Non-Proportional Thinking in Repurchases

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Abstract

This paper examines the non-proportional thinking in the context of the repurchase announcements in India, using a hand-collected set of Securities and Exchange Board of India (SEBI) documents on 281 repurchase executions from 2008 to 2024. We find the presence of non-proportional thinking in the Indian market around repurchase announcements and their completion. Further, this tendency is amplified for the firms with poor past performance and higher repurchase participation from smaller shareholders. Our findings suggest that institutional investors, being well-informed, are less prone to this bias. The findings suggest that investors' financial decisions are affected by framing variability, which results in non-proportional thinking during share repurchases. This study helps investors recognize their behavioural biases. We add to the extant literature by providing the first evidence of non-proportional thinking in the share repurchase context.

Keywords:

Non-proportional thinking, Framing, Repurchase announcements, Repurchase premium, Market reaction

1. Introduction

The extant literature on stock repurchases highlights that premium announcements influence shareholder returns and market reactions, often signalling management's belief in the stock's undervaluation (Ikenberry et al., 1995, 2000; Peyer & Vermaelen, 2009). Management's perception of undervaluation often leads to higher premium tender offers, signalling stronger undervaluation and attracting more shareholders to participate in the repurchase (Pugh & Jahera, 1990). Additionally, trading activity around repurchase tenders has been shown to generate significant abnormal positive returns, particularly for smaller firms, which often offer larger premiums to enhance market visibility and strengthen their signalling power (Lakonishok &

Vermaelen, 1990). Overall, premiums play a critical role in the subscription to repurchase programmes.

In this study, we investigate the presence of non-proportional thinking bias in the context of repurchase programmes. Non-proportional thinking implies that people focus more on nominal dollar changes and underattend to the denominator (Shue & Townsend, 2021). It affects how people interpret news and form perceptions about stock price movements. As a result, investors suffer from "denominator neglect" or "ratio bias", which is explained as a tendency of individuals to focus excessively on the numerator rather than thinking in percentage terms.

In the context of share repurchase announcements, non-proportional thinking suggests that investors may react more strongly to the absolute value of the premium rather than adjusting proportionally to the stock prices. This concept challenges the assumption that investors process financial signals rationally and in relative terms, such as percentages (Shue & Townsend, 2021).

To illustrate this, consider two companies that announced share repurchases in 2023. Tata Consultancy Services (TCS) offered to buy back shares at ₹4,150 when the pre-announcement price was ₹3,404, resulting in a premium of ₹745 in absolute terms and 22% (approx.) in percentage terms. On the other hand, Fairdeal Pharma announced a repurchase price of ₹500 for shares trading at ₹409, offering a similar 22% percentage premium but with a much lower absolute premium of ₹91. Although both companies offered the same percentage premium in their share repurchase announcements, investor responses varied significantly. TCS had a subscription rate of 7.20%,[1] while FP had 5.34%[2]. This difference is likely driven by the disparity in the absolute premium amounts, indicating that investors were more influenced by the absolute figures than the percentage premium alone.

Using the unique documents from the SEBI website, we manually collected a final sample of 281 firms' tender-repurchase announcements and post-repurchase reports, covering all occurrences between 2008 and 2024. We find that non-proportional thinking prevails during repurchases, i.e., the market reacts more strongly to the absolute premium than the percentage premium. The reaction is even higher when the stocks suffer from poor past performance. Furthermore, we find that retail investors are more prone to this bias than institutional investors,

[1] https://www.sebi.gov.in/sebi_data/commondocs/dec-2023/Tata_Consultancy_POPA_p.pdf
[2] https://www.sebi.gov.in/sebi_data/commondocs/sep-2023/FDC_Limited_PBPA_p.pdf

as the latter are better informed and more rational. Our results are robust to additional control variables and alternative econometric specifications.

Our study contributes to the literature by offering insights into how investors process information related to share repurchases, specifically through the lens of non-proportional thinking. Our findings suggest that investors tend to focus more on absolute premiums and underweight percentage premiums, leading to biased stock price reactions. This adds to the growing work on investor misperceptions and behavioural biases. Shue & Townsend (2017) demonstrate that investors often process stock price changes in absolute rather than percentage terms, leading to exaggerated responses to news, especially for lower-priced stocks. Similarly, Birru & Wang (2016) show that investors suffer from a nominal price illusion, overestimating the growth potential and skewness of low-priced stocks, which results in systematic mispricing. Our findings extend these insights by showing that such biases also influence investor responses to share repurchase announcements.

Our findings suggest that investors may overvalue repurchase announcements with higher absolute premiums while underreacting to those with higher percentage premiums. This contributes to an understanding of why repurchase signals are not always incorporated efficiently into stock prices. This misalignment in premium perception can introduce a new dimension to share repurchase strategies and the subsequent market reactions, broadening the scope of non-proportional thinking in financial decision-making.

The rest of the paper is structured as follows: Section 2 explores the related literature and develops hypotheses, Section 3 describes data and variables, Section 4 covers the empirical analysis, and Section 5 concludes the study.

2. Literature Review and Hypotheses Development

While announcing repurchases through SEBI, the firm announces only the absolute premium offered, i.e., the repurchase price, rather than the percentage premium. Figure 1 shows the repurchase announcement of Wipro Ltd. In such a scenario, anchoring bias may impact the decisions, leading investors to react more to absolute premiums rather than percentage premiums. Investors may tend to focus more on the numerator while under-attending to the denominator. This can lead to non-proportional thinking in investors.

Figure 1 Wipro Public Announcement for tender repurchase.

