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An exploratory study to identify the Nudges causing increase in P/E ratio in Indian Stock Markets

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Abstract

“ The P/E ratio reached an all time high of 36.21 in February 2021 and it was at a record low of 10.36 in October 2008” is the extract from the key information about India P/E ratio, CEIC data. A PE ratio is a metric that measures the price-to-earnings ratio of a company or it is the reflection of the behavior of the investors, and their expectations about the company’s performance. A higher PE ratio indicates that investors are willing to pay more for each rupee earnings than they earn back in dividends. If a company has a low PE ratio but its stock is trading at a higher price, it may be worth considering whether the company’s business model can support that level of stock price. The PE ratio of Indian Stock Markets in general and Nifty 50 in specific has gone through a Roller Coaster Ride in the last two decades. The PE ratio of Nifty 50 has reached a low of 10.36 during the subprime crisis of 2008 but could sustain itself when pandemic hit the entire world in 2019 & 2020. The PE ratio didn’t fall to earlier lows and even the recovery was quite fast. Nudge theory is based on the premise of shaping the environment. In the present study attempt is being made to search for the answers of slow but steady increase in PE ratio in Nudge theory.

The present exploratory study is a modest attempt that will try to explore the reasons behind gradual but remarkable increase in PE ratio of Indian Stock Markets in the light of Nudge theory.

Keywords: Stock Markets, PE(price-to-earnings) ratio, Nudge theory, Over-reaction and Under-reaction.

Introduction

A dragline excavator is a large earth-moving machine used in mining, civil engineering, and other heavy construction projects. It is a type of excavator that utilizes a large bucket, called a dragline bucket, attached to a long, hinged boom. The bucket is suspended from the boom by a series of cables or ropes, which are operated by the dragline operator to control its movement.

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A PE ratio is a metric that measures the price-to-earnings ratio of a company or it is the reflection of the behavior of the investors, and their expectations about the company's performance. A higher PE ratio indicates that investors are willing to pay more for each rupee earnings than they earn back in dividends. If a company has a low PE ratio but its stock is trading at a higher price, it may be worth considering whether the company's business model can support that level of stock price. The PE ratio of Indian Stock Markets in general and Nifty 50 in specific has gone through a Roller Coaster Ride in the last two decades. The PE ratio of Nifty 50 has reached a low of 10.36 during the subprime crisis of 2008 but could sustain itself when pandemic hit the entire world in 2019 & 2020. The PE ratio didn't fall to earlier lows and even the recovery was quite fast.

In the present study attempt is being made to search for the answers of slow but steady increase in PE ratio in Nudge theory. Nudge theory is based on the premise of shaping the environment.

Nudge theory is attributed to the work of American Academicians Richard H. Thaler and Cass R. Sustein who built much of their theory on the Heuristics work of Israeli-American psychologists Daniel Kahnemann and Amos Tversky.

The dictionary definition of Nudge is ,"Coax gently and encourage (someone) to do something".

Thaler and Sustein don't actually give a specific definition of 'Nudge Theory' in their book, although a definition of a nudge is given in the book and quoted by Wikipedia(2014) as ,"…. A nudge, as we will use the term, is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not….."

Nudge theory can be applied widely than to 'behavioral economics'. Nudge theory can be applied to virtually any type of human relationships where the alteration of peoples thinking and decision making may be beneficial for those people and to wider society and the planet as a whole.

Thaler and Sustein draw heavily on earlier 'Heuristics' work of Kahnemann and Tversky which emerged in the 1970's in University papers and psychological journals. Thaler and Sustein say that essentially these 'Heuristics' referred by Kahnemann and Tversky as ' Nudges'.

'Heuristics' basically means the various internal references and responses which people use in assessing things, developing views and in making decisions.

2. Literature review

According to the article titled," The anatomy of a stock market bubble staring India in the face" featured in Electronic version of Mint, the Nifty 50 stock market Index has reached its all time high of 37.84 on December 18th 2020. Article further says that this was around 87% greater than 20.26 , the average PE ratio recorded since 1999. The author of the article further emphasizes on the point that the increase in PE ratio is pointing towards formation of bubble.

