

Measuring Market Concentration using Indices: An Empirical Analysis on Listed Financial Companies of Bangladesh



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Indices such as Herfindahl–Hirschman Index (HHI), entropy concentration index, 3-firm concentration ratio etc. are used to assess market concentration and an increase in the index value is interpreted as an indicator of reduced level of competition. Such a measure should help decision makers and regulators formulate policies to facilitate proper growth of the industry. This study scrutinized market competitiveness using concentration indices that were measured using daily trading data of 140 listed companies since January 2009 and across different financial sectors such as banks, non-banking financial institutions (NBFI), insurance companies – life and general, and mutual funds.

Keywords: Market Concentration, Herfindahl-Hirschman Index, Competitiveness, Entropy Index

1. Introduction

Market concentration refers to the extent to which the market shares in terms of sales, assets etc. of the largest firms within a market accounts for a large proportion of economic activity. Other things remain same, high levels of market concentration are more conducive to firms engaging in monopolistic practices. (OECD, 2003). If market concentration increases, it reduces competition and efficiency and regulators constantly monitor the state of market concentration esp. before and after possible merger and acquisition activities. Detection of high market concentration at an early stage of the market development may help the regulators at appropriate proactive planning. Similarly, at later stage regulators could take corrective measures to reduce market concentration. Thus, analysis of market concentration esp. in financial sector could help developing nations like Bangladesh ensure discipline and proper growth. This could also contribute to the development of capital market since financial sector comprises a large part of the capital market and proper functioning of capital market depends on competitive environment in financial sector. This study investigates the level of market competitiveness in different financial sectors (i.e., industries) in Bangladesh and market capitalization data were used from listed public companies over a period of more than ten years.

2. Literature Review

While measuring market concentration, many indices have been used, but the best-known among them are the m-firm concentration ratio, esp. the 3-firm concentration ratio, the 4-firm concentration ratio, entropy concentration index, and more commonly, the Herfindahl-Hirschman index (HHI). (Herfindahl, 1950; Hirschman, 2018). HHI has long been used as a tool to measure market concentration, while the entropy index has been used, mostly in economics literature, as a tool to measure competition.

Nawrocki & Carter (2010) argued that if the capital markets can value a firm's prospects, then market value of equity of firms in an industry could be used as a proxy to quantify market concentration. They also cautioned against such an approach by raising two points - it requires that all firms in an industry have the same leverage ratio and it using market capitalization is only possible when the firms are listed (i.e., publicly traded).

This article applies two measures of market concentration, the Herfindahl–Hirschman Index (HHI) and the entropy concentration index to different industries in Bangladesh. The Herfindahl-Hirschman Index (HHI) is computed as the sum of the squared firm proportions within an industry and should vary between 0 and 10,000.

$$HHI = \sum (s * 100)^2$$

Where, s is the market share of the specific firm on basis of sales, market capitalization etc. and the value should be between 0 and 1. The HHI indicates concentration within an industry where a high number could be interpreted as high degree of concentration (i.e., monopoly power) while a low number could be interpreted as high degree of competition.

Besides, another measure described by Horowitz and Horowitz (1968) is the entropy measure of competition. Let s be the probability of a discrete event, the entropy H is given by:

$$H = - \sum s \ln s$$

If entropy is used as a measure of the degree of competitiveness, then s is the firm's proportional market value within the industry and the higher the entropy value the higher the degree of competitiveness. The entropy measures have found acceptance within the economics literature as a measure of competition (Curry and George, 1983; Attaran and Saghafi, 1988). Furthermore, Kelly (1981) and White (1982) have suggested that a numbers equivalent be used to improve the performance of the HI (and subsequently the entropy measures). Fortunately, an equivalent number of firms' calculation is available from information theory.

$$E = e^H$$

Where E is the number of equal size firms that would result in the same amount of entropy H . The equivalent number of equal size firms, E can be used to compare the degree of competition in one industry with that in another industry or to compare the degree of competition at one period of time with that at another. In general, higher values of E is indicative of less market concentration, i.e., better competition.

