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BART FRIJNS & ALIREZA TOURANI-RAD

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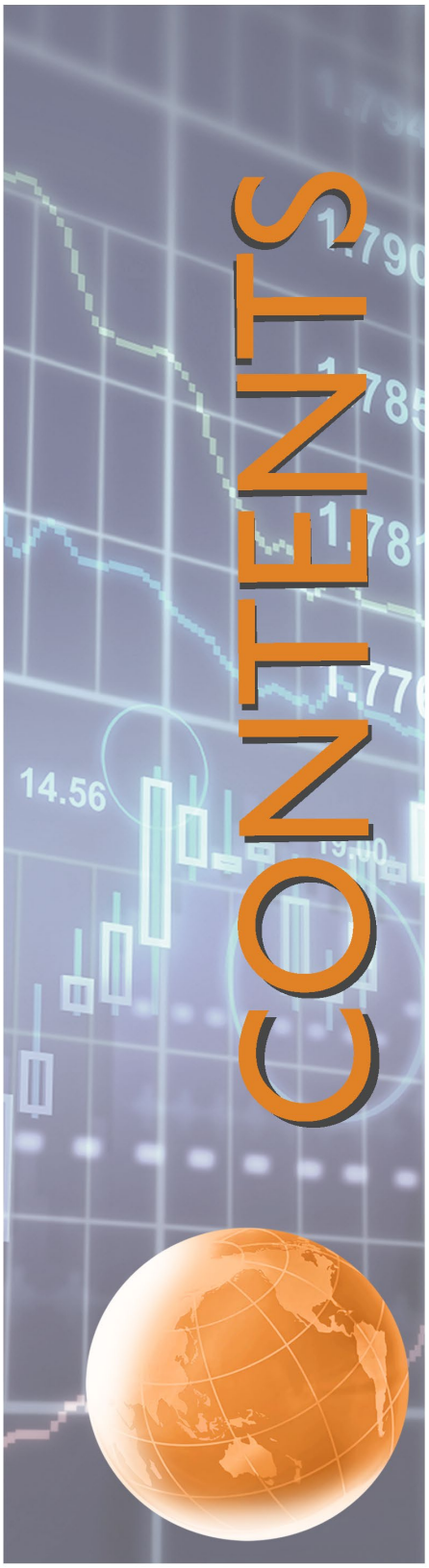

PREFACE

Securities and Exchange Board of India (SEBI) and National Institute of Securities Markets (NISM) jointly organised a national conference on the theme "Changing landscape of securities markets" on January 22 to January 24, 2020. The national conference was conducted in the NISM Campus, Patalganga near Mumbai.

The conference theme was selected, keeping in view there have been several changes in securities markets viz., market microstructure, in capital market processes like IPO, in corporate governance regulations, in regulations relating to MIIs and market intermediaries, the introduction of new regulations relating to interoperability, several changes in mutual fund regulations, etc.

Research papers were invited from academicians, research students and industry participants by issuing a call for papers on all prominent research platforms. The invitation covered various themes like Corporate Finance, Issuance of capital, Corporate Governance, Technological solutions for secondary markets, Corporate Bonds, Nurturing Economy through Mutual Funds, Role of Futures Markets in price discovery of Agricultural Commodities and Foreign Portfolio Investments in India.

There was an overwhelming response to 'call for papers'. In all about 151 papers were received from researchers from Institutions in India viz., IIMs, IITs, postgraduate colleges, professionals engaged in the securities industry, etc. Papers were also received from researchers from foreign universities viz., Germany, USA, Canada, Australia and the Netherlands. Independent academic reviewers reviewed all the papers on various parameters such as the relevance of the paper to the conference theme, the robustness of research methodology applied etc. Finally, 51 papers were accepted for presentation at the conference.

NISM is grateful to Applied Finance Letters Journal for agreeing to publish the selected papers in the form of a special edition. This special edition will extend the reach and contribution of the conference participants to all researchers who refer to Applied Finance Letters for the latest research work in the field of finance.

SEBI and NISM acknowledge the contributions made by all researchers who submitted papers in response to the call for papers; the reviewers who spent their valuable time identifying and accepting papers for presentation at the conference. We also acknowledge the team of officers from SEBI and NISM. They worked hard before, during and after the conference to ensure its success and contributed to the compilation this special edition.

This joint effort will continue, and it is expected that the next SEBI and NISM national conference will be held in early 2021.

Dr V.R. Narasimhan
Dean, NISM.

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RESPONSES OF ECONOMIC NEWS ON ASSET PRICES: A STUDY OF INDIAN STOCK INDEX FUTURES

AMEET KUMAR BANERJEE [1*], **H. K PRADHAN** [2]

1. Xavier Institute of Management, Xavier University, India
2. XLRI –Xavier School of Management, India

* Corresponding Author: Dr Ameet Kumar Banerjee, Associate Professor, Xavier Institute of Management, Xavier University, Bhubaneswar, Odisha – 751 013, India
☎ +919648734000, +917023584105 ✉ ameet@ximb.edu.in, ameet.banerjee@rediffmail.com

Abstract

The study examines the role of economic news surprises on the volatility of the returns of the Indian Index futures market. Theoretical literature posits that news arrivals influence price discovery. In similar lines, we investigated the relationship between economic news releases, trading activity variables, and returns volatility. We find that economic news surprises and trading activity variables significantly affect returns volatility. However, among volume and news surprises, economic news surprises are much stronger informational signals, and the news surprises effects are found seemingly asymmetric in the index futures contract.

