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Investigating Fisher Effect in Bangladesh and Its Elements in the Dhaka Stock Exchange

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Abstract
This study aims to address the existence of Fisher Effect on the Stock Exchanges. Empirically, investors in Bangladesh has faced striding up and downs on the Capital Market, much of it can be attributed to the players' lack of competencies in technical and fundamental analysis. While various macroeconomic forces are simultaneously at work, from the major indicators, this paper selectively argues the position of the Fisher Elements in the Dhaka Stock Exchange (DSE). Results show that Real Interest Rate impacts negatively, while Inflation Rate and Nominal Interest Rate has positive effects; the latter's impact is much more profound. In-depth analysis exhibits the absence of Fisher Effect, presence of Price Puzzle and the offsetting effects of Inflation and its role in stimulating the economy in the country using Targeting Inflation. Whereas, Real Interest Rates tend to make savings much more lucrative for the middle-class dominated population that leads to crowding out of investments in the DSE. Finally, apparent failure of the policy makers to boost the Market Index by cutting the Nominal Interest Rate has also become evident.
Keywords: Price Puzzle, Target Inflation, Fisher Effect, Dhaka Stock Exchange (DSE) General Index Point

1. Introduction

1.1 Background

The Capital Market is somewhat considered the trigger point in the modern economic settings, as it brings the firms and investors under one roof. The companies that plan to engage in Business Activities through a primary market can raise capital by issuing IPOs (Initial Public Offerings) and at a later stage, RPOs (Repeat Public Offerings) as per Bangladesh Security Exchange Commission (2017). On the other hand, potential investors that wish to place their money in the Capital Market can choose to do so via BOs (Beneficiary Owner's) Account (HAC Securities Ltd., 2017). While two types of investors exist in the market, Bangladesh is a middle-class predominated nation, and as found by Chun et al. (2016), the middle-class primarily prompts the economy to thrive. While various companies engage in the stock market trading for hedging purposes, generally the middle-class investors and numerous fund/portfolio managers enter the market in order to earn a higher return than the risk-free rate or even more than the bank deposit rate. The two operational Stock Exchanges in Bangladesh, naming the Chittagong Stock Exchange (CSE) and Dhaka Stock Exchange (DSE) had been empirically suspected of working in a somewhat weak-form of efficiency (Mobarek & Keasey, 2000; Islam & Khaled, 2005; Alam et al., 2007; Mobarek et al., 2008), which can be associated with factors like limited number of players in the market, inequality in the size of the investment pie allowing manipulation by few major traders (few affluent outliers amongst the investors), consequent illiquidity due to limited average number of trades per investor, artificial information barriers, etc. More recent findings suggest that DSE in fact, is in weak-form of "inefficiency" and also does not adhere to random walk (Khan & Huq, 2013; Miah & Banik, 2013). As a result, investors poses the opportunity to gain an above market average return by making educated forecasts and investing accordingly in DSE, which is also referred only as the "Share Market", despite being a market that hosts a variety of tradeable instruments and the reason is that, out of the 562 tradeable securities, only 10 securities are made up of Debentures and Corporate Bonds, 36 securities containing of mutual funds, while 221 of them are Treasury Bonds, and the majority of the securities comprising of Company Shares, and the shares are traded more than the debt instruments, as the latter yields optimum benefits only if held over a long period of time; other Financial Derivatives are in planning stage for future considerations (DSEBD, 2017). Despite the assorted offerings, the capital market size is meager against the country's entire economy. As a result, an efficient market had been far from being achieved, eventually leading to several failures and market crashes in the past. Noted periods include 1996-1997, when the capital market crashed for the first time, and 2010-2011, when the second major crash occurred. Since then, despite the available opportunities, the catastrophes in the capital market led the investors' confidence to plummet. The situation of having a modest index of trade volume, limited set of potential and actual traders, and the effects of inequality in the proportion of transaction among them is dampened further by usage of poor technical and fundamental analysis techniques. The absence of efficiency even in the weak-form makes it possible to earn above average market return by using technical

analysis and fundamental analysis to forecast the intrinsic values of the security. As most of the investors are working-class, they do not have the time to make appropriate analysis and it is essential for them to have a road-map that relatively gives them an appropriate direction towards which the Capital Market is moving, without having to rely on many other indicators. This investigation aims only to focus on the fundamental analysis, and identifies three major macroeconomic forces that are in interface with the DSE General Index. These three elements are related to the Fisher Effect theory, and if observed properly, can yield recurring patterns and establish a connection in relation to the stock market General Index Points. Studies by Uddin et al. (2008) & Ahmad (2010a) illustrated no traces of the Fisher Effect in Bangladesh, which this study aims to investigate. The 3 variables considered are Inflation rate, Interest Rate on Deposit, and Real Interest rate; data sets of slightly more than a decade to around a quarter century have been used. The findings of this research, is expected to assist the investors during their investment decisions (Osamwonyi & Evbayiro-Osagie, 2012).