The CR3 index (the concentration ratio of the largest three firms) have also been used to measure market concentration. It is computed by summing market shares of the three largest firms

$$CR3 = \sum_{i=1}^3 s_i$$

Despite the ease of calculation and subsequent easy interpretation, its shortcoming should be noted, too – differences in the market structure may not be evident since the market share distribution among the top three cannot be captured by this method. The same argument is applicable for 4-firm concentration ratio, CR4 and 5-firm concentration ratio, CR5 that are used by many researchers. However, higher values of $CR3$ generally indicate high market concentration, i.e., less competition among the firms.

3. Dataset

Sector wise HHI and entropy indices were calculated using market capitalization data from different companies in sectors such as commercial banks, non-banking financial institutions, and general as well as life insurance companies. Daily trading data from January 2009 to October 2019 were collected from Dhaka Stock Exchange (DSE) and analyzed in this study. Table AI in Appendix lists all the companies selected for this study. Data from a total of 30 commercial banks, 23 non-banking financial institutions, 36 general insurance companies, 12 life insurance companies, and 37 mutual funds were analyzed in this study.

4. The Empirical Results

According to the U.S. Department of Justice guidelines (2010) for horizontal mergers, HHI value of less than 1,500 is indicative of 'unconcentrated market', while values exceeding 2,500 indicates a highly concentrated market. HHI values between 1,500 and 2,500 could be interpreted to be representing a moderately concentrated market. In light of this guideline, the results are described below grouped into different sectors.

Commercial Banks: Commercial banks constitute an integral part of financial market and in capital market their market share stood at 40% at the beginning of the analysis period, i.e., January 2009. However, by the end of October 2019, the market share dropped to approximately 16% which is significant nevertheless.

The presence of thirty listed commercial banks has contributed to an apparently unconcentrated market and it indicates to a highly competitive market. The HHI could be measured based on deposit, loan & advance, or, market capitalization data from the commercial banks. In all three cases, the HHI based on annual data showed that it never exceeded the 500 mark (Figure 1).

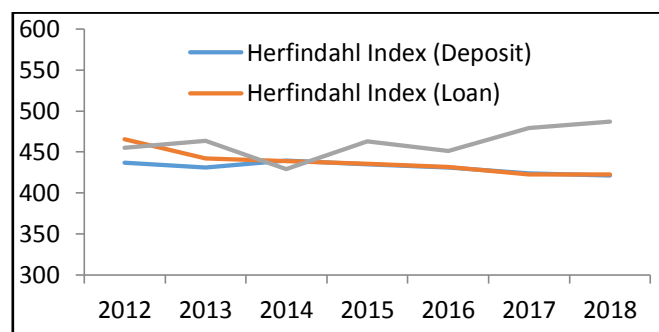


Figure 1 Level of Market Concentration in Commercial Bank Sector (i.e., the Listed Banks Only) (2012-2019)

Further, similar analysis was done using daily trading data that revealed similar findings - the HHI never exceeded the 600 mark while the number of equivalent equal-sized (hypothetical) firms was pretty close the actual number of firms present and it never fell below 20 (Figure 2a, 2b). The 3-firm concentration ratio, at no point during the analysis period, exceeded 0.30. In other words the 3 largest banks never enjoyed more than 30% of the total market share. That, too, supports the finding from other measures of market concentration. (Figure 2b)

