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Firm Fundamentals, Corporate Life Cycle and Stock Market Crash: Evidence from an Emerging Economy

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Abstract

The main purpose of this study is to investigate the impact of firm fundamentals on the propensity of stock market crash. More specifically, this study shows whether there is any association between the movements of share prices and firms' accounting components along with other determinants using listed companies in Dhaka stock exchange (DSE). To examine the conjecture, the present study conducts an in-depth analysis based on a sample of DSE listed companies from 2005 to 2011. Results of the study show that the firm's profitability is highly correlated with the stock price which indicates that shareholders emphasize, mostly, the firm's profitability before making their investment decisions. However, we do not find any association between share price and other accounting components in this study, which is contradictory with the extant capital market research. Further, the present study presents the impact of firm life cycle stages on the association between accounting components and stock prices. Overall, this paper contributes to literature of capital market research by providing empirical evidence. Nevertheless, this paper contributes to the policy making regarding capital markets and it provides a set of recommendations to attenuate the possibility of future capital market crash in emerging economies.

Keywords: stock market crash, firm fundamentals, developing market, life cycle stage, market return, return volatility.

I. INTRODUCTION

A large number of studies investigate issues relating to stock market crash (e.g., Roll, 1988a; King & Wadhwani, 1990; Malliaris & Urrutia, 1992; Islam & Khaled, 2005; and Mukit & Shafiullah, 2012). Some of them focuses on the consequences of stock market crash, and other studies investigate the effects of stock market crash on market returns. Mostly above studies concentrated on US market, and other developed countries' stock markets (Wang et al., 2009). More importantly, major stock market crashes happened globally in October 1987 and more than 19 stock markets faced severe crises in 1987 (Lauterbach & Zion, 1993). Recently, some research focuses on the moderating role of COVID-19 pandemic on stock market crash risk in different jurisdictions (such as, Hanspal et al., 2021; Liu et al., 2021; and Mahata et al., 2021). For instance, Mazur et al. (2021) document that stock market crash risk of S&P 500 in 2020 is highgly triggered by COVID-19 as authorities of business organizations imposed strict restrictions on population and they were compelled to shut-down their business operations. Moreover, the unemployment rate, in USA, was more than 20% in 2020.[1] Similarly, Liu et al. (2021) document via empirical evidence that pandemic has increased stock market crash risk in China. However, none of the prior studies focuses on identifying the factors which can be attributed as responsible factors for a stock market

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[1] https://people.duke.edu/~charvey/Audio/COVID/COVID-Harvey.html.

crash. This study fills this gap by investigating the factors which are responsible for stock market crash which happened in 2010 and 2011 at Dhaka stock exchange (DSE), in Bangladesh.

Since 1996 DSE has faced significant crises multiple times, the notable crisis happened in 1996 and again in the period of 2010 and 2011. The severity of such a capital market crisis has been covered in many national and international newspapers, dailies and journals. For instance,

> "The sharp drop in the benchmark index - which had risen about 95 per cent over 2010 until the decline began, attracting millions of first-time investors - is one of the biggest issues facing the government." (The Financial Times, 11 January 2011, Dow Jones).[2]
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> "In the past three years, the number of retail investors has risen from 500,000 to about 3.5 million, many of whom do not understand stock market volatility and are ill-prepared for such a sharp fall." (The Financial Times, 11 January 2011).[3]
>
> "The Dhaka stock exchange general index rose 80% in 2010 but has fallen several times over the past few weeks. It tumbled 7.8% Sunday and 9% in early trading Monday, prompting an indefinite trading suspension." (The Wall Street Journal, 11 January 2011).[4]

The above news shows the severity of the crisis in Dhaka stock exchange. Millions of investors lost their capital in the market. A growing number of literatures investigate the impact of stock market crashes on the economy, GDP, and other dimensions. Such as, some research investigates the impact of stock market crash on earnings management (Francis et al., 2016; Neifar & Utz, 2019), and earnings quality (Lara et al., 2009; Isidro & Dias, 2017). Another stream of research investigates the impact of dividend policy on stock return (Suwanna, 2012), impact of stock market crash on different industries including technology (Park & Mezias, 2005), wealth of US household (Kim & Hanna, 2016), mental health (McInerney et al., 2013). However, much less is known about the reasons for such a stock market crisis. This study fills this research gap.

This study is primarily motivated by several premises. First, none of the prior research investigates the reasons for DSE crash till so far. Secondly, DSE is the country's primary capital market where millions of investors invest their capital and currently a large number of foreign investors are also investing in DSE. It is the responsibility of regulatory bodies to protect the faith of all types of investors. Foreign investors get information about their investee company from their respective company's annual reports. If the market does not respond as per financial statements, people will make the wrong decision and gradually the market will move unusually leading to a crash. Keeping this sentiment, this study provides empirical evidence on the impact of firms' fundamentals on their stock returns. Thirdly, we believe this study is the first study investigating the association between firm level fundamentals and stock market crash which will also help regulatory bodies to take precautionary measures to mitigate the possibility of future stock market crash.

To test the proposition, this study uses a sample of listed companies in DSE. Results of analysis show that stock returns are highly associated with the firm's

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[2] https://www.ft.com/content/3768183c-1ce5-11e0-8c86-00144feab49a.

[3] https://www.ft.com/content/3768183c-1ce5-11e0-8c86-00144feab49a.

[4] Bangladesh market drop sparks riot: https://www.wsj.com/articles/SB10001424052748704428004576074972437070008?mod=Searchresults_pos5&pag =1.

profitability. Those companies were making losses or negative profit have suffered loss in those periods and they eventually exacerbate the March of stock market crash. Levered firms were in severe condition compared to equity funded companies. Firms with lower liquidity also suffered significantly compared to other firms. To further extend our analysis a new dimension is added in this paper i.e. inclusion of the corporate life cycle (CLC) as an experimental variable. There are several reasons for adding CLC in this paper. Such as, prior research shows that CLC has significant impact on firm's profitability and propensity to decline (Koh et al., 2015; Hamers et al., 2016; and Habib & Hasan, 2019). Moreover, firm's liquidity, funding cost, and profitability are also highly connected with the firm's stage in its life. Taking this tension, CLC is added in this study. Results of CLC inclusion show that stock returns do not move with the corporate life cycle stages which is surprisingly different compared to global literature. There can be several interpretations in this regard. For instance, such a crisis could have been triggered by the presence of large number of speculative people who were not informed investors. Secondly, investors were not well informed about their investee companies. Thirdly, firms could have manipulated their earnings which were not representing themselves properly in the capital market. Fourth, there might be some other limitations from regulatory bodies that is they could have taken some timely initiatives to mitigate such crisis in capital market. Finally, investors' entry to market should have been controlled by compliance with strict policies such as business literacy, basic economic knowledge, market movements understanding etc.

This study has several contributions to literature and a number of policy implications. First, this study contributes to literature of capital market research by providing empirical evidence of the impact of firm level fundamentals on stock market return in South Asia, namely Dhaka stock exchange in Bangladesh. Secondly, this research shows the importance of investors' understanding about business, economy and environment before entering into capital market. Thirdly, this study will help regulatory bodies in their policy regarding capital market. For instance, Bangladesh securities and exchange commission (BSEC) can take initiatives to amend/modify their ordinance, in future, to incorporate measures to control speculative attitude of investors which will reduce the possibility of future stock market crash. Fourth, regulatory bodies can mandate minimum qualifications for investors so as to make capital market as healthy as it is the single largest place of raising capital in any country. It is believed that such a mandate will demotivate ill-minded people or at least will reduce the tendency of speculation in the capital market. Finally, this study will be useful for all categories of investors including institutional investors, individual investors and foreign investors for understanding the importance of firms' fundamentals and their audited public reports to make their well-informed economic decisions.