1.2 Hypothesis

Several studies on the stock markets in various countries, depict the various macroeconomic factors that play integral role on the stock market movement. However, the common factors that are identified, only contribute at variable velocities in the different capital markets. Empirical researches show, that the conditions that set various market conditions are, the total size of the capital market, the knowledge and perceptions of the individual investors, the number of listed companies in the selected capital market as well as the number of individual and institutional investors. When the macroeconomic variables such as Inflation rate, Interest rate on Deposit and Real Interest rate, interact with the market conditions, it yields a certain positive or negative movement in the value of General Index Point, but the magnitude differs (Bhunia, 2012). The assumptions are that, the findings of Uddin et al. (2008) & Ahmad (2010a) can be rebutted to prove the existence of the Fisher Effect in Bangladesh, and the common macroeconomic variables will impact similarly in DSE as it has in other Stock Exchanges, and but the extent has to be identified. In order to calculate the coefficient of correlation (r) and Regression (R-Square) analysis between the each of the selected macroeconomic forces with DSEX General Index Point individually, data set of 13-24 years have been utilized. Whereas, in order to calculate multi-correlation and multi-regression, only data set of 13 years have been used. How each of the selected macroeconomic variables affect the movement in DSE, have been presented in the later stages.

1.3 Objectives

The prime objective of this study, is to display the existence of the Fisher Effect in Bangladesh and present the interaction between Macroeconomic forces like Inflation Rate, Interest Rate on Deposit and Real Interest Rate and the General Index in Dhaka Stock Exchange Ltd (DSE).

2. Literature Review

The 1-to-1 relationship between the inflation rate and the interest rates in the long-run suggested by the Fisher hypothesis (1930) has been the focus of study for various economists, some of which such as Crowder & Hoffman (1996), Evans & Lewis (1995), Granville & Mallick (2004), Gul & Acikalin (2008) and Badillo et al. (2011) have found traces of unbalanced cointegration between the two, where inflation is inversely proportional to the real interest rates. Complimentary studies held by Paul (1984), Garcia (1993), Pelaez (1995), Thornton (1996), Payne & Ewing (1997), Lanne (2001), Berument & Jelassi (2002), Ur et al. (2004), Ito (2009), Obi et al. (2009), Bassil (2010), Toyoshima & Hamori (2011), Awomuse & Alimi (2012), Incekara et al. (2012), Muse & Alimi (2012) have yielded affirmative results favoring the hypothesis. Daniels (1996), Atkins & Coe (2002), Lee (2007), Westerlund (2008), Beyer et al. (2009), Hall et al. (2010), Ahmad (2010b), Phiri & Lusana (2011) and Jareno & Tolentino (2012a) have found the Fisher Effect to be notably present only in the long-run, and Ucak et al. (2014) even found the Fisher Effect to be above par. It can be ascertained to the findings of Mundell (1963) and Tobin (1969), where the investors used real assets as an inflation hedging mechanism; in addition, in some eras, the firms and household diverting their liquid assets to a portfolio of other investments had led the interest rates to descent, while pro-liquidity in some regimes had led interest rates to ascend to more than the long-run mean, and hence the fluctuations. Further deviations occur due to tax adjustments (Dutt & Ghosh, 2007) as well as regime chances (Mishkin, 1992). There were occasions where Effects of Fisher had but only partially been evident (Bajo-Rubio et al., 2005; Dutt & Ghosh, 2007), of which, the former event's unbalanced movement of the nominal interest rates, hints towards a level of "money illusion in the financial market", as rightfully phrased by Yaya (2015). Ucak et al. (2014) indicated an existence of tax-regulations on the Nominal Interest Rates (Darby, 1975), and linking the findings of Dutt & Ghosh (2007), the pre-tax Nominal Interest Rate must rise to adjust proportionally to the fluctuating Inflation Rate and the stable post-tax Real Interest Rate (Woodward, 1992), because according to Crowder & Sonora (2002), the Real Interest Rate is the factor that remains stable while the Nominal Interest Rates shifts in response to the altering Inflation Rate. Contrarily, studies by Dutt & Ghosh (1995), Olekalns (1996), Hawtrey (1997), King & Watson (1997), Weidmann (1997), Evans (1998),