Farah Freihat in his research paper titled, "Factors affecting price to earnings ratio(P/E) –

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Evidence from the emerging market " had identified variables that directly affect the P/E ratio and may be used to explain P/E ratio volatility in Jordannian Public Shareholding enterprises. The findings strongly reaffirms the dividend payout and the size of the company were the most important variables, and profits, growth and interest rates had less impact on P/E ratio.

Dev Ashish in his article titled," Why Indian Market's PE ratio scaling new highs?" says that PE ratio has skyrocketed and into previously uncharted territory as a result of the Index's strong climb from its March lows and the Nifty 50 firm's steadily declining EPS in the recent months. History teaches us that markets do not remain appealing at these levels because of some exceptional once-in-a-generation occurrence that caused this.

According to Nitasha Shankar in her article titled, " Index Price to Earnings ratio: Myth and Reality", says that Index PE , like the indices themselves, has a rich reference value that helps in our understanding of the market's position and expected future course, but it is by no means prescriptive in terms of trading and investment choices. The P/E (Price to Earnings) ratio, which compares market price to earnings per share, enables us to determine if a stock's price accurately reflects its worth in terms future earnings potential. The article further says that the standards of PE ratio are different for different sectors, so the inter-sectoral comparison shouldn't be done and only intra-sectoral comparison be done.

Dr.Hemendra Gupta in his research paper titled,"A Study on Evaluating P/E and its Relationship with the Return for Nifty"says that when making an investment, the P/E of Nifty is undeniably an indication that should be taken into account but its should be noted that the P/E ratio can be altered by a relatively small number of parameters.In his results he noticed that a one-time charge resulting from litigation or another exceptional expense may have a negative impact on company's profitability ,giving the stock what looks too be an exceptionally high trailing P/E.In addition,he emphasizes that these exaggerated business earnings have the potential to raise Nifty's PE even higher,which would have an impact on the market's value and prevent it from accurately reflecting the actual situation.

Dimitrios Kenourgios, Spyros Papathanasiou &Anastasia Christina Bampili in their article titled,"On the predictive power of CAPE or Shiller's PE ratio:the case of the Greek stock Market"stated the FTSE/ASE Large Cap Index's CAPE ratio is trustworthy indicator of future performance.They observed that Future returns and the CAPE seem to be inversely connected ,with larger ratios indicating lower expected future returns.In addition, they determined that short-term interest rate returns(RSR)are statistically significant,but the P/E ratio has minimal predictive power and the rise in short-term returns will cause future yields to increase.Furthermore,they ascertained long-term interest rate returns(RLR)are statistically significant, but because of their low t-stat value, they cannot be relied upon to accurately predict future returns.In conclusion, the Future returns may b accurately predicted using the FTSE/ASE Large CAPE measure and its variant ,the CAPE 5.However,the factors researched by the researchers in the study and any other variables cannot predict future profits when a market is efficient,the findings do not

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support the Efficient Market Hypothesis(EMH).

3. Objective of the Study

1. To study the trends in PE ratio for the study period (1999- 2022).
2. To explore the nudges causing the increase in PE ratio.

4. Hypothesis of the study

H01: There is no significant increase in PE ratio of Nifty 50 during the study period.

5. Scope of the study

The P/E ratio of Nifty 50 is studied for the period that ranges from 1999 to 2023. Not all the Heuristics or Nudges defined in Nudge theory are taken. The Nudges of over reaction (Over confidence) and under reaction were considered.

6. Research Methodology

Sources of data:

Historical prices of Nifty 50 and P/E ratios are collected from the rich archives of NSE.
Compiled P/E ratio is also drawn from CEIC website.
Research papers, relevant theory, news paper articles related to the present study are also collected.