WIPRO LIMITED

Corporate Identification Number (CIN): L32102KA1945PLC020800
Registered Office: Doddakannelli, Sarjapur Road, Bengaluru - 560 035, India.
Phone: +91 80 2844 0011; **Email:** corp-secretarial@wipro.com;
Website: www.wipro.com; **Company Secretary and Compliance Officer:** Mr. M Sanaulla Khan

PUBLIC ANNOUNCEMENT FOR THE ATTENTION OF EQUITY SHAREHOLDERS//BENEFICIAL OWNERS OF EQUITY SHARES OF WIPRO LIMITED (THE "COMPANY") FOR THE BUYBACK OF EQUITY SHARES THROUGH TENDER OFFER UNDER THE SECURITIES AND EXCHANGE BOARD OF INDIA (BUY-BACK OF SECURITIES) REGULATIONS, 2018, AS AMENDED.

This public announcement (the "Public Announcement") is being made pursuant to the provisions of Regulation 7(i) of the Securities and Exchange Board of India (Buy-Back of Securities) Regulations, 2018, as amended (including any statutory modification(s), amendment(s) or re-enactments from time to time) (the "Buyback Regulations") and contains the disclosures as specified in Schedule II of the Buyback Regulations read with Schedule I of the Buyback Regulations.

OFFER FOR BUYBACK OF UP TO 26,96,62,921 (TWENTY SIX CRORE NINETY SIX LAKH SIXTY TWO THOUSAND NINE HUNDRED AND TWENTY ONE ONLY) FULLY PAID UP EQUITY SHARES HAVING FACE VALUE OF Rs. 2/- (RUPEES TWO ONLY) EACH OF COMPANY (THE "**EQUITY SHARES**") AT A PRICE OF Rs. 445/- (RUPEES FOUR HUNDRED AND FORTY-FIVE ONLY) PER EQUITY SHARE ON A PROPORTIONATE BASIS THROUGH THE TENDER OFFER PROCESS USING THE STOCK EXCHANGE MECHANISM.

Certain figures contained in this Public Announcement, including financial information, have been subject to rounding-off adjustments. All decimals have been rounded off to two decimal points. In certain instances, (i) the sum or percentage change of such numbers may not conform exactly to the total figure given; and (ii) the sum of the numbers in a column or row in certain tables may not conform exactly to the total figure given for that column or row.

1. DETAILS OF THE BUYBACK OFFER AND OFFER PRICE

1.1 The board of directors of the Company (the "**Board**", which expression shall include any committee constituted and authorized by the Board to exercise its powers), at its meeting held on April 27, 2023 (the "**Board Meeting**") has, subject to the approval of the shareholders of the Company by way of a special resolution through a postal ballot by remote e-voting, pursuant to the provisions of Article 8.2 of the Articles of Association of the Company, Sections 68, 69, 70 and 110 and all other applicable provisions, if any, of the Companies Act, 2013, as amended (the "**Companies Act**"), the Companies (Share Capital and Debentures) Rules, 2014, and Rule 22 of the Companies (Management and Administration) Rules, 2014, to the extent applicable, and in compliance with the Buyback Regulations and subject to such other approvals, permissions, consents, exemptions and sanctions, as may be necessary and subject to any modifications and conditions, if any, as may be prescribed by statutory, regulatory or governmental authorities as may be required under applicable laws, approved the buyback by the Company of up to 26,96,62,921 (Twenty Six Crore Ninety Six Lakh Sixty Two Thousand Nine Hundred and Twenty One only) fully paid-up Equity Shares representing up to 4.91% of the total number of Equity Shares in the paid-up Equity Share Capital of the Company at a price of Rs. 445/- (Rupees Four Hundred and Forty-Five only) per Equity Share (the "**Buyback Price**") payable in cash for an aggregate consideration of up to Rs. 120,00,00,00,000/- (Rupees Twelve Thousand Crores only) (the "**Buyback Size**"), which is 20.95% and 17.86% of the aggregate of the fully paid-up equity share capital and free reserves of the Company as per the latest audited standalone and consolidated financial statements, respectively, as at March 31, 2023, on a proportionate basis through the "tender offer" route as prescribed under the Buyback Regulations, from all of the shareholders of the Company who hold Equity Shares as of the Record Date (as defined below) (the "**Buyback**").

1.2 The Buyback is more than 10% of the total paid-up equity capital and free reserves of the Company based on both standalone and consolidated financial statements of the Company as per its latest audited (both standalone and consolidated) financial statements as of March 31, 2023. Accordingly, the Company sought approval of its shareholders for the Buyback, by way of special resolution through the postal ballot notice dated April 27, 2023 (the **"Postal Ballot Notice"**), in accordance with first proviso to Section 68(2)(b) of the Companies Act and first proviso to Regulation 5(1)(b) of the Buyback Regulations. The shareholders of the Company approved the Buyback, by way of a special resolution, through a postal ballot by remote e-voting on June 1, 2023 and the results of which were announced on June 2, 2023.

1.3 The Buyback Size represents 20.95% and 17.86% of the aggregate of the fully paid-up equity share capital and free reserves as per the latest audited standalone and consolidated financial statements of the Company as of March 31, 2023, respectively, and is within the statutory limit of 25% of the aggregate total paid-up capital and free reserves of the Company, based on both standalone and consolidated audited financial statements of the Company, as per applicable provisions of the Companies Act and Buyback Regulations.