II. DHAKA STOCK EXCHANGE: HISTORY, CONTRIBUTION AND MARKET CRASH

This section discusses the Dhaka stock exchange (DSE) and its evolution since inception to till day writing this paper. DSE was established in 1954 although its necessity was recognized by the east Pakistan government in early 1952. Dhaka stock exchange was incorporated with an authorized capital of RS. 3,00,000 (for 150 shares). Later, authorized capital of DSE was increased to RS. 5,00,000 (for 250 shares) in 1964. Formal trading of DSE was started in 1956 at Narayanganj although it was incorporated in

1954.[5] Later, the office of DSE was shifted to Dhaka (capital of Bangladesh) in 1958 and till now it is in its own building. However recently, government has taken initiative to relocate its operation from Mothijheel to Nikunj (in Dhaka) where currently main operations are being done. Since its inception, main functions of DES include listing of companies, providing automated services for trading, settlement of trading, gifting shares or granting approval for transactions, market administration, market surveillance and market control, work as watchdog of listed companies, work as centre of investors grievance cell, work as guardian to protect investors' fund, work as platform to provide earnings or price sensitive information to current and potential investors, and publishing monthly or quarterly business or monthly review of capital market.[6]

In this market, diverse investors can participate and trade in this market. Moreover, there are separate arrangements for foreign and non-resident Bangladeshi people as well. For instance, as per DSE guidelines, foreign investors are defined as those foreigners living in Bangladesh or abroad willing to invest in Bangladesh capital market. Bangladesh provides a very convenient and friendly environment for foreign investors. Currently there is no capital gains tax on individual (NBR, 2023). On the other hand, non-resident Bangladeshi are those having foreign country's permanent resident or with valid work permit. In case with foreign passport holder, they need to have just an endorsement from the Bangladeshi Embassy in their local country. Currently government/authority is providing a number of incentives for NRB investors including 10% quota for all initial public offerings (IPOs), no capital gains tax on individual, similar tax assessment like local Bangladeshi. Moreover, 10% tax rebate is allowed as investment allowance on security investment (NBR, 2023).

Compared to stock market in developed countries, stock market in emerging countries can be categorised with lower investor protection, concentrated ownership (Mobarek & Mollah, 2005; Mobarek et al., 2008). For instance, prior research defined them as with lower volume and frequencies of trading, and ease of manipulation by few large players in the market (Islam & Khaled, 2005). Table 1 shows the key statistics of DSE from 2005 to 2020. It shows that trading volume was gradually increasing even it was more than 112 percent in 2010, however, it has sharply dropped into -60% in 2011. This sudden decline was really unexpected and results in severe panic hit on millions of small investors of DSE. Figure (1) shows the trends of DSE general index (DGEN) for the periods from December 2010 to March 2011. It shows that sharp decline happened in this period which made a historical drop in Bangladesh capital market.

Table 1
Key Statistics of Dhaka Stock Exchange (2005-2020)

Year	Total Trade	Change (%)	Volume	Cha-nge (%)	Total Value in Taka (mn)	Cha-nge (%)	Market Capitali-zation in Taka (mn)	Cha-nge (%)
2005	9628.1	-	3423827	-	251.4	-	218560.3	-
2006	13340.6	38.56%	3713346	8.46%	290.4	15%	246932.3	13%
2007	34452.5	158.25%	11900000	220.47%	1362.3	369%	506609.9	105%
2008	63534.5	84.41%	19400000	63.03%	2818.4	107%	899808.7	78%
2009	115900.6	82.42%	32700000	68.56%	6046.3	115%	1246996.0	39%
2010	214034.2	84.67%	69600000	112.84%	16434.1	172%	2748810.0	120%

[5] Narayangonj is one of the cities in Bangladesh. Primarily DSE started its operation in Narayangonj and continued its operation till they moved to Dhaka, the capital of Bangladesh.

[6] History of DSE is available at: https://www.dsebd.org/ilf.php.

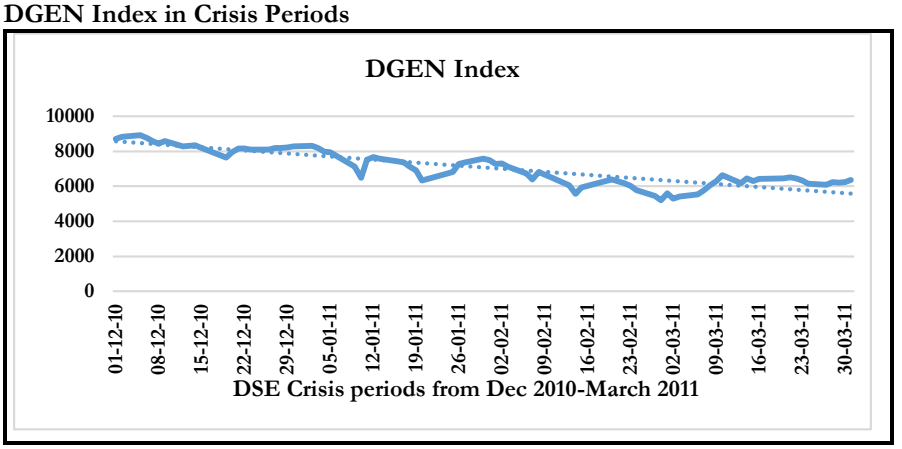
To be continued Table 1.

Year	Total Trade	Change (%)	Volume	Change (%)	Total Value in Taka (mn)	Change (%)	Market Capitalization in Taka (mn)	Change (%)
2011	143243.3	-33.07%	72200000	3.74%	6642.2	-60%	2799341.0	2%
2012	109885.8	-23.29%	91100000	26.18%	4206.2	-37%	2461740.0	-12%
2013	103816.5	-5.52%	96600000	6.04%	4003.1	-5%	2463538.0	0%
2014	107879.0	3.91%	109000000	12.84%	4993.8	25%	3026202.0	23%
2015	105138.8	-2.54%	107000000	-1.83%	4227.0	-15%	3213590.0	6%
2016	114269.8	8.68%	145000000	35.51%	4944.3	17%	3190970.0	-1%
2017	138228.5	20.97%	265000000	82.76%	8748.4	77%	3895621.0	22%
2018	123462.0	-10.68%	139000000	-47.55%	5510.9	-37%	3942490.0	1%
2019	126318.4	2.31%	138000000	-0.72%	4803.4	-13%	3858645.0	-2%
2020	136418.0	8.00%	235000000	70.29%	6489.5	35%	3576229.0	-7%

Source: DSE library (accessed as on 04 March 2021).

Figure 1

DGEN Index in Crisis Periods



III. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Stock market crisis research is no longer new to researchers especially for accounting and finance academics. A large number of research have already been conducted, but majority of those are relating to US stock market crisis of 1987 (Edwards, 1988; Roll, 1988b; Mitchell & Netter, 1989; Limmack & Ward, 1990; White, 1990; Blackley, 1992; Pope & Howe, 1992; Arshanapalli & Doukas, 1993; Koch & Koch, 1993; Tang & Mak, 1995; Najand, 1996; Yang & Bessler, 2008; Cagan, 2019; and Rai et al., 2022). This is because there were eight times US stock market faces severe crises in different times since October 19, 1987, to September 2001 (Wang et al., 2009). All of those crises were identified with a decrease of index by 5% or more. Surprisingly, of eight, four crashes happened in October (Wang et al., 2009). In providing some signals, Levy (2008) identified some conditions which leads to stock market crash, such as 1) random information flow which is very common in capital market, 2) strong conformity effects, and 3) large number of investors are homogenous. In fact, the author refers to the 1987 US stock market crash as spontaneous social transition phase. In addition, the author explains that the larger the investors participation, the greater the conformity. There will be an equilibrium situation. The author also showed that even if there is lower participation, there will be another equilibrium situation. Ultimately, multiple equilibriums lead to stock market crash. This is because every crash has unusual volatility

in the market which can be taken as signals for the next stock market crash. However, all of stock crash related literature focus on either to identify the reasons for crash (Roll, 1988a; King & Wadhwani, 1990; and Malliaris & Urrutia, 1992) or investigated the co-movements of markets during and after crashes (e.g., Meric et al., 2001). But it is not yet clear why stock markets face such a severe crisis, which is yet to be explored. Whether stock market falls due to information asymmetry or due to firm level poor fundamentals, which raises a natural question to investigate.