Hasan (1999), Koustas & Serletis (1999), Coppock & Poitras (2000), Junttila (2001), Ghazali & Ramlee (2003), Koustas & Lamarche (2010) and Fahad & Ahmed (2016) have disproved the existence of Fisher Effect. Edirisinghe et al. (2015) has found that for a setting where an economy opposes the monetary theory's inverse relationship between the Nominal Interest Rate and Inflation, a "Price Puzzle" occurs, and in this scenario, Inflation-Targeting should be implemented, which also solves a problem of "high inflation". Ahmed & Ahmed (2008) mentioned that various central banks tend to engage in Inflation-Targeting keeping output gap and price stability in mind, and do through manipulation of short-term interest rates, but this often more than not results in large fluctuations in price level in the long-run as a compensation for overlooking shocks in the short-run. Bangladesh has been using Inflation-Targeting Monetary Policy, but in order to boost the Inflation Rate rather than limiting it (Bangladesh Monetary Policy Statement Team, 2015) in order to sustain economic growth.

Lunn & Duffy (2015) found that Inflation would depreciate the purchasing power of money, which supports the rationale of the public to reallocate their savings or move away from monetary investments towards real assets as hypothesized by the Mundell-Tobin Effect. Hoesli (1994), Ghosh et al. (2004), Ranson (2005), Levin & Wright (2006), Long et al. (2013), Amonhaemanon et al. (2014), Shahbaz et al. (2014) and Bampinas & Panagiotidis (2015) have found Real Estate and Gold to be successful inflation-hedging instruments. However, the spillover effect, of "Subprime Mortgage Crisis" since 2007, has left the public somewhat skeptical of the Real Estate Market which is iterated by Glascock et al. (2008). Also, more recent studies by Van-Hoang et al (2016) and Khair-Afham et al. (2017), while supporting gold's hedging ability, have found it to be inconsistent depending on the "time-horizon, price-momentum and regime changes". Financial Assets such as stocks, however were also found to have provided good cover against Inflation, such as the findings of Luintel & Paudyal (2006), Adam & Frimpong (2010), Alagidede & Panagiotidis (2010), Adnan & Abbas (2011), Bruno & Chincarini (2011), Kim & Ryoo (2011), Tugcu (2011), Jana (2013), Long et al. (2013b), Davenport (2015), Tiwari et al. (2015), Shahbaz et al. (2016) and Ozatac et al. (2017). Conversely, only Bhandari & Bandi (2017) from the most recent studies are not in support of the notion of using common stocks to hedge against inflation.

Furthermore, researches conducted on Inflation and Stock Returns during the cold-war (Jaffe & Mandelker, 1976; Nelson, 1976; Pearce, 1982) and Post-Cold-War (Asikoglu & Ercan, 1992; Samarokoon, 1996; Kim, 2003) using historic data demonstrated an inverse relationship. Inflation rate and its three-month average were found to have significant effect on Stock Market volatility (Aliyu, 2012) in addition to the Nominal Interest Rate (Bosupeng, 2016). It is supported by Daferighe & Charlie (2012), that stated that various tests between Inflation and Stock Market performance yielded an inverse relationship except for Turnover Ratio. The negative impact of inflation, on the stock prices, is further confirmed by the study of Quayes & Jamal (2008). Similarly, decrease in inflation rate tends to generate a positive signal for the stockholders to invest in the capital market, as it foreshadows an expansion in the business sector, and consequently the returns of companies are expected to increase; moreover, declining inflation rate indicates a fall in expected interest rates, and this reduction in financing cost, encourages the establishment of newer firms (Omran & Pointon, 2001). Some studies, however, have found a negative relationship between stock returns and inflation only in the short term, but this link becomes positive in the long term (Torrecillas & Jareño, 2013). Supporting studies by McCarthy et al. (1990), Khan (2004), El-Nader & Alraimony (2012), Nair (2012), Reddy (2012), Moya et al. (2013), Ayaydın et al. (2013), Satti et al. (2013), Saleem et al. (2013) and Yemelyanova (2013) have come to similar deductions about the inverse relationship between inflation and the general stock prices.

