosures negatively affect the governance because strong governance system ensures the shareholders in maximum utilization of their resources with minimum cost and achieve the credibility of the minimum disclosure. Besides, other bank level variable BGROWTH, BAGE, and industry level variable SMDEV have a positive impact on corporate governance. In macroeconomic variable, GDPG has a positive

impact on corporate governance and also significant at 1% level, but INFLA has negative effect and too significant ($P < 0.01$).

Table 15: The effect of Overall Risk on Corporate Governance Disclosures

	Model XI	Model XII
Z Score	-0.00002*** (0.00001)	
Z Score 1		-0.00252* (0.00144)
BDI	-0.08719* (0.04977)	-0.08565* (0.04941)
BGROWTH	0.00115*** (0.00029)	0.00116*** (0.00029)
BAGE	0.00794*** (0.00112)	0.00785*** (0.00111)
SMDEV	0.00044*** (0.00011)	0.00047*** (0.00011)
GDPG	0.00569*** (0.00139)	0.00560*** (0.00135)
INFLA	-0.01493*** (0.00203)	-0.01504*** (0.00203)
CONST	0.91550*** (0.02264)	0.91590*** (0.02242)
No. of Banks	32	32
Observations	346	346
Adj. R ²	59.81%	59.94%
F value	14.5122***	14.4952***
Sargan test	0.9422	0.9354

(***) indicates significance at 1% level; (**) indicates significance at 5% level and (*) indicates significance at 10% level. The reported p-values are all two-tailed except intercept. All variables are defined in previous sections.

The adjusted R² is a better measure of the variance explained by the model. This is because it gives an idea of how much variance in the response variable would be accounted for if the model had been derived from the population (Field, 2009).

5. Conclusions

The increasing trends of establishing new banks have taken keen attention and create a stiff competition in the financial market of Bangladesh. It is remarkable that the performance of the commercial banks is devastating due to the loss of public confidence and lack of good governance practice. Banks have regularly published annual reports ignoring the relevance, reliability, and the quality of information. The distorted information misguided the investors or depositors that ultimately affect the market share price. Moreover, banks are willing to take extravagant risk by concealing relevant information to the public that induce bad governance practice. Financial disclosures and good governance practice not only minimize risk taking behavior of banks but also create a good image in the public's mind that ultimately boosting the bottom line figure of the bank, i.e. profitability.

The study advocated that financial transparency (disclosure) and governance practice can jointly act to tackle the rapid growth of bank risk. The bank risk, most debated issue in contemporary business research, should address properly by the regulatory authority, the policy makers as well as management team to strengthen the economic condition of Bangladesh. The stable market condition of Bangladesh can be a milestone achievement in the international arena.

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Appendix

A-1: Composite Disclosure Index

The bank composite disclosure index followed the study conducted by Neir and Baumann (2006) as a transparent disclosure index. There are four (4) broad heads of disclosure areas with seventeen (17) individual line items. For the simplicity of the calculation, the study took “1” for disclosure and “0” otherwise. Moreover, the sub-index S6, S7, and S13 put values in three different categories, like “2” for detailed breakdown, “1” for disclosure and “0” for non-disclosure. Besides, banks who are reporting S6, S7, and S13 will get “1” or otherwise “0”. Finally the sum of all values is 21 of 17 disclosure items. The simple average of the index will be calculated by following way:

$$\text{Bank Disclosures Index (BDI)} = \frac{1}{21} \sum_{i=1}^{17} S_i$$

Bank Disclosure indices			
	Sub-index	Categories	
Assets			
Loans	s1: Loans by maturity	Sub three months, three to six months, six months to one year, one to five years, more than five years	
	s2: Loans by type	Loans to municipalities/government, mortgages, HP/lease, other loans	
	s3: Loans by the counterparty	Loans to group companies, loans to other corporate, loans to banks	
	s4: Problem loans	Total problem loans	
	s5: Problem loans by type	Overdue/restructured/other non-performing	
	Other earning assets	s6: Securities by type	Detailed breakdown: Treasury bills, other bills, bonds, CDs, equity investments, other investments
		s7: Securities by holding purpose	Coarse break-down: Government securities, other listed securities, non-listed securities, Investment securities, trading securities
Liabilities			
Deposits	s8: Deposits by maturity	Demand, savings, sub-three months, three to six months, six months to one year, one to five years, more than five years	
	s9: Deposit by type of customer	Banks deposits, municipal/government Other funding	
	s10: Money market funding	Total money market funding	
	s11: Long-term funding	Convertible bonds, mortgage bonds, other bonds, subordinated debt, hybrid capital	
Memo lines			
	s12: Reserves	Loan loss reserves (memo)	
	s13: Capital	Total capital ratio, tier 1 ratio, total capital, tier 1 capital	
	s14: Contingent liabilities	Total contingent liabilities	
	s15: Off-balance sheet items	Off-balance sheet items	
Income statement			
	s16: Non-interest income	Net commission income, net fee income, net trading income	
	s17: Loan loss provisions	Loan loss provisions	

*The categories chosen reflect the presentation in the annual report.

A-2: Corporate Governance Index

The Corporate Governance Index (CGI) is calculated based on the Corporate Governance compliance items provided by Bangladesh Securities and Exchange

Commission (BSEC) notification in July 03 2012 (SEC/CMRRCD/2006-158/129/Admin/43). There are 119 items with 7 broad heads. The study used simple average technique to calculate the Corporate Governance Index (CGI). The composite index is determined based the the compliance basis where “1” indicates CG compliance and “0” for non-compliance. The summary of the compliance items are given below:

Summary of CG Compliance Items

S.N.	Sub Index	Disclosure Items
1	Board of Directors	49
2	Chief financial officer (CFO), Head of Internal Audit and Company Secretary (CS)	2
3	Audit Committee	42
4	External/Statutory Auditors	9
5	Subsidiary Company	5
6	Duties Of Chief Executive Officer (CEO) And Chief Financial Officer (CFO)	4
7	Reporting and Compliance of Corporate Governance	2
Total Items		113