However, prior research such as Barlevy and Veronesi (2003) shows that there can be an abrupt change in stock price even though there is no change in firms fundamentals. This is because of the behaviour of uninformed traders' presence in the market. They document, by using rational panic model, where uninformed traders assume that they are suffering from information asymmetry, thereby, they reduce their interest to buy assets, which results in further lowering stock prices. Finally, they suggest that there can also be crisis having fundamentals strong, however, magnitude of such crisis will be dependent on the level of information asymmetry among the investors and the presence of passive investments in the market. On the other hand, Gennotte and Leland (1990), using hedging model, document that prior research blamed hedging strategies for stock market crash. Using a rational expectation model, Gennotte and Leland (1990) find that market can become discontinuous (crash/crisis) even with relatively little hedging. They found in their model that price can play an important role to shape expectations. In addition, they claim that markets, in their rational expectation model, are less liquid compared to prior traditional models. Limmack and Ward (1990) focuses on the volatility of share price, using traditional finance models, particularly in the crash period. Mainly their study analysed a particular set of securities which were traded in those crash periods to show an incremental contribution to their research. Based on a sample of 270 companies they document an evidence of individual stock price movement on those days in October 1987 where they claimed that price adjustments have occurred. However, they also identified that additional factor which was the pessimistic view of the potential investors in international markets. As per their findings they cautioned that investors should revalue their possible growth globally in the early stages of crash where safety measures were highly pronounced.

White (1990) investigated the stock market boom and crash of US during 1920-1929. They tried to figure out the reason behind why the market followed bullish trend and what made it to crush suddenly in USA. To test their proposition, they used indices of US stock of that period in their data sample, and they also conducted data comparison between 1929 and 1987 to explain the situation. Through data analysis they find that there were multiple reasons for happening such instability in the market. For instance, one important reason was the emergence of large scale industries which required huge capital and they took it from capital market. Secondly, due to the strict central bank policy bank could not directly finance hence brokers loans were provided. Ease of getting credit from the brokers also attracted large customer to invest. Thirdly, speculative mania also speeds up the growth of bubble. Fourth, many new investors started to invest without doing prudent judgement and thus it creates bubble in the market. Fifth, a group of people thought that high market price was another product of economic fundamentals. Finally, strict and conservative Federal Reserve Policy (FRP) later initiated augmented the depression further. Antoniou and Garrett (1993) studied various aspects of the relationship between stock index and the stock index futures, in USA, to determine whether there was a breakdown between the two markets. They document a possible link between these markets which was happened by arbitrage. But arbitrage trades could not

be executed effectively because of the liquidity problems in the stock market. Consequently, the above arbitrage link was and results in downward slope in stock prices even in both markets. Finally, they conclude that the purpose of future market was not achieved, rather it results in market decline.

Maloney and Mulherin (2003) investigated stock returns and trading volume surrounding the crash of the space shuttle challenger and give testimony on the speed and accuracy of price discovery. Main purpose of their study is to test the market efficiency and how quickly and accurately a stock market process the implications of such space shuttle crash. Through taking a sample of NYSE listed companies they find that price discovery occurred without large trading profits and that much of the price discovery occurred during a trading halt of the firm responsible for the faulty component. Finally, although they document what are arguably quick and accurate movements of the market, they were unable to detect the actual manner in which particular informed traders induced price discovery.

Blackley (1992) investigated the impact of US stock market crash of 1987 on job market in New York City. By using intervention analysis, they find that such crash has resulted to permanent job reduction by approximately 25000 jobs in securities industry through July 1990. Lauterbach and Zion (1993) examine the behaviour of a small stock market in Israel (TASE) during the October 1987 crash. The crash and its aftershocks lasted for a week and selling pressure was concentrated in higher beta, larger capitalization, and lower leverage firm stocks. Their study provides a reliable description of stock behaviour before, during, and after the crash. By using daily stock price and firm fundamental data from October 13 to October 28 of 1987, the find that trading halts and price limits had no impact on the overall decline, but merely smoothed return fluctuations around the crash event. Investors were demanding for a mix between continuous trading system and circuity breaker system. More importantly, the market in Israel was highly concentrated and it is well known for higher beta, presence of larger companies and lower leverage stocks as well.

Ray (2009) tested the investment behavior of student investors in India after world global stock market crisis in 2008. He tested how student investors reacted to the global slowdown and slumping in stock market. He used a structured questionnaire and found that the behavior of market participants was irrational, however, it was present during crashing time only and the composition of investments has altered because of the speculative bubbles. Finally, students commented by providing significant importance on firm fundamentals for making their investment decision. In sum, this paper provides idea about the changing behavior of investors when bubble happened in capital market.

Kumiega et al. (2011) examined the factor that influence US equity market during 2007 to early 2010. In the same time this paper analyses about the equity index volatility & the independent components that can influence the commodity market in the same market. In this study they mainly used independent component analysis on data of S&P 500 companies. They claim that factors generated through independent component analysis (ICA) provided meaningful economic interpretation for present and potential investors. More specifically, they identified three main factors which are responsible for such bubble in the market was energy and materials factor, a standard market factor and the last factor was financial dominated factor. Finally, they document a surprising finding that correlation rose significantly in crisis year 2008 which is rarely found in other similar crisis based studies.

Markwat (2014) examines the relation between the rise of global stock market and crash probabilities of that market and the study of comparable stock rise and market crash in Asia, USA, Europe and Latin America. They used data from 1989 to 2010 from these markets. After testing their hypotheses, they document that the stock market crash is happening more frequently in the past two decades. The rate increases not only for the reason of raise of stock market, but also many other economic factors are involved with the crisis of market crash probabilities. But rise of stock market creates market bubble and panic attack in the mind of the investors which is followed by the deep market crash probabilities.

Najand (1996) attempted to find out the connection between the Asian stock markets and the effect of the crash in one stock market onto the other using state space modelling. In this study author used daily data for 6 years from January 1984 to December 1989 in three Asian stock markets including Hong Kong, Japan and Singapore. They collected stock price data from Wall Street Journal (WSJ). They converted all price data by using logarithm. Their analysis shows that Japan's stock market played a significant role among the Asian stock market during and after the crash of 1987. Moreover, it is found that there was increasing interaction between Asian stock market in post-crash periods.

Kapopoulos and Siokis (2005) investigate the impact of stock market crash and especially they tested what happens after a crash. They analyse stock market crash from seven developing countries and four developed countries. They document that the statistical relationship of capital market research is consistent with simple statistical law discovered in geophysics (popularly known as "Gutenber-Richter relationship"). Finally, they suggest that concurrent stock market crashes are essentially different from the earlier stock market crash which happened one decade earlier.

