Circuit breakers: Development of testable hypothesis

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Abstract: In October 1996, The Dhaka Stock Exchange (DSE) adopted trading halts for individual stocks, collectively known as “circuit breakers”, to reduce the stock market volatility. This paper reviews the existing circuit breakers literature and developed five hypothesis—“Magnet Effect”, “Cool off-Heating (C-H) Effect”, “Information Hypothesis”, “Volatility Spillover Hypothesis” and “Trading Interferences Hypothesis”—which could be tested empirically not only in the Dhaka Stock Exchange but any stock exchanges around the world. This paper also suggests most appropriate econometric models for empirical testing. GARCH for inter day data and Event Study methodology for intra day data. Moreover, to test the robustness non-parametric tests need to use along with parametric one. Considering the stock market bubbles in 1996, it has been found that it was optimal for the regulators to adopt this trading halt, but not for the market. It failed to protect the market. However, this might be the consequences of misconceptions about the purpose and effectiveness of circuit breakers. Despite many arguments contrary to this mechanism and absence of any conclusive empirical evidence for a fragile stock exchange like DSE, it may be useful sometimes to replace the “invisible hand of the marketplace” with the “visible hand of the market regulators”.

Key words: trading halt; circuit breakers; inter day data and intra day data

1. Introduction

The Brady Commission first proposed trading halts in principle immediately after the market crash of 1987. The Brady Commission¹ called such trading halts “Circuit Breakers”², and cited three benefits to adopting them. First, they limit credit risks and loss of financial confidence by providing a time-out amid frantic trading to settle up and ensure that everyone is solvent. Second, the facilitate price discovery by providing a “time-out” to pause, evaluate, inhibit panic and publicize order imbalance to attract value traders to cushion violent movements in the market. Third, circuit breaker mechanism counter the illusion of liquidity by formalizing the economic fact of life, so apparent in October, that markets have limited capacity to absorb massive one-sided volume. Making circuit breakers part of the contractual landscape makes it far more difficult for some market participants—pension portfolio insurers, aggressive mutual funds—to mislead themselves into believing that it is possible to sell huge amounts in short time periods. This makes it less likely in the future, and the flawed trading strategies will be pursued to the point of disrupting markets and threatening the financial system. While the Brady Commission did not recommend a specific type of circuit breaker, it suggested that such mechanisms should be coordinated among exchanges and “be formulated and implemented”. Subsequent to the 1987 Crash, circuit breakers based on

¹ Brady Commission Report. (1988). Report of the presidential task force on market mechanisms, which was headed by Nicholas Brady (Fed. Sec. L. Rep. (CCH) note 1).
² Through out this paper, the word circuit breaker and trading halt will be used interchangeably.
predetermined price limits were adopted by both stock and futures exchanges.

The impact of circuit breakers and program trading limits has been the subject of lively debate among market regulators, market administrators, professional traders and academics. Questions about whether the market is (or should be) adequately protected by circuit breakers have often been raised and addressed. Unfortunately and fortunately, no satisfactory answer to these questions has emerged. In spite of the strong existence of price limits worldwide, there is no much information regarding the effects of price limits on volatility and price discovery, which has important policy implications for the regulators. In fact, there are very few studies on price limits in South Asia.

The objective of this paper is to review the circuit breaker literature and attempt to develop hypothesis to be tested in the emerging capital market of Bangladesh. In addition, the paper also concentrates on the methodology to test the developed hypothesis. The paper attempts to learn the most about these circuit breakers when prices are extremely volatile. And without extreme volatility, it is almost impossible to determine what effects this has on the markets as a whole.

1.1 Circuit breakers around the world

Rule 80A: The first circuit breaker in the world formally known as “Rule 80A” adopted by New York Stock Exchange (NYSE) and, went into effect in early 1988 on a voluntary basis. Rule 80A's intent from the beginning to minimize excess market volatility and promote stabilization of the market3. It is interesting despite the continuous arguments against and in favor of circuit breaker that this first circuit breaker adopted not by the market authorities but by the traders themselves.

Rule 80B: It is the extreme form of circuit breaker that exists in the world. NYSE4 first adopted it and no other market around the world has a similar one. Indeed, other markets do not need it, because in October 1997 (for the first and the last time in history), it was triggered, and the market was shut down for the rest of the day not only in NYSE but also in other American Stock Markets. Moreover, trading halted in all major stock exchanges of Japan, England, Germany, Australia, Canada etc.

One common feature of Rule 80A and Rule 80B is that they set a market wide trading restrictions. When they triggered, trading of all stocks have halted. Other than the US, four different countries have adopted the circuit breakers; they are France, Germany, Switzerland and Canada (Quebec).

The most probable impact of Rule 80A, which is directed at professional arbitrageurs, is to increase the cost of their trading. The imposition of such costs tends to increase transitory volatility and uncouple NYSE and Chicago Mercantile Exchange (CME) markets. Each time Rule 80A is invoked, two markets that ought to be closely interlinked are artificially separated. Market information, which is often first expressed as price change in future markets, is restrained from flowing freely to the stock market and its public investors. That net loss of information directly disadvantages public investors.

In addition, Rule 80A directly interferes with arbitrage between the two markets in a manner that reduce trading opportunities in Chicago. A striking impact on trading is experienced by the CME when Rule 80A is triggered. Academics5 calculate the loss of business in the range of $100,000,000 in notional value whenever

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3 Cochrane, J. L., senior vice president and chief economist of the NYSE, on Trading Halts and Program Trading Restrictions, presented to the Subcommittee on Securities, Committee on Banking, Housing and Urban Affairs, United States Senate, January 29, 1998.
4 When Rule 80B triggered on the NYSE, they automatically apply to other exchange in North America, including the Toronto Stock Exchange.
5 Overdahl, J. & McMillan, H.. (1997). Another day, another collar: An evaluation of the effects of NYSE rule 80A on trading costs and inter-market arbitrage. OCC Economics working paper, 97-98.
Rule 80A is triggered. Given the regulatory of triggering events, the diversion of business from the CME is in the range of $25 billion annually.

1.1.1 Speed bumps or shock absorbers

In the US, stock markets have implemented intermediate measures, or so called “speed bumps” or “shock absorbers”, to slow down the securities trading when markets experienced a significant volatility. The NYSE Rule 80A provides that when the Dow Jones Industrial Average Index (DJIA) moves up (down) 50 points or more, all index arbitrage orders to buy (sell) component stocks in the S&A 500 index.