Alam & Uddin (2009) has found that interest rate, on a global scale, has significant negative relationship with the price in all the stocks. Thang (2009) has pointed out that, interest rate has a negative relation with the stock prices only in the short run. Reddy (2012) iterated that, a reduction in interest and inflation rate resulted in increased general stock prices. But when the companies of stock portfolio are classified according to "industries" or "capitalization size", it can be observed that depending on the interest rates and the tax-shielding prospects, the different firms tend to structure their capitalization accordingly, which effects the health and profitability and hence inducing a certain stock price (Fahad, 2016). Furthermore, Fahad et al. (2016) has found that the reduction in Nominal Interest Rate induces an accelerated consumeristic behavior resulting in boosted Aggregate Demand. This boost may in fact lead to the overall Stock Market Index to do well. There is an indirect implication too; as the economy as a whole tends to expand in a reduced Interest Rate scenario, as it not only affects the Public Listed Companies, but also assists the micro-businesses. However, certain SMEs that are "Sharia" compliant, tend to be insulated from any fluctuations as the cost of capital is carried through profit/loss sharing contracts rather than Interest Rates which tends to raise the standard of living of the small and micro enterprise owners more successfully than the conventional financing methods (Ahmed & Fahad, 2016) which increases the purchasing power of the household sector for necessary goods. While this does not affect the capabilities of the Public Listed Companies directly, apart from boosting demand for their products, these said SMEs can also often work as distribution partners for bigger companies and thus strengthening the Supply Chain of those companies that results in increased profitability, cash flow and ultimately the firm value. Fahad (2016) has also demonstrated how the supply chain partners and policies ultimately affect the parent companies' values. The

effect of inflation and interest rate tend to have an opposing effect on equity prices (Cunningham, 2007). Investigations in the North American context showed, that fluctuations in American interest rates and Saudi Arabia Riyal impacts unfavorably on the said index (Anlas, 2012). Fahad & Ahmed (2016) displayed that a high Interest Rates may attract investors that seek covered arbitrage opportunities, which may lead to boost in FDI or overseas stock trades in a country and increase the Index Points in the Stock Exchange, but contrarywise, the Inflation Rate component of the Nominal Interest Rates reflects the risk factor in a given economy that may crowd-out foreign direct investments and consequently inhibit General Index growths.

3. Research Design and Technique

3.1 Sources of Data

Data comprises solely of secondary nature. However, the information has been collected from a wide range of sources. They include various journals articles, publications, webpages, books and reports available from the Bangladesh Bank Website and Dhaka Stock Exchanges e-Library, in addition to academic research sites.

3.2 Methodology

The research has been conducted rigorously, based on statistics on the economic indicators from around the last decade to last quarter century in Bangladesh. There are multiple macroeconomic forces at work that impact on the DSEX General Index in Dhaka Stock Exchange Ltd. (DSE), such as Inflation rate, Interest rate on Deposit and Real Interest rate, and hence this paper aims to identify the relationship mathematically to identify which factors affect proportionally or inversely towards the capital market; the findings will be presented in both tabular and graphical forms.

3.3 Limitations

Due to lack of data accessibility, the entire set of macroeconomic data could not be considered to investigate the relationships. Moreover, inconsistencies may exist, as data across different time horizon has been collected where only figures have been available; in order to standardize, statistical figures have been collected from a single source. For example, for the inflation rate, only 13 years' monthly-data have been considered to calculate the correlation coefficient (r) and Regression (R-Square) against the DSEX General Index for the purpose of getting a close estimation of the "expected Inflation Rate" (Leiser & Drori, 2005; Jareno & Tolentino, 2012a; Jareno & Tolentino, 2012b; Jareno & Tolentino, 2013), whereas, annual data of last 24 years is considered for Interest Rate on Deposit and Real Interest Rate as they tend to remain stable per annum so as to not cause any disequilibrium. Finally, to conduct the Multi-Correlation and Multi-Regression analysis, year ended data of all variables for only 13 years' annual data have been considered even though, a more optimum verdict could have been reached using historical figures of at least two-decades for all the indicators used.

3.4 Statistical Treatment Applied

The types of statistics used, were Descriptive and Inferential Statistics, and in order to assist with the data analysis, the primary statistical software packages used, were Excel and SPSS. Some of the statistical tools (inferential) utilized are Coefficient of Correlation (r), Regression (R-Square) and Multivariate test among the variables.

4. Results and Discussion

4.1 Comparison and Regression Analysis of DSEX General Index with individual Variables

While it is understandable that there are multiple economic stimuli, that contributes toward the movement in the Stock Market simultaneously, the significance of those stimuli at individual level, cannot be overlooked. Investors by understanding the relative impact of these indicators, will able to make more spontaneous decisions given a period where the economic undercurrents change due to government policies (Pramod-Kumar & Puja, 2012), such as instances if Target Inflation is abandoned which may have implications on the economic activity or on the interest rate, etc. which would ultimately have impact on the Capital Market.