When we consider a single country's capital market crisis, there was a severe stock market crash happened in Hong Kong in 1997. The Hang Seng index (HSI) futures decrease by 1300 points in an hour. Prior research shows that volatility on that stock market was nearly 148% on that particular crisis day (Fung, 2007). Fung (2007) examines the information conveyed by options and examines their implied volatility at the time of the 1997 Hong Kong stock market crash. They determine the efficiency of implied volatility as a predictor of future volatility by comparing it to other leading indicator candidates. These include volume and open interest of index options and futures, as well as the arbitrage basis of index futures. Finally, they document that the implied volatility outperforms for a number of predictors in forecasting future volatility (e.g., open interest options, futures, lagged realized volatility etc.).

Another international stock markets-based study, Yang and Bessler (2008), investigate contagion among seven international stock markets (Australia, Hong Kong, Japan, Singapore, Germany, UK, and US) around the October 19, 1987 crash. They took this issue as it is not yet clear whether the financial contagion occurs during the 1987 crash period is a reason for other country's crash or other countries impact on US. Another reason is the 1987 crash is the most significant global stock market crash among developed equity markets in last 20 years, hence, this serious issue remains interesting to investigate the impact or association with other economies. By using vector auto regression (VAR) analysis, they find that US stock market crash was the start of international stock market crash although they find inconsistency with the relevant academic research. Because prior research claim that Asian stock market crash was started first which causes other countries. But in-depth analysis showed that Japan did not participate with worldwide downward pressure for other market, rather, Japan helped US

for recovery from crash. However, their analysis also shows that significant dropping of US index on or following the date of October 19 was definitely associated with US past innovation, and other markets (especially United Kingdom, Germany, Hong Kong, and Australia) have modest negative impact on US stock market crash.

Kumiega et al. (2011) investigate the factors that drove the U.S. equity market returns from 2007 to early 2010 as this period was highlighted by volatile energy and commodity prices, the collapse of insurance and banking firms, extreme implied volatility and a subsequent rally in the overall market. Using GARCH and EGARCH model for daily dividend adjusted log returns for S&P 500 data from 2007 to 2010, they find that generated factors have interesting financial interpretations, and they are consistent with the major economic themes of the period. In addition, they find that the EGARCH model which accommodates asymmetric responses between returns and volatility can plausibly fit the high levels of variance during the crash.

McInerney et al. (2013) examine the impact of sudden large loss on mental health. More specifically, they investigate and compare cross-wave changes in wealth and mental health of US adults who were interviewed before and after the October 2008 stock market crash in US. They took required data from health and retirement study (HRS), a nationally representative longitudinal survey of more than 22,000 Americans over the age of 50 from 2006 to 2008. They took interviews every two years and asked questions on different issues such as household wealth, income, mental health status and behaviors, among other topics. The findings of their analysis show that the crash reduced wealth and increased feelings of depression, and use of antidepressant drugs, and that these effects were largest among respondents with high levels of stock holdings prior to the crash. In addition, they show that the stock market crash of 2008 altered subjective measures of mental health for respondents with large holdings of stock.

All of the above studies focus on either US stock market crisis or some stock markets of developing countries. However, only few studies investigate about the crisis of Dhaka stock exchange (DSE), the oldest exchange of Bangladesh. For instance, Islam and Khaled (2005) examine the efficiency of DSE, as there were conflicting arguments among prior studies. However, such differences are found due to the different methodologies used by the researchers in the same setting. For instance, first research, Alam et al. (1999) document that monthly stock price index of DSE follows random walk theory which is contradictory with the study of Mobarek et al. (2008). Secondly, another study on DSE, Chowdhury (1995), investigated the informational efficiency of DSE. Thirdly, Islam and Khaled (2015) attempted to see the behavior of DSE general index over ten-year periods from 2003 to 2013. By using GARCH-type framework, they find that conditional standard deviation is negatively related with the market returns which is inconsistent with the theory of positive risk premium. They interpret their findings that investors may not claim risk premiums, in special crisis moments, if they are capable to bear such risk caused stock market volatility. Faruqui and Rahman (2013) claim that stock market crash possibility was exaggerated due to the influence a group of people who were involved with DSE. They were in syndicate and their such speculative attitude exacerbate the market's condition. A large amount of black money was invested in the capital market and those investors were not business literate rather they behaved unusually and gradually results in the stock market crisis in 2010 to 2011.

Mobarek and Mollah (2005) examine the factors that affect share return on DSE. By using a widely used capital asset pricing model (CAPM), they find that their results do not support the critical conditions of CAPM model which is usually found in other developed economies. But they claim that such similar results are visible in developing

countries. Later, they show that couple of firm level determinants which have played role in affecting share returns such as size, price to book ratio, trading volume, earnings capacity, and firms liquidity position etc. Mollik and Bepari (2015) examine the relation between risk and return by taking a sample of 110 stocks of DSE over the period of 2000 to 2007. They used monthly returns, and they used logged form share price for the analysis. They document the positive relation between risk and return. More importantly, they find that portfolio returns are also positively and significantly associated with portfolio beta values. Such results remain valid when the companies are in a group based on beta values. However, they also cautioned that highest betas do not provide highest return always, which is inconsistent with the prior research and that indicates the presence of market anomalies. They suggest investors make diversified portfolio to maximize their return in DSE. By incorporating multivariate tests on the relation between money supply and stock prices, they found that there is no directional causality between money supply and stock prices, which is an indication of informational inefficiency. Considering the possibility of future capital market crisis, it is timely to investigate the role of firm level fundamentals on stock market returns to minimize the possibility of future crisis. Nevertheless, none of the prior research focuses on firm level fundamentals which are investigated in this study. Taken together, it is hypothesized that firm level accounting components have definite impact on stock market crash. Considering prior research works, the following hypothesis is estimated:

H_1: firm fundamentals are significantly associated with the stock market crash risk.

IV. RESEARCH METHODOLOGY

4.1. Research Design

4.1.1. Sample

This study covers only DSE listed companies. Data are collected from different sources. Daily and monthly share price data are collected from DSE library. Firm fundamentals data are manually collected from annual reports. Detail sample breakdown is given below in Table 2. It shows that all samples firms are from ten different industries including cement and ceramics, engineering, financials, food and allied, fuel and power, IT and services, miscellaneous, pharmaceuticals, tannery, and textiles. The highest number of firm year observations come from financials (48.20%), 12.59% firms come from the engineering sector, 10.07% come from pharmaceutical, 6.83% observations come from cement and ceramics, 5.76% observations come from foods and allied industry, and only 0.72% firm-year observations come from Tannery industry. Newly listed firms are not considered in my sample. Insurance companies are excluded as they are subject to different regulatory bodies. Moreover, their accounting system is different from the rest of the industries in Bangladesh. More than 250 firm year observations are excluded because of unavailable data. Some firms are excluded as their share prices are not available. 15 firms are excluded as they do not provide annul reports on their websites or were not available in DSE library. The above process leaves me 278 firm year observations for regression analysis. All of the regression models, in this study, are done based on 278 firm-year observations.

Insert Table 2 here.

4.1.2. Identification and measurement of stock market crash

In this study, stock market crash is defined when DSE general index decreases by 5% or more in the daily value-weighted market index following Wang et al. (2009). Based on their definition, this study finds that DSE faces 12 days stock market crashes in the following dates (Table 3).