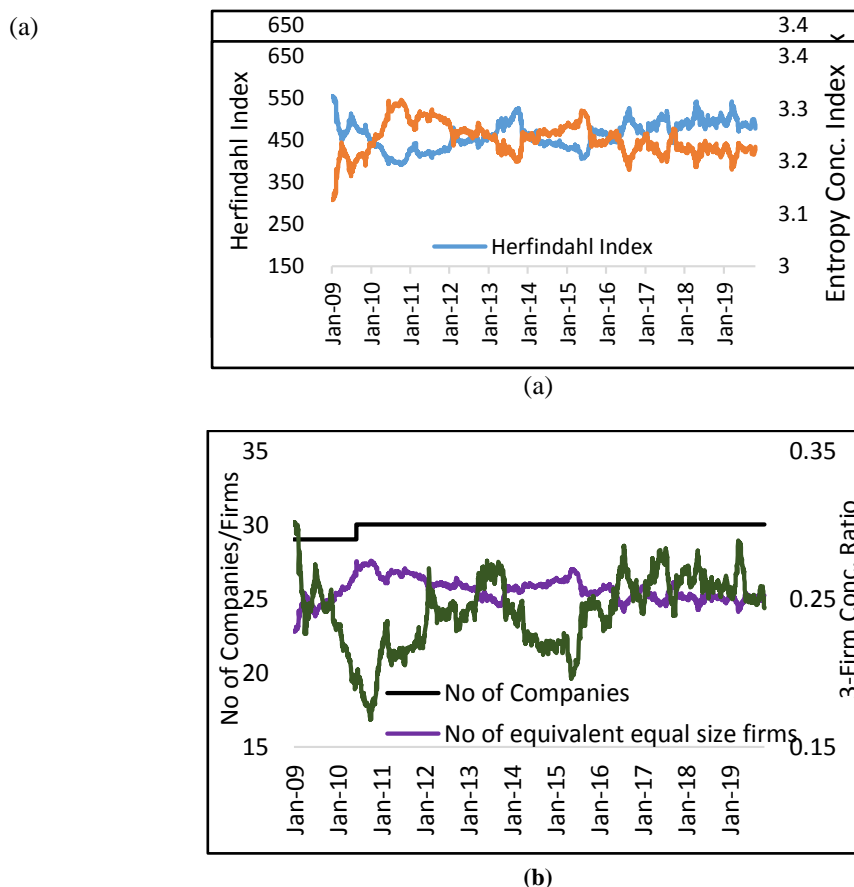
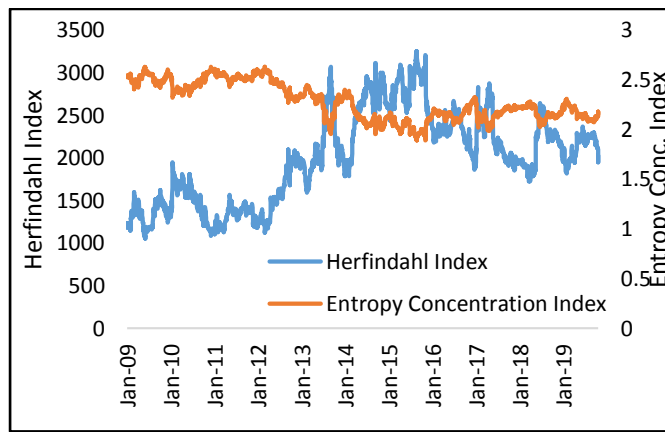


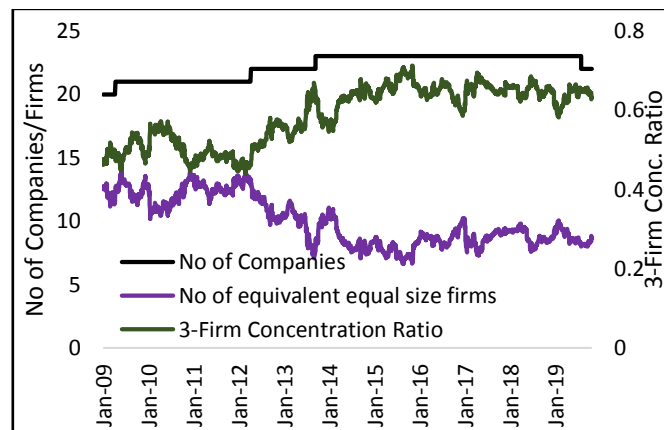
Figure 2: Level of Market Concentration in Commercial Bank Sector (i.e., the listed banks only) (2009-2019)