4.1.1 Inflation Rate of Bangladesh

Table 1. Distribution of DSEX Index Point and Inflation Rate

	DSEX General Index	*Inflation Rate %*
Mean	2792.73	6.93
Median	2266.75	7.35
SD	1950.79	2.63
Min	607.43	1.24
Max	8602.44	11.59
CV%	69.85%	37.92%

(Hossain, 2014)

Considering the fully-available data of last 13-years, Table 1 shows the range of DSEX General Index point is 607.43 to 8602.44 with a mean of 2792.73 ± 1950.79, where the median value is 2266.75 Index points. Meanwhile, the Inflation Rate is found to have varied between 1.24% to 11.59%, but on average, the rate remains at 6.93% ± 2.63%, while the median is 7.35%. Moreover, the Inflation Rate is relatively more stable with a CV of 37.92%, which is almost half the CV of the Index Points.

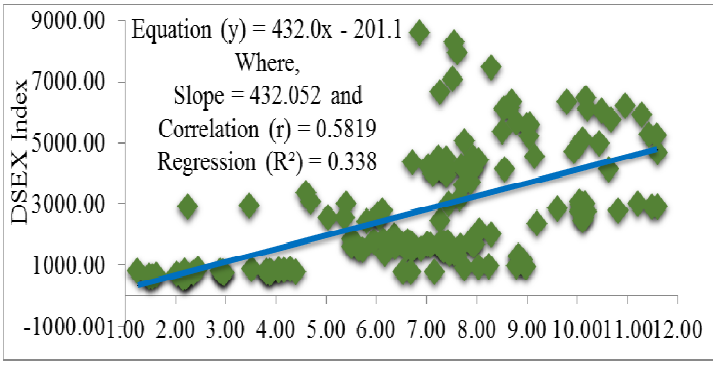

Figure 1. Relationship between Inflation Rate (%) of Bangladesh and DSEX Index Point

(Hossain, 2014)

Figure 1 depicts that the relationship between the Inflation Rate and the General Index Point is somewhat moderately positive, with an r-value of 0.5819. This means that, the Index Point is to some extent, dependent on the Inflation Rate of the economy, however, it is not a major indicator dictating the magnitude. Pradhan et al. (2013), Pradhan et al. (2014), Pradhan et. al. (2015) and Plíhal (2016) found that, there is a cointegration between the Capital Market Boost and Inflation in the Developing Economies, and it is bidirectional; healthy level of inflation results in economic growth, that leads to surge in the Stock Market Index. The trendline in Figure 1 implies that, for every 1% increase in inflation, the DSE Index inclines by 432.05 points, while the R^2 result shows, that the analysis has only 33.8% chance of fitting the market condition. While there are contrary results (Kim, 2003; Spyrou, 2004; Rafique et al., 2014; Şükrüoğlu & Temel-Nalin, 2014; Kabeer et al., 2016; Sulaiman et al., 2016), there are some scholars that support this investigation (Ratanapauorn & Sharma, 2007; Horasan, 2008; Yartey, 2008; Falahati et al., 2012; Li, 2015, Oshaibat, 2016). Based on Table 1 and Figure 1, it is evident that there is a positive relation between DSEX Index and Inflation, but both are quite unstable (CV>30%) in the long-run. This long-term instability can be explained by the phenomenon "Inflation Targeting" that is triggered by varying the short-term interest rates (1 year >) that ignores short-run shocks (Ahmed & Ahmed, 2008) and as a derivative, it makes stock purchasing more lucrative that ascends the share prices and consequently the General Index level (Bank of England, 2017). Mild inflation is however, a necessary means for achieving growth in the economy and it can be explained from the managerial perspective; rising price of products encourage firms to increase production in order to capture more revenue (while realize economies of scales), and the economy as a whole develops (Spyridis, 2009), as there are other implications, such as greater production leading to disposable income surges which leads to more savings and investment that eventually influences the Capital Market positively.

In contrast to a stable Target Inflation, a volatile Inflation Rate would have been rather unfavorable for the economy and the Stock Market, as stated by Lee (1999). Furthermore, "Inflation" is likely to hit different sectors discriminately (Albulescu et al., 2016; Cano et al., 2016; Alomari et al., 2017), and hence forecasting the direct impact is a challenge. To add on, the instability in the Stock Market in excess of the volatility in the Inflation Rate, may be contributed to the fact that actions are more prone by investors during adverse periods, while they become more passive during the more favorable eras (Olweny & Omondi, 2011). Talla (2013) put it as such that, the players in the Stock Market may in fact react differently based on either expected or unexpected inflation; while the former can yield positive impact as it increases production, consequent earnings, economic activities, and the overall standard of living whereas in the latter case, the cost of living rises abruptly that inhibits the

aggregate demand as the household sector's demand for goods or capacity to invest plummets, but it has been disputed by Durai & Bhaduri (2009), where they found the "expected" inflation component to be a negating factor to Stock Returns too. Asikoglu & Ercan (1992) and Jareño & Cano (2015) suggested that the positive affect on the stock market can be attributed to the lack of competition in the market, which encourages the firms to absorb the shock in material price hike and transferring it over to the consumers in the form of price. In an oligopoly arrangement and relatively inelastic demand schedule, marginal increase in price actually boosts overall profitability as the surplus extracted from the consumer offsets the deadweight-loss bore by the firm, and hence the cash-flow rises, leading to greater company valuation and hence a general surge in the Stock Market Index.