Table 2
Sample Distribution-Industry-Wise

Sector	Code	Freq.	Percent	Cum.
Cement & Ceramics	1	19	6.83%	6.83
Engineering	2	35	12.59%	19.42
Financials	3	134	48.20%	67.63
Foods and Allied	4	16	5.76%	73.38
Fuel and Power	5	5	1.80%	75.18
IT & Services	6	14	5.04%	80.22
Miscellaneous	7	12	4.32%	84.53
Pharmaceuticals	8	28	10.07%	94.6
Tannery	9	2	0.72%	95.32
Textiles	10	13	4.68%	100
Total observations			**100%**	

Table 3
Stock Market Crash Days

Date	DGEN	Change in points	Decrease in DGEN (%)
Sunday, December 19, 2010	7654.405	-551.767	-6.72%
Sunday, January 9, 2011	7135.020	-600.197	-7.76%
Monday, January 10, 2011	6499.436	-635.584	-8.91%
Thursday, January 20, 2011	6326.345	-587.045	-8.49%
Sunday, February 6, 2011	6719.045	-406.287	-5.70%
Sunday, February 13, 2011	6052.412	-474.779	-7.27%
Monday, February 14, 2011	5579.505	-472.907	-7.81%
Sunday, February 27, 2011	5463.352	-337.588	-5.82%
Wednesday, March 2, 2011	5292.175	-309.424	-5.52%
Sunday, March 13, 2011	6179.525	-459.656	-6.92%
Sunday, June 12, 2011	5676.287	-313.527	-5.23%
Sunday, November 27, 2011	5065.176	-308.128	-5.73%

4.2. Regression Models

To test of my proposition, I use the following regression model following Wang et al. (2009).

$$RET = \beta_0+\beta_1 SDR+\beta_2 SIZE+\beta_3 TDTA+\beta_4 STDTD+\beta_5 LAR+\beta_6 BEP+ \beta_7 LOSS+\beta_8 CFLIQ+\beta_9 FAR+\beta_{10} BANKRUPT\_SCORE+ Industry\ Fixed\ Effects+Year\ Effects+\varepsilon \quad (1)$$

Where:
RET : the stock returns on the event year.
β_0 : a constant.
$B_1 \ldots \beta_{10}$: the regression coefficients.
SDR : standard deviation of monthly market return
SIZE : the logarithm of the firm's market capitalization.
TDTA : the debt ratio (Total Debt/Total Assets).
STDTD : the short-term debt to total debt ratio (Short-term Debt/Total Debt).
LAR : the liquid assets ratio [Cash + Marketable Securities)/Total Assets].
BEP : the basic earning power ratio (EBIT/Total Assets).
LOSS : 1, if a firm has loss in a period, and 0 for otherwise.
CFLIQ : the ratio of cash flow from operating activities to total assets.
FAR : fixed assets of the firm scaled by firm's total assets.
BANKRUPT_SCORE: 1 if a firm's Altman (1968) Z-score is less than 2.675, and 0 otherwise.

Z-score : calculated following a modified version of Altman (1968) model that proxies for the firm's financial condition.[7]

To test second proposition regarding the impact of corporate life cycle (CLC) on the association between determinant of stock market crash and firms' determinants, the following regression model is estimated:

$$\mathbf{RET} = \beta_0+\beta_1\mathbf{LIFECYCLE\_INTRO}+\beta_2\mathbf{LIFECYCLE\_GROWTH} +\beta_3\mathbf{LIFECYCLE\_MATURITY}+\beta_4\mathbf{LIFECYCLE\_DECLINE} +\beta_5\mathbf{LIFECYCLE\_SHAKEOUT}+\beta_6\mathbf{SDR}+\beta_7\mathbf{SIZE}+\beta_8\mathbf{TDTA} +\beta_9\mathbf{STDTD}+\beta_{10}\mathbf{LAR}+\beta_{11}\mathbf{BEP}+\beta_{12}\mathbf{LOSS}+\beta_{13}\mathbf{CFLIQ}+\beta_{14}\mathbf{FAR} +\beta_{15}\mathbf{BANKRUPT\_SCORE} +\text{Industry fixed effects}+\text{Year effects}+\varepsilon \quad \ldots\ldots \quad 2$$

Where, life cycle proxies are measured following prior research (such as, Dickinson, 2011; Hasan et al., 2015) to the capture the impact of firm's life stage on the association between firm fundamentals and stock prices. It is reasonable that some firms are already in declining stage who cannot well fight with any kind of severe crisis like stock market crash. On the other hand, strong firms or firms who are in the profitable condition with positive growth can fight or can survive with unexpected pressure or crisis happened. Taking this sentiment, I take life cycle proxies as variables of interest to see whether the tendency of stock market crash is associated the firm's level in their life cycle. The measures of life cycle proxies are done based on cash flows of the respective sample firms. Three types of cash flow including cash flow from operating activities, cash flow from investing activities and cash flow from financing activities are used to measure life cycle proxies. Prior research shows that a business will pass through following five different stages including introduction, growth, maturity, decline, and shake-out stage (Dickinson, 2011).

Following Dickinson (2011) measure, this study uses strategy to define a firm in its stage in its life cycle. Financial statements particularly statement of cash flow is used to measure corporate life cycle proxy. This measure has been widely used in contemporary accounting and finance research which ensures the reliability and validity of the measure used in this study (Hasan et al., 2015; Habib & Hasan, 2017; and Bakarich et al., 2019). Using the strategy of Dickinson (2011), the following conditional table is constructed to calculate different stages of corporate life cycle of sample firms. Such as,

Formula of Determining Corporate Life Cycle stages

Formula	Company' Stage of the Life Cycle
If CFO<0, CFI<0, and CFF>0	Introduction
If CFO>0, CFI<0, and CFF>0	Growth
If CFO>0, CFI<0, and CFF<0	Maturity
If CFO<0, CFI>0, and CFF≤or≥0;	Decline
The remaining firm years	Shake-out

Notes: CFO= cash flow from operating activities, CFI= cash flow from investing activities, CFF= cash flow from financing activities. This information is hand collected from the statements of cash flows of the respective sample companies.

V. RESULTS AND DISCUSSION

5.1. Descriptive Statistics

Table 4 displays the descriptive statistics for the variables used in this study. I have shown descriptive statistics for the entire sample together and separately for each sample

[7] Altman Z-core= 0.3(Net Income/Assets)+1.0(Sales/Assets)+1.4(Retained Earnings/Assets)+ 1.2(Working Capital/Assets)+0.6(Market Capitalisation/Total Liabilities).

year. Table 4 shows the overall scenario of all the variables used in our regression analysis. On the other hand, Table 5 and 6 show individual year-wise picture of capital market in Bangladesh. For individual analysis we can see that market return has significantly fallen in crash year which is 2011 and consistent with our proposition in this study. I have taken all independent variables following prior relevant studies. All the variable definitions are given in appendix. Prior studies show that variability of market return has significant impact on capital market crash risk.

