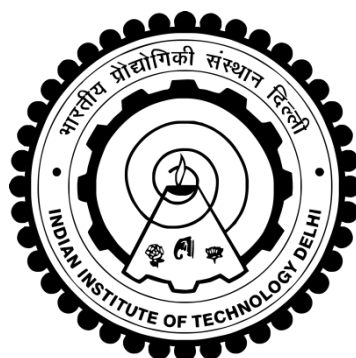


STOCK MARKET ANOMALIES: AN EMPIRICAL STUDY IN INDIAN CONTEXT

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**DEPARTMENT OF MANAGEMENT STUDIES
INDIAN INSTITUTE OF TECHNOLOGY DELHI
OCTOBER 2018**

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STOCK MARKET ANOMALIES: AN EMPIRICAL STUDY IN INDIAN CONTEXT

by

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Department of Management Studies

Submitted

in fulfilment of the requirements of the degree of Doctor of Philosophy
to the



INDIAN INSTITUTE OF TECHNOLOGY DELHI

OCTOBER 2018

To the Almighty

CERTIFICATE

We are satisfied that the thesis titled **Stock Market Anomalies: An Empirical Study in Indian Context** presented by **Ms. Harshita** to the Indian Institute of Technology Delhi is worthy of consideration for the award of the degree of **Doctor of Philosophy** and is a record of the original bona fide research work carried out by her under our guidance and supervision and that the results contained in it have not been submitted in part or full to any other university or institute for award of any degree/diploma.

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ACKNOWLEDGEMENTS

*Madiraalay jaane ko ghar se chalta hai peene waalaa,
'Kis path se jaaon?' asmanjas me hai woh bholaa bhaalaa;
Alag alag path batlaate sab par main yeh batlaataa hoon...
'Raah pakad tu ek chala chala, paa jaaega Madhushaalaa'*

(Bachchan, 2015)

[A drinker leaves home in search for a tavern. Unacquainted, he wonders, 'which path shall I choose'. Different people suggest different paths to go, but this is what I say, 'select one of the paths (*with confidence*) and just go on, you will finally reach the tavern (*destination*)'.] For the wandering thoughts that I have always had, at the very outset, drawing parallels with these lines from Harivansh Rai Bachchan's *Madhushaalaa*, I wish to express my intense gratitude to my thesis supervisors, Prof. Shveta Singh and Prof. Surendra S. Yadav: for seeing in me the ability to pursue Ph.D. from such a prestigious institution and therefore shortlisting me, for gracing me with the honor of pursuing Ph.D. under their supervision and for their consistent support through the entire journey of Ph.D. and beyond. Helping me choose the path that I needed to follow, always being there to guide me when I got lost, and always encouraging me to follow my chosen path, my supervisors have always been like my lighthouse¹. Never to forget, despite their academic and institutional commitments that consistently demanded their time, they have always been available to listen to me and discuss my work.

For his unmatched teaching during the coursework and for his guidance at important junctures during my research work, I express my sincere gratitude to Prof. P. K. Jain, the chairperson of my Student Research Committee (SRC). For the unwavering energy he has contagiously showered during every meeting, for his couple of rejuvenating sessions I had been fortunate to attend, I express my gratitude to Prof. Ravi Shankar. I express my

¹ Sharma (2009), in his book titled 'The Monk Who Sold His Ferrari', stated that a lighthouse was like those well-defined goals and priorities of lives that guided us during the rough times when we lost our paths.

gratitude to Prof. V. Upadhyay (external expert of my SRC) for his valuable inputs during every meeting, to Prof. Seema Sharma (internal expert of my SRC) for the insightful paths she has shown at every stage of doubt and for aspiring to study econometrics by making it easier to understand, to Prof. Smita Kashiramka for always being welcoming, for the valuable inputs she has been willing and available to provide and for her support in primary data collection.

My sincere thanks to all the respondents of the primary survey, for taking time out of their busy schedules and providing their valuable inputs.

I wish to express my gratitude to Amit Tiwari Sir, Jagadish Sir, Parikshit Sir, Rajinder Sir, Chopra Sir and Dalchan Ji for always taking care of all the administrative and accounts related work. To my institute, Indian Institute of Technology (IIT) Delhi, for providing all the facilities that made the research path smoother, for giving me my first international exposure by providing funds to attend a conference at London, for giving me the vision to dream bigger. The air of IIT was different from the outside world: it was like the country of the Red Queen (Carroll, 2015): “... said the Queen. ‘Now, here, you see, it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!’”.