Sl. No.	Name of Shareholder	No. of Equity Shares	% Shareholding
1.	Azim H Premji	23,68,15,234	4.32
2.	Yasmeen A Premji	26,89,770	0.05
3.	Rishad Azim Premji	17,38,057	0.03
4.	Tariq Azim Premji	15,80,755	0.03
5.	Pagalthivarthi Srinivasan	89,796	0.00
6.	Lakshminarayana Ramanathan Kollengode	18,400	0.00
7.	Vadapally Ravi Kiran	6,653	0.00
8.	Bhoopalam Chandrashekharaiah Prabhakar	10,400	0.00
9.	Ayyagari Lakshmanarao	40,070	0.00
10.	Tekkethalakal K Kurien	8,46,999	0.02
11.	Deepak Jain	1,40,483	0.00
12.	Manoj Jaiswal	4	0.00
	Total	**24,39,76,621**	**4.45**

(iii) Aggregate shares purchased or sold by the Promoter and Promoter Group, persons in control, Directors of companies which are a part of the Promoter and Promoter Group during a period of six (6) months preceding the date of the Board Meeting at which the Buyback was approved and the date of the Postal Ballot Notice, i.e., April 27, 2023:

(a) Aggregate of shares purchased or sold by the Promoter and Promoter Group and persons who are in control: **NIL**

(b) Aggregate shares purchased or sold by the Directors of companies which are part of the Promoter and Promoter Group: **NIL**

7. INTENTION OF THE PROMOTER AND PROMOTER GROUP AND PERSONS IN CONTROL OF THE COMPANY TO PARTICIPATE IN BUYBACK

7.1. In terms of the Buyback Regulations, under the tender offer route, the Promoter and Promoter Group have an option to participate in the Buyback. In this regard, the Promoter and Promoter Group entities and persons in control of the Company have expressed their intention to participate in the Buyback vide their letters dated April 27, 2023 and may tender up to an aggregate maximum of 3,91,74,17,716 Equity Shares or such lower number of Equity Shares in accordance with the provisions of the Buyback Regulations. Please see below the maximum number of Equity Shares to be tendered by each of the Promoter and Promoter Group as well as persons in control of the Company:

Sl. No.	Name of the Promoter and Promoter Group entity	Maximum No. of Equity Shares intended to be offered
1.	Azim H Premji	15,22,82,702
2.	Yasmeen A Premji	26,89,770
3.	Rishad Azim Premji	17,38,057
4.	Tariq Azim Premji	15,80,755
5.	Mr. Azim Hasham Premji Partner Representing Hasham Traders	92,89,46,043
6.	Mr. Azim Hasham Premji Partner Representing Prazim Traders	1,11,98,92,315
7.	Mr. Azim Hasham Premji Partner Representing Zash Traders	1,13,56,18,360
8.	Hasham Investment and Trading Co. Private Limited	14,25,034
9.	Azim Premji Philanthropic Initiatives Private Limited [1]	1,45,68,663
10.	Azim Premji Trust [2]	55,86,76,017
	Total	**3,91,74,17,716**

Source: SEBI (https://www.sebi.gov.in/sebi_data/commondocs/jun-2023/Wipro_LTD_PA_p.pdf)

Literature documents that absolute numbers shape investor behaviour through different biases, for instance, nominal price illusion, numerical anchoring, etc. (Birru & Wang, 2016; Costa, 2020). Thinking in relative terms is more relevant in the case of stock returns or calculating potential changes due to any corporate announcements, whereas absolute terms can result in lower returns to investors when deciding to repurchase demonstrate that decision framing can lead to significant shifts in preferences (Shue & Townsend, 2021; Tversky & Kahneman, 1981, 1986). Similarly, repurchase premiums framed in two different ways are perceived differently. These different interpretations can lead to non-proportional thinking biases (Costa, 2020). Along similar lines, Bourjade et al. (2023) find that dollar price revisions in IPOs significantly influence post-IPO returns, despite the actual ratio of price change remaining constant. Therefore, assessing whether the market reacts to the repurchase absolute premium is important. This leads to our first hypothesis.

H1: The stock market reacts positively to repurchase announcements with a higher absolute premium.

Literature has documented the past performance of the stock to be a critical factor influencing the repurchase decision (Bonaimé, 2012; Jha et al., 2022; Ota et al., 2019). Investors may perceive higher premium as a stronger signal of the firm's undervaluation for recent poor performers. This leads us to test whether the market reacts differently to absolute premiums when a firm has recent negative performance. Therefore, our second hypothesis is:

H2: The impact of the absolute premium is higher for the stocks with negative past performance.

The repurchase literature shows a negative relationship between market reaction to repurchase announcements and institutional ownership. Ratner et al. (1996) demonstrate that firms with higher institutional ownership experience muted market reactions to tender offer announcements, as institutional ownership reduces information asymmetry between managers and the market. Thus, repurchase announcements can serve as a stronger undervaluation signal for lower institutional ownership firms than for those with higher institutional ownership. Further, institutional investors are widely viewed as more sophisticated and rational in their decision-making compared to retail investors, making them less susceptible to common behavioural biases such as non-proportional thinking (Jiambalvo et al., 2002; Shue & Townsend, 2021). Building on this distinction, with the following hypothesis, we examine whether the type of investor moderates the effect of premium framing in repurchase announcements.

H3: Market reaction to repurchase announcements by firms with higher institutional ownership is more sensitive to the percentage premium than to the absolute premium.

Retail investors are generally more prone to behavioural biases, which shape how they interpret financial information (Kumar, 2009; Kumar & Lee, 2006). Unlike institutional investors, retail investors typically have limited understanding of the complex information and frequently use cognitive shortcuts for processing it (Barberis & Thaler, 2003). Consequently, they may heavily anchor on the first piece of information they come across, such as the example shown in Figure 1, where firms emphasise, the absolute amount offered per share (Tversky & Kahneman, 1974). In the context of share repurchase announcements, the absolute premium often serves as this anchor, especially when it is prominently displayed in advertisements in newspapers, defining investors' perceptions of value disproportionately (Tversky & Kahneman, 1974). Hence, we hypothesize the following:

H4: Retailers are more sensitive to the absolute premium than to the percentage premium.