4.1.2 The Interest Rates in Bangladesh

Table 2. Distribution of DSEX Index Point, Interest Rate (%) on Deposit and Real Interest Rate (%)

	DSEX General Index	*Interest on Deposit (%)*	*Real Interest Rate (%)*
Mean	1788.20	8.87	9.16
Median	894.76	8.46	9.07
SD	1800.34	1.74	2.87
Min	320.91	6.04	4.00
Max	6153.68	12.05	14.67
CV%	100.68%	19.56%	31.37%

(Hossain, 2014)

In order to identify the relationship between the movement in the Stock Market and the Interest Rate on Deposits, available data of 24-years have been used. Table 2 displays that, the DSEX General Index ranged between 320.91 to 6153.68 points that averaged to 1788.20 ± 1800.34 points; the median value has been calculated to be 894.76 points. Meanwhile, the Interest Rate on Deposit ranged between 6.04 % to 12.05% with a mean of 8.87 % ± 1.74%, while the median was found to be 8.46%. This articulates that the Interest Rate on Deposits fluctuated less compared to the Stock Market movement, as the latter had a CV almost five times (at 100.68%) greater than the Deposit Rate.

As the nominal Interest Rate on Deposits do not by itself give much clear indications, it should be corrected for inflation considerations. Hence, data on real interest for the same time horizon has been analyzed. Table 2 presents that, the Real Interest Rate ranged fluctuated between 4.00% to 14.67%, with an average of 9.16% ± 2.87%, where the median was at 9.07%. While the Real Interest Rate is more stable than the Capital Market movement, the former having around one-third (31.37%) the CV of the latter, the Real Interest Rate seemed to have shifted more than the nominal Interest Rate on Deposits which only had a CV of 19.56%; the finding is opposite to the investigation by Jareño & Tolentino (2012a) that determined Real Interest Rate to be the stable element while the Nominal Interest Rate is expected to move in tandem with the Inflation Rate, but that is not the case in the Bangladesh Market. It may be determined, that the Bangladesh Bank had been indeed taking initiatives for "Targeting Inflation" as suggested by the Bank of England (2017), which explains why the Face Value of the Interest Rate on Deposits seemed relatively stable. As the Real Interest Rate is a residual of the Nominal Interest Rate and the Inflation Rate, the Real Interest fluctuated the most because of dual functions; they are i) the Target Inflation Rate and ii) the Nominal Interest Rate on Deposit set by the Bangladesh Bank, in specific periods, to boost confidence in the Capital Market.

4.1.2.1 Interest Rate on Deposit (%)

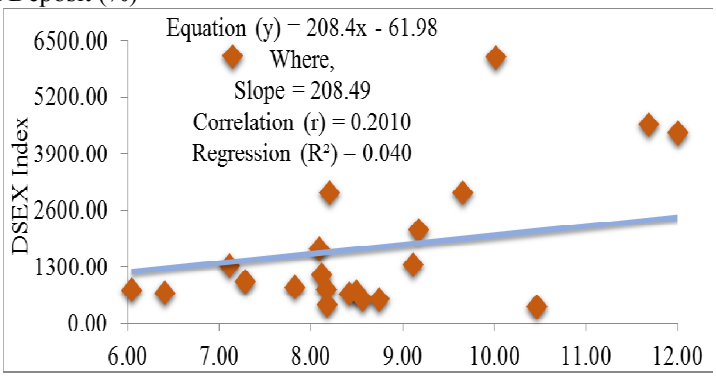

Figure 2. Relationship between Interest Rate on Deposit (%) of Bangladesh and DSEX Index Point (Hossain, 2014)

As suggested by Figure 2, there is a very weak but positive correlation between the DSE Index point and the Interest Rate on Deposits with an r-value of only 0.2010. It is estimated that for every 1% increase in the Interest Rate, the General Index goes up by 208.49 points. However, the reliability is disputed as there is only 4% (R^2) chance for the equation to fit in the context of the Capital Market in Bangladesh. Indeed, this is fairly

contradictory to the findings of Uddin & Alam (2007), Alam & Uddin (2009) and El-Nader & Alraimony (2012). Contrarily, Banerjee & Adhikary (2009) and Wiedmann (2011) argued that the Stock Market is actually relatively independent with little or no impact by the change in Interest Rate at all; their finding seems to be in par with the results of this investigation, as the R^2 is negligible. Figure 2, is also in accordance with the analysis of Banerjee & Adhikary (2009), as the slight positive trendline and relatively stable Interest Rate, compared to DSEX Index, suggests that the Bangladesh Bank had indeed had over the years executed various supplementary directives to cut the Interest rates with the objective of boosting the Capital Market, but instead, the market had gone bearish, or stayed sluggish in those instances.