Keywords: Economic news surprises; asymmetric effect; exponential GARCH; returns volatility

1. Introduction

Recently news as a source of information signal influencing asset price discovery in financial markets drew extensive attention. The daily deluge of news information, whether related to corporate earnings, news of macroeconomic nature such as exchange rate or interest rate or political ones which impinges on financial markets that may have an atypical but different degree of influence on a particular asset class. For instance, news of macroeconomic nature has a profound impact on the currency market than the stock and the bond market (Andersen et al., 2007). Moreover, an excessive inflow of information may also be chaotic as investors will fail to decode the information content of the news, resulting in an imprecise estimation about the state of the economy in the future and the asset prices.

This paper contributes to the literature by examining a particular class of news, that is, the economic news that is released in the public domain to a somewhat elusive asset class such as the stock index futures. Moreover, we specifically explore whether surprises in the news segment affects asset price, through return and volatility of the index futures contracts. However, most of the empirical studies have focused their attention on mature markets providing a nuanced view of the informational role of the news surprises (Andersen et al., 2007; Elder et al., 2012; Paiardini, 2014). However, there is still exists void in the context of the emerging market in understanding the informational role of news signals, whose market structure vastly differs from that of the mature markets.

Past literature has also attempted to employ volume or open interest (volume proxies) as a source of the market signal testing "mixture of distribution" hypothesis (Epps and Epps, 1976; Harris, 1986). Bessembinder and Seguin (1993) have also used open interest as a proxy to test the market depth. In this paper, we explored the importance of information signals. We attempted to unravel valuable insights into asset price discovery and volatility, considering six news variables that are of concern

to both investors and policymakers and volume proxies serving as additional sources of information signals. Moreover, the established consensus in the literature claims that news and especially surprises in the press releases significantly affect financial markets both in terms of asset return and their volatility (Ho et al., 2017; Nowak et al., 2011).

In this paper, we tried to address three essential issues:

1. What is the impact of economic news on returns and volatility
2. Does volume serve as an information proxy?
3. Among volume proxies and economic news, which are stronger signals of information flow?

In our work, to test the above issues, we have identified six different news releases such as dividend yield, put-call ratio, exchange rate, repurchase rate (Repo), index of industrial production (IIP) and wholesale price index (WPI), considered as the most important news serving as a proxy for information arrivals on index futures returns and their volatility. The logic to use these variables was to be representative of vastly different kinds of news categories, in the broader areas of corporate news (dividend yield), sentiment indicator (put-call ratio), and macroeconomic news (exchange rate, Repo, IIP, and WPI). We also included trading volume and open interest as proxies for information flow as traders use these endogenous variables as indicators of market trends.

Interestingly our analysis provides newer insights. First, we found that news surprises significantly affect the volatility of index futures returns. In particular, news about dividend yield, exchange rate, the repo rate, and index of industrial production (IIP) has a significant effect on returns volatility. Additionally, trading volume and open interest significantly affect return volatility when used as a proxy for informational arrivals. However, when integrated with economic news volume, proxies lose their significance, indicating that economic news provides much stronger signals of information flows.

The rest of the article proceeds as follows. In section II, we review the related literature and develop our research hypothesis. In section III, we present the data characteristics. Estimation methodology is presented in Section IV, followed by the empirical results in Section V. The conclusion, findings, and scope for the future are in section VI.

2. Relevant literature review and hypotheses

There is a great deal of interest in examining the market reaction to the news. In line with the theoretical underpinning of Kim and Verrecchia (1991), investor apriori has some expectation about the news and trade accordingly. Whenever the news sprung surprises, the traders revise their beliefs and revisit trading. Similarly, Kim and Verrecchia (1997) and Nowak et al. (2011) argued that news releases cause information asymmetry leading to heterogeneous responses among traders, thereby news impact on volatility is found to dominate security prices. Moreover, Garcia (2013) and Gospodinov and Jamali (2015) reported that news of macroeconomic nature tended to affect stock prices and stock market volatility and witnessed an asymmetric response to monetary policy shocks. To get further insights, we derive a list of potential news variables with relevant literature, as presented in Table 1, to analyze the impact of these macroeconomic variables on the volatility of index futures.

Based on the current literature, we test the following hypothesis:

H_1: Economic news surprises affect the volatility of the returns and have an asymmetric impact.

Bessembinder and Senguin (1993), studying eight futures markets, provided shreds of evidence of a positive relationship between futures return volatility and trading volume proxies. By bifurcating the trading volume proxies into expected, and unexpected components were the unexpected component is synonymous with unanticipated changes in contract positions. They reported

particularly that the influence of unexpected volume shocks contributing more to price volatility than the expected volume. The findings of the study supported that expected open interest is negatively related to price volatility in the futures market, indicating that increased open interest position is more related to lower price volatility. Daigler and Wiley (1999), and Hong and Yogo (2012), by examining index futures contracts obtained analytical results that confirm the empirical findings of Bessembinder and Seguin (1993). From the results of the above studies, it is apparent that trading activity variables such as volume and open interest are an essential determinant of futures price volatility.

Table 1: List of Macroeconomic Variables

Serial No.	Variable	Relevant Literature
1	Dividend Yield	Gospodinov and Jamali (2015)
2	Sentiment Indicator (Put Call Ratio)	Brzesczynski et al. (2015)
3	Exchange Rate	Karali and Power (2013)
4	Short term Interest Rate (REPO)	Frankel (2014)
5	Inflation rate (WPI)	Balduzzi et al. (2001)
6	Industrial Index of Production (IIP)	Karali and Power (2013)

Hence the following hypotheses are tested:

H_2: Trading activity variable of the expected volume relates positively with returns volatility

H_3: Trading activity variable of the unexpected volume relates positively with returns volatility

H_4: Trading activity variable of expected open interest (OI) relates negatively with returns volatility

H_5: Trading activity variable of unexpected open interest (OI) relates negatively with returns volatility

Most of these studies primarily investigated either the determinants of volatility or the effect of trading volume variables on volatility. However, given the significant role of trading volume, open interest, and news surprises on returns volatility, we integrated these variables in the same model and followed by their interaction effects in the Indian index futures market. We pose two critical questions: does economic news surprises determine the return volatility of the index futures contract in India, and whether there is an interaction effect of trading volume, open interest with economic news surprises on volatility?