3. Data and Variable Description

We have hand-collected documents of all the Tender Route share repurchases in India between 2008 and 2024 from the Securities Exchange Board of India website (SEBI). According to the SEBI Buy-Back Regulation (2018), companies are required to publish this document stating key indicators. The SEBI website has a document for every announcement of the repurchase, followed up by any corrigendum if required, and the post-repurchase document. The first document includes all the information related to the buyback, such as the purpose of the buyback, details of their shareholding at the time of repurchase, the repurchase handler, the merchant banker, and the necessary ratios to be maintained as per law. A corrigendum is a document that carries any changes or rectifications in the previous document, if needed. Lastly, the post-repurchase announcement document includes the average prices of buyback, the total number of shares bought back, the amount used in share buyback, and the key ratios post-buyback.

This website has 1322 documents reporting buybacks through the tender route repurchases during our sample period. We record every detail and match every buyback announcement with its respective corrigendum and post-buyback reporting. This leads to 306 announcements with post-buyback reporting. We have a final sample of 281 announcements after excluding financial and utility firms. All other financial variables are taken from CMIE Prowess. Variables are described in Table 1.

Table 1 Variable Description

Dependent variables:	
Market Reaction (MR)	Market-adjusted CARs over the window (0,1), (0,2), (0,3), (0.4), and (0,5) estimated over (-46,-252) wrt announcement date.
Small shareholder Response	The number of times small shareholders subscribe to the repurchase program. (Only valid subscriptions included)[3]
Independent Variables:	
Abs_pre	Log of the nominal premium offered by the firm at the time of repurchase. $$Abs\ premium = ln(P_T - P_0)$$

[3] To protect the interests of the small shareholders within the Indian regulatory environment, an average of 15% of share buybacks must be reserved for them. In the post-repurchase document, Indian repurchasing firms need to disclose how many valid and invalid tenders they subscribed to. Valid tender refers to the repurchase subscription by the eligible shareholders, i.e., those who hold shares as of the record date. Therefore, we consider only valid tender subscriptions scaled to the reserved shareholder shares for every respective firm on every announcement.

Perc_pre	The percentage premium offered by the firm at the time of repurchase. $$Percentage\ Premium = \frac{P_T - P_0}{P_0}$$
Poor past performance	A dummy variable with value 1 if past returns are negative or 0 otherwise,
Control Variables:	
Ln(Assets)	The natural log of total assets at the end of the year prior to the repurchase
Past Returns	Past returns represent stock returns on the firm minus returns on the NIFTY-500 index, calculated from 40 days prior to the announcement until 6 days prior to the announcement.
SD of Returns	The standard deviation of returns is calculated over 200 trading days, from 210 days prior to the announcement until 10 days before the announcement
Ln(Illiquidity)	The natural log of the average ratio of the daily absolute return to the (Rupee) trading volume on that day, following Amihud (2002)
EPS	The ratio of the annual income of the company to the number of shares outstanding prior month to the repurchase announcement
Ln(Firm Age)	Log of the number of years for which the firm existed. Specifically, Log of (Announcement Year- Year of Incorporation)
Inst_Investor	A dummy variable is 1 for the high presence of institutional investor holdings in a particular company at the time of the announcement; otherwise, 0.
MKBK	The ratio of the market value of equity to the book value of assets at the end of the day prior to the repurchase announcement
Net profit	The net profit scaled to total assets at the end of the year prior to the repurchase
Repurchase Size	The announced shares to be repurchased are expressed as a percentage of the total outstanding shares.
Free Reserves	The ratio of total cash available to distribute as dividends, scaled to total assets prior to the repurchase announcement.
Dividend	The ratio of total dividends paid as a percentage of net profits prior to the repurchase
Leverage	Debt/shareholder equity Prior to the repurchase announcement
Cash	Cash and equivalents/total assets at the end of the year prior to the repurchase

Tables 2 and 3 show the summary statistics and correlation matrix for this study.

Table 2 Summary Statistics

Variables	Count	Mean	Median	SD	Min	Max
(0, 1)	172	-0.001	0.003	0.044	-0.260	0.173
(0, 2)	172	-0.002	0.001	0.049	-0.253	0.226

(0, 3)	172	-0.002	0.002	0.051	-0.266	0.156
(0, 4)	172	0.000	0.001	0.055	-0.270	0.176
(0, 5)	172	0.002	0.006	0.058	-0.265	0.203
Ln(size)	280	20.663	20.710	1.911	16.146	25.916
Abs_pre	184	4.286	4.345	1.468	-0.288	8.166
Small shareholder response	273	2.256	1.365	2.961	0.000	29.540
Repurchase Size	280	0.075	0.039	0.077	0.003	0.250
Ln(Assets)	277	23.172	23.262	1.981	18.349	28.819
Cash	274	0.053	0.018	0.097	-0.098	0.590
Free Reserves	277	0.519	0.553	0.236	-0.821	0.961
Leverage	277	0.188	0.030	0.335	0.000	2.310
Ln(Firm Age)	278	3.540	3.511	0.529	1.946	4.820
MKBK	206	3.733	3.010	2.891	0.380	17.080
Perc_pre	206	0.307	0.170	1.170	-0.890	15.720
Past Returns	199	0.020	0.022	0.130	-0.727	0.457
SD of returns	199	0.004	0.005	0.021	-0.152	0.126
Ln(Illiquidity)	198	-22.708	-22.530	2.526	-28.997	-14.776
Poor_past_perf	199	0.422	0.000	0.495	0.000	1.000
Inst_Investor	280	0.500	0.500	0.501	0.000	1.000
Dividend	278	26.801	16.845	39.491	0.000	371.150
EPS	215	32.177	17.940	55.507	-96.050	451.670
Net Profits	277	0.102	0.082	0.099	-0.224	0.666