Several US futures exchanges also have adopted “Shock Absorber” or “Speed Bumps” which are also intended to slow down, but not to halt, stock index futures trading. These less restrictive trading rules consist of temporary and maximum daily price limits on the price movements at levels much narrower than circuit breakers levels. These include opening price limits for stock index futures traded at the Chicago Mercantile Exchange (CME) or New York Future Exchange (NYFE) which are set at the equivalent of 40 DJIA points and effectively in place only for the first ten minutes of trading, interim price decline limit set at 100 DJIA points for stock index futures traded at the CME, Chicago Board of Trade (CBT) and the NYFE; and maximum daily price limits of 160 DJIA equivalent points for stock index futures traded at the CME, CBT and Kansas City Board of Trade (see Table 1 for example).

| Country daily | Price limits |
|--------------|-------------|
| The People’s Republic of China | 10% of previous day’s closing price |
| India | % of previous day’s closing price to quoted share price |
| | 10% Over Rs. 20 |
| | No limit Below Rs. 20 |
| | Group B1^ and B2^ |
| | 25% Rs. 10-20 |
| | 50% Rs. 1-10 |
| | 75% Up to Rs. 1 |
| Republic of Korea | 15% of previous day’s closing price |
| Malaysia | 30% of previous session’s closing price |
| Pakistan | 25% (or Rs. 5, whichever is higher) of opening price |
| Philippines | Upper Limit: 50% of previous day’s closing price |
| | Lower Limit: 40% of previous day’s closing price |
| Taipei, China | 7% of previous day’s closing price |
| Thailand | 30% of previous day’s closing price |

Notes: ^ Daily price limit is subject to change even within the day; ^ Large companies with very high liquidity; ^ The next large companies (with equity of Rs. 30 million or above) with high liquidity; ^ Small companies (with equity below Rs. 30 million) with low trading volume.

Data source: Asian Development Bank, 2005.

1.1.2 Price limit

Price limits instituted to control the volatility of daily stock price movements through establishing price constraints (floor-ceiling). Contrary to the Rule 80A and Rule 80B system, the market does not close when price
limits reached. Traders cannot be affected at a price above the upper limit or below the lower limit. If traders are willing to negotiate prices within the prescribed price limits, trading can resume. Several countries have adopted the price limits rule such as Japan, France, Greece and emerging markets, such as Turkey and Lithuania. Bangladesh adopted a variation of price limit where stock market has the authority to halt the trading of a particular security. Amex as well as National Association of Securities Dealers Automated Quotations (NASDAQ) and Brussels stock exchange has such trading limit and the basic feature of this mechanism is, "special exchange regulations determine the maximum percentage change in the price of a security during a session".

1.1.3 Other forms of trading halt

(1) Transaction taxes
Transaction tax\textsuperscript{6} mechanism restrict trading by it to (a) decrease volatility because “noise”\textsuperscript{7} traders will be discouraged from trading, (b) reduce excess speculation as well\textsuperscript{8}, (c) lengthen investors’ expected holding periods, and (d) increase government revenue.

(2) Margin requirements\textsuperscript{9} and position limits
Restrict the size of positions that traders can accumulate.

(3) Suspension of trading
This is a mechanism of protection mostly for potential investors. The supervisory body suspends\textsuperscript{10} trading when it believes the public may be making investment decisions based on false or misleading information. However, at least in short term suspension of trading may cause harm to the current holders of the security in question as it often causes dramatic decline in the security’s price. The supervisory bodies should always try to balance the interest of the current holders of the security and the interest of the potential future buyers.

1.1.4 Trading halt in Bangladesh

The Dhaka Stock Exchange is a self-regulated non-profit organization. DSE was first incorporated as the East Pakistan Stock Exchange Association Limited. Formal trading began in 1956 with 196 securities listed on the DSE with a total paid up capital of about Taka 4 billion. On June 23, 1962, it was renamed as Dhaka Stock Exchange (DSE) Limited\textsuperscript{11}. As of 11th October 2002, there were 256 securities listed on the DSE with a market capitalization of Taka 69,702 million. Number of listed companies is 238, number of mutual funds and number of listed debentures is 8. Share price index as of 11th October 2002 was Tk.822.23273.

DSE is registered as a public limited company and its activities are regulated by its articles of association and its own rules, regulation and by-laws along with the Securities and Exchange Ordinance 1969, the companies Act 1994, and the Securities and Exchange Commission Act 1993 (DSE, 1999).

The circuit breaker has been introduced for the first time in October 1996 during the stock market bubble in Bangladesh. The current trading halt described in Table 2 has been modified in 2nd October, 2001 according to

\textsuperscript{6} Arguments concerning securities transaction taxes appear in Stiglitz (1989) and Summer and Summers (1989), Amihud and Mendelson (1990), Gllndfest and Shoven (1991), Kupiec, White and Duffee (1993), Schwert and Seguin (1993), Subrahmanyam (1996) and Kupiec (1995, 1996).

\textsuperscript{7} Who trade for any reasons other than information about the underlying securities?

\textsuperscript{8} Subrahmayan (1996) notes, however, that a high transaction tax may eliminate some deadweight losses to society that come from too many informed traders competing to profit from the same information.

\textsuperscript{9} Arguments concerning margins appear in Moore (1996), Figtewski (1994), Hartzmark (1986), Hardouvelis (1988a, 1988b), warshawsky (1989), Kupiec and Sharpe (1991), Ma, Kao and Forthich, Chance (1993) and Kupiec (1997).

\textsuperscript{10} It should be note that suspension is provisional sanction (e.g., SEC suspends the trading for a period up to ten days) “where the smooth operation of the market is, or may be, temporarily jeopardized or where protection of investors so requires”.

\textsuperscript{11} Chowdhury (1994).
subsection (4) of section 34 of the securities and Exchange Ordinance, 1996 (XVII of 1969).

| Previous days per share market price | Limits                                |
|--------------------------------------|---------------------------------------|
| 01. Up to Tk. 100                    | 15% but not exceeding Tk. 12          |
| 02. Above Tk. 100 up to Tk. 300       | 10% but not exceeding Tk. 20          |
| 03. Above Tk. 300 up to Tk. 500       | 7.5% but not exceeding Tk. 30         |
| 04. Above Tk. 500 up to Tk. 1000      | 5% but not exceeding Tk. 30           |
| 05. Above Tk. 1000                   | 3% but not exceeding Tk. 50           |

Note: This new limit is in effect from 2nd October, 2001. Provided however that the SPMRC may fix any limit at any time within the above range in respect of any script if it considers being proper for the benefits of the investors vis-à-vis the market.

Data source: Dhaka Stock Exchange, 2005.

After the adoption of circuit halt in October 1996, ten years have passed and the rule modifies time to time. Unfortunately, no study yet conducted to identify the costs and benefits associated with circuit breakers. Nobody knows exactly how many times it activated, how stocks reacted when it triggered, what happened to volatility, volume, price of the halted stock.

The bottom line is no study has been done on the circuit breaker of DSE despite its vivid presence in the market since 1996.

1.2 Circuit breaker literature empirical evidence

Fama (1989) states that volatility may increase if the price discovery is intervened. This is supported by Kyle (1988) and Kuhn, Kuserk and Locke (1991). Kuhn, et al (1991) find that limits were ineffective in reducing volatility during the 1990 mini-crash in U.S..

Lehmann (1989) also suggests that imbalances in supply and demand in trading induce prices to reach their limits, which implies a transfer of transactions to subsequent days.

Lee, Ready and Seguin (1994) find volatility and volume increase on day following trading halts, and this evidence supports the spillover hypothesis where price limits may cause volatility to spread out over a longer period of time because limits prevent large one-day price changes and immediate price corrections.