Hence the following hypothesis is tested:

H_6: News surprises moderates the relationship between trading volume and open interest on returns volatility

We examine the six hypotheses as stated above to uncover valuable information and draw meaningful insights into the sensitivity of index futures markets of India to economic news shocks.

3. Data Characteristics

We have used daily data of Nifty 50 futures contract as traded at the National Stock Exchange (NSE), India, from 02 January 2011 to 29 December 2016. The index futures prices are nearby month contracts, which are the most actively traded to avoid any maturity effect biases (Chen and Tai, 2014). Further, we roll over the nearby contract into the second-nearest contract on the expiration date for continuity.

The returns are calculated for the index futures contracts by taking the natural logarithmic difference in the price levels.

$$R_t = \left(\ln P_t - \ln P_{t-1}\right) \quad (1)$$

where P_t is the closing price of Nifty 50 futures contract at date t. The source of economic variables which are part of the study is from the handbook of statistics of Reserve Bank of India (RBI), and Bloomberg database.

Table 2: Descriptive Statistics of daily CNX Nifty 50 Futures contracts

	Returns	Total Volume (Lacs)	Open Interest
Mean	0.044706	864997.60	17997344
Median	0.054276	822962.60	17763900
SD	1.005714	325954.20	4588278
Max	3.608335	3612235.00	34347975
Min	-6.208278	43095.06	5220225
Skewness	-0.294988	1.504110	0.195538
Kurtosis	5.071054	10.15625	3.635052
Jarqure–Bera Statistics	239.4025	3110.989	28.71549
	(0.0000)*	(0.0000)*	(0.0000)*

Note: *, ** and *** represents significance level at 1%, 5% and 10%.

Table 3: Tests on time series property of CNX Nifty 50 Futures Contract

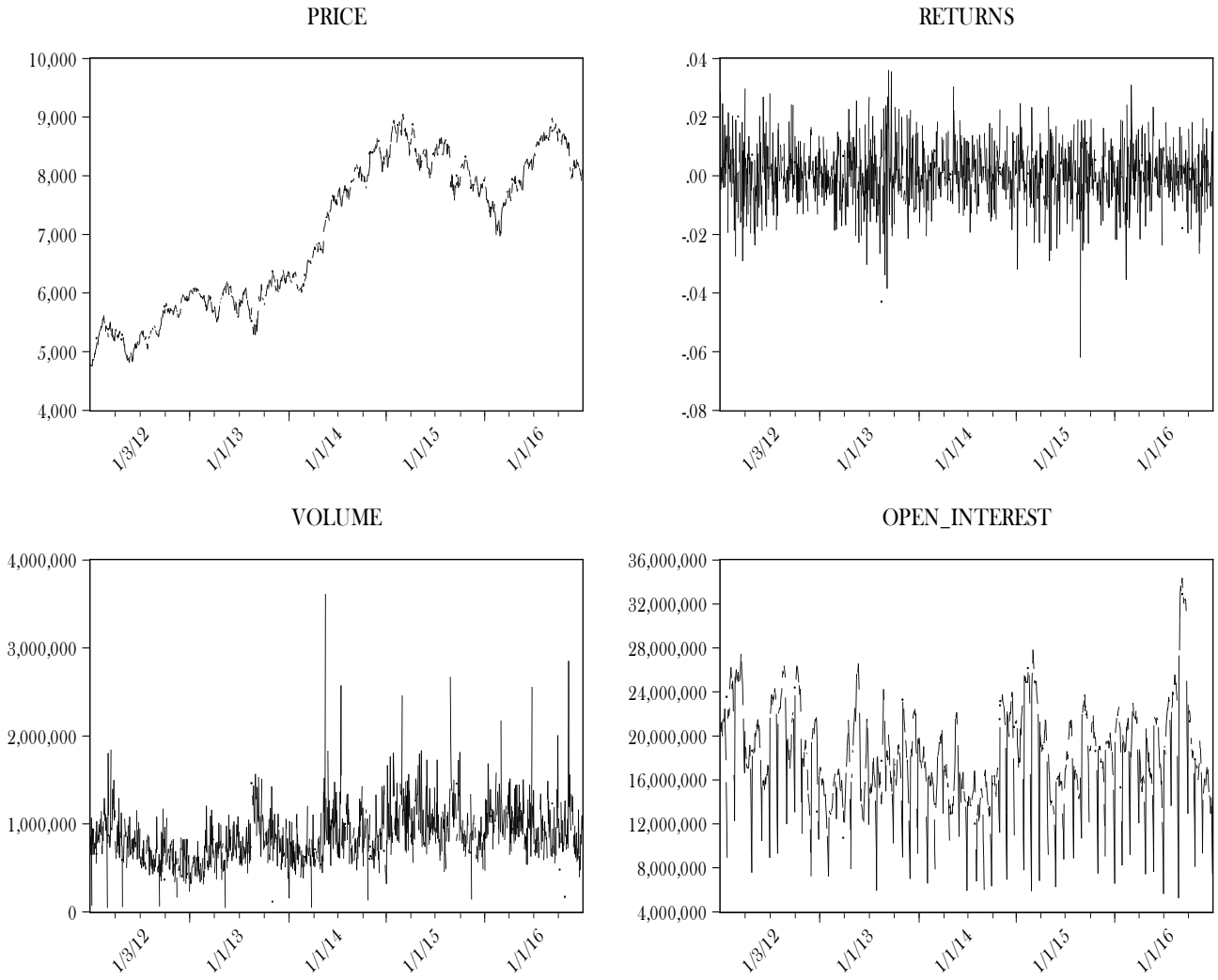
Unit Root Test				
		Panel A	**Panel B**	**Panel C**
Tests Statistics		ADF Test	PP Test	KPSS Test
Return Series		-33.93275*	-33.91017*	0.16550*
Critical Values	1%	-3.43541	-3.43541	0.739000
	5%	-2.86366	-2.86366	0.463000
	10%	-2.56795	-2.56795	0.347000
Heteroscedasticity Test				
Ljung- Box Statistics				
Q(36)		40.161		
		(0.291)		

Note: *, ** and *** represents statistical significance level at 1%, 5% and 10%. Q is Ljung –Box test on the returns series in levels for 36 lags, which are chi-squared (36) with the null hypothesis of no autocorrelation.

