

Stock Market Anomalies: an Empirical Study in Indian Context

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Abstract

The study aims to test the presence of five market anomalies (size, calendar, value, liquidity and standardized unexpected earnings (SUE) effects) in the Indian stock market and corroborate the findings with the primary survey of practitioners and regulators. The study covers a period of 22 years (1995 to 2017). The findings suggest presence of size, liquidity and SUE effects over the entire study period. The value effect is evident for the sub-period before 2008 but ceases to exist for the sub-period after 2008. For the calendar effect, no month-of-the-year consistently generates highest returns over the study period. To the best of the author's knowledge, this is probably the first study to report for an emerging market (India), five of the major market anomalies at an individual level as well as their interplay and supplement the findings with a primary survey.

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INTRODUCTION

Stock market anomalies refer to the behavior observed in the stock markets which are deviations from the normal order. In the field of finance, it is a practice to consider an efficient stock market as 'normal', and therefore, 'anomalies' are deviations from market efficiency. In the context of this thesis, anomalies are defined as deviations from semi-strong form of market efficiency. A market is said to be semi-strong form efficient when the stock prices quickly and fully incorporate all the publicly available information. If the stock prices fail to do so, it is said to be an evidence of an anomaly.

This study aims to test the presence of five of the major anomalies in the Indian stock market and corroborate the findings with the primary survey of practitioners and regulators. The anomalies are: (a) Size effect anomaly: It refers to the tendency of small size stocks (in terms of market capitalization) to generate higher risk-adjusted returns than big size stocks, (b) Calendar effect anomaly: It refers to the tendency of stocks to generate higher returns at certain calendar times of a year, (c) Value effect anomaly: It refers to the tendency of stocks with low price-to-fundamentals ratio (also known as value stocks) to generate higher risk-adjusted returns than stocks with high price-to-fundamentals ratio (also known as growth or glamor stocks), (d) Liquidity effect anomaly: It refers to the tendency of less liquid stocks to generate higher risk-adjusted returns than more liquid stocks and (e) Standardized Unexpected Earnings (SUE) effect anomaly: Also termed as post-earnings-announcement drift (PEAD) anomaly or the earnings momentum anomaly, it refers to the tendency of stocks with positive SUE to continue to drift in positive direction in the post-earnings-announcement period and vice-versa.



RESEARCH OBJECTIVES AND METHODOLOGY

Research gaps and objectives

Based on review of literature, following research gaps were identified:

- i. There are very limited studies based on emerging markets, especially India. Only a few of them report country specific findings.
- ii. No comprehensive study was found in the context of India on all the major market anomalies taken together.
- iii. Primary surveys of practitioners with regard to market anomalies have been very limited in the Indian context.

Corresponding to the research gaps, following research objectives were designed:

- i. To test the existence of the following market anomalies in the Indian context:
 - a. Size effect anomaly
 - b. Calendar anomaly
 - c. Value effect anomaly

- d. Liquidity effect anomaly
- e. Standardized unexpected earnings (SUE) effect anomaly
- ii. To test the relationship among different anomalies.
- iii. To carry out a survey to gauge the perceived relevance of stock market anomalies by investors and regulators.



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Secondary data: The study covers a time period of 22 years (October 1995 to September 2017) and the constituent companies of Nifty 500 index form the study sample. As on 31 March 2014 (the date of sample collection), the index represented 97 per cent of the free float market capitalization of the stocks listed on the National Stock Exchange (NSE fact sheet, 2014). Further, the study is limited to company-years that end in March - 88.90 per cent of the total records meet this criterion. The data is collected from Ace Equity®, and the websites of the Reserve Bank of India (RBI) and NSE.

Primary data: Primary survey is based on structured questionnaire based survey. Responses are sought from the practitioners and regulators of the stock market, viz. investment advisors, portfolio managers, research analysts and stock brokers. The information about the prospective respondents are obtained from the websites of Securities and Exchange Board of India (SEBI) and the NSE.



METHODOLOGY

Market capitalization is chosen as the proxy for size. Price-to-book (P/B) ratio and price-earnings (P/E) ratio are employed as the proxies for value. To test the presence of liquidity effect anomaly, four measures are employed as the proxies for liquidity for the initial analysis – Amihud's (2002) illiquidity (AI) measure, trading volume, rupee trading volume and turnover rate. For subsequent analysis, AI measure is chosen as the proxy. To test the presence of SUE effect anomaly, actual earnings of the same quarter in the last fiscal year is chosen as the proxy for the expected earnings of this quarter.