Santoni and Liu (1993) test for changes in volatility surrounding the adoption of the circuit breakers using an RCH model. Using data through May 1991, they find no significant effects. A number of authors argue that since numerous other factors could affect volatility, the results are not reliable12.

However, Fama (1989), Miller (1989), Subrahmanyam (1994) and Choi and Lee (1997) suggest that price limits are likely to generate a “magnet” or “gravitation” effect.

Kim and Singal (2000) identified the characteristics of stocks that frequently hit price-limits, and found that those stocks typically have the same characteristics, volatile, heavily traded and small market caps.

Manalis (1999) have examined the effects of prices limits on the volatility in Athens Stock Exchange by testing the information and overreaction hypotheses using the econometric techniques, such as serial correlation and GARCH models. Their results show support for the information hypothesis.

Ma, Rao and Sears (1998b) suggest that price limits function positively to prevent investors from

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12 The use of the ARCH process probably does not contribute much to the result. The ARCH model allows the authors to model how variance changes at high frequencies through time. Since the effect of circuit breakers on volatility should be a long-term effect, it will act at very low frequency. The ARCH technology therefore is not needed here.
overreacting by providing a cooling-off period in the Treasury bond futures market, which makes the future market stable.

Chen (1998) investigates the overreaction hypothesis and evaluates the effect of price limits on price resolution in future markets. He found little evidence to support the overreaction hypothesis.

Lauterbach and Uri (1993) examine effects of trading halts on the Tel Aviv Stock Exchange during the October 1987 crash, finding that the circuit breakers help reduce the next day price declines but have little long-term effect.

Bertero and Mayer (1990) examine effects of markets structure, including circuit breakers, on stock market performance on 23 markets around the world during the October 1987 crash.

Ma, et al (1989), for example, study the influence of daily price limits on the price formation process after the market has resumed trading. They conclude that price limits serve a useful function in giving the market “time to breathe”.

Lee, et al (1994) study circuit breakers on the New York Stock Exchange and find that trading halts are associated with increased volume and volatility, which persist for one day and three days after reinstatement, respectively. The authors therefore conclude that trading halts are not successful at fulfilling their goal of reducing “excess volatility”. These results support their claim that the trading halt disrupts “learning by trading”.

Kryzanowski and Nemiroff (1998) investigate the price discovery process around trading halts on the Montreal Exchange. They find volatility and trading activity increase significantly around trading halts and return lower levels in less than two days after the resumption of trading.

Kim and Rhee (1997) study daily price limits on the stock market on the Tokyo Exchange and conclude that price limits are ineffective.

The empirical evidence relating to halts price limits, collars, margins and transactions taxes to volatility is generally quite scant. Efforts to assemble this evidence complicated by the lack of meaning data, the overabundance of alternative explanations for volatility, and an inability to identify whether changes in policies cause volatility or follow volatility. The only statement that we can make with confidence is that none of those policies has such a large effect on volatility that we can easily identify it.

1.3 Some arguments about circuit breakers

Though empirical findings and the theoretical works have shown mixed results, but still one can identify some very common properties of circuit breakers from empirical and theoretical research works.

1.3.1 Pro limits and halts

First, they minimize market volatility, they limit credit risks and financial confidence by providing a “time out” amid frenetic trading to settle up and insure that everyone is solvent. Closing or slowing trading would give shocked investors time to cool off, reassess their positions and restart bargain hunting. Second, they would facilitate price discovery by giving market player time to evaluate and publicize order imbalance “to attract value players to cushion violent price movement”. Third, they would “counter the illusion of liquidity” by formalizing
the fact “that markets have a limited capacity to absorb massive one-side volume”. Which allow the traders enough time to meet intraday margin calls and avoid forced liquidation? Finally, they provide financial institutions and regulators with time to assess the situation of the market. They may prevent widespread bankruptcies of financial intermediaries.

1.3.2 Contra limits and halts

First, they deprive investors in transactions opportunities as they shut the exit from the market, and thus they locked the investors to place their money in other investments. Nobody is going to buy a stock if he thinks that he could not get rid of it if he holds this stock.

Second, they drive concerned investors (and especially institutional investors) to markets that do not have such instruments. They cause trading to migrate overseas, thus making the market less competitive.

Third, they can create huge traffic jam of sell orders and mass confusion even panic (Greg Burns, “Commentary: Circuit breakers do more harm than good”, Business Week 5.8.1996).

Fourth, the market finds its level when buyers meet sellers, which only happens if trading is under way. Fifth, traders may reduce their surveillance of the market if they know that they will be notified.

Finally, it is contrary to the right to freely contract.

1.4 The effect of circuit breakers on various types of traders

1 Speculators

Speculators are informed traders. Trade to profit from their superior ability to forecast future prices based on their access to fundamental information. Any efforts to restrict their trading will make the market less efficient. Since, they often offer liquidity when uninformed traders move prices away from fundamental values, and any measure that reduced their incentives to trade will increase volatility. So, circuit breakers harm the trading ability of speculators.

2) Dealers

Dealers are traders who profit by offering liquidity to other traders. Any measures that halt trade will increase their transaction costs while decrease market liquidity and create more volatility\(^{13}\).

3) Bluffers

They were very common in DSE during the stock market bubble in 1996. They attempt to profit by tricking other traders into offering liquidity foolishly. In a typical bluffing strategy, the bluffer acquires a large position with as little impact on price as possible. The bluffer then buys very aggressively in attempt to quickly raise prices and generate excitement. Bluffers may take this part of the strategy to immediately follow the release of positive information that the bluffer hopes other traders will misinterpret when associated with the large price change that the bluffer creates. The bluffer may also generate rumors at this time, although this is generally illegal. If the bluff is successful, foolish momentum traders will join the cause and try to buy as well. The bluffer will then sell his position to these traders at the top. Since the bluffing strategy is unrelated to fundamental information, the price changes associated with bluffing are very volatile. The larger these price changes are, the more money the bluffer will make. Any measures that reduce wild price swings by halting trade will discourage the bluffing strategy and potentially decrease volatility. The problem is, most regulatory measures designed to discourage bluffing will also negatively affect speculators. Because the only feasible way of discriminating two types of traders is the duration

\(^{13}\) For example, dealers are exposed to more inventory risk when fundamental volatility is high. To avoid this risk, they may withdraw some from the market.
of holding period.

(4) Gamblers

Gamblers are traders who trade for entertainment, although they are not realizing it. Gamblers include all uninformed traders who trade because trading excites them. Although they often believe that they are informed traders, they usually trade on stale information, which is already reflecting the stock price. Since gamblers are uninformed traders, the price impact of their trading contributes to volatility. Measures that increase their costs by trading halt will decrease volatility. Unfortunately, it is difficult to target these traders since most of them will claim, and may even appear to be informed traders.

(5) Day netters

These type of trader is still very common in DSE. They buy and sell the same share couple of time during a trading session. Strangely, volatile market is very attractive to them. They can try to create temporary price swings to gain. They are most aggressive type of gamblers and ready to take the risk of losing money. Since, they do not loose much money at a time. At the end of day, their positions remain the same. Unfortunately, they create volatility that affects others. Trading halt might be an effective mechanism for these traders.