Table 4

Descriptive Statistics: Full Sample

Variables	Mean	Median	Std. Dev.	Skewness	Kurtosis	Minimum	Maximum
RET	0.152	0.046	0.969	1.754	8.060	-0.981	5.205
MKT_RETURN	0.020279	0.012995	0.08727	-0.03167	5.774099	-0.304793	0.3022018
STD_RETURN	0.191	0.166	0.093	0.904	3.548	0.005	0.564
SIZE	9.328	9.872	2.140	-0.482	1.933	4.196	12.872
TDTA	0.711	0.849	0.268	-0.432	2.524	0.036	1.438
STDTD	0.417	0.250	0.431	0.176	1.189	0.000	1.000
LAR	0.039	0.000	0.085	3.549	19.133	0.000	0.678
BEP	0.094	0.088	0.057	1.218	6.820	-0.098	0.317
LOSS	0.025	0.000	0.157	6.061	37.740	0.000	1.000
CFRATIO	0.054	0.037	0.085	1.196	6.007	-0.161	0.443
FAR	0.358	0.105	0.383	0.587	1.815	0.001	1.211
CASHFLOW_OPN	1527.402	288.111	3146.076	1.480	6.803	-7920.410	14950.540
CASHFLOW_INV	-78.673	-55.343	2115.316	2.743	19.387	-7269.219	14718.100
CASHFLOW_FIN	736.664	0.000	5674.502	15.010	240.402	-2890.536	91719.120
TOTALASSETS	43871.800	19389.880	55046.020	2.225	11.185	66.412	389375.600
WORKINGCAPT	17614.640	2883.349	28740.120	1.691	6.751	-65351.140	149842.400
BANKRUPT Z-SCORE	1.086	0.964	0.889	1.659	9.609	-0.952	6.821
LIFECYCLE PROXIES:							
INTRODUCTION	0.133	0.000	0.340	2.160	5.667	0.000	1.000
GROWTH	0.216	0.000	0.412	1.382	2.909	0.000	1.000
MATURITY	0.281	0.000	0.450	0.977	1.954	0.000	1.000
DECLINE	0.043	0.000	0.204	4.496	21.212	0.000	1.000
SHAKEOUT	0.496	0.000	0.501	0.014	1.000	0.000	1.000
DEANGELO LIFECYCLE	0.090	0.046	0.183	-1.530	12.438	-0.913	0.637

Table 5 presents descriptive statistics for crisis period only. It shows that mean (median) value of stock return is -0.695 (-0.8060) which is significantly different from prior periods. The results indicate that stock market crisis has been severe in 2011 which is also evident is DSE general index. Secondly, the variability of market return measured by the standard deviation has been increased in crisis year from 0.196 to 0.254. When we compare firms' bankruptcy level measured by Altman Z score, it shows that the value of Z-score has also been increased significantly from 2010 (Z= 1.087) to 2011 (Z= 1.223). Total firm level fixed assets have also been decreased from pre-crisis to post-crisis periods.

Table 5

Descriptive Statistics: 2011

Variables	Mean	Median	Std. Dev.	Skewness	Kurtosis	Minimum	Maximum
RET	-0.695	-0.806	0.265	0.418	1.766	-0.960	-0.083
MKT_RETURN	-0.029	-0.043	0.128	-0.250	3.709	-0.305	0.221
STD_RETURN	0.254	0.272	0.100	0.409	3.058	0.094	0.564
SIZE	9.462	9.829	2.222	-0.356	1.773	4.323	12.872
TDTA	0.681	0.743	0.300	-0.142	2.652	0.036	1.438
STDTD	0.457	0.545	0.445	0.029	1.134	0.000	1.000
LAR	0.052	0.007	0.088	2.135	7.314	0.000	0.416
BEP	0.098	0.088	0.061	0.935	5.652	-0.081	0.307
LOSS	0.030	0.000	0.171	5.525	31.531	0.000	1.000

To be continued Table 5.

Variables	Mean	Median	Std. Dev.	Skewness	Kurtosis	Minimum	Maximum
CFRATIO	0.052	0.038	0.075	0.948	5.472	-0.154	0.307
FAR	0.347	0.263	0.351	0.562	1.985	0.001	1.211
CASHFLOW_OPN	2471.961	790.988	3925.479	1.349	5.098	-6921.601	14950.540
CASHFLOW_INV	157.886	-43.704	2909.915	2.534	13.583	-6061.456	14718.100
CASHFLOW_FIN	610.321	0.338	2116.321	3.179	16.451	-2890.536	12395.080
TOTALASSETS	56137.990	18559.380	69781.680	1.864	8.742	75.427	389375.600
WORKINGCAPT	24951.710	2336.279	38800.990	1.186	4.398	-65351.140	149842.400
BANKRUPT Z-SCORE	1.223	1.010	1.143	2.128	10.694	-0.952	6.821
LIFECYCLE PROXIES:							
INTRODUCTION	0.119	0.000	0.327	2.347	6.511	0.000	1.000
GROWTH	0.254	0.000	0.438	1.132	2.281	0.000	1.000
MATURITY	0.254	0.000	0.438	1.132	2.281	0.000	1.000
DECLINE	0.015	0.000	0.122	8.001	65.015	0.000	1.000
SHAKEOUT	0.478	0.000	0.503	0.090	1.008	0.000	1.000
DEANGELO LIFECYCLE	0.087	0.048	0.224	-2.004	11.400	-0.913	0.575

Table 6
Descriptive Statistics: 2010

Variables	Mean	Median	Std. Dev.	Skewness	Kurtosis	Minimum	Maximum
RET	0.163	0.194	0.817	0.723	4.318	-0.981	3.190
MKT_RETURN	0.053	0.043	0.059	0.729	3.194	-0.036	0.183
STD_RETURN	0.196	0.168	0.096	0.775	2.792	0.065	0.494
SIZE	9.473	9.970	2.164	-0.491	1.914	4.280	12.709
TDTA	0.702	0.851	0.280	-0.183	2.418	0.183	1.409
STDTD	0.432	0.466	0.440	0.101	1.143	0.000	1.000
LAR	0.047	0.001	0.096	2.566	9.213	0.000	0.425
BEP	0.093	0.082	0.067	1.456	5.723	-0.058	0.313
LOSS	0.032	0.000	0.177	5.342	29.533	0.000	1.000
CFRATIO	0.044	0.026	0.086	1.216	4.890	-0.123	0.347
FAR	0.349	0.082	0.378	0.626	1.837	0.008	1.115
CASHFLOW_OPN	258.371	97.897	2406.756	-0.534	6.244	-7920.410	7596.126
CASHFLOW_INV	-500.915	-98.178	1536.568	-1.633	8.345	-7269.219	2720.809
CASHFLOW_FIN	720.367	12.015	1625.025	2.353	9.137	-1784.022	7854.397
TOTALASSETS	50242.33	21372.40	59853.57	1.858	8.669	72.251	330785.20
WORKINGCAPT	20595.43	2931.746	31289.55	1.387	5.128	-44444.61	130809.30
BANKRUPT Z-SCORE	1.087	0.976	0.897	1.012	4.882	-0.861	4.279
LIFECYCLE PROXIES:							
INTRODUCTION	0.159	0.000	0.368	1.868	4.489	0.000	1.000
GROWTH	0.254	0.000	0.439	1.130	2.278	0.000	1.000
MATURITY	0.270	0.000	0.447	1.037	2.075	0.000	1.000
DECLINE	0.095	0.000	0.296	2.758	8.605	0.000	1.000
SHAKEOUT	0.444	0.000	0.501	0.224	1.050	0.000	1.000
DEANGELO LIFECYCLE	0.095	0.051	0.216	-1.777	11.580	-0.899	0.637

4.2. Correlation Statistics

Table 7 shows the correlation statistics between variables used in this study. Based on the results it shows that corporate life cycle stage particularly introduction stage, maturity stage and declining stage have positive correlation with price return. On the other hand, growth stage, shakeout stages are negatively correlated with stock return. When we use alternative proxy for life cycle measure, we also document positive correlation with stock return. When discuss other control variables we find that variability of return is negatively and significantly associated with stock return which is consistent with our hypothesis and prior research. Firm size (SIZE) is also negatively associated with stock returns which indicates that larger companies have lower stock returns compared to smaller companies in the market. Proportion of debt to total assets (TDTA) is also negatively correlated with stock returns and their relation is also statistically significant. It suggests that levered firms are highly affected in capital market which is

consistent with notion that they are underperforming compared to firms with lower external debt. Equity based companies were stronger in the capital market during crisis periods compared to levered firms. Likewise, proportion of short-term debt to total debt (STDTD) is also positively and significantly associated with stock returns. Liquidity ratio is also positively associated with stock return, but current ratio is negatively associated with stock returns. The variable of firms' profitability (LOSS) is negatively correlated with stock return. Proportion of cash flow from operating activities (CFLIQ) to total assets is positively associated with stock returns which suggest that firm with higher level of cash flow or liquidity assets have positive stock returns.