*Yeh toh sach hai ki bhagwaan hai, hai magar fir bhi anjaan hai
Dharti pe roop maa baap kaa, us vidhaataa ki pehchaan hai...*

(Rawal, 1999)

[It is true that God exists, yet he is unknown. The parents (mother and father) are the identity of that great God on this earth.] I wish to use this chance to express my heart felt gratitude to my *Gods*, my parents. From inception to destination, nothing would have been a reality if not for them. Words cannot justifiably convey my regards to them. As John (2006) in his TED Talk stated, “...what really leads to success...you’ve got to push through shyness and self-doubt...now it’s not always easy to push yourself, and that’s why they invented mothers”. My *mummy*, Mrs. Sudha Sharan, has been that push I needed at every stage of my research work. My *papa*, Mr. Sant Sharan, being the most optimistic person I know, taught me to keep moving on despite difficulties. As Valvano (2001) rightly stated, which is true for my father as well, “...our father...gave...the greatest gift any one person

can give to another – the gift of believing in yourself because the other person believes in you...Success...can at some point be traced to a person who simply said, ‘I believe in you. I believe you can do this’”.

This thesis would not have been a reality without my sisters and brothers-in-law: thank you for always being there for me and for never giving up on me, and especially for bearing with me even during the moments I was pesky. Thank you for constantly reminding me of the two quotes that significantly influenced my working: “...Life’s battles don’t always go to the stronger or faster man, but sooner or later the man who wins is the man WHO THINKS HE CAN!” (Hill, 2014) and “Done is better than perfect” (Sandberg, 2017). I wish to say thanks to Saumya Nidhi (*Badi di*) and Sawan Saurabh (*Bade jiju*) for the faith they maintained in me that gave me motivation in tough times, to Garima Tanu (*Chhoti di*) and Harshvardhan Senghani (*Chhote jiju*) for the push and the guidance they provided to keep me focused and run my race despite obstacles; to my *angel*, Ankita Kirti for always being that light in darkness that acted as my undying ray of hope.

A little thanks to my little niece *Mithi* for sprinkling joyous moments in this journey demanding **p**atience, **h**ard work and **d**iligence.

I wish to say thanks to my husband *Jai* for his constant support through all the ups and downs of my research journey, for the assurance that come what may, he is with me and will always be and for giving me the faith and strength every time I seemed to lose them. In words of Warren (1996), “You’re the one who held me up, never let me fall. You’re the one who saw me through, through it all”. I wish to express gratitude to my mother-in-law (Mrs. Chitra Singh) and father-in-law (Mr. Ashok Singh) for always being understanding and supportive, for giving me the liberty to follow my heart, to spread my wings, and to create my own skyline. I wish to thanks Shuchi di and Hitish jijaji, Prachi di and Muni jijaji, Kuldeep bhaiya and Rachita bhabhi, Devesh, Advik, Satvik and Kritvik for their love, support, encouragement and faith.

Date:

Harshita

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) which is further divided into two sub-periods (employing 2008 as the break-point). While size, value and liquidity effects are analyzed using ordinary least squares (OLS) regression with robust standard errors, the calendar effect is tested with the exponential generalized auto regressive conditionally heteroscedastic (EGARCH) model and SUE effect requires employment of Fama and MacBeth (1973) cross-sectional regression. Primary survey is based on structured questionnaire. 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. 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. The study has important implications for academia, investors, regulators and society. While it enriches the existing body of knowledge with fresh and more holistic evidences for the academia, for the investors it suggests possible investment strategies to exploit the anomalous patterns. For the regulators, it identifies areas that demand their attention to work upon and improve market efficiency. Further, it provides an update on level of efficiency and then encourages the members of society to increase their participation in the market that would eventually lead to economic growth. 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.