(6) Panic seller

They make high volume selling brought about by sharp price declines. The main problem with panic selling is that investors are not evaluating fundamentals, but are just selling on emotion.

(7) Utilitarian

Utilitarian trade for reasons other than trading profits. Instead, they use the market to solve various problems that originate outside the markets. Investors, bowers, asset exchangers belong to this group. Utilitarian traders use the markets because they value the services that markets provide them. Since they are uniformed traders, their trading contributes to volatility. Any measures to prevent them, unfortunately and perhaps quite significantly, will also harm the economy by marking it harder for these traders to solve the important problems that they face.

2. Hypothesis that could be developed and tested

2.1 The magnet effect

Under the magnet (or gravitation) effect hypothesis, market participants should have an increasing demand for liquidity on the buy side of the market as prices approach the halt trigger level. The magnet effect could manifest itself in a number of ways.

First, market sell orders should be submitted at an increasing rate and increasing sizes as the trigger approaches. Second, limit order traders wishing to sell may decide to cancel their limit sell order and replace them with market sell orders, choosing to exchange trading profits for immediacy. Third, limit order traders wishing to buy shares may decide to cancel or reposition their limit orders in anticipation of the approaching market wide halt.

Empirical findings are mixed to support it. For example, Miller (1996) argues that price limits might become self-filling as traders rush to avoid being locked into their positions when prices become in the range of the trigger point. In contrast, Berkman and Steenbeek (1998) do not find any evidence to support the gravitation effect. Volume and volatility are expected to change according to Subramanian (1994) who proposed this hypothesis.

Thus testable hypotheses are:

\[ H_1 : \text{Volatility and profitability in pre-limit period should be higher than in post-limit period.} \]
H₂: Volume of trade will be much higher in the per-limit period than in the post-limit period.

2.2 The “cool off-heating” (C-H) effect

The cooling off-heating (C-H) effect is claimed to be one of the major benefits of price limits by the advocates and, it is the opposite of magnate effect. Some argue that circuit breakers allow the market to somehow “catch-up”, or at least catch their breath. The market will then time to reassess the fundamental value to counter the over reaction. When overreaction exists in the market investors, overreact to new information and cause price reach to the limits. Triggered price limits give additional chance to market to evaluate the information and to reposition their strategies. Finally, this C-H period decreases the volatility.

Thus, testable hypotheses are:

H₃: Volatility in post-limit period should be less than in pre-limit period.

H₄: If C-H effect is absent, then there is a magnate effect.

2.3 The information hypothesis

According to information hypothesis, if price limit exists and true equilibrium price falls outside the daily price limits, the price will continue to move in a direction towards equilibrium as new trading limits are imposed. Price limits only prolong the number of trading days it will take for the market to adapt to a disturbance towards equilibrium. Hopewell and Schwartz (1987) examine trading suspensions (halts) on the NYSE observe that stock prices adjust rapidly to the new information released during the suspension period. However, Kryzanowski and Nemiroff (1998) finds that only the good news disseminated during a trading suspension is rapidly impounded in stock prices. When suspension leads to the disclosure of bad news, the stock markets react slowly.

Therefore, testable hypotheses are:

H₅: More significant serial correlations in returns in post-limit period.

H₆: There should be no difference in volatility between pre- and post-limit periods.

2.4 The volatility spillover hypothesis

The volatility spillover hypothesis says price limits will increase the volatility on the subsequent trading days because the limits prevents large one day price change and immediate correction in order imbalance. Price limits do halt the trading on individual stocks, but they prevent immediate correction in order imbalance, so that it will have the same volatility spillover may increase if the price discovery is intervened. This is supported by Kyle (1988) and Kuhn, Kuserk and Locke (1991). Kuhn, et al (1991) find that limits were ineffective in reducing volatility during the 1989 mini-crash in U.S.. Lehman (1989) also suggests that imbalances in supply and demand in trading induce prices to reach their limits, which implies a transfer of transactions to subsequent days. Therefore, price limits may cause volatility to spread out over a longer period of time because limits prevent large one-day price changes and immediate price corrections. This spillover to subsequent trading days is consistent with the volatility spillover hypothesis. Lee, Ready and Seguin (1994) first propose this hypothesis.

Therefore, testable hypotheses are:

H₇: Volatility will be higher than normal in post-halt period for more than two days.

H₈: Higher than normal volume in the pre-halt as well as the post-halt period.

2.5 The trading interference hypothesis

Trading interference hypothesis says price limits, and then the stock become less liquid and trading will be heavier on the following days. Stock become less liquid if price limits prevent trading activity on following days may increase as a result of interference. Fama (1989) also notes this problem and Lauterbach and Uri (1993) indicated that, interference in liquidity is a cost of circuit breakers. Alternatively, Lehmann (1989) argues that
blocking the trading induces price to reach their limits and impatient investors will trade at unfavorable prices or patient investors will wait for prices to reach the equilibrium. In either situation, the trading volume will be higher on the days following limit-days, which is consistent with the trading interference hypothesis.

Therefore, testable hypotheses are:

$H_9$: Trading volume will be heavier in the post-halt period than in the pre-halt period.

$H_{10}$: Share price will decline in the post period and the heavier the trading volume sharper the price decline.

3. Methods for empirical analysis

3.1 Problem encountered with the data set

It can be very difficult or even impossible to reliably estimate the net effect of a circuit breaker on the markets. The difficulty lies in the myriad of alternative explanations for why price change. A decrease in volatility following the imposition of the circuit breaker may be due to the imposition of the circuit breaker, or it may be due to a complete unrelated decrease in the number of uniformed trades, may be due to arrival of new information about natural disaster, or perhaps the arrival of new technology that allows traders to offer more liquidity. Without making strong assumption about what volatility would have been and the circuit breaker has not been imposed it is impossible to make reliable inferences about the specific effects of the circuit breaker.

Another major problem is the sample period, circuit breakers do not triggered quite often. And without much sample empirical analysis would not be very realistic. The problem is for the sake of data for the analysis one must not hope to be the market become more volatile. And without volatility circuit breaker will not be triggered.

Lacking of data is the foremost problem to study the net effect of a circuit breaker on the market. This paper is one example of such problem. DSE adopt circuit breaker but their data collection, storage system either backdated or may be they are careless that did not find any data to test any of the aforementioned hypothesis. This is strange that DSE adopt circuit breakers but does not take any attempt to study the effectiveness of the mechanism. Moreover, when studying circuit, breaker should be an empirical one unapparent lack of data prohibit me from dong so.

While collecting data, one must be careful and precise because some hypotheses could be tested by daily data but others intraday data.

3.2 Econometric methodology

In order to analyze the stock return behavior surrounding trading suspensions, three alternative methodologies can be suggested, because it is impossible to capture the behavior surrounding the trading halts with just one methodology. For example, GARCH is very effective when daily data are used, but not so effective in case of intraday data. The paper will explain this later. Event study methodology can also be employed for intra day analysis to all the possible explanations of circuit breakers. Moreover, to test the robustness non-parametric tests need to use along with parametric one.