Table 3. Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. (0, 1)	1																
2. Abs_pre	0.27**	1															
3. Small shareholder	-0.02	0.37***	1														
4. Ln(Assets)	0.02	-0.06	-0.17	1													
5. Past Returns	0.02	-0.03	-0.17*	0.02	1												
6. SD of returns	-0.16	-0.08	0.1	-0.13	0.01	1											
7. Ln(Illiquidity)	0.03	-0.20*	-0.12	-0.68***	0.08	0.04	1										
8. EPS	0.08	0.48***	0.04	0.09	-0.04	-0.01	-0.16	1									
9. Ln(Firm Age)	-0.09	-0.15	-0.17	0.20*	0.22*	-0.05	-0.02	0.04	1								
10. Inst Investor	0.01	0.03	-0.17*	0.51***	-0.11	-0.15	-0.47***	0.05	-0.03	1							
11. MKBK	-0.06	0.36***	0.14	-0.15	-0.15	0.19*	-0.21*	0.18*	-0.18*	0.1	1						
12. Net Profits	0.08	0.2 *	0.02	-0.03	-0.12	0.06	-0.1	0.06	-0.08	0.02	0.27**	1					
13. Leverage	0.09	0.02	0.19*	0.15	0.09	-0.11	-0.05	-0.03	0.09	-0.06	-0.09	-0.23**	1				
14. Cash	0.04	0.09	-0.05	-0.04	-0.05	0.1	0.02	-0.05	-0.08	-0.12	0.11	0.34***	-0.20 *	1			
15. Repurchase Size	0.11	-0.36***	-0.3***	-0.26**	0.06	0.18*	0.42***	-0.16	0.06	-0.24**	-0.41***	-0.06	-0.15	0.07	1		
16. Dividend	0.13	-0.25**	-0.19*	0.15	0.04	-0.02	0.04	-0.13	0.03	0.03	-0.15	-0.06	-0.12	-0.03	0.1	1	
17. Free Reserves	-0.13	-0.04	-0.20*	-0.13	0.03	0.05	0.01	0.13	0.02	-0.08	-0.06	0.20*	-0.53***	0.13	0.26**	-0.09	1

4. Results and Findings

The investors' reaction to the repurchase announcement is computed following Brown & Warner (1985), considering the newspaper publishing date of the repurchase announcement as the event day. We have calculated the Cumulative Abnormal Returns (CAR) for each firm by adding their respective Abnormal returns (AR) over a time frame. These AR are market-adjusted using the CAPM model[4].

$$AR_{i,t} = R_{i,t} - \left(\alpha_i + \beta_i\left(R_{m,t} - R_{f,t}\right)\right) = R_{i,t} - E_{i,t} \quad \text{(i)}$$

Where α_i is the stock-specific intercept, β_i is the stock's sensitivity to market returns. $R_{i,t}$ is the actual return of stock i at time t, $R_{m,t}$ and $R_{f,t}$ are the market return and risk-free rate at time t and $E_{i,t}$ is the expected return calculated using NSE500 index.

Finally, the CARs are calculated by summing up ARs within the event windows estimated over 252 trading days, ending 46 days prior to the event. It is estimated as:

$$CAR_{t1,t2} = \sum_{t=t1}^{t2} AR_{i,t} \quad \text{(ii)}$$

4.1 Market Reaction to Absolute Premium

The nominal share price has no real meaning (Shue & Townsend, 2021), despite many studies have found that they play an important role in how investors behave. When prices go up or down, investors often change their decisions (Birru & Wang, 2016). In share repurchases, companies usually offer to buy back shares at a price higher than the current market price. This higher offer influence both the repurchase decision and the company's stock price(Chan et al., 2004). Investors often see this higher price as a signal that the stock is undervalued. The larger the gap between the offer price and the market price, the stronger this signal of undervaluation (Dittmar, 2000). In a fully rational market, investors would be expected to respond to the percentage premium (how much higher the offer is compared to the market price) rather than just the absolute amount. In order to test this non-proportional thinking, we propose the following model to analyze whether the absolute premium impacts the market reaction (MR).

$MR = \beta_0 + \beta_1 \text{Abs\_pre}_{i,} + \beta_2 \text{Ln(Assets)}_i + \beta_3 \text{Past Returns}_i +$ $\beta_4 \text{SD of returns}_i + \beta_5 \text{Ln(Illiquidity)}_i + \beta_6 \text{EPS}_i + \beta_7 \text{Ln(Firm Age)}_i +$	(1)

[4] Risk-free rate of return is been taken up from https://faculty.iima.ac.in/iffm/Indian-Fama-French-Momentum/

$+ \beta_8 \text{Inst\_Investor}_i + \beta_9 \text{MKBK}_i + \beta_{10} \text{Net Profit}_i + \beta_{11} \text{Leverage}_i + \beta_{12} \text{Cash}_i + \varepsilon_{i,t}$	

Where MR (Market reaction) = CAR (0,1), CAR (0,2), CAR (0,3), CAR (0,4), and CAR (0,5).

Table 4 shows the results for Model 1. The results show that the absolute premium offered has a positive and significant relationship with CAR for all the windows. This shows that investors react favourably to higher absolute premiums, supporting non-proportional thinking in the market, aligning with our first hypothesis. MKBK is significantly impacting returns, aligning with the findings of Brav et al. (2005), and Ikenberry et al. (1995). Undervaluation is the primary factor driving decisions.