Methodology:

In the present study the Nifty 50 and the corresponding P/E ratios are considered for the years 1999 to 2023. The EPS of the Nifty 50 is calculated by dividing Nifty 50 with the corresponding P/E ratio. Then the total return and also increase in EPS (fundamental return) is calculated. Total return is compared with the fundamental return and with the help of suitable statistical technique the analysis is done.

Statistical Tools and Techniques:

To find out the total return the formula used is as follows:
Total return = (Ending price-Beginning price)/Beginning price *100

To find EPS of Nifty 50 the following calculation is followed:
EPS= Nifty 50/PE ratio

To calculate the changes in EPS or in other words Fundamental return the following calculations were done:
Fundamental return = (Ending EPS-Beginning EPS)/Beginning EPS *100

To achieve the first objective single factor ANOVA was used to find out if there was any significant changes in PE ratio across the years.(1999-2023)

To explore the nudges causing the changes in PE ratio, Heuristics described in Nudge theory were studied thoroughly and the Nudges that were causing changes in PE ratio were identified. The results are discussed by comparing the total return with that of fundamental return.

7. Analysis of Changes in P/E ratio (1999-2023)

It would be interesting to note the changes in P/E ratio over the last two decades. These historic P/E ratios are very important as they not only help us draw some important lessons but also will help us in studying the behavior of market participants. The result also would be important for us to explore the reasons behind variations in P/E ratios.

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Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	26.16	27.12	25.69	22.81	20.33	23.68	22.33	20.53	20.84	18.22	18.77	19.59
2001	20.75	21.32	18.2	16.0	15.74	15.37	15.32	15.23	13.65	13.76	14.86	15.59
2002	16.42	18.32	18.59	18.0	17.44	16.28	15.39	14.54	14.69	14.25	14.55	14.57
2003	14.56	14.32	13.85	13.2	11.15	12.2	12.5	13.89	15.0	16.6	17.42	19.19
2004	21.0	20.32	20.78	19.91	14.86	12.18	13.0	13.5	14.14	15	15.67	16.0
2005	14.41	14.4	14.98	14.16	13.77	14.0	14.31	14.61	15.58	15.26	15.47	16.72
2006	17.27	17.97	19.25	20.59	19.53	16.65	17.95	18.55	20.0	20.92	20.72	20.95
2007	21.24	19.64	17.95	19.28	19.74	20.0	21.3	19.47	21.0	24.59	25.15	26.55
2008	25.33	22.19	20.58	21.26	21.46	19.0	17.56	18.63	17.98	13.77	12.42	12.69
2009	12.73	13.38	13.3	15.89	18.67	20.16	19.83	20.5	21.86	22.34	21.91	22.7
2010	22.84	20.72	22.0	22.76	21.2	21.73	22.42	22.95	24.51	25.23	24.39	23.82
2011	22.84	20.67	21.16	22.0	20.37	20.2	20.49	18.29	18.11	18.15	18.11	17.32
2012	17.71	19.0	18.74	18.46	16.97	16.89	17.22	17.67	18.42	18.95	18.14	18.63
2013	18.87	18.26	17.89	17.4	18.13	17.49	17.88	16.12	16.83	17.72	17.8	18.56
2014	18.29	17.37	18.33	18.99	19.62	20.57	20.66	20.42	21.2	20.65	21.5	21.23
2015	21.73	23.0	23.21	22.88	22.4	22.7	23.49	22.99	21.69	22.48	21.36	21.1
2016	20.34	19.34	20.39	21.29	21.51	22.52	23.33	23.65	24.0	23.35	21.99	21.49
2017	22.44	23.23	23.47	23.37	24.25	24.31	25.1	25.37	25.99	26.26	26.35	26.42
2018	27.24	25.61	24.97	26	26.58	26.77	27.19	28.22	27.46	25.0	25.59	26.0
2019	26.0	26.66	27.76	29.12	28.88	29.25	28.28	27.12	26.93	26.51	27.67	28.18
2020	27.96	26.92	21.38	20.38	21.24	24.7	28.6	31.59	32.55	33.99	34.34	37.26
2021	38.9	40.8	40.43	32.73	29.27	29.0	28.11	26.11	26.98	27.31	23.43	23.69
2022	23.42	22.54	21.7	22.7	20.32	19.5	20.73	21.2	20.64	20.9	21.9	22.0
2023	21.49	20.89	19.97									