GARCH (generalized autoregressive conditional heteroskedasticity):

Modeling the time varying of the stock returns allows examining the implications of the hypothesis that concern the volatility before and after the structural changes. High frequency stock returns, as well as other financial assets, exhibit periods of large absolute changes followed by periods of relatively small absolute changes. This phenomenon is known in the literature as “clustering”. In addition, after careful examination of the descriptive statistics, one immediately notices the high level of kurtosis prevalent in the stock returns. The most
successful and thus common method that allows one to model the time varying volatility and leptokurtosis in stock returns has been the generalized autoregressive conditional heteroskedasticity (GARCH) models. GARCH models allow persistence in the volatility process by imposing an autoregressive structure on the conditional variances.

The core GARCH model we suggest for the daily stock returns is as follow:

\[
\sigma_i^2 = a_0 + \sum_{i=1}^{p} \alpha_i \epsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2
\]

where \( \alpha_i \) and \( \beta_j \) are both greater than or equal to zero for \( i=0, \ldots, p \) and \( j=1, \ldots, q \), so that \( \sigma_i^2 \) is greater than zero. The sum of the GARCH coefficients, i.e., \( \alpha_i \) and \( \beta_j \), denote how persistent the conditional variance is to a shock to the system. One interpretation of such a shock is the arrival of news. For the variance to be stationary, this sum should be less than unity. For pure ARCH models, \( \beta_j = 0 \) for all \( j=1, \ldots, q \).\(^{14}\)

However, previous empirical analysis used such model indicate that trading activity, represented by volume or the daily value of transactions, may be an important determinant of conditional volatility in the stock returns is considered. Trading activity proxies for the amount of information flow into the market, which has been given as one of the explanations for the prominence of GARCH\(^{15}\) models. The relationship between the volatility of returns and trading volumes is theoretically based on the implication of the Mixture Normal Distributions Hypothesis (MDH), where the variance of daily price increments is heteroscedastic, especially when related to the rate of daily information arrival\(^{16}\).

Thus, the conditional volatility\(^{17}\) represented by following equation, which is modified to include the lag of the value of daily transactions:

\[
\sigma_i^2 = a_0 + \sum_{i=1}^{p} \alpha_i \epsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2 + \nu V_{t-i}
\]

where \( V_t \) represents the trading volume series.

In order to test the effects of any structural break, we need the following equation:

\[
\sigma_i^2 = a_0 + \sum_{i=1}^{p} \alpha_i \epsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2 + \nu V_{t-i} + \delta D_i
\]

where \( D_i \) is the dummy variable associated with any structural break.

Following Glosten, Jagannathan and Runkel (1993) and Zakaian (1990), that bad news has greater impact on stock volatility than good news for various stocks, this is known as a threshold ARCH, or TARCH specification. Thus finally augment the variance equation in our GARCH model as follows:

\[
\sigma_i^2 = a_0 + \sum_{i=1}^{p} \alpha_i \epsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2 + \nu V_{t-i} + \delta D_i + \tau e_{t-i}^1 I_{t-i}
\]

\(^{14}\) For a review of ARCH modeling in finance see Bollerslev, Chou and Kroner (1992) and/or Bollerslev, Engle and Nelson (1994) for a more comprehensive treatment.

\(^{15}\) Phylaktis, Kavussanos and Manalis find that trading activity is important for the Athens Stock Exchange (1996, 1999). See Berry and Howe (1994) for an example of news releases and trading volume and again Bollerslev, et al (1992) for the relationship between GARCH models and news releases.

\(^{16}\) Again refer to Phylaktis and Manalis (1999).

\(^{17}\) Trading volumes are important only for a limited number of stocks. The lag of volume is used to avoid simultaneously issues, see Harvey (1989) for further details.
where \( I_t \) takes the value of unity if the news is bad and zero if the news is good. For exposition, let \( p=q=1 \). Hence, good news has the impact on volatility of \( \alpha \), while bad news an affect of \( (\alpha + \tau) \). If \( \tau \) is greater than zero, leverage effects exist, and thus the impact of news on volatility would be asymmetric\(^{18}\).

Schwartz (1989) suggests an array of macroeconomic variables ranging from the inflation to industrial production variability may affect stock market volatility. The institution begins that future macroeconomic uncertainty would affect stock return volatility by influencing future expected cash flows. Moreover, the economy of Bangladesh is frequently affected by political uncertainty and natural disasters. The stock exchange was dampering by 1996 bubble-crash and now it is going through a crisis period with lack of investor’s confidence, lower turnover, faulty regulation etc. In order to avoid misspecification when modeling the conditional variance, this will bias results, we needs to include appropriate variables to instrument for the macroeconomic circumstances. The equation for the conditional variance using the additional macroeconomic variables could be described as follows:

\[
\sigma_t^2 = \alpha_0 + \sum_{i=1}^{k} \alpha_i e_{t-i}^2 + \sum_{j=1}^{k} \beta_j \sigma_{t-j}^2 + \alpha \sigma_t + y C_t + \sum_{k=1}^{K} e_{t-k} X_{t-k} \]

Where \( C_t \) is the respective crisis dummy and \( X_t \) is the macroeconomic volatility proxy.

1 Problems with intra-day data and ARCH/GARCH

A well-documented characterization of equity market volatility is the “ARCH effects” in the time series of equity returns: volatility is autoregressive and conditionally heteroscedastic. This characterization implies that volatility changes in a particular pattern, where periods of high volatility tend to be followed by additional periods of high volatility and periods of low volatility tend to followed by periods of low volatility, and that volatility tends to revert (or auto regress) to a long-run mean. One common implementation of this ARCH effect with a GARCH (generalized ARCH) model, where the volatility at time \( t \), denoted as \( \sigma_t \), develops over time according to the equation:

\[
\sigma_t^2 = a + b \sigma_{t-j}^2 + c e^2_t
\]

where \( a, b \) and \( c \) are the GARCH parameters. One period’s estimated variance is constant plus a weighted sum of last period’s estimated variance and the most recent squared return. This model of variance dynamics captures a changing volatility structure where volatility levels tend to cluster in time but also tend to revert over time to a long-run mean.

Various attempts at estimating this equation (and alternate ARCH-family specifications) via maximum likelihood were deemed unreliable. When the equation was estimated using intraday data, the estimation procedure often did not converge (in over 30 percent of the cases) or yielded estimates where \( (b+c)>1 \), which implies that volatility explodes over time instead of mean reverting (this occurred in about 20 percent of the cases). In the cases where the procedure converged and yielded economically feasible parameter estimates, this variance of the estimates over time was so great even on consecutive days as to make inference from their use untenable.

The lack of usefulness in GARCH estimation with intraday data is consistent with existing literature, which finds only limited applicability of GARCH estimation using intraday data. One potential source of noise that makes intraday GARCH untenable is the bid-ask bounce, which is present but small in daily data is dominating in intra-day data. Another problem with intraday data is the issue of how to handle the overnight change. With daily data, the time between observations is assumed to be constant, even if some time changes include a weekend.