Non-Banking Financial Institutions: Unlike the commercial banks, the NBFIs sectors showed little sign of market competitiveness. The average value of HHI stood at 2000 when the daily market cap data were analyzed over the analysis period, i.e., 2009-2019 that suggests a moderate level of market concentration. A further scrutiny suggests that the HHI level was below 1500 mark during most of the period between 2009 and 2012. However, since then the market started becoming less competitive or, more concentrated. The entropy concentration index fell during that period. Also, things are improving since 2015-16 and the HHI value is falling down. (Figure 3a)

The 3-firm concentration ratio paints an alarming picture of the NBFIs sector in terms of market concentration as Figure 3b shows that on average more than 60% of the market share are being enjoyed by top three NBFIs listed at the bourse and more alarmingly there is an upward trend in CR3 value. Further, the equivalent number of equal size firms was found to be less than half the number of NBFIs actually operating in the sector. The average number of NBFIs that operated during the analysis period, i.e., 2009-2019 was found to be 22.2 against the average number of equivalent equal size firms that stood at less than ten. Such a relatively lower number of equivalent equal size firms indicate high level of market concentration, i.e., less competition.



(a)



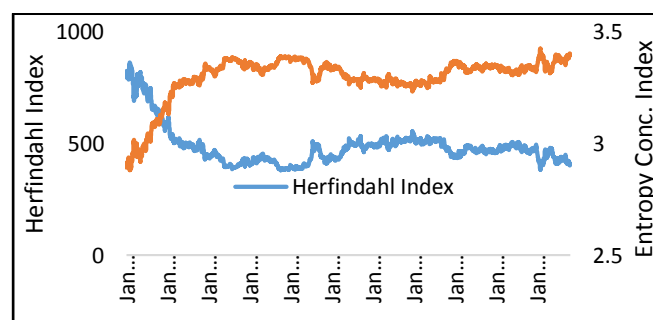
(b)

Figure 3 Level of Market Concentration in NBFIs (2009-2019)

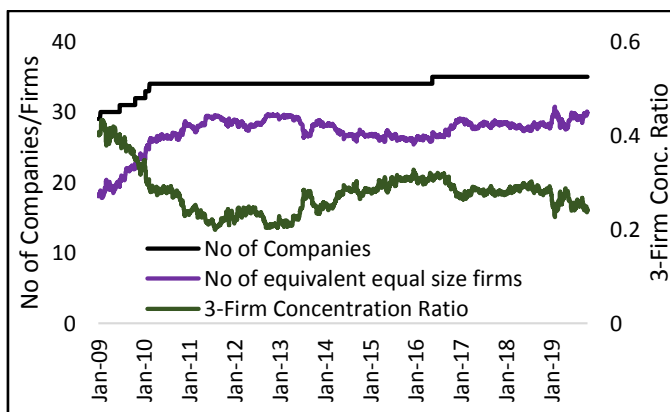
General Insurance Companies: The number of listed general insurance companies rose from about 29 in 2009 to 36 in 2019 that shows relatively high level of market competition in this sector. The HHI value never exceeded the 900 mark and the average value was found to be less than 500 over the last eleven years. Such a low number is indicative of low market concentration and relatively high level of business competitiveness. (Figure 4a)

The number of equivalent equal size of firms was pretty high compared to actual number of firms operating in the sector. Its average over the last eleven years was found to be 27 compared to the average 33 general insurance companies actually operating. Such a high number indicates high level of market competitiveness. Besides, the 3-firm concentration ratio also suggests low market concentration. The highest value of CR3 during the last eleven years was found to be 43% while the lowest was 20% with an average of 27%. All these findings suggest that the market was not concentrated among few top players in the sector. (Figure 4b)