Insert Table 7 here.

Stock return is positively associated with fixed assets ratio (FAR) which also suggests that firms with higher level of fixed assets have higher stock returns. This result suggests that firms having higher level of property, plant and equipment (PPE) are considered positively by shareholders and they produce higher stock returns in capital market. Finally, this study finds a positive association between stock return and bankruptcy score which is though inconsistent with the extant literature. Moreover, there is no multicollinearity issues among the independent variables. Following prior accounting and finance research, variance of inflation (VIF) is calculated, and the result is 2.49 which is much lower than benchmark for collinearity.

5.3. Regression Results

Table 8 presents regression analysis results. Four separate models are run to test our hypothesis. In model 1, all firm level determinants are used in the regression model. This study finds that only firm's profitability measure (LOSS) has significant negative impact on stock returns. The results suggest that firms' operational performance has definite impact on share market price which we measure through stock price. Model 2 shows the results of the impact of corporate life cycle proxy measures on stock returns. It shows that the measure by DeAngelo and DeAngelo (2006) which has negative impact on stock return that warrants further research. To do so, this study used widely used model of corporate life cycle proxy. To further strengthen the association, other measures of corporate life cycle proxy are applied, in the present study, following prior research (Dickinson, 2011; Hasan et al., 2015). Results of using second measure are presented in model 3 and model 4.

Model 3 shows that all stages of corporate life are positively associated with stock returns but none of the coefficients are statistically significant, which suggests that firms return are not affected by the listed firm's life cycle stage rather some other issues may be connected with the variability of stock returns. To avoid multicollinearity between life cycle stages, one stage is dropped and the main regression is run again. Results are presented in model 4 which shows the similar results in model 3. In sum, we can infer that the firm's stock returns are not varying due to firm's different stages in their life rather stocks return may be correlated with other factors which are not controlled in our regression models which warrants further research.

Returning to control variables we find that variability of stock returns has negative coefficient on stock returns which is consistent with our proportion and in line with prior research. Secondly, firm size has negative impact on stock returns which indicates that larger companies have lower stocks returns that indicates that bigger firms are heavily affected by the stock crash in capital market compared to smaller firms. When this study focuses on firms' profitability measure, I find that firms profitability is negatively associated with stock returns. It indicates that loss making firms are severely affected in

Table 7
Correlation Statistics

Variables		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]
RET	[1]	1.000																
LIFECYCLE_INTRO	[2]	.068	1.000															
LIFECYCLE_GROWTH	[3]	-.038	-.206**	1.000														
LIFECYCLE_MATURE	[4]	.184**	-.245**	-.328**	1.000													
LIFECYCLE_DECLINE	[5]	.061	-.083	-.111	-.133*	1.000												
LIFECYCLE_SHAKEOUT	[6]	-.213**	-.389**	-.084	-.412**	.108	1.000											
DEANGELO_LIFECYCLE	[7]	.100	-.008	.055	.180**	.000	-.303**	1.000										
STD	[8]	-.237**	.039	.094	-.116	-.046	-.049	-.125*	1.000									
SIZE	[9]	-.287**	-.142*	-.002	-.368**	.087	.670**	-.192**	-0.082	1.000								
TDTA	[10]	-.167**	-.052	-.189**	-.330**	.094	.684**	-.629**	-0.028	.626**	1.000							
STDTD	[11]	.240**	.174**	.028	.467**	-.091	-.821**	.419**	.057	-.865*	-.794**	1.000						
LAR	[12]	.044	-.028	.094	.124*	-.006	-.320**	.384**	.015	-.415**	-.365**	.463**	1.000					
BEP	[13]	.054	-.187**	-.031	.281**	.062	-.176**	.575**	-.144*	-.006	-.192**	.192**	.378**	1.000				
LOSS	[14]	-.082	.140*	-0.084	-.049	-.034	-.022	-.481**	.004	-.033	.219**	-.002	-.063	-.381**	1.000			
CFLIQ	[15]	.037	-.469**	.044	.382**	-.224**	-0.067	.255**	-0.076	-.190**	-.211**	.206**	.289**	.401**	-.127*	1.000		
FAR	[16]	.229**	.158**	.074	.389**	-.099	-.733**	.212**	.068	-.752**	-.680**	.793**	.176**	-.037	.064	.122*	1.000	
BANKRUPT_Z-SCORE	[17]	.074	-.070	-.056	.220**	-.009	-.274**	.604**	-.038	-.389**	-.390**	.461**	.552**	.527**	-.216**	.401**	.146*	1.000

Notes: variable definitions are given in Appendix. *, **, and *** indicates statistical significance at 10%, 5%, and 1% level respectively.

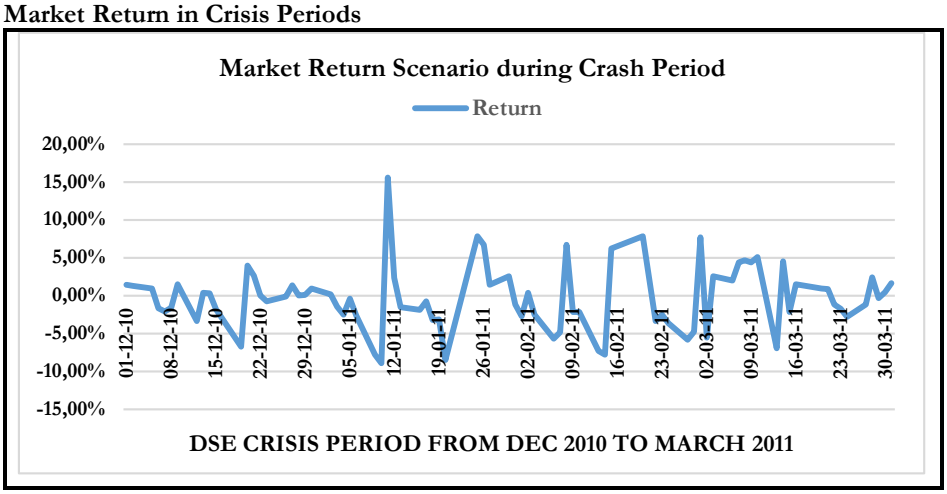
the capital market during crisis is consistent with the notion that firm's profitability condition was seriously counted in stock market. R^2 and adjusted R^2 are quite high which indicates the fitness of my regression models. However, based on the signs of coefficients I believe a further study is needed to investigate to see the impact of non-financial or non-accounting variables on stocks returns particularly for crisis periods. Based on my results, a trend analysis is conducted to show the market behaviour in addition to regression analysis which is presented below (Figure 2).