While size, value and liquidity effects are analyzed based on Capital Asset Pricing Model (CAPM) using ordinary least squares (OLS) regression with robust standard errors, the calendar effect is tested with the exponential generalized autoregressive conditionally heteroscedastic (EGARCH) model and SUE effect requires employment of Fama and MacBeth (1973) cross-sectional regression. To study the interplay among anomalies, augmented CAPMs are additionally employed. Table 1 summarizes the employed models.

To test if the results are robust to changes in the underlying study period, the overall study period is divided into two sub-periods, with September 2008 chosen as the point of division – the period before this point is referred to as sub-period 1 and the period after this point is referred to as sub-period 2.

Table 1: Summary of models employed

CAPM E	$E(R_i) = R_f + \beta_i[E(R_m) - R_f]$ <p>Where :</p> <p>$E(R_i)$ is the expected return on security or portfolio i (R_f) is the risk-free return β_i is the regression coefficient (gradient).</p> <p>$E(RM)$ is the expected return on market portfolio</p>
EGARCH	<p>Conditional Mean</p> $R_t = \lambda_1 JAND_t + \lambda_2 FEBD_t + \lambda_3 MARD_t + \lambda_4 APRD_t + \lambda_5 MAYD_t + \lambda_6 JUND_t + \lambda_7 JULD_t + \lambda_8 AUGD_t + \lambda_9 SEPD_t + \lambda_{10} OCTD_t + \lambda_{11} NOV D_t + \lambda_{12} DECD_t + u_t$ <p>Conditional Variance</p> $\ln(\sigma_t^2) = \iota + \kappa \ln(\sigma_{t-1}^2) + \xi \frac{u_{t-1}}{\sqrt{\sigma_{t-1}^2}} + v \left[\frac{ u_{t-1} }{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right]$ <p>Where :</p> <p>$\lambda_1 - \lambda_{12}$ are regression coefficients</p> <p>JAND – DECD are dummy variables for each month of the calendar 1n is the natural logarithm</p> <p>σ_t^2 and σ_{t-1}^2 are conditional variance of u_t and u_{t-1} respectively ι, κ, ξ and v are the parameters of the equation</p>
Amihud Illiquidity (AI)	$AI_{i,y} = \frac{1}{D_{i,y}} \sum_{d=1}^{D_{i,y}} \frac{ R_{i,y,d} }{RVOL_{i,y,d}}$ <p>Where :</p> <p>$AI_{i,y}$ is illiquidity for stock i during year y</p> <p>$D_{i,y}$ is number of days with available trading data for stock i during year y</p> <p>$R_{i,y,d}$ is the return on stock i on day d of year y</p> <p>$RVOL_{i,y,d}$ is the trading volume (in Rupee) of stock i on day d of year y</p>
Fame & MacMeth	<p>Standalone:</p> $PEAD_i = \omega_0 + \omega_1 SUE_i + u_i$ <p>Where :</p> $PEAD = BAHR_{stock} - BAHR_{market\ index}$ $SUE = \frac{Actual\ earnings - Expected\ earnings}{Scaling\ variable}$

	<p>$PEAD_i$ is the PEAD for Stock i</p> <p>ω_0 and ω_1 regression coefficients (intercept and gradient respectively)</p> <p>SUE_i is the SUE for stock i</p> <p>BAHR is the buy and hold return</p> <p>Interplay:</p> $PEAD_i = \omega_0 + \omega_1 SUE_i + \omega_2 (SUE_i X Beta_i) + \omega_3 (SUE_i X Size_i) + \omega_4 (SUE_i X Value_i) + \omega_5 (SUE_i X Illiquidity_i) + u_i$ <p>Where:</p> <p>ω_2 to ω_5 are regression coefficients (gradients)</p> <p>Interaction variables for stock i are derived from interaction of SUE with the control variables (beta, size, value and liquidity)</p>
Augmented CAPM	$R_{it} - R_{ft} = \alpha_i + \beta_i (R_{mt} - R_{ft}) + \zeta_i SMB_t + \eta_i LMH_t + u_{it}$ $R_{it} - R_{ft} = \alpha_i + \beta_i (R_{mt} - R_{ft}) + \zeta_i SMB_t + \theta_i IMV_t + u_{it}$ $R_{it} - R_{ft} = \alpha_i + \beta_i (R_{mt} - R_{ft}) + \eta_i LMH_t + \theta_i IMV_t + u_{it}$ <p>Where:</p> <p>SMB_t is the size premium</p> <p>LMH_t is the value premium</p> <p>IMV_t is the liquidity premium</p> <p>ζ_i, η_i, and θ_i the regression coefficients (gradient)</p>