Table 1: PE Ratios of Nifty 50 Index (1999-2023)

Source: https://primeinvestor.in/nifty-pe-ratio/

It is observed from the above table that PE ratio of Nifty 50 had seen the sea changes over the years. In the years of crisis it has fallen to the lows, in the years of optimism it has seen new heights. To confirm our observation further Single factor ANOVA was conducted to check if the observed variations are significant or not. The results of Single factor ANOVA are given below.

Table 2: Single Factor ANOVA to test difference in PE Ratios of Nifty 50 (1999-2022)

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	5095	22	231.5897	33.0121993	1.01E-61	1.584488144
Within Groups	1774.9	253	7.015276			
Total	6869.8	275				

Source: Based on the results generated by using MS-Excel, to the secondary data.
https://primeinvestor.in/nifty-pe-ratio/

The hypothesis which is framed and is tested is as follows:

Hypothesis

Null Hypothesis: There is no significant increase in PE ratio of Nifty 50 during the study period.

Alternate Hypothesis: There is significant increase in PE ratio of Nifty 50 during the study period.

Calculated value of F is 33.01 for degrees of freedom 22. The calculated value of F is greater tha the F critical value (1.584), hence null hypothesis is rejected. The alternate hypothesis is accepted. Hence it is concluded that at 5% level of significance there is a significant increase in the PE ratio during the study period. Now that it was concluded that there is significant increase in PE ratio the attempt to explore reasons for the increase was done with the help of Nudge theory.

The concept of Heuristics was given by Daniel Kahnemann and Amos Tversky and later this concept was further elaborated or researched by Thaler and Sustein in their Nudge theory. The dictionary meaning of Heuristics is as follows:Heuristics refers to the process by which people find things out for themselves, usually by trial and error. Heuristics are defined as a rule of thumb that make decision making easier. Rule of thumb is useful particularly when time is limited. When situations change this rule of thumb may lead to biases. Heuristics decision process may result in poorer decisions. In the present study the Heuristics that are applied are Over reaction and Under reaction.
The following table depicts the comparison of total return of Nifty 50 with that of fundamental return.

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Table 3: Returns of Nifty 50 Index(1999-2022)

Date on which return is calculated	Year	Nifty 50	PE Ratio	Total Return	Fundamental Return	
					EPS	Return
Jan-99		890.8	11.62		76.66	
Jan-00	1999	1592.2	25.91	79.69%	61.45	-19.84%
Jan-01	2000	1254.3	16.06	-19.97%	65.81	7.09%
Jan-02	2001	1055.3	15.29	-14.38%	69.02	4.88%
Jan-03	2002	1100.15	14.92	6.63%	73.74	6.84%
Jan-04	2003	1912.25	21.09	75.26%	90.67	22.97%
Jan-05	2004	2115	15.57	12.50%	135.84	49.82%
Jan-06	2005	2835.95	17.16	35.65%	165.27	21.67%
Jan-07	2006	4007.4	21.48	42.51%	186.56	12.89%
Jan-08	2007	6144.35	27.64	54.16%	222.3	19.15%
Jan-09	2008	3033.45	13.3	-48.77%	228.08	2.60%
Jan-10	2009	5232.2	23.31	73.42%	224.46	-1.59%
Jan-11	2010	6157.6	24.57	18.70%	250.61	11.65%
Jan-12	2011	4636.75	16.79	-23.07%	276.16	10.19%
Jan-13	2012	5950.95	18.82	29.73%	316.2	14.50%
Jan-14	2013	6301.65	18.69	7.38%	337.17	6.63%
Jan-15	2014	8284	21.16	32.72%	391.49	16.11%
Jan-16	2015	7963.2	21.53	-2.42%	369.87	-5.52
Jan-17	2016	8179.5	22.08	4.07%	370.45	0.16%
Jan-18	2017	10435.6	26.68	26.68%	391.14	5.59%
Jan-19	2018	10910.1	26.88	4.54%	405.88	3.76%
Jan-20	2019	12182.5	26.28	11.66%	463.56	14.21%
Jan-21	2020	14018.5	28.33	15.07%	494.82	6.74%
Jan-22	2021	17625.7	38.55	25.73%	457.21	-7.60%
Jan-23	2022	18197.5	24.49	3.24%	743.05	62.51%