Table 2 reports the descriptive statistics of the returns, trading volume, and open interest of the Nifty 50 futures contract. The mean daily return on Nifty 50 futures is 0.04470, with returns standard deviation 1.0057 per day. The skewness is -0.29498, indicating that the returns series is negatively skewed, and the kurtosis value of 5.07105 is an indication that the unconditional distribution of the returns exhibits fat tails and excess kurtosis against the normal distribution, which is also confirmed by the Jarque-

Bera (JB) statistics. The mean and standard deviation of the volume are 864,997.0 (lacs) and 325,954.20 (lacs), and that of open interest is 17,997,344.0 and 4,588,278.0. The skewness and kurtosis of the volume are 1.50411 and 10.51625, and the corresponding value for open interest is 0.19553 and 3.63505, respectively, thereby clearly showing deviation from normality which is also supported by Jarque-Bera test. Thus, the rejection of normality characteristic is evident in all three series of returns, volume, and open interest. Figure 1 presents the times series plot of closing prices, return, volume, and open interest.

Figure 1: Time series plot of daily closing prices, returns, daily trading volume and open interest of Nifty 50 index futures contract



4. Methodology

The study tests the impact news surprises rather than their absolute released values by the official agencies, as the market participants are expected to trade in stock index futures based on the expected news arrival. We first constructed the forecasted value of the news variable using an ARIMA model. We then obtained the difference between the actual news and their forecasted values to derive the surprise or unexpected news component. As units of measurement differ across the news variables, we standardized the news surprises as derived following Balduzzi et al. (2001) for any news type *k* on day *t*, the calculation of news surprise (NS) is as follows:

$$NS_{k,t} = \frac{A_{k,t} - F_{k,t}}{\sigma_k} \quad (2)$$

where $A_{k,t}$ is the actual value of a news release of type k at time t and $F_{k,t}$ is the forecasted value, and σ_k is the standard deviation k^{th} news surprise component.

In the present study, we adopted an exponential GARCH (EGARCH) model of Nelson (1991) to examine the relative impact of news surprises on the volatility of the returns of the index futures, by regressing news surprises on return and its conditional volatility. In general, the past studies have modeled the news impact on the mean return. Still, only a limited number of studies have tried to examine if there is any impact on the conditional volatility of return. To capture the asymmetric effect, we have integrated the news surprises variables in both the mean and return equations. The model specification of the EGARCH model is given by:

$$R_t = \tau_c + \tau_{lag} R_{t-1} + \sum_{k=1}^{m} \theta_{-venews} - veNS_{k,t} + \sum_{k=1}^{m} \theta_{+venews} + veNS_{k,t} + \varepsilon_t \quad (3)$$

$$\log\left(\sigma_t^2\right) = \delta_c + \delta_{\varepsilon,1}\left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \delta_{\varepsilon,2}\left(\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right) + \delta_{lag}\log\left(\sigma_{t-1}^2\right) + \sum_{k=1}^{m}\gamma_{-venews,k} - veNS_{k,t} + \sum_{k=1}^{m}\gamma_{+venews,k} + veNS_{k,t} \quad (4)$$

where $\varepsilon_t = z_t\sigma_t$ and $z_t \sim N(0,1)$, R_t = the returns of the futures contract; ε_t = The error term is assumed ~ $(0, \sigma_t)$; σ_t = The conditional volatility; $NS_{k,t}$ = the component of news surprises.

The coefficient δ_{lag} measures the persistence of the conditional variance. The coefficients $\delta_{\varepsilon,1}$ and $\delta_{\varepsilon,2}$ represents the impact of lagged errors on the current conditional variance. While a negative $\delta_{\varepsilon,2}$ indicates that the negative shocks have a larger effect on the conditional variance. In contrast, a significant γ suggests that the news surprises have a direct impact on the conditional variance on the release dates. While $\gamma_{-venews,k}$ and $\gamma_{+venews,k}$ are the coefficients of negative and positive news on volatility.

4.1 Modeling the impact of volume on volatility

Following Gulen and Mathew (2000), whether trading volume and open interest affect volatility, we integrated volume and open interest (expected and unexpected component) into the EGARCH model as a proxy for predicting the arrival of unobservable information (Lamourerex and Lastrapes, 1990; Daigler and Wiley, 1999). However, Lamourerex and Lastrapes (1990) have reported that the volatility persistence significantly diminishes with the inclusion of trading activity variables in the conditional variance. To capture how the responses of volatility are by adding the expected and unexpected components of volume proxies to the EGARCH framework. The modified model is as follows:

$$\log\left(\sigma_t^2\right) = \delta_c + \delta_{\varepsilon,1}\left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \delta_{\varepsilon,2}\left(\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right) + \delta_{lag}\log\left(\sigma_{t-1}^2\right) + \delta_{Exp\_Vol}Exp\_Vol_t + \delta_{Unexp\_Vol}Unexp\_Vol_t + \delta_{Exp\_OI}Exp\_OI_t + \delta_{Unexp\_OI}Unexp\_OI_t \quad (6)$$

where δ_{Exp_Vol} and δ_{Unexp_Vol} are the coefficients of expected and unexpected volume and δ_{Exp_OI} δ_{Unexp_OI} are the coefficients expected and unexpected open interest.