\(^{18}\) Quasi-likelihood robust standard errors were used, for the reason that most of the residual that displayed significant leverage effects had residuals that were highly leptokurtic.
while other do not. This simplification appears to be innocuous. However, for intra-day data, the change from one
day’s close to the next day’s open is orders of magnitude greater than minute-to-minute changes, and at the same
time, it seems to be too important a piece of information not to include in estimating future volatility. However,
there is no obvious way to incorporate this overnight changes into an intraday GARCH-type framework.

(2) How to solve the problem of intra-day with GARCH

The forecasting ability of GARCH models has often been questioned in the past (Poon & Granger, 2001, for
an interesting discussion on this topic). But, as pointed out in Andersen and Bellerose (1997), considering the
squared daily returns as the “true” volatility (which has been the case for a long time) may not be a proper
measure. They propose an alternative measure of this “realized”.

Volatility that can be expressed as:

$$\sigma_i^2 = \sum_{k=t}^{K} r_{ik}^2$$

where \( r_{ik} \) is the return of the \( k_{th} \) intra-day interval of the \( t_{th} \) day and \( K \) is the number of intervals per day. To assess
the performance of the different models in forecasting the conditional variance, some measures could be used:

Mean squared errors (MSE):

$$MSE = \sum_{i=1}^{n} (\sigma_i - h_i)^2$$

Adjusted mean absolute percentage error (AMAPE):

$$AMAPE = \frac{t}{h+1} \sum_{i=1}^{n} \frac{\sum_{k=t}^{S+h} |\sigma_i^2 - \sigma_i^2|}{\sum_{k=t}^{S+h} (\sigma_i^2 + \sigma_i^2)}$$

where \( h \) is the number of steps and \( S \) the sample size, \( \sigma_i^2 \) is the casted variance and \( \sigma_i^2 \) is the “actual” variance.

Mincer-Zarnowitz R² (R2):

Historically, the Mincer-Zarnowitz regression (Mincer & Zarnowitz, 1969) has been largely used to evaluate
forecasts in the conditional mean. For the conditional variance, it is computed by regressing the forecasted
variance on the “actual” (or “true”) variance:

$$R2LOG = \sum_{i=1}^{n} [\log(\sigma_i^2 h_i^{-2})]$$

The R2 statistics from this regression therefore provides the proportion of variances explained by the forecast
(i.e., the higher the R2, the better the forecasts).

3.3 Event study methodology

Event study methodology can successfully applied to test the hypothesis of circuit breakers, it can effectively
use daily or even intra-day data. Determine the precise data/time of the trading halt (the event data). This date is
referred to as date 0.

Identifying the precise event date affects the power of the test. To some extent, the event may be anticipated
and this will weaken the power of the event study, since stock prices will have already reacted to some of the
event before (Brown & Warner, 1980, JFE).

Normally in daily event studies, the two-day event data is considered to be the event dates itself and the
previous day. The event date’s abnormal returns are cumulated to obtain a simple picture of the cumulative
average abnormal return-measure average abnormal stock price movements. The authors will test whether this
average abnormal return is statistically significant. To illustrate cumulative abnormal returns statistical
methodology, assume stock returns are generated by the market model:
Abnormal returns following a trading halt are defined as:

\[ R_{it} = \alpha_t + \beta_t R_{mt} + \varepsilon_{it} \]

We test that if the average abnormal return (AARE) on the event (suspension) is equal to zero (the null hypothesis). The alternative hypothesis is a non-zero abnormal stock return. The tests are expressed as follows:

\[ \begin{align*}
H_0 &: AAR_{\delta} = 0 \\
H_1 &: AAR_{\delta} \neq 0
\end{align*} \]

If trading halts are effective, we expect to find no abnormal returns prior to or after the suspension. The average abnormal return on the event day is derived from aggregating individual stock abnormal returns aligned in event time, and expressed as:

\[ AAR_{\delta} = \frac{1}{N} \sum_{i=1}^{N} AR_{it, \delta} \]

where, \( N \) is the number of stocks in the sample.

Individual stock abnormal returns are measured as the difference between the realized or actual return on the event day \( R \) and the expected return \( E[R_{i, t}] \), which is the benchmark normal return in the absence of the event.

We could analyze any number of half-day event windows in our sample that encompasses the event day and number of trading days before and after suspension. We define the event day: day \([0]\) as the day on which trading suspension occurs, day \([-1]\) as the trading day immediately before the day of suspension and day \([+1]\) as the day immediately after the end of suspension. Daily stock returns could be calculated using close-to-close stock prices. The appropriate way to calculate return of day \([0]\) is using the last closing price before suspension and the first closing price after suspension. Similarly the return of day \([+1]\) is calculated as the return from the first closing price of the stock after trading suspension to the next closing price.

To determine statistical significance using both parametric and non-parametric tests will be wise decision. A \( t \)-test assuming cross-sectional independence might perform first. This test statistic standardizes abnormal returns for each stock by its standard deviation. To test the hypothesis that the average effect is equal to zero, the authors first standard individual abnormal returns as:

\[ SAR_{it} = \frac{AR_{it}}{\sqrt{Var(AR_{it})}} \]

where,

\[ Var(AR_{it}) = \sigma^2 \left( 1 + \frac{1}{L} + \frac{(R_{mt} - \overline{R}_m)^2}{\sum_{i=1}^{L}(R_{mt} - \overline{R}_m)^2} \right) \]

where, \( L \) is the number of time-series observations in the estimation period. So the standardized abnormal returns are approximately unit normally distributed assuming the abnormal returns are normal and independent through time. The average standardized abnormal return at time \( t \) is:

\[ AAR_{m} = \frac{L}{N} \sum_{i=1}^{N} AR_{it} \]

And the test statistic is:

\[ t \text{-test} = \frac{AAR_{t}}{\sqrt{\frac{1}{L} \sum_{i=1}^{L} (AR_{it} - \frac{1}{L} \sum_{i=1}^{L} AR_{it})^2}}, \text{where} \overline{AR}_{t} = \frac{1}{N} \sum_{i=1}^{N} AR_{it} (t = 1, L) \]
The cumulative average abnormal return (CAAR) is defined up to T periods after the event as:

$$CAAR = \sum_{t=1}^{T} \frac{1}{N} \sum_{i}^{N} AR_{i}$$

The relevant $t$-statistic is:

$$t - test = \frac{CAR_{i}}{\sqrt{\left(\sum_{t}^{T} (AR_{i} - \frac{1}{L} \sum_{t'}^{T} AR_{i'})^2\right) / L}}$$