Keywords: Anomalies, Market efficiency, Asset pricing models (APMs), Indian stock market, Calendar effect, Liquidity effect, Size effect, Standardized Unexpected Earnings (SUE) effect, Value effect, Stock market survey

Journal of Economic Literature (JEL) Classification: G12 (Asset Pricing), G14
(Information and Market Efficiency)

सार

अध्ययन का उद्देश्य भारतीय शेयर बाजार में पांच बाजार विसंगतियों (आकार, कैलेंडर, मूल्य, तरलता और मानकीकृत अप्रत्याशित कमाई (एसयूई) प्रभाव) की उपस्थिति का परीक्षण करना है और प्रैक्टिशनरों और नियामकों के प्राथमिक सर्वेक्षण के साथ निष्कर्षों की पुष्टि करना है। इस अध्ययन में 22 साल की अवधि (1995 से 2017) शामिल है जिसे आगे दो उप-अवधि में विभाजित किया गया है (2008 को ब्रेक-पॉइंट के रूप में नियोजित किया गया है)। जबकि मजबूत मानक त्रुटियों (robust standard errors) के साथ सामान्य कम से कम वर्ग (ordinary least squares) (ओएलएस) रिग्रेशन का उपयोग करके आकार, मूल्य और तरलता प्रभाव का विश्लेषण किया गया है, कैलेंडर प्रभाव को घातीय सामान्यीकृत ऑटो प्रतिगामी सशर्त रूप से हेटरोसेडस्टिक (exponential generalized auto regressive conditionally heteroscedastic) (ईजीएआरसीएच) मॉडल के साथ परीक्षण किया गया है और एसयूई प्रभाव के लिये फामा और मैकबेथ के (1973) पार-अनुभागीय (cross-sectional) रिग्रेशन का प्रयोग किया गया है। प्राथमिक सर्वेक्षण संरचित (structured) प्रश्नावली पर आधारित है। निष्कर्ष पूरे अध्ययन अवधि में आकार, तरलता और एसयूई प्रभाव की उपस्थिति का सुझाव देते हैं। मूल्य प्रभाव 2008 से पहले उप-अवधि के लिए स्पष्ट है लेकिन 2008 के बाद उप-अवधि के लिए अस्तित्व में नहीं है। कैलेंडर प्रभाव के लिए, साल का कोई भी महीना अध्ययन अवधि में लगातार उच्चतम रिटर्न उत्पन्न नहीं करता है। विसंगतियों के अंतःक्रिया (interplay) के लिए, जबकि एसयूई प्रभाव अन्य चर (variables) के नियंत्रण के बाद भी स्पष्ट है, शेष चार विसंगतियां अन्य प्रभावों के नियंत्रण के बाद मिश्रित साक्ष्य (evidence) (दृढ़ता – of persistence) उत्पन्न करती हैं। अध्ययन में अकादमिक, निवेशकों, नियामकों और समाज के लिये महत्वपूर्ण निहितार्थ (implications) हैं। जबकि अकादमिक के लिए यह ताजा और अधिक समग्र साक्ष्य के साथ ज्ञान के मौजूदा भंडार को समृद्ध करता है, निवेशकों के लिए यह असंगत पैटर्न का उपयोग करने के लिए संभावित निवेश रणनीतियों का सुझाव देता है। नियामकों के लिए, यह उन क्षेत्रों की पहचान करता है जो बाजार दक्षता पर काम करने और सुधारने के लिए उन का ध्यान मांगते हैं। इसके अलावा, यह दक्षता के स्तर पर एक अद्यतन (update) प्रदान करता है और फिर समाज के सदस्यों को बाजार में अपनी भागीदारी बढ़ाने के लिए प्रोत्साहित करता है जो अंततः आर्थिक विकास का कारण बनता है। लेखक के सर्वोत्तम जानकारी के अनुसार, यह शायद उभरते बाजार (भारत) के लिए रिपोर्ट करने वाला पहला अध्ययन है, जो व्यक्तिगत स्तर पर पांच प्रमुख बाजार विसंगतियों के साथ-साथ उनके इंटरप्ले रिपोर्ट करता है तथा प्राथमिक सर्वेक्षण के साथ निष्कर्षों को पूरक करता है।

कीवर्ड्स: विसंगतियां, बाजार दक्षता, संपत्ति मूल्य निर्धारण मॉडल (asset pricing model) (एपीएम), भारतीय शेयर बाजार, कैलेंडर प्रभाव, तरलता प्रभाव, आकार प्रभाव, मानकीकृत अप्रत्याशित कमाई (एसयूई) प्रभाव, मूल्य प्रभाव, स्टॉक मार्केट सर्वेक्षण