Life Insurance Companies: The number of life insurance companies listed at DSE was only 9 in January 2009 and since then the number only grew to 12 till October 2019. Accordingly, the level of market concentration only deteriorates which is evident from the HHI value that averages 1,750, i.e., moderate level of market concentration, over the last eleven years and the highest value was found to be 3,200 indicating high level of market concentration. Such a high range of values of HHI indicates relatively low level of business competitiveness. (Figure 5a)

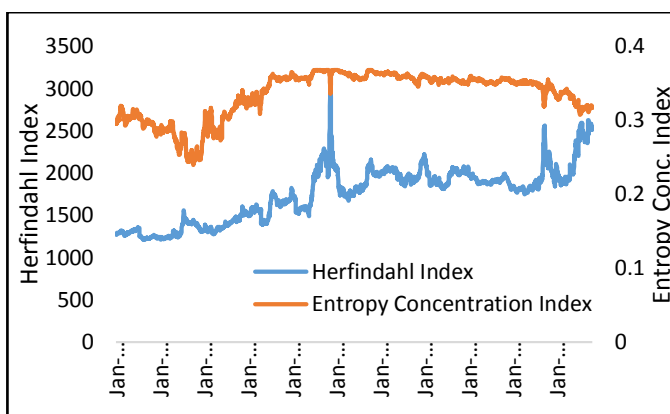


(a)

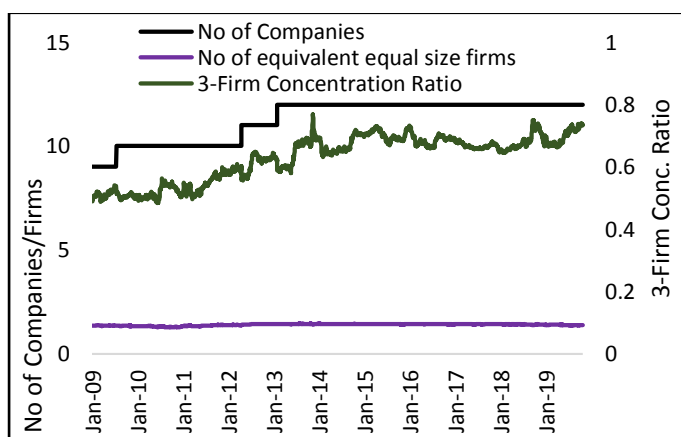


(b)
Figure 4 Level of Market Concentration in General Life Insurance Sector (i.e., Listed Companies Only) (2009-2019)

The number of equivalent equal size of firms was a fraction of the total number of firms in operation. It averages close to one, 1.4 to be precise, during the last eleven years while the average number of life insurance companies in operation was more than 11. Such a low figure of suggests low level of market competitiveness. Additionally, the 3-firm concentration ratio supports findings from other measures. The highest value of CR3 during the analysis period, i.e., 2009-2019 was found to be as high as 77% while the lowest was 48% with an average of 63%. All these findings suggest that the market was highly concentrated among few top players in the sector diminishing the overall market competitiveness in this sector. (Figure 5b)



(a)



(b)

Figure 5 Level of Market Concentration in Life Insurance Sector (i.e., Listed Companies only) (2009-2019)

Mutual Funds: Mutual funds are an important part of the financial sector especially when it is considered in the context of listed companies. The total market share of closed-end mutual fund had been pretty low in Bangladesh – it hovered near 2 % during 2010-2019.