5. Empirical results

Table 4 presents the coefficients estimates of $\delta_{\varepsilon,1}$ and $\delta_{\varepsilon,2}$. In contrast, the coefficient $\delta_{\varepsilon,1}$ is positive (0.2104) indicating that new information leads to increasing volatility, the coefficient of asymmetric $\delta_{\varepsilon,2}$ estimated in the EGARCH framework is negative (-0.0500), which is indicative of the asymmetric return-volatility relationship. These findings are consistent with the studies of Chen et al. (2011) who posited that negative impacts are more significant than positive impacts in the context of the volatility of index futures.

Table 4 further provides useful insights into the relationship between economic news releases and returns volatility; among the news items that have an impact on volatility are dividend yield, exchange rate, the repo rate, and index of industrial production (IIP). Although both types of negative and positive news surprises have significant impacts, the magnitudes of their effects are statistically different from each other (Hypothesis 1), that is $\gamma_{+\text{venews}} \neq \gamma_{-\text{venews}}$, as observed from the Wald's tests.

Table 4: Estimated EGARCH (1,1) model with surprises in economics news releases components

Variance Equation			
Coefficients	**Values**	**z- Statistics**	**P values**
δ_c	-10.8185	-11.8135	0.0000
$\delta_{\varepsilon,1}$	0.2104	2.8557	0.0043
$\delta_{\varepsilon,2}$	-0.0500	-0.9213	0.3568
δ_{lag}	0.0778	0.9659	0.3340
$\gamma_{-\text{venews,div\_yield}}$	-0.6642	-4.9208	0.0000
$\gamma_{+\text{venews,div\_yield}}$	0.8970	8.0438	0.0000
$\gamma_{-\text{venews ,PCR}}$	-0.0141	-0.1242	0.9011
$\gamma_{+\text{venews,PCR}}$	0.0270	0.2542	0.7993
$\gamma_{-\text{venews,ex\_rate}}$	0.1582	1.5735	0.1156
$\gamma_{+\text{venews,ex\_rate}}$	0.1894	1.9429	0.0520
$\gamma_{-\text{venews,repo}}$	-0.1748	-2.0509	0.0403
$\gamma_{+\text{venews,repo}}$	-0.0885	-1.1368	0.2556
$\gamma_{-\text{venews,wpi}}$	0.0731	1.4805	0.1387
$\gamma_{+\text{venews,wpi}}$	-0.1019	-1.5734	0.1156
$\gamma_{-\text{venews,iip}}$	0.1731	4.0087	0.0001
$\gamma_{+\text{venews,iip}}$	-0.1396	-1.7957	0.0725
Adjusted R^2	0.7582		

Note: The results of the above table is computed using the following equation

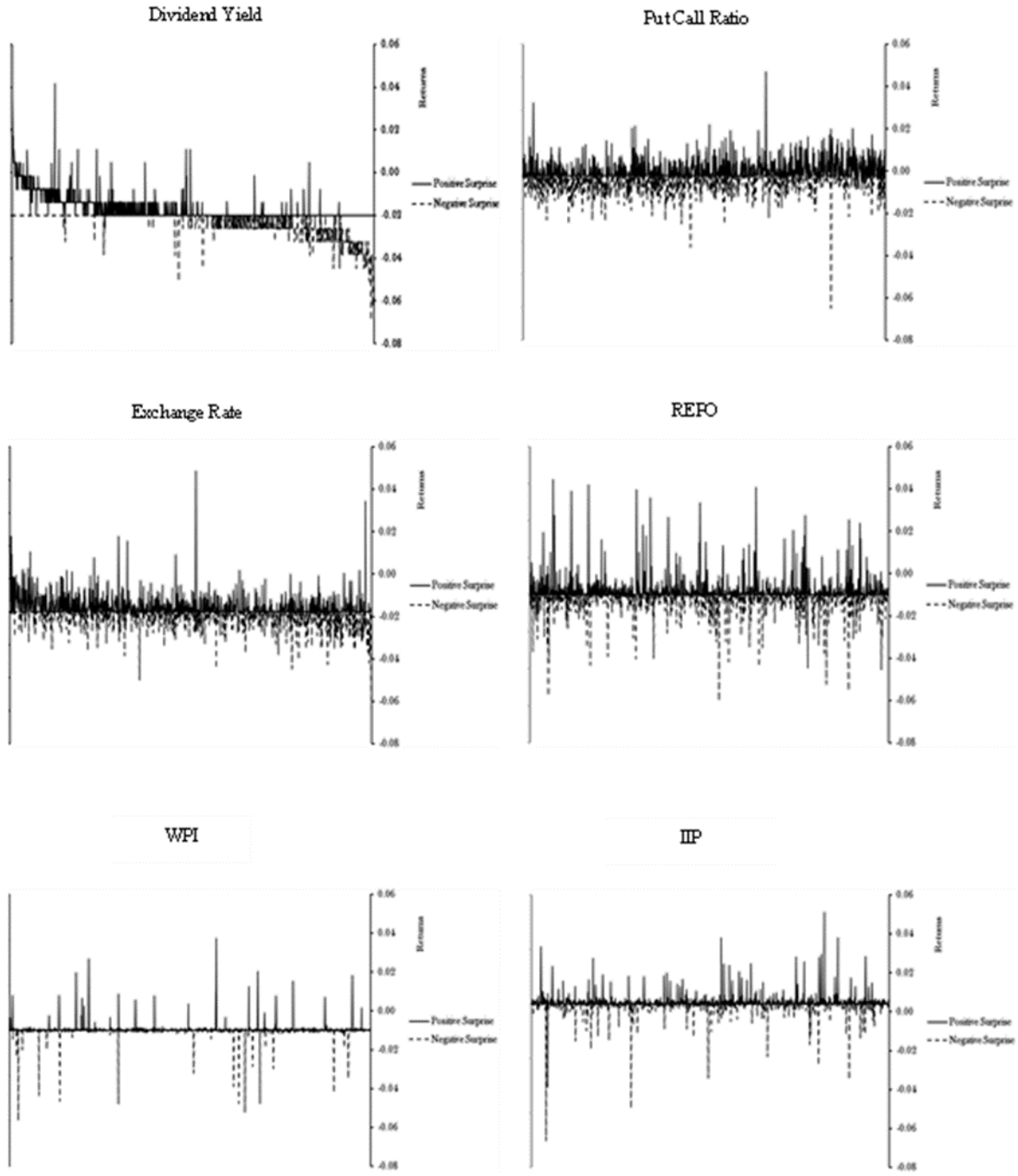
$$R_t = \tau_c + \tau_{lag} R_{t-1} + \sum_{k=1}^{m} \theta_{-venews} - veNS_{k,t} + \sum_{k=1}^{m} \theta_{+venews} + veNS_{k,t} + \varepsilon_t$$