Table 4 Market Reaction to Absolute Premium

	Dependent variable: CAR				
VARIABLES	(0, 1)	(0, 2)	(0, 3)	(0, 4)	(0, 5)
	(1)	(2)	(3)	(4)	(5)
Abs_pre	0.009***	0.011***	0.009**	0.007*	0.008*
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Ln(Assets)	−0.001	−0.003	−0.002	−0.002	0.001
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Past Returns	0.013	−0.005	−0.041	−0.044	−0.061*
	(0.028)	(0.031)	(0.032)	(0.034)	(0.037)
SD of returns	−0.272	−0.164	−0.085	−0.158	−0.118
	(0.173)	(0.193)	(0.203)	(0.210)	(0.229)
Ln(Illiquidity)	0.001	−0.000	0.000	0.001	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
EPS	−0.000	−0.000	−0.000	0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(Firm Age)	−0.005	−0.006	−0.010	−0.013	−0.009
	(0.008)	(0.009)	(0.010)	(0.010)	(0.011)
Inst Investor	−0.002	−0.006	−0.006	−0.002	0.000
	(0.010)	(0.011)	(0.012)	(0.012)	(0.013)
MKBK	−0.003	−0.005**	−0.005**	−0.004**	−0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Net Profits	0.040	0.074	0.037	0.071	0.064
	(0.043)	(0.048)	(0.050)	(0.052)	(0.057)
Leverage	0.017	0.016	0.013	0.028*	0.027
	(0.012)	(0.014)	(0.015)	(0.015)	(0.016)
Cash	0.014	−0.001	−0.027	0.028	0.007
	(0.062)	(0.069)	(0.072)	(0.075)	(0.081)
Constant	0.097	0.086	0.107	0.127	0.091
	(0.091)	(0.101)	(0.106)	(0.110)	(0.120)
Adjusted R^2	0.089	0.118	0.051	0.059	0.029
Industry FE	Yes	Yes	Yes	Yes	Yes

Year FE	Yes	Yes	Yes	Yes	Yes
Observation	135	135	135	135	135

*Note: Table 4 reports the results from Model 1, which examines the market reaction to absolute premium over various event windows ranging from (0,1) to (0,5), presented in Columns (1) to (5), respectively. All specifications include fixed effects. Robust t-statistics are reported in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.*

4.2 Effect of Past Performance on Market Reaction

Since investors are reacting to the absolute premium, this reaction should be amplified when a repurchase announcement complements undervaluation . This undervaluation signal we have proxied by past performance (Bonaimé, 2012). Therefore, when a repurchase, announcement follows a period of poor performance, the market is expected to react more strongly compared to when the firm has shown good performance in the past. Hence, we employ the following model to test:

$$MR = \beta_0 + \beta_1 \text{Abs\_pre}_i \times \text{Poor\_past\_perf} + \beta_2 \text{Abs\_pre}_i + \beta_3 \text{Poor\_past\_perf}_i + \beta_4 \text{Ln(Assets)}_i + \beta_5 \text{Past Returns}_i + \beta_6 \text{SD of returns}_i + \beta_7 \text{Ln(Illiquidity)}_i + \beta_8 \text{EPS}_i + \beta_9 \text{Ln(Firm Age)}_i + + \beta_{10} \text{Inst\_Investor}_i + \beta_{11} \text{MKBK}_i + \beta_{12} \text{Net Profit}_i + \beta_{13} \text{Leverage}_i + \beta_{14} \text{Cash}_i + \varepsilon_{i,t} \quad (2)$$

Where MR (Market reaction) = CAR (0,1), CAR (0,2), CAR (0,3), CAR (0,4), and CAR (0,5)

As shown in table 5, poor past performance increases the post-announcement returns significantly when accompanied by a higher absolute premium for four windows out of five. This clearly shows the undervaluation signal effect on such stocks. MKBK is also aligning with the undervaluation theory in repurchases. Results are in line with hypothesis 2.

Table 5 Effect of Past Stock Performance and Absolute Premium on Market Reaction

	Dependent variable: CAR				
VARIABLES	(0, 1)	(0, 2)	(0, 3)	(0, 4)	(0, 5)
	(1)	(2)	(3)	(4)	(5)
Abs_pre x Poor_past_perf	0.015***	0.018***	0.011*	0.012*	0.007
	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)
Abs_pre	0.004	0.005	0.005	0.003	0.006
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Poor_past_perf	−0.068***	−0.085***	−0.055*	−0.060**	−0.039
	(0.024)	(0.026)	(0.029)	(0.030)	(0.033)
Ln(Assets)	−0.001	−0.002	−0.001	−0.001	0.001
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Past Returns	0.002	−0.027	−0.057	−0.062	−0.086*
	(0.036)	(0.040)	(0.044)	(0.045)	(0.050)
SD of returns	−0.279	−0.170	−0.088	−0.161	−0.115

	(0.168)	(0.186)	(0.201)	(0.208)	(0.229)
Ln(Illiquidity)	0.001	−0.000	0.000	0.001	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
EPS	−0.000	−0.000	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(Firm Age)	−0.005	−0.005	−0.009	−0.012	−0.007
	(0.008)	(0.009)	(0.010)	(0.010)	(0.011)
Inst Investor	−0.002	−0.006	−0.006	−0.002	0.000
	(0.010)	(0.011)	(0.011)	(0.012)	(0.013)
MKBK	−0.002	−0.004*	−0.005**	−0.004*	−0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Net Profits	0.018	0.045	0.018	0.050	0.049
	(0.043)	(0.047)	(0.051)	(0.053)	(0.058)
Leverage	0.019	0.018	0.014	0.029*	0.027*
	(0.012)	(0.013)	(0.014)	(0.015)	(0.016)
Cash	0.044	0.038	−0.002	0.056	0.026
	(0.061)	(0.067)	(0.073)	(0.075)	(0.083)
Constant	0.112	0.100	0.115	0.136	0.089
	(0.089)	(0.098)	(0.106)	(0.110)	(0.121)
Adjusted R^2	0.084	0.089	0.039	0.068	-0.022
Industry FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observation	135	135	135	135	135

*Note: Table 5 reports the results from Model 2, which examines the effect of past stock performance and absolute premium on market reaction to repurchase announcements. Columns (1) to (5) present results for event windows ranging from (0,1) to (0,5), respectively. All specifications include fixed effects. Robust t-statistics are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

4.3 Institutional Holdings: Absolute vs Percentage Premium

Building on the market's reaction to absolute premiums, it is important to explore whether such biases also exist across different types of ownership. Institutional investors, being more informed and sophisticated (Jiambalvo et al., 2002; Shue & Townsend, 2021), are generally expected to behave rationally. Therefore, examining their response to repurchase premiums provides a useful setting to test for the presence of non-proportional thinking. Specifically, we test whether the market reacts differently when firms have high institutional ownership, which may indicate a more measured or rational response. To examine this, we use Models 3 and 4 to test for non-proportional and proportional thinking in institutional investors, respectively.