4.1.2.2 Real Interest Rate (%)

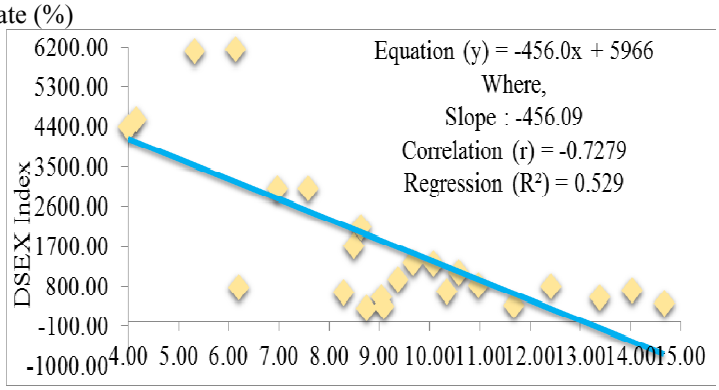

Figure 3. Relationship between Real Interest Rate (%) of Bangladesh and DSEX Index Point (Hossain, 2014)

When the Interest Rates are adjusted for Inflation, it yields a strongly inverse correlation with the DSEX General Index points, with an r-value of -0.7279 according to Figure 3. The slope in Figure 3 infers that, for every 1% increase in the Real Interest Rate, the DSEX General Index decreases by 456.09 points; there is a 52.99% (R^2) possibility for the equation to be fitting in the context of DSE. This negative relationship is in fact, supported by several studies (Spiro, 1990; Alam & Uddin, 2009; Ozbay, 2009; Muktadir-Al-Mukit, 2012; Zafar, 2013; Ali, 2014). Foerster & Sapp (2003) and Fahad (2016) stated that the Interest Rate impacts the different stocks in the Capital Market variably depending on which sectors or valuation size they belong to. Thus, contrasting studies have found that, Real Interest Rates actually contribute towards growth of economy through accelerated financial activities (Gelb, 1989; Pill, 1997; Omran, 2003; Ali & Fei, 2016; Ayopo et al., 2016).

4.2 Multivariate Analysis of DSEX General Index with the Economic Indicators

Table 3. Multi-Correlation Analysis of DSEX Index Point and the Macroeconomic Forces

	General Index/DSE Broad Index*	Interest on Deposit (%)	Real Interest (%)
Interest on Deposit (%)	0.4179	1	-0.6344
Real Interest (%)	-0.8599	-0.6344	1
Inflation (%)	0.7019	0.3572	-0.7958

Table 4. Multi-Regression Analysis of DSEX Index Point and the Macroeconomic Forces

REGRESSION STATISTICS						
MULTIPLE R	0.875886					
R^2	0.767177					
ADJUSTED R^2	0.689569					
STANDARD ERROR	1092.871					
OBSERVATIONS	13					
ANOVA						
	DF	*SS*	*MS*	*F*	*SIGNIFI-CANCE F*	
REGRESSION	3	35420037	11806679	9.885305	0.003299	
RESIDUAL	9	10749300	1194367			
TOTAL	12	46169337				
	COEFFI-CIENTS	*STANDARD ERROR*	*T-STAT*	*P-VALUE*	*LOWER 90.0%*	*UPPER 90.0%*
INTERCEPT	11066.86	4892.743	2.261893	0.050022	2097.909	20035.81
INTEREST ON DEPOSIT (%)	-284.873	278.9768	-1.02113	0.333854	-796.269	226.5231
REAL INTEREST RATE (%)	-660.552	215.7573	-3.06155	0.013538	-1056.06	-265.044
INFLATION RATE (%)	-32.6515	217.4663	-0.15014	0.883961	-431.292	365.9888