### 3.4 Non-parametric tests

#### 3.4.1 Nonparametric generalized sign test

This test is like the traditional sign test. However, the sign test requires the assumption that the number of stocks in a sample of size $n$ that have positive returns on the event date follows a binomial distribution with parameter $p$. The null hypothesis for the traditional sign test is that $p=0.5$. In the generalized sign test, the null hypothesis does not specify $p$ as 0.5, but as the fraction of positive returns computed across stocks and across days in the parameter estimation period. Thus the fraction of positive abnormal returns expected under the null hypothesis is:

$$\hat{p} = \frac{1}{N} \sum_{j=1}^{n} \frac{1}{T} \sum_{i}^{T} \phi$$

And the generalized sign test statistic is:

$$Z = \frac{(W-n\rho)}{[n\rho(1-\rho)]}$$

#### 3.4.2 Non parametric rank tests

The rank test was developed by Corrado (1989). The rank test procedure treats the 255-day estimation period and the event day as a single 256-day time series, and assigns a rank to each daily return for each firm. Following the notation of Corrado, let $K$ represent the rank of abnormal return $AR$ in the time series of 256 daily abnormal returns of stock $j$ rank one signifies the smallest abnormal return. Following Corrado and Ziveny (1992), we adjust for missing returns by dividing each rank by the number of non-missing returns in each firm’s time series plus one:

$$U_{j} = \frac{K_{j}}{M_{j} + 1}$$

where $M_{j}$ is the number of non-missing abnormal returns for stock $j$. The rank test statistic is:

$$Z = \frac{1}{\sqrt{N}} \sum_{j} \left( U_{j} - 0.5 \right) / S_{j}$$

The standard deviation $S_{j}$ is:

$$S_{j} = \sqrt{\frac{1}{256} \sum_{i=1}^{N} \left[ \frac{1}{\sqrt{N}} \sum_{i=1}^{N} (U_{i} - 0.5) \right]^{2}}$$

where there are $N$ non-missing returns across the stock in the sample on day $t$ of the combined estimation and event period. Corrado, Campbell and Wisely (1993) reported that the rank test is well specified and powerful. Cowan (1992) reports the test to be powerful and well specified with exchange-listed stocks.

### 4. Five reasons for adopting circuit breakers in DSE

There are almost five different reasons which might be the cause for imposing daily price limits in DSE.

Overreaction hypothesis is the most important one of them. Price reversal after limits is reached indicating
over reaction, subsequent correction and also volatility subside.

Second, price limits minimize market volatility, they limit credit risks and financial confidence by providing a “time out” and “cooling-off” periods for traders to settle-up their trading and insure that everyone is solvent. Closing or slowing trading would give shocked investors time to cool off, reassess their position and restart bargain hunting. During trading halt with the arrival of new information, investors will be able to reassess their trading strategy.

Third, facilitate the collection of margin by brokers and clearinghouse. Trading halt help markets compensate for other weakness in the trading process. For example, when brokers cannot collect margins continuously in real time trading halts give them time to collect margins. When order flow expected the processing capacity of a market then trading halts protect traders from trading in an informational disorganized market such as DSE.

Forth, price limits can give traders time to consult their principles during a big price swing. Provide time for informed traders to counteract panicked uniformed traders. They could learn from them and plan to act more profitable in the future.

Lastly, they provide financial institutions and regulators with time to assess the situation of the market. In assertion, may enhance the total welfare by transferring risk between different groups of traders in the market.

Political economy of circuit breakers:

In this part, this paper will speculate on why DSE adopted trading halt and why this particular type of halt mechanism not some other one (may be a sever one like Rule 80B). Moreover, the question will rise about the timing of the adoption of trading halt in DSE and will try to answer that on behalf of regulatory. These questions are interesting because no one really knows whether their benefits out weight their costs. In addition, these questions are crucial because of the absence of available data to test their efficiency.

This short section suggests some arguments for circuit breakers based on asymmetries in how regulators weigh Type I and Type II decision errors. Briefly, following an extreme event, regulators tend to overreact because they fear being blamed for failing. This model may explain why DSE adopted the trading halts.

Immediately following the 1987 Crash (the Black Monday), many people demanded that regulators act to prevent future crashes. Regulators around the world did so. However, in Bangladesh thing does not go that way and DSE circuit breaker introduced within three months during the stock market bubble in 1996? The bottom line of adopting the circuit breaker is that they will stop the market crash. And when in 1996, some inventors already expecting a crash circuit breaker only increased the panic. Moreover, investors surely thought that regulatory knew the crash is inevitable. So what would happen if the circuit breaker were present in the market earlier in the market say from 1990 or 1992? Maybe it would prevent the bubble, and without bubble there would not be any crash and market index would gradually increase. Nobody knows whether circuit breakers have such power or not, but still there is a chance (may be very insignificant) that if circuit breakers were present before the speculative run up to the DSE index in 1996, it could prevent the crash following it.

Given this environment (regulators at that time surely knew that eventually there would be a crash), it can easily imagine that regulators in the government and in the exchanges reasoned as follows:

- If you do not adopt some circuit breakers and the crash occurs, the public will hold us responsible for failing to protect the public, regardless of whether the circuit breakers would or even could have made a difference.
- If you do not adopt some circuit breakers and the bubble vanished without any crash, we will have saved whatever costs the circuit breakers might impose upon the markets, but nobody will credit us with our wisdom.
- If we adopt circuit breakers and the crash occurs, people will learn that we cannot prevent crashes, but we
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tried and perhaps they will not blame us for not trying to stop the crash.
- If we adopt circuit breakers but no crash occurs, people may credit us with preventing the crash, even if the circuit breakers are not effective.

We can summarize these contingent costs and benefits in Table 3:

|                          | Adopt circuit breaker | Do not adopt circuit breaker |
|--------------------------|-----------------------|-----------------------------|
| There will be a crash    | No cost               | High cost                   |
| There will be no crash   | Benefit               | No cost                     |

Given these assumed values, it is optimal for regulators to adopt circuit breakers. The regulators should adopt some circuit breakers, whether or not circuit can protect a crash, and they did so in 1996.

Now consider why this type of trading halt and not any server one (like Rule 80B) that will be halt the trading of all the shares if circuit breakers activated. Mild circuit breakers like trading halt on individual securities are unlucky to significantly change trading where as server circuit breakers will alter the character of trading. Regulators may have reasoned as follows:
- If we adopt mild circuit breakers and the crash occurs, we may be faulted for not acting more strongly. Investors may conclude from the crash that regulators cannot prevent crashes.
- If we adopt server circuit breakers and the crash occurs, most will conclude that regulators cannot prevent crashes. Some, however, will claim that had the server circuit breakers not in the place, the unconstrained market would have been able to handle the crisis. We may be blamed for causing the crash.
- If we adopt mild circuit breakers but no crash follows, we will have had little effect on the markets.
- If we adopt server circuit breakers and no crash follows, we will be faulted for overreacting.

We can summarize these contingent costs and benefits in Table 4:

|                          | Adopt mild circuit breaker on individual stocks | Adopt server circuit breaker on index |
|--------------------------|-----------------------------------------------|--------------------------------------|
| There will be a crash    | Some cost                                     | Possibly high cost                   |
| There will be no crash   | No cost                                       | High cost                            |

Given these assumed values, it is optimal for regulators to adopt mild circuit breakers. So, it is clear why regulators adopt trading halt of such type in DSE.

The conclusions in these simple analyses obviously depend on our assumed contingent valuations. If someone makes other assumptions, he/she may obtain different conclusions, or may not be able to obtain any conclusions without assuming additional information about the probabilities of future crashes. These assumptions seem reasonable to us, but everybody have the freedom to think otherwise.