Model 3:

$$MR = \beta_0 + \beta_1 \text{Inst\_Investor x Abs\_pre}_i + \beta_2 \text{Abs\_pre}_i + \beta_3 \text{Inst\_Investor}_i + \beta_4 \text{Ln(Assets)}_i + \beta_5 \text{Past Returns}_i + \beta_6 \text{SD of returns}_{i,} + \beta_7 \text{Ln(Illiquidity)}_i + \beta_8 \text{EPS}_i + \beta_9 \text{Ln(Firm Age)}_i + \beta_{10} \text{MKBK}_i + \beta_{11} \text{Net Profit}_i + \beta_{12} \text{Leverage}_i + \beta_{13} \text{Cash}_i + \varepsilon_{i,t} \quad (3)$$

$MR = \beta_0 + \beta_1 \text{Inst\_Investor x Perc\_pre}_i + \beta_2 \text{Perc\_pre}_i + \beta_3 \text{Inst\_Investor}_i + \beta_4 \text{Ln(Assets)}_i + \beta_5 \text{Past Returns}_i + \beta_6 \text{SD of returns}_{i,} + \beta_7 \text{Ln(Illiquidity)}_i + \beta_8 \text{EPS}_i + \beta_9 \text{Ln(Firm Age)}_i + \beta_{10} \text{MKBK}_i + \beta_{11} \text{Net Profit}_i + \beta_{12} \text{Leverage}_i + \beta_{13} \text{Cash}_i + \varepsilon_{i,t}$	(4)

where, MR (Market reaction) = CAR (0,1), CAR (0,2), CAR (0,3), CAR (0,4), and CAR (0,5).

Table 6 shows the results of the above models. While the interaction of institutional ownership with absolute premium is insignificant, the term *Inst Investor x Perc premium* is negatively and significantly related to repurchase announcement returns. Results support hypothesis 3 that institutional investors are more sensitive to percentage premium to the probable reason for this negative relation could be lower information asymmetry between managers and the market in the presence of high institutional ownership (Ratner et al., 1996). In contrast, when institutional ownership is low, the market perceives repurchase announcements as more informative, leading to a stronger reaction.

Table 6 Institutional Holdings: Absolute vs Percentage Premium

	Dependent variable: CAR									
VARIABLES	(0, 1)	(0, 2)	(0, 3)	(0, 4)	(0, 5)	(0, 1)	(0, 2)	(0, 3)	(0, 4)	(0, 5)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Inst Investor x Abs_pre	0.005	0.006	0.004	0.004	0.003					
	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)					
Abs_pre	0.006	0.007	0.006	0.004	0.005					
	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)					
Inst Investor x Perc_pre						−0.042**	−0.044**	−0.051**	−0.050**	−0.065***
						(0.018)	(0.019)	(0.020)	(0.021)	(0.023)
Perc_pre						0.046**	0.052***	0.057***	0.056***	0.071***
						(0.018)	(0.019)	(0.020)	(0.021)	(0.022)
Inst Investor	−0.023	−0.031	−0.022	−0.017	−0.013	0.016	0.010	0.015	0.016	0.021
	(0.028)	(0.032)	(0.033)	(0.034)	(0.037)	(0.011)	(0.012)	(0.013)	(0.013)	(0.014)
Ln(Assets)	−0.0004	−0.002	−0.001	−0.001	0.001	−0.003	−0.002	−0.001	0.002	0.004
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Past Returns	0.013	−0.005	−0.041	−0.044	−0.061	0.044	0.029	−0.004	−0.008	−0.012
	(0.028)	(0.031)	(0.033)	(0.034)	(0.037)	(0.032)	(0.034)	(0.036)	(0.037)	(0.040)
SD of returns	−0.277	−0.170	−0.089	−0.162	−0.122	−0.153	−0.075	0.015	0.012	0.013
	(0.174)	(0.194)	(0.203)	(0.211)	(0.230)	(0.185)	(0.197)	(0.207)	(0.217)	(0.234)
Ln(Illiquidity)	0.001	−0.0001	0.001	0.001	0.004	−0.002	−0.003	−0.002	0.0004	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
EPS	−0.000	−0.000	−0.000	0.000	−0.000	0.00	0.000*	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(Firm Age)	−0.005	−0.006	−0.010	−0.013	−0.009	−0.009	−0.011	−0.012	−0.017	−0.014
	(0.008)	(0.009)	(0.010)	(0.010)	(0.011)	(0.009)	(0.009)	(0.010)	(0.010)	(0.011)
MKBK	−0.003	−0.004**	−0.005**	−0.004**	−0.003	−0.005**	−0.005***	−0.006***	−0.006***	−0.004*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Net Profits	0.047	0.082*	0.042	0.076	0.068	0.090*	0.126**	0.087*	0.107*	0.104*
	(0.044)	(0.049)	(0.051)	(0.053)	(0.058)	(0.046)	(0.049)	(0.052)	(0.054)	(0.058)
Leverage	0.019	0.018	0.014	0.029*	0.028	0.027**	0.024*	0.021	0.030*	0.025