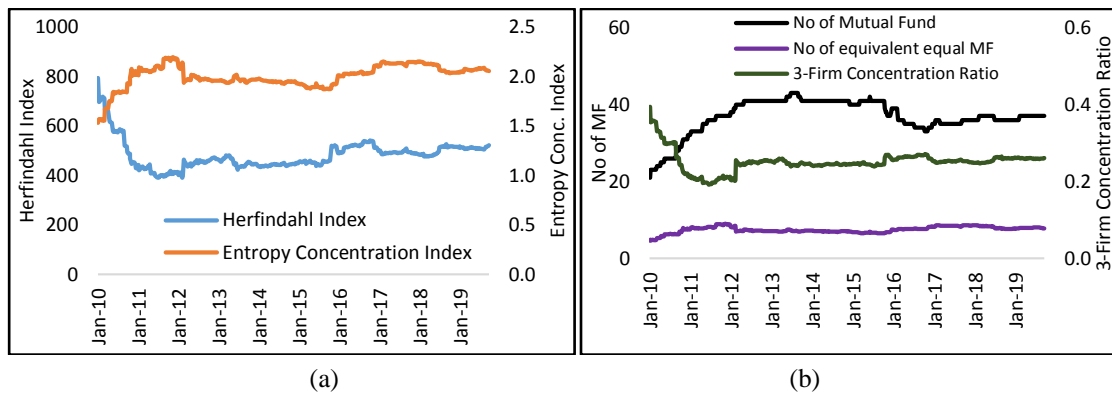


Figure 6 Level of Market Concentration among Different Mutual Funds (i.e., Closed-End Only) (2010-2018)

Market concentration in mutual fund industries could be analyzed from two perspectives – mutual funds and asset managers. The mutual fund industry from the perspective of individual funds, was found to be less concentrated (Figure 6a) with the HHI never exceeding 900 mark since January 2010 with an overall average less than 500. Moreover, number of funds back then was 21 which stood at 37 as of October 2019 with an overall average of 37 that indicates presence of competitiveness among the different funds. The average CR3 during that period was about 25% that also supports the presence relatively less market concentration. (Figure 6b).

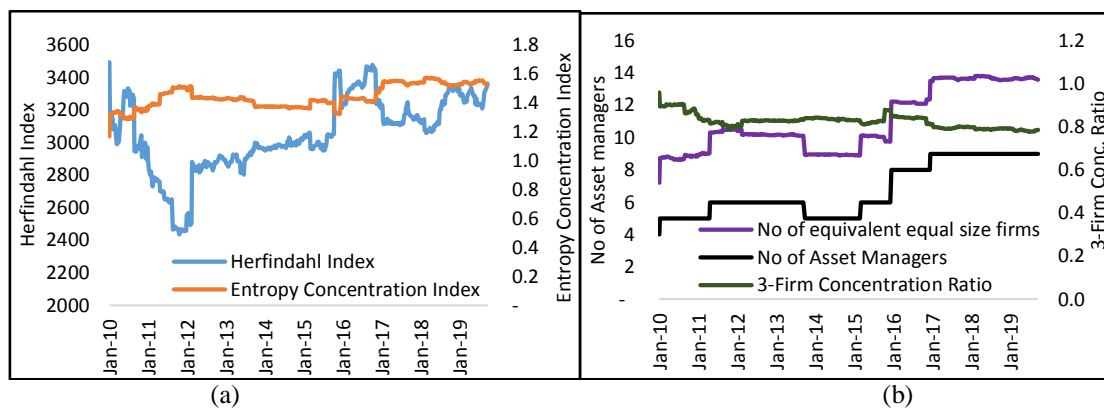


Figure 7 Level of Market Concentration among Mutual Fund Asset Managers (i.e., Closed-End Only) (2010-2018)

However, mutual funds should better be analyzed from the perspective of asset managers whose number was only 4 in January 2010 and stood at 9 in October 2019 that is also the highest number of asset managers listed in DSE during the period. The market concentration has been found to be pretty high resulting in lack of competitiveness among the asset managers. The HHI value hardly fell below the 2,500 mark while the overall average exceeded 3,000 and the highest value was found to be 3,492. (Figure 7a) Furthermore, the market was found to be highly concentrated among the top three managers with the CR3 value exceeding 95% in early 2010 and stood at almost 80% in October 2019. During the analysis period, the average CR3 value was found to have exceeded 82% indicating that market was highly concentrated among the top asset managers. (Figure 7b)