$$\log\left(\sigma_t^2\right) = \delta_c + \delta_{\varepsilon,1}\left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \delta_{\varepsilon,2}\left(\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right) + \delta_{lag}\log\left(\sigma_{t-1}^2\right) + \sum_{k=1}^{m}\gamma_{-venews,k} - veNS_{k,t} + \sum_{k=1}^{m}\gamma_{+venews,k} + veNS_{k,t}$$

where $\varepsilon_t = z_t\sigma_t$ and $z_t \sim N(0,1)$, R_t = the returns of the futures contract; ε_t = The error term is assumed $\sim (0,\sigma_t)$; σ_t = The conditional volatility; $NS_{k,t}$ = The component of news surprises. While $\gamma_{-venews,k}$ and $\gamma_{+venews,k}$ are the coefficients of negative and positive news on volatility.

Moreover, particularly in case repo or exchange either negative or positive news surprises were found statistically significant at 5% and 10% level while news relating to dividend yield (1%) and index of industrial production (IIP) (1%, 10%) both categories of surprises in the news significantly impacted volatility with their appropriate level statistical significance. Interesting observations were that the coefficient values of negative news ≠ positive news indicating the presence of an asymmetric effect, thus finding support to our hypothesis H_1. Figure 2 presents the responses of the index futures contract to economic news surprises.

Figure 2: Responses of Index futures returns volatility to economic news surprises



5.1 The impact of trading activity variables on return volatility

Table 5 reports the results of the estimated coefficient of trading activity variables. The coefficient of expected volume and unexpected volume in the volatility equation is found significant at a 1% level. At the same time, the magnitude and statistical significance show that the expected and unexpected trading volume has a heterogeneous effect on volatility. Most of the studies in the past reported a positive correlation between volume and volatility, for instance, Gallant et al. (1992) in stock markets or Bessembinder and Seguin (1993) in the futures market. Our results support the asymmetry return-volatility relationship by decomposing the trading volume into expected and unexpected components and hence finding support to hypothesis 2 and 3. Furthermore, the coefficient of unexpected trading volume is more significant than expected volume, indicating that unexpected trading volume affects returns volatility more than the expected trading volume; these results are consistent with Frino et al. (2012) and Chen and Tai (2014). The coefficient estimates for both expected and unexpected open interest is positive statistically significant at a 1% level finding negative support for hypothesis 4 and supporting hypothesis 5. These results of open interest are similar to the findings of Chen et al. (2011).

Table 5: Estimated EGARCH (1, 1) model with volume components

Variance Equation			
Coefficients	**Values**	**z- Statistics**	**P values**
δ_c	-2.8367	-2.7619	0.0057
$\delta_{\varepsilon,1}$	0.2013	3.2485	0.0012
$\delta_{\varepsilon,2}$	-0.0749	-1.9906	0.0465
δ_{lag}	0.7197	6.8360	0.0000
δ_{Exp_Vol}	3.2319	3.6970	0.0002
δ_{Unexp_Vol}	4.0119	5.7141	0.0000
δ_{Exp_OI}	2.9822	3.7484	0.0002
δ_{Unexp_OI}	1.5686	3.1825	0.0015
Adjusted R^2	0.0388		

Note: The above results are calculated using the following regression specification

$$\log\left(\sigma_t^2\right) = \delta_c + \delta_{\varepsilon,1}\left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \delta_{\varepsilon,2}\left(\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right) + \delta_{lag}\log\left(\sigma_{t-1}^2\right) + \delta_{Exp\_Vol}Exp\_Vol_t$$
$$+\delta_{Unexp\_Vol}Unexp\_Vol_t + \delta_{Exp\_OI}Exp\_OI_t + \delta_{Unexp\_OI}Unexp\_OI_t$$

where δ_{Exp_Vol} and δ_{Unexp_Vol} are the coefficients of expected and unexpected volume an δ_{Exp_OI} δ_{Unexp_OI} are the coefficients expected and unexpected open interest.

5.2 The impact of trading activity variable and economic news surprises on volatility

To explore among volume or macroeconomic news releases that are stronger in their impact on information flow, we regressed the trading activity variables of expected and unexpected volume and open interest on the macroeconomic news surprises in the EGARCH framework. As can be observed from Table 6, most of the trading activity variables lose their significance exception being unexpected open interest, which was found significant at a 10% level. However, most of the news variables retained their significance level. It can be observed from Table 6 that it is the economic news surprises, not the trading activity variable, which seems to serve as a more decisive factor affecting returns volatility, which is also indicated by the significant change in adjusted R^2 value to 76.6%.