आर्थिक साहित्य जर्नल (जेईएल) वर्गीकरण: जी 12 (संपत्ति मूल्य निर्धारण), जी 14 (सूचना और बाजार दक्षता)

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SYMBOLS²

English alphabets	Description
C	Constant
d	Day
D	Number of days
e	Earnings announcement
E	Expected
f	Risk-free security
i	Stock/portfolio
I	Integrated
k	Number of parameters in a model
m	Market portfolio
N	Number of observations
p	Number of lags
P	Price of a stock
q	Total lags for Ljung-Box test statistic
Q	Ljung-Box test statistic
R	Return
t	Time
u	Residual/error/disturbance term
x	Excess
y	Year
Y	Data series
z	Order of integration

² This heading is inspired by Field (2009)

Greek alphabets	Description
α (alpha)	Intercept in asset pricing models/Jensen's alpha
β (beta)	CAPM beta
γ (gamma)	Covariance
Δ (capital delta)	Difference
ζ (zeta)	Coefficient for SMB in asset pricing models
η (eta)	Coefficient for LMH in asset pricing models
θ (theta)	Coefficient for IMV in asset pricing models
ι (iota)	Coefficient for ARCH models
κ (kappa)	Coefficient for ARCH models
λ (lambda)	Coefficient for Calendar effect's switching model
μ (mu)	Mean
ν (nu)	Coefficient for unit root test
ξ (xi)	Coefficient for ARCH models
Π (capital pi)	Product of multiplication
ρ (rho)	Correlation
σ (sigma)	Standard deviation
Σ (capital sigma)	Summation
τ (tau)	Autocorrelation coefficient
υ (upsilon)	Coefficient for ARCH models
ϕ (phi)	Coefficient for unit root test
ψ (psi)	ϕ -1
ω (omega)	Coefficient for SUE anomaly regressions

ABBREVIATIONS

Abbreviation	Description
ACF	Autocorrelation Function
ADF	Augmented Dickey Fuller
AI	Amihud Illiquidity
APM	Asset Pricing Model
ARCH	Auto Regressive Conditionally Heteroscedastic
BRIC	Brazil Russia India China
CAPM	Capital Asset Pricing Model
CAR	Cumulative Abnormal Return
CGPA	Cumulative Grade Point Average
CNX	CRISIL NSE indices
CRISIL	Credit Rating Information Services of India Limited
EGARCH	Exponential Generalized Auto Regressive Conditionally Heteroscedastic
EMH	Efficient Market Hypothesis
FF3FM	Fama and French 3-Factor Model
FTSE	Financial Times Stock Exchange
GARCH	Generalized Auto Regressive Conditionally Heteroscedastic
GDP	Gross Domestic Product
GLS	Generalized Least Squares
GMM	Generalized Method of Moments
IFC	International Finance Corporation
IISL	India Index Services & Products Limited
IIT	Indian Institute of Technology
IMF	International Monetary Fund
IMV	Illiquid Minus Very Liquid
INR	Indian National Rupee
ISMR	Indian Securities Market - A Review
JEL	Journal of Economic Literature
KPSS	Kwaitkowski-Phillips-Schmidt-Shin
LOT	Lesmond, Ogden, Trzcinka

LMH	Low Minus High
LTS	Least Trimmed Squares
MBA	Master of Business Administration
Mcap	Market capitalization
MILA	Latin American Integrated Market
MOY	Month-of-the-Year
MSCI	Morgan Stanley Capital International
NAV	Net Asset Value
NCR	National Capital Region
NSE	National Stock Exchange of India Limited
NYSE	New York Stock Exchange
OLS	Ordinary Least Squares
PACF	Partial Autocorrelation Function
P/B ratio	Ratio of price-to-book value
P/E ratio	Price earnings ratio
PEAD	Post Earnings Announcement Drift
PP	Phillips-Perron
RBI	Reserve Bank of India
SEBI	Securities and Exchange Board of India
SMB	Small Minus Big
SRC	Student Research Committee
SUE	Standardized Unexpected Earnings
S&P	Standard and Poor's
TED	Technology, Entertainment, Design
UK	United Kingdom
US	United States
WEO	World Economic Outlook
WFE	World Federation of Exchanges
WLS	Weighted Least Squares