Source: Calculated and compiled by the researchers based on secondary data. https://www.nseindia.com/products/content/equities/indices/historical_index_data.htm

From the above table it the following findings are drawn:

1. In the year 1999 though the Earnings have decreased by 19.84% but then index increased significantly by 79%. This was probably because of the effect of the Nudge- Over reaction. In 1999 IT sector was on boom and it had spillover effect on overall index too.
2. In the year 2000 though the EPS recovered slightly but then the Nifty 50 had gone down considerably (20%). This can be because the investors under reacted to the improving EPS of Nifty 50.
3. In the year 2001 also the under reaction to the increase in EPS continued.
4. In the year 2003 though the EPS has increased by 23% but this increase caused market participants to over react and as a result market return was 75.26%.
5. Again the following year of 2004 was a year of under reaction as the EPS has considerably improved by 49.82% but it was not reflected in Total return which increased merely by 12.5%.
6. In 2006 the earnings of Nifty 50 companies increased by 12.89% but caused the participants to over react and as a result the market has gone up by 42.51%.
7. The over reaction of 2006 continued in 2007 as well and took the market to new heights.
8. In the year 2008 though the impact of subprime crisis was there but there was still a small increase in EPS of 2.6 %. But people over reacted in a negative direction and lead to a huge fall of 48.77%.
9. In the year 2009 economy was reviving from the clutches of crisis and there was only a small drop in EPS of about 1.59% but participants over reacted(over rejoiced) and as result the total return was 73.42%.
10. In 2011 the EPS of Nifty 50 has gone up by 10.19% but people under reacted and led to a market fall of 23.07%.
11. In the year 2012, over reaction was evident as the increase in fundamentals were only 14.5% but led to increase of 29.73% in total return.
12. Again in the year 2014, 2017 and 2020 there was over reaction by market participants.
13. In the year 2021 people under reacted to the fundamentals that have actually gone down by 7.76% but market participants ignored that decrease and the total return had increased by 25.73%.
14. Again the following year of 2022 was a year of under reaction, though EPS had substantially

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increased by whooping 62.51% but total return merely increased by 3.24%.

8. Conclusion

In the words of Meir Statman, "People in standard finance are rational. People in behavioral finance are normal".

The stock market index in general and PE ratio in particular is a barometer of nation's economic health as market prices reflect expectations about the economy's performance and PE ratio reflects the market participants optimism and above all both Index and PE ratio measures the overall market sentiments, the investor's behavior, and their expectations through a set of stocks that are representative of the market. The present study reveals that the PE ratio of Nifty 50 has significantly increased over the years. It is also revealed from the study that there was an impact of nudge- over reaction in the years 1999, 2003, 2006, 2007, 2008, 2009, 2012, 2014, 2017 and 2020. The market participants have also under reacted in some of the years. The years in which the market participants have under reacted are 2000, 2001, 2004, 2011, 2021 and 2022.

The present exploratory study is a modest attempt that will try to explore the reasons behind gradual but remarkable increase in PE ratio of Indian Stock Markets in the light of Nudge theory.

9. Limitations and scope for further study

The present study is limited only to Nifty 50 and does not include other non-indexed stocks. The Heuristics that were used for this study were over reaction and under reaction. The study can be extended to other sectoral indices and also to the individual stocks. Other mental biases can also be studied.

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