Table 3 and Table 4 compared to Figure 1, Figure 2 and Figure 3 shows that it is significantly more reliable to take a holistic approach, when assessing the direction of the market. Individual Analysis shows that, the real interest rate is highly negatively correlated with point of DSEX general Index, with an r-value of -0.7279. The correlation for the other two variables were found to be in positive; such as the Inflation Rate which was at moderate range at 0.5819, while the Interest Rate on Deposit fell under relatively weak range at 0.2010, in relation to the DSE General Index. Multivariate analysis shows that Real interest rate is in fact even more negatively correlated with an r-value of -0.8599, while the r-value for Inflation Rate and Interest Rate on Deposit changed to a strong 0.7019 and dominantly moderate 0.4179 respectively. These 3 elements put together can explain as much as 87.59% of the movement in the Market while individually, Inflation Rate, Real Interest Rate or Interest Rate on Deposit can explain only 33.8%, 52.9% or 4.0% respectively, and hence it is best to assess all the three elements together when forecasting Stock Market performance. Inter-variable analysis shows that Real Interest Rate is inversely correlated to both Nominal Interest Rate (r-value = -0.6344) and Inflation Rate (r-value = -0.7958), while the latter two are positively correlated (r-value = 0.3572). The dynamics between the 3 elements suggest target-inflation being adopted. As the Inflation Rate and Real Interest Rate move sternly in converse directions in Bangladesh, the public's stock pricing may vary significantly depending on which variable they are focusing on, it is at par with the findings of Jareño & Navarro (2010); the index may further shift depending on the expected and unexpected portion of the Inflation Rate, as it will indicate an inflated or real economic boost (Talla, 2013).

4.3 Findings of the Investigation

Based on the inferential and descriptive statistical analysis, some key findings have come up and they are listed as follows:

- The Stock Market Index is moderately affected by the Inflation rate (individual analysis), that too positively, indicating that the inflation within the target range, contributes toward the appreciation in the Index points as a result of accelerated aggregate demand.
- There lies a weak relationship between the DSEX General Index point and Interest Rate on Deposits (individual analysis); this is attributed to the fact that the other two elements contribute at opposing magnitudes. While the resulting movement in the Interest Rate on Deposit remained fairly stable, there were sharp periods of movement in the Stock Market that were observed. Hence, the correlation between the two is so low.
- While the effect of the Nominal Interest Rates to the Stock Market movement is non-conclusive, a more evident pattern emerges when the Real Interest Rates are considered instead (individual analysis). The relationship emerges to be strongly negative. This signifies that, the middle-class dominated population is risk averse as similar to findings by Arrow (1984), Estache & Leipziger (2009) and Li (2010), and when the Real Interest Rates are higher, they choose to keep their savings in the banks (or Debt Instruments) instead of Investing in the Stock Market. As a result, the number of trades decline, share

prices remain stationary or even plummets as players sell their shares when exiting the market to redirect their funds.

- Multivariate analysis iterates the relationship and effects of the 3 elements stated earlier but indicates that, instead of fragmented observation, all the variables should be assessed in a coordinated fashion as it gives a more reliable forecast as the effects become more visible.

The dynamics between Real Interest Rate, Expected Inflation Rate and Nominal Interest Rate, it is deduced that Fisher Effect is inexistent in Bangladesh, and more so, due to the Price Puzzle (positive association between Inflation Rate and Nominal Interest Rate) Inflation Targeting has empirically been adopted by the Bangladesh Bank.

Conclusions

The relationship between Inflation rate and Nominal Interest Rate is way below 1-to-1, and as a result refutes the assumption of the existence of Fisher Effect in Bangladesh. Individual Analysis shows that, the real interest rate is highly negatively correlated with point of DSEX general Index; conversely, the correlations for the other two variables were found to be in positive; such as the Inflation Rate which was at moderate range while the Interest Rate on Deposit fell under relatively weak range, in relation to the DSE General Index. Multivariate analysis shows that Real interest rate is in fact even more negatively correlated, while the r-value for both Inflation Rate and Interest Rate on Deposit changed to a strong and moderately positive range respectively. These 3 elements put together can explain as much as 87.59% of the movement in the Market while individually, Inflation Rate, Real Interest Rate or Interest Rate on Deposit can explain only 33.8%, 52.9% or 4.0% respectively, and hence it is best to assess all the three elements together when forecasting Stock Market performance. Real Interest Rate is negatively correlated to both Nominal Interest Rate and Inflation Rate, while the latter two are positively correlated. The dynamics between the 3 elements suggests that target-inflation is being adopted, the absence of Fisher Effect and the existence of price-puzzle.

This study is expected to assist the investors in the Capital Market in Bangladesh in their forecasting techniques, in order to take more educated decisions pertaining to investment, by considering a key few economic indicators when other information is deemed unavailable. This paper can act as a guideline, so that decision makers know which external factors impact directly on the stock market, and which ones contribute inversely.

The recommendation is to expand the research including more than the selected 3 economic indicators, using more data for reliability and considering Chittagong Stock Exchange General Index points along with the movement in DSE Ltd.; the statistical information is also suggested to be standardized instead of taking samples across different time period.

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