5. Conclusion

There are other measure of competitiveness in any industry and measuring market concentration helps, if not solely dictates in determining the presence of competitiveness. The current study focuses on the listed companies only and it was evident from data from the last decade that market concentration remains high in industries such as NBF, life insurance, and mutual fund. Compared to this, banks and general insurance companies were found to have low market concentration that fosters competitiveness. However, data from a significant number of insurance companies, commercial banks, NBF, and open-ended mutual fund that are not listed could certainly supplement the current study. Further, other participants in the financial sector such as rating agencies, micro finance institutions etc. could also be analyzed to get a better picture of state of market concentration in this sector. Finally, future research could utilize revenue, enterprise value etc. in lieu of market capitalization data only in order to determine market share and subsequent analysis of market concentration.

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7. Appendix

Table AI Selected Financial Companies as of October 31, 2019

	Ticker Of Banks	Ticker Of Nbfis	Ticker Of General Insurance	Ticker of Life Insurance	Mutual Funds	Ticker Of MF
1.	Abbank	Bayleasing	Agranins	Deltalife	Race	Ebl1stmf
2.	Alarabank	Bdfinance	Asiains	Fareastlif		Trustb1mf
3.	Bankasia	Bifc	Asiapacins	Meghnalife		Ific1stmf
4.	Bracbank	Dbh	Bgic	Natlifains		Ijanatamf
5.	Citybank	Fareastfin	Centralins	Padmalife		Popular1mf
6.	Dhakabank	Fasfin	Citygenins	Popularlif		Phpmf1
7.	Dutchbangl	Firstfin	Continins	Pragatilif		Eblnrmbf
8.	Ebl	Gspfinance	Dhakains	Primelife		Abb1stmf
9.	Eximbank	Icb	Easternins	Progreslif		Fbfif
10.	Firstsbank	Idlc	Eastland	Rupalilife		Exim1stmf
11.	Icbibank	Ilfsl	Federalins	Sandhanins	Icb	Icbamcl2nd
12.	Ific	Ipdc	Globalins	Sunlifeins		1stprimfmf
13.	Islamibank	Islamicfin	Greendelt			Icbepmf1s1
14.	Jamunabank	Lankabafin	Islamiins			Prime1icba
15.	Mercanbank	Midasfin	Janatains			Pf1stmf
16.	Mtb	Nhfil	Karnaphuli			Icb3rdnrb
17.	Nbl	Phoenixfin	Mercins			Ifilismf1
18.	Nccbanc	Pfsl	Nitolins			Icbsonal1
19.	Onebankltd	Premierlea	Northrnins			Icbagrani1
20.	Premierban	Primefin	Paramount			Dbh1stmf
21.	Primebank	Unitedfin	Peoplesins		Greendelmf	
22.	Pubalibank	Unioncap	Phenixins		Aib1stmf	
23.	Rupalibank	Uttarfin	Pioneerins		Mbl1stmf	
24.	Shahjabank		Pragatiins		Lrglobmf1	
25.	Sibl		Primeinsur		Nccb1mf1	
26.	Southeastb		Provatiins		Semllecmf	
27.	Standbankl		Purabigen		Semlibb1sf	
28.	Trustbank		Reliancins		Semlfbslgf	
29.	Ucb		Republic		Sebl1stmf	
30.	Uttarabank		Rupaliins		Nli1stmf	
31.			Sonarbins		VANGUARD	VAMLBDMF1
32.			Standarins			VAMLRBBF
33.			Takafulins		Capm	Capmbdb1mf
34.			Unitedins			CAPMIBBLMF
35.			Bnicl		Aims	Grameens2
36.			Agranins			Reliance1
37.					Asian Tiger	Atcslgf