Almost ten year later, now time has come to taking a second thought—deciding whether to reset the conditions of current circuit breakers for their use. Despite their growing use, especially among emerging market countries, there continue to be misconceptions about the purpose and effectiveness of circuit breakers (Bangladesh is foremost them). Circuit breakers are only a temporary measure for reducing market volatility or unidirectional price movements. If fundamental information is the basis for the price movement, and not features of destabilizing trading strategies or panics, then circuit breakers simply slow the eventual price movement—they do not reverse it.

To choose the circuit breaker mechanism that will be the most effective, it is important to define the goals of
the circuit breaker and to assess the surrounding environment. In most cases, the goal of circuit breakers is either to dampen price movements caused by speculative activity or to slow down the price effects of trading strategies that are thought to have destabilizing effects. Even when destabilizing speculative activities or trading strategies are absent, there is often a belief that sharp movements in prices, regardless of their cause, are likely to engender a panic mentality, causing investors to act irrationally, further reinforcing exiting price movements. Similarly, even when price movements reflect underlying fundamentals, a limit on the maximum amount lost in a given period may flow participants who would not able to pay for their losses and had the full price decline occurred to pay on a timely basis.

Regardless of which type of circuit breaker is chosen, to operate effectively in market needs to be centralized, information needs to be disclosed during the halt, and there needs to be a well known method for the resumption of trade. Trading halts can only truly halt trading when trading is centralized.

In the United States, for example, when trading halts were introduced after the 1987 market break, close coordination between the stock exchange and the future exchanges, on which associated futures contracts were traded, was required. On the other hand, from July 1991, the share market index at DSE started rising. There was continuous and rapid increase in the average price of the stocks until the market collapsed in November 1996. In October 1996, the DSE instituted a circuit breaker to limit price movements to a daily 5 percent, only to have its effectiveness undermined by the unofficial curb market where no such impediment to trading could be maintained. It did not produce result. There was hardly any buyer and the collapse came inevitably. Clearly, DSE authority failed to adopt the most effective circuit breaker in their time.

This lack of understanding and inability to take correct steps on time was the main cause of the market disaster. It created the opportunity for some greedy people to make millions. For thousands of others, it brought ruination.

5. Conclusions

While market restriction mechanisms have been justified in part as instruments to protect individual investors, the rationale is debatable, and it raises a lot of discussion among the market participants and the economists. They raise economic issues as they affect the market as well as psychological issues as they change how people think about trading. Circuit breakers have economic power since they restrict what trades do because they alter relationships among various classes of traders. Circuit breakers have psychological power because they can change how people think about trading and security values. They raise political-ideological issues, as regulators have to decide whether restrictions should be implemented in the market and what those restrictions should be. Finally, analyses of statistical power explain why empirical studies that attempt to examine the effects of circuit breakers cannot be convincing.

Most of the jurisdictions worldwide have adopted one or a combination of more than one of the mechanisms presented therein. The necessity of such mechanisms is much more obvious in the case of emerging. Non-mature capital markets exist, such as DSE. However, it appears that there are no clear and satisfactory answers worldwide unfortunately, and empirical studies that took place did not provide us with deceive and convincing answers or any guidance whatever adds to the good or bad effect of such restrictions in the markets that have opted them. In fact, so many factors influence the stock prices, it is not easy to determine what would have happened in a market, had these mechanisms not been in place. Moreover, there is no clear explanation for volatility too. That is why
further investigation need to be conducted to evaluate the circuit breakers mechanisms in Bangladesh Stock market. Despite many arguments contrary to these mechanisms are often considered as impediments to the free market and free allocation of resources for a fragile stock exchange like DSE, it may be useful sometimes to replace the “invisible hand of the market place” with the “visible hand of the market regulators”.

References:
Avanidhar, S. (1994). Circuit breakers and market volatility: A theoretical perspective. *The Journal of Finance, 49*(1), 237-254.
Admati, A. R. & Pfleiderer, P. (1988). A theory of intraday patterns: Volume and price variability. *Review of Financial Studies, 1*, 3-40.
Chen, H. (1998). Price limits, overreaction and price resolution in future market. *Journal of Future Markets, 18*, 243-263.
Christie, W. G., Corwin, S. A. & Harris, J. H. (2002). NASDAQ trading halts: The impact of market mechanisms on prices, trading activity and execution costs. *The Journal of Finance, VII*(3), 1443-1478.
Corwin, S. A. & Lipson, M. L. (2000). Order flow and liquidity around NYSE trading halts. *Journal of Finance, 55*, 1771-1801.
Fama, E. F. (1989). Perspective on October 1987, or what did we learn from the crash? In: Kamphuis, R. W. Jr., Kormendi, R. C. & Watson, J. W. H. (Eds.), *Black Monday and the future of the financial markets* (Irwin, Homewood, III).
Greenwald, B. C. & Stein, J. C. (1991). Transactional risk, market crashes and the role of circuit breakers. *Journal of Business, 64*, 443-462.
Kim, J. & Singal, V. (2000). Stock market of openings: Experience of emerging economics. *Journal of Business, 73*, 25-66.
Kryzanowski, L. & Nemiroff, H. (1998). Price discovery around trading halts on the Montreal Exchange using trade-by-trade data. *The Financial Review, 33*, 195-212.
Kuhn, B. A., Kurserk, G J. & Locke, P. (1991). Do circuit breakers moderate volatility? Evidence from October 1989. *The Review of Futures Markets, 10*, 136-175.
Kyle, A. S. (1988). Trading halts and price limits. *The Review of Futures Markets, 7*, 426-434.
Lauterbach, B. & Uri, B. Z. (1993). Stock market crashes and the performance of circuit breakers: Empirical evidence. *Journal of Finance, 48*, 1909-1925.
Lee, C. M. C., Ready, M. J. & Seguin, P. J. (1994). Volume, volatility and New York Stock Exchange trading halts. *The Journal of Finance, 49*(1), 183-214.
Lehmann, B. N. (1989). Commentary: Volatility, price resolution and the effectiveness of price limits. *Journal of Financial Services Research, 3*, 205-209.
Mann, R. & Sofianos, G. (1990). Circuit breakers for equity markets. In: *Market volatility and investor confidence*. New York: New York Stock Exchange.
McMillan, H. (1990). Circuit breakers in the S&P500 futures market: Their effect on volatility and price discovery in October 1989, unpublished manuscript, Securities and Exchange Commission.
Michael, G & Kavajecz, K. A. (2000). Liquidity provision during circuit breakers and extreme market movements, working paper, The Wharton School, 443-462.
Miller, M. H. (1989). Commentary: Volatility, price resolution and the effectiveness of price limits. *Journal of Financial Services Research, 3*, 165-199.
Phylaktis, K. & Manalis, G. (1999). Price limits and the stock market volatility in the Athens Stock Market. *European Financial Management, 5*(1), 69-84.
Santoni, G. J. & Liu, T. (1993). Circuit breakers and stock market volatility. *Journal of Future Markets, 13*(3), 261-277.
Weaver, D. G. (2000). Papers and proceedings of the sixtieth annual meeting of the american finance association. Boston, Massachusetts, *The Journal of Finance, 55*(4), 1801-1805.

(Edited by Ruby and Chris)