Table 6: Estimated EGARCH (1, 1) model with volume and surprises in news releases

Variance Equation			
Coefficients	**Values**	**z- Statistics**	**P values**
δ_c	-11.3030	-10.5702	0.0000
$\delta_{\varepsilon,1}$	0.1458	2.0633	0.0391
$\delta_{\varepsilon,2}$	-0.0462	-0.8856	0.3758
δ_{lag}	0.0403	0.4233	0.6721
δ_{exp_vol}	-0.0025	-0.0064	0.9948
δ_{unexp_vol}	0.5329	1.2876	0.1979
δ_{exp_oi}	1.8535	1.2254	0.2204
δ_{unexp_oi}	1.1826	1.9389	0.0525
$\gamma_{-venews,div\_yield}$	-0.6777	-4.6401	0.0000
$\gamma_{+venews,div\_yield}$	0.9273	7.1973	0.0000
$\gamma_{-venews,pcr}$	-0.1086	-0.9413	0.3465
$\gamma_{+venews,pcr}$	0.0488	0.4914	0.6231
$\gamma_{-venews,ex\_rate}$	0.1727	1.6834	0.0923
$\gamma_{+venews,ex\_rate}$	0.2033	1.9939	0.0462
$\gamma_{-venews,repo}$	-0.1417	-1.6997	0.0892
$\gamma_{+venews,repo}$	-0.1026	-1.2691	0.2044
$\gamma_{-venews,wpi}$	0.0532	1.1130	0.2657
$\gamma_{+venews,wpi}$	-0.0689	-1.0294	0.3033
$\gamma_{-venews,iip}$	0.1444	3.0886	0.0020
$\gamma_{+venews,iip}$	-0.1185	-1.5593	0.1189
Adjusted R^2	0.7660		

Note: The results of the above table are calculated using the following specification

$$\log\left(\sigma_t^2\right) = \delta_c + \delta_{\varepsilon,1}\left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \delta_{\varepsilon,2}\left(\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right) + \delta_{lag}\log\left(\sigma_{t-1}^2\right) + \delta_{Exp\_Vol}Exp\_Vol_t + \delta_{Unexp\_Vol}Unexp\_Vol_t +$$

$$\delta_{Exp\_OI}Exp\_OI_t + \delta_{Unexp\_OI}Unexp\_OI_t + \sum_{k=1}^{m}\gamma_{-venews,k} - veNS_{k,t} + \sum_{k=1}^{m}\gamma_{+venews,k} + veNS_{k,t}$$

where δ_{Exp_Vol} and δ_{Unexp_Vol} are the coefficients of expected and unexpected volume and δ_{Exp_OI} and δ_{Unexp_OI} are the coefficients expected and unexpected open interest and $NS_{k,t}$ = the component of news surprises. While $\gamma_{-venews,k}$ and $\gamma_{+venews,k}$ are the coefficients of negative and positive news on volatility.

6. Findings, Conclusion, and Scope of Future Research

This paper examines the effect of macroeconomic news surprises on trading activity variables and returns volatility in the index futures market in India. For this purpose, we examined the index futures contract of CNX Nifty 50 traded on the National Stock Exchange (NSE), India, by using a dataset spanning for five years from January 2012 to December 2016. Estimating within the EGARCH framework, the results reveal that news surprises significantly affect returns volatility and that the news announcement of dividend yield, exchange rate, the repo rate, and index of industrial production

are prima facie strong candidates affecting volatility. Besides, when trading activity variables were used as a proxy for information flows to check its impact on volatility, it was found that unexpected volume and open interest significantly affect volatility. However, when integrated into the EGARCH framework with news surprises, volume proxies lost their significance, indicating that news surprises are much stronger informational signals affecting return volatility.

The results of the study are of interest to various groups of market participants, namely policymakers, regulators, and investors. By investigating the reaction of the index futures market to news can offer insights on whether market participants respond to the views about how the economy operates. The study provides a clue to the fund managers and investors who can rebalance their portfolios by considering the return dynamics caused by the release of new news. Our study is comprehensive in scope by evaluating the responsiveness of several market activity variables, including the return, volatility, and trading volume against previous studies that have addressed the issue individually.

Future work may explore if global financial spillovers originating from different markets affect domestic financial markets, specifically the index futures. Other issues that also merit further consideration include using intraday data and see the sequences of news effects on market volatility within minutes around the news release.

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DOES THE NATURE OF INDEX AND LIQUIDITY INFLUENCE THE MISPRICING IN FUTURE CONTRACTS IN INDIA?

DEEKSHA GARG[1], KARAM PAL NARWALI[1]

1. Guru Jambheshwar University of Science & Technology, Hisar, Haryana

* Corresponding Author: Deeksha Garg, Research Scholar, Guru Jambheshwar University of Science and Technology, Haryana, India.
☎ +00 (844) 7532920 ✉ deekshagarg99@gmail.com

Abstract

In this study, we investigate the variations in the mispricing of futures in Nifty (benchmark index), Bank Nifty and Nifty IT. Using a regression model on 1230 observations for the period of 1 January 2014 to 31 December 2018, we find no significant mispricing exists in the last week to the expiry of the contract in all three indices. This finding supports the existing literature that as the contract moves towards the maturity date, its value converges the market value. However, the main highlight of the paper is to reveal the difference in the life of mispricing in different indices. This difference in mispricing can be allocated to the liquidity in that indice. We report that being the most liquid, Bank Nifty shows mispricing only in 1 week (first week) of the contract. No significant mispricing exists thereafter. Nifty shows significant mispricing for the first two weeks and Nifty IT shows mispricing for all, except the last week. This is the pioneering work which considers the sectoral differences while evaluating futures mispricing. The findings of this study will provide useful insight to the regulators and investors.

Keywords: Cost of carrying model, mispricing, sectoral indices, arbitrage.