Table 8
Regression Analysis Results

Variables	Model (1)	Model (2)	Model (3)	Model (4)
	Return	Return	Return	Return
DeAngelo LCL		-0.479		
		[-0.74]		
LIFECYCLE_INTRO			0.143	0.094
			[0.69]	[0.38]
LIFECYCLE_GROWTH			0.138	0.108
			[0.98]	[0.77]
LIFECYCLE_MATURITY			0.151	0.122
			[1.08]	[0.80]
LIFECYCLE_DECLINE			0.321	
			[1.52]	
LIFECYCLE_SHAKEOUT				0.048
				[0.24]
SDR	-0.839	-0.878	-0.790	-0.820
	[-0.98]	[-1.04]	[-0.94]	[-0.98]
SIZE	-0.061	-0.051	-0.066	-0.069
	[-0.74]	[-0.59]	[-0.78]	[-0.81]
TDTA	0.196	-0.032	0.167	0.191
	[0.48]	[-0.06]	[0.43]	[0.50]
STDTD	-0.014	-0.047	-0.106	-0.051
	[-0.03]	[-0.08]	[-0.18]	[-0.09]
LAR	-0.728	-0.694	-0.713	-0.700
	[-0.96]	[-0.89]	[-0.91]	[-0.92]
BEP	0.493	0.852	0.156	0.486
	[0.36]	[0.54]	[0.11]	[0.34]
LOSS	-0.571**	-0.671**	-0.553**	-0.551**
	[-2.26]	[-2.52]	[-2.15]	[-2.13]
CFLIQ	-0.765	-0.817	-0.507	-0.842
	[-1.02]	[-1.10]	[-0.62]	[-1.04]
FAR	-0.218	-0.267	-0.248	-0.221
	[-0.56]	[-0.68]	[-0.63]	[-0.56]
BANKRUPT_SCORE	-0.012	0.017	-0.004	-0.001
	[-0.18]	[0.27]	[-0.06]	[-0.02]
Year Controlled	-0.582***	-0.582***	-0.568***	-0.572***
	[-3.76]	[-3.74]	[-3.63]	[-3.68]
Industry Controlled	Yes	Yes	Yes	Yes
Constant	1.703	1.842*	1.702	1.675
	[1.54]	[1.65]	[1.54]	[1.50]
Observations	278	278	278	278
R-squared	0.42	0.43	0.43	0.43
Adj. R-squared	0.37	0.37	0.37	0.36

Notes: variable definitions are provided in Appendix A. *, **, and *** indicates statistical significance at 10%, 5%, and 1% level respectively.

Figure 2
Market Return in Crisis Periods



VI. CONCLUSION

6.1. Conclusion, Limitations, and Future Research Directions

The main purpose of this study was to investigate the impact of firm fundamentals towards stock market crash. More specifically, this study investigates whether firm level fundamentals of DSE listed companies and how they affect the propensity of stock market crash. This study was primarily motivated from the prior studies (e.g., Wang et al., 2009) that firm accounting components have significant impact on the propensity of capital market crash. Moreover, a large number of studies investigated the impact of stock market crashes and post-crash consequences on different dimensions including future markets, fund raising costs, job markets, and economic condition. Bangladesh is an emerging economy where it has two capital markets such as DSE and Chittagong stock exchange (CSE). Shares of all listed companies are traded in these two stock markets. DSE is the premier outlet for raising capital from externals sources. However, this market has experienced severe crashes two times; once in 1996 and second time in 2010-2011. Because of such market panic, a large number of small investors lost their capital, and many people are severely and individually affected. For instance, newspapers report that many dwellers leave their houses without paying their rent as they did not have anything left after losing their capital in stock market (BBC, 2011). In addition, many investors left the market taking their money from the market results in crash in market. Such crisis is revealed in DSE general index which has fallen more than 8% in 2011 which was highest fall in history. Such severe crisis affected millions of investors in Bangladesh and lot of foreign investors lost their money in this market. Taking such sentiment, this study attempted to investigate the reasons for DSE crisis. More specifically the present study attempts to focus on the connection between firm level determinants and propensity of stock market crash. Our result shows that firm's profitability has significant impact on firms' propensity to stock crash. Profitable firms are found more stable in the crisis period compared to loss-making firms which is consistent with the notion that shareholders did care about the firms' operational performance. Later, this study investigated the impact of corporate life cycle stages on the propensity of crash risk of those companies. Although this study documents the influential role of corporate life cycle stage on the relation between firm level components and crash risk, but statistical significance is poor which is consistent with the unique nature of capital market in

Bangladesh. Prior research also shows that in Bangladesh investors are poorly protected and many investors invest in this market based on private search information. They do not make investment decisions based on financial statements, which demonstrates the prevailing inefficiency of the capital market in the same setting.

This paper is also subject to some limitations. First, this study covers periods from 2005 to 2011, but a comprehensive study could have been on the same topic if it could cover the 1996 crisis. This study conducts analysis based on a sample of listed companies; however, future research can cover all listed companies. Second, this study does not control corporate governance performance in regression models. Prior research shows that better-governed firms have a lower chance of stock market crash. In addition, prior research also shows that high quality audits can also mitigate the adverse impact of stock market crash risk which is not incorporated in this study. Thirdly, this study does not consider financial and non-financial companies separately while prior research excludes financial and utilities industry due to different nature of the industry. The present study covered both financial and non-financial companies in the present study all companies are subject to same set of corporate governance guidelines in Bangladesh. However, future research can attempt to investigate whether the picture becomes different due to industry differences. Finally, this study did not control the impact of the global financial crisis of 2008 which has affected the entire world, particularly, severe impact was evident in developing and under-developing countries. It is also reasonable that such GFC could have also exacerbated the impact of fundamentals on capital market crash.

Despite limitations mentioned above, the present study has several contributions. First, this study attempts rachet up our understanding about the impact of firm level fundamentals on stock market crash particularly in a developing economy like Bangladesh. Second, this study will shed light on the necessity of strengthening regulations in the stock market to protect investors' interests. Third, regulatory bodies can increase control mechanisms to regulate the market efficiently. Fourth, central bank can play a significant role in shaping financial markets by using global practices in developing capital market policies. Fifth and finally, BSEC, as a primary regulatory body for capital market in Bangladesh, can formulate policies and control the market by following extant world renowned and stable capital markets' practices.

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Appendix A
Variable definition and measurement

Variable	Definition
RET	RET represents the stock returns on the event year.
SDR	It is measured as a standard deviation of monthly market return.
SIZE	It is the logarithm of the firm's market capitalization.
TDTA	TDTA is measured as the ratio of total debt to total assets of the company in year t.
STDTD	STDTD is ratio of the short-term debt to total debt (Short-term Debt/Total Debt).
LAR	It represents the firm's liquid assets ratio which is measured as the sum of Cash and Marketable Securities divided by firm's Total Assets].
CFPS	CFPS is the cash flow per share.
BEP	BEP shows the basic earning power of the company and it is calculated as the ratio of EBIT to total assets.
LOSS	1, if a firm has loss in a period, 0, otherwise.
CFLIQ	Cash flow from operating activities divide by total assets.
FAR	Fixed assets of the firm scaled by firm's total assets.
BANKRUPT_SCORE	1 if a firm's Altman (1968) Z-score is less than 2.675, and 0 otherwise. The Z-score is calculated following a modified version of Altman (1968) model that proxies for the firm's financial condition. Specifically, Z-score = 0.3 (Net Income/Assets) + 1.0 (Sales/Assets) + 1.4(Retained Earnings/Assets) + 1.2(Working Capital/Assets) + 0.6 (Market Capitalisation/Total Liabilities).
DeAngelo	This measure is based on the prior research by DeAngelo in 2006. More specifically, this measure of life cycle proxy used the proportion of retained earnings to total assets of the firm. This measure shows that higher ration indicates firms are more prone to mature or declining stage. On the other hand, lower proportion indicates initial stage of corporate life cycle. Detail measure is explained in DeAngelo et al. 2006.
MKT_RETURN	Market return of the sample companies.
STD_RETURN	Standard deviation of the market return.
CASHFLOW_OPN	Cash flows from the operating activities.
CASHFLOW_INV	Cash flows from the investing activities.
CASHFLOW_FIN	Cash flows from the financing activities.
WORKINGCAPT	Working capital of the sample firm.
Life cycle proxy	A vector of dummy variables that capture firms' different stages in the life cycle (Dickinson, 2011).

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