Findings

At the individual level, the findings suggest the presence of size, liquidity and SUE effects over the entire study period. The value effect is evident during whole study period and sub-period 1 but ceases to exist during sub-period 2. For the calendar effect, no month-of-the-year consistently generates highest returns over the study period. The summary of results is presented in Table 2.

Table 2: Summary of results – Objective (i)

Anomaly	Existence	Robust to sub-period analysis
Size effect	✓	✓
Calendar effect	✓	✗
Value effect (P/B effect)	✓	✗
Value effect (P/E effect)	✓	✗
Liquidity effect	✓	✓
SUE effect	✓	✓

For interplay of anomalies, while the SUE effect is evident even after controlling for other variables, the remaining four anomalies generate mixed evidences (of persistence) after controlling for the other effects. For example, December effect is evident for all but the largest size portfolio. Size effect is evident for a subset of portfolios after controlling for P/B ratio. Size and liquidity effects are not robust after controlling for each other. While size effect fails to exist, liquidity effect is evident only during two of the three study periods. Liquidity effect is evident in subset of portfolios after controlling for P/B ratio or P/E ratio. The results are summarized in Table 3.

Table 3: Summary of results – Objective (ii)

Anomaly	Existence/Robustness to sub-period analysis					
	Size effect	Calendar effect	P/B effect	P/E effect	Liquidity effect	SUE effect
Size effect	N/A	Conditional	Conditional	Conditional	Conditional	
Calendar effect	Conditional	N/A	Conditional	Conditional	Conditional	
P/B effect	Conditional	*	N/A		Conditional	
P/E effect	Conditional	Conditional		N/A	*	
Liquidity effect	Conditional	Conditional	✓*	✓*	N/A	
SUE effect	✓✓		✓✓		✓✓	N/A

For primary survey, nearly 70 per cent of the respondents consider market anomalies while taking decisions to buy, hold or sell stocks in the Indian stock market. Among the five market anomalies studied here, value effect anomaly is the most sought after (employed by 26.51 per cent respondents) whereas calendar effect anomaly is the least sought after (employed by 13.86 per cent of the respondents). The same is presented in Table 4.

Table 4: Summary of results – Objective (iii)

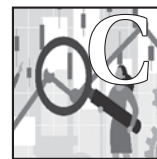
Anomaly	Aware (%)	Perception about presence in India (%)	Consider in decision-making (69.39%)
Size effect	64.29	78.72	25.30
Calendar effect	46.94	63.64	13.86
Value effect	60.20	77.17	26.51
Liquidity effect	63.27	81.40	19.88
SUE effect	73.47	80.72	14.46



RECOMMENDATIONS

These findings have important implications for four sets of stakeholders. For academia, the study implies that the debate on market efficiency is not over yet and more studies are recommended. Investors can benefit from the findings by designing their investment strategies taking into

consideration the prevalent anomalies of the market. Policy makers and regulators are interested in knowing the anomalous areas operating in the stock markets. By providing an update on the five major anomalies, this study recommends the possible areas that they ought to concentrate their efforts on. Further, by providing an update on the level of efficiency of the Indian stock market and by suggesting recommendations for designing investment strategies, this study recommends the society to increase their participation in the Indian stock market. A better functioning market could lead to better economic growth.



CONTRIBUTION

The study endeavors the following contributions towards each of the three research gaps identified:

- i. By endeavoring to provide an in-depth study on the Indian stock market, this work attempts to contribute to the limited literature on emerging markets (country level).
- ii. While there were studies reporting individual or interplay of some of the anomalies, this study brings together five of the major stock market anomalies.
- iii. At present, there is a paucity of studies reporting primary data on the relevance of stock market anomalies in actual practice. By undertaking a survey to gauge the role of stock market anomalies in the strategies designed by market practitioners, this study aims to address this dearth in literature.

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