	(0.013)	(0.014)	(0.015)	(0.015)	(0.017)	(0.013)	(0.014)	(0.015)	(0.016)	(0.017)
Cash	0.017	0.003	−0.024	0.031	0.009	−0.023	−0.032	−0.055	−0.014	−0.031
	(0.062)	(0.069)	(0.072)	(0.075)	(0.082)	(0.065)	(0.069)	(0.073)	(0.076)	(0.082)
Constant	0.103	0.094	0.112	0.132	0.096	0.053	0.036	0.036	0.026	−0.007
	(0.091)	(0.102)	(0.107)	(0.111)	(0.121)	(0.094)	(0.100)	(0.105)	(0.110)	(0.118)
Adjusted R^2	0.084	0.089	0.039	0.068	-0.022	0.065	0.110	0.091	0.108	0.050
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	135	135	135	135	135	151	151	151	151	151

*Table 6 presents the results from Models 3 and 4, which examine the impact of institutional holding on market reaction to absolute versus percentage premium around repurchase announcements. Columns (1) to (5) report results for absolute premium, while Columns (6) to (10) present results for percentage premium, across event windows ranging from (0,1) to (0,5), respectively. T-statistics are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$*

4.4 Small Shareholder Participation: Absolute vs Percentage Premium

Retail investors are typically more susceptible to behavioral biases, which shape the way they interpret and respond to financial information (Kumar, 2009; Kumar & Lee, 2006). Among the various signals presented during a repurchase announcement, the absolute premium is often the most immediate and visually prominent cue. This prominence increases the likelihood that retail investors will anchor on the absolute value, rather than assess the offer in proportional terms, leading to non-proportional thinking. As retail investors often lack the analytical tools or expertise to contextualize such information, their reactions may be driven more by heuristics than by rational evaluation. To assess how retail investors respond to absolute versus percentage premiums, we propose the following models:

Model 5:

$$Small\ Shareholder\ Response_i = \beta_0 + \beta_1 \text{Abs\_pre}_i + \beta_2 \text{Ln(Assets)}_i + \beta_3 \text{Repurchase Size}_i + \beta_4 \text{Net Profit}_i + \beta_5 \text{Dividend}_i + \beta_6 \text{Free Reserves}_i + \beta_7 \text{MKBK}_i + \beta_8 \text{Past Returns}_i + \beta_9 \text{SD of returns}_i + + \beta_{10} \text{Leverage}_i + \beta_{11} \text{Cash}_i + \varepsilon_{i,t} \quad (5)$$

$$Small\ Shareholder\ Response_i = \beta_0 + \beta_1 \text{Perc\_pre}_i + \beta_2 \text{Ln(Assets)}_i + \beta_3 \text{Repurchase Size}_i + \beta_4 \text{Net Profit}_i + \beta_5 \text{Dividend}_i + \beta_6 \text{Free Reserves}_i + \beta_7 \text{MKBK}_i + \beta_8 \text{Past Returns}_i + \beta_9 \text{SD of returns}_i + + \beta_{10} \text{Leverage}_i + \beta_{11} \text{Cash}_i + \varepsilon_{i,t} \quad (6)$$

Table 6 shows results for models 5 and 6 and finds a positive and significant relationship between the absolute premium and small shareholder response, whereas the percentage premium is not significantly impacting the latter. This relationship supports hypothesis 4 that non-proportional thinking is dominant among small shareholders. Repurchase size is negatively correlated with small shareholders, aligning with the findings of previous literature that larger repurchase offers often signal greater managerial confidence in the firm's future prospects to shareholders (Ratner et al., 1996). Probably, this signal motivates small shareholders to hold. Further, Past returns have a negative relation with small shareholder response, as these shareholders probably want to get rid of these stocks by exercising the repurchase and earning a premium.

Table 7 Small Shareholder Participation: Absolute vs Percentage Premium

VARIABLES	Dependent variable Small Shareholder Response	
	(1)	(2)
Abs_pre	0.395***	
	(0.137)	
Perc_pre		−0.136
		(0.132)
Ln(Assets)	−0.546***	− 0.502***
	(0.130)	(0.121)
Past Returns	−4.228***	−3.653***
	(1.325)	(1.279)
SD of returns	23.919***	20.706***
	(8.645)	(7.856)
Repurchase Size	−18.188***	−18.711***
	(4.732)	(3.672)
MKBK	−0.182**	−0.130*
	(0.079)	(0.070)
Net Profits	0.977	2.368
	(2.084)	(1.944)
Dividend	0.004	0.002
	(0.004)	(0.004)
Free Reserves	−1.253	−1.022
	(1.156)	(1.048)
Leverage	1.069	1.091*
	(0.684)	(0.655)
Cash	3.239	1.853
	(2.980)	(2.439)
Constant	13.790***	14.194***
	(3.762)	(3.565)
Adjusted R^2	0.364	0.357
Industry FE	Yes	Yes
Time FE	Yes	Yes
Observation	161	179

*Note: Table 7 presents the results from Models 5 and 6, which examine the impact of absolute versus percentage premiums on small shareholder participation in the repurchase around repurchase announcements. Columns (1) report results for absolute premium, while Columns (2) present results for percentage premium, respectively. T-statistics are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

5. Conclusion

In this paper, we have visited the repurchase phenomenon to analyse whether non-proportional thinking prevails in the financial market. This paper finds that this thinking bias prevails in the Indian markets. This relationship is observed differently according to the types of investors. Retail investors are found to be more prone to such biases.

From a theoretical perspective, these findings contribute to the growing literature on behavioural finance, highlighting that investors anchor on absolute premium rather than fully adjusting for a scale, such as a percentage premium. This bias can distort market reactions and pricing efficiency around repurchase announcements, especially in firms with large total assets or market capitalization. From a regulatory standpoint, the findings underscore the need for clearer disclosures and investor education to mitigate cognitive biases in interpreting repurchase signals. Finally, for investors and analysts, this study highlights the importance of evaluating repurchase offers in proportionate terms, not just absolute numbers.

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