1. Introduction

Pricing of the futures contract is extensively researched in the finance literature. Since the introduction of index futures in various international markets at different point of time, several studies have been undertaken on arbitrage and price dynamics in the index futures market. For pricing of the futures, the cost of carrying model serves as the benchmark model. Applicability of this model has been explored in different markets by various authors such as Figlewsky (1984), Yadav and Pope (1990), Bailey (1989), Fassas (2010) and Nandan *et al*. (2014) in US, UK, Japanese, Greek stock market and Indian futures market respectively. In the Spanish market, Verdasco (2016) confirmed the compliance of the cost of carrying model, and it has been deemed fit for pricing of index futures.

Theoretically, the price of the futures contract should be the price of the underlying asset plus the cost of carrying that future contract. However, in real-world, this rarely happens, either the future price is less than the theoretical price or more than the theoretical price. The deviation from the theoretical price is known as mispricing in the futures contract. Both instances, i.e. underpricing or overpricing, also known as mispricing, provides a riskless arbitrage opportunity to the traders. Previous studies by Cornell and French (1983), Modest and Sundaresan (1983), Buhler and Kempf (1995), Brenner et al. (1989), Pope and Yadav (1994), Vipul (2005), Andreou and Pierides (2008), Figlewski (2016), Lai (2017), Lepoene (2019)and Qin et al. (2019) have reported substantial underpricing in the index futures in different markets around the world. On the other hand, Mackinlay and Ramaswamy (1988), Bhatt and Cakici (1990), Fung and Draper (1999), Draper and Fung (2003), Chu and Hsieh

(2002) and Richie et al. (2008) observed positive mispricing in their respective markets. Vipul (2005) found that futures in India are persistently underpriced. Even in the IPO segment, Gupta et al. (2019) found that the IPOs are underpriced to the extent of 12 percent in the Indian market. Lepoene (2019) examined the impact of short selling restrictions on the futures mispricing in the Chinese markets and observed it imposes additional costs to the arbitrage strategies leading to persistent underpricing. In the Hong Kong futures market, Fung and Draper (1999) found that government intervention impeded arbitrage efficiency as well as liquidity in the market. The problem of underpricing in the futures market can be resolved by lifting short sale constraints (Fung & Draper,1999), Marcinkiewicz (2016).

However, all these past studies, consider the benchmark index, for instance, NIFTY in case of India. The index comprises of the top securities based on market capitalization like NIFTY comprises of top 50 companies of India based on market capitalization. It implies studying mispricing of an Index will provide us with a picture of the top companies in a country. It also raises an important question, i.e. what about other companies which are not in the top list or do companies which are similar in characteristics like banking companies or IT companies shows a similar pattern for mispricing? Since the benchmark index analysis tends to hide the true picture as it may miss out the behavioural aspect of index mispricing. Therefore, the in-depth analysis of sectoral difference might highlight another dimension to the mispricing in index futures. There is very scant literature available which studies mispricing in different sectors, motivating us to study sectoral mispricing in India.

Butterworth and Holmes (2000) critically examined the pricing efficiency of the FTSE 100 and FTSE mid 250 index futures contract traded in the UK. Due to less liquidity in the Mid 250 contracts, as compared to FTSE 100, more substantial mispricing was observed in the Mid 250 index contracts. It implies that the liquidity of the contract is also playing a significant role in explaining the mispricing. However, to the best knowledge of the author, there is no study which relates the liquidity to the life of the mispricing of the contract. This study is an attempt to fill this gap in the literature.

This paper highlights that the liquidity of a stock or index affects its life of mispricing. Further, liquidity is having an inverse relationship with the life of the mispricing. It implies that higher the liquidity, less will be the life of the mispricing or vice-versa. Here, the life of mispricing means the period for which the mispricing continues. In this paper, the period is measured in terms of a week. As the liquidity of bank nifty is much higher than Nifty IT, this study expects that life of mispricing will be more for Nifty IT than Bank Nifty. This is more logical as well because higher liquidity implies more trading, which means more information to the market, which results in converging price towards the actual price of the security.

The paper finds that mispricing disappears in the last week to expiry for all three indices, highlights the convergence of the price when the security is near to its maturity. Also, the traders unwind their positions in the last week, resulting in no significant mispricing. The Nifty index shows significant mispricing for the first two weeks, then little mispricing is observed in the remaining week to expiry. Bank Nifty shows significant mispricing for the first week, then no significant mispricing noted in the remaining week to expiry. Nifty IT reveals significant mispricing for the entire period except for last week to expiry. These results are quite insightful as they highlight how the liquidity of an index affects the life of the mispricing. This paper is organized as follows. Section 2 presents data and the methodology used in the paper. Section 3 provides the results of the study. Finally, Section 4 concludes the study.

2. Data and Methodology

Daily closing prices have been obtained for all three sectors from the official website of the National Stock Exchange (NSE) of India (nseindia.com). Since there is significantly less liquidity observed for the far month contracts, therefore, we have used daily closing prices for the near month contracts. It is consistent with the literature as well (Nandan et al., (2015), Vipul (2005)). Mumbai Inter-Bank Offer Rate (MIBOR) rate has been taken as a proxy for the risk-free rate of interest. The data for 1-month

term MIBOR rates have been extracted from the Financial Benchmarks India Pvt. Ltd (FBIL), which maintains the official data regarding the MIBOR. Even, NSE uses MIBOR rate as the appropriate risk-free interest rate for the settlement mechanism.

Due to the difference in the holidays of banking and exchange, we have used the previous day MIBOR rate for the missing value. The annualized dividend yield has been taken from the National Stock Exchange of India.

Along the lines of previous studies such as Cornell and French (1983), Neal (1996), Brailsford and Hodsgon (1997), Mcmillan and Ulku (2009), Roll et al., (2007), Richie et al., (2008), Nandan et al., (2014), Qin et al. (2019) we have computed the theoretical price as follows:

$$F(t,T)= Se^{(r-d)(T-t)/365} \quad (1)$$

Where, $F(t, T)$ is the futures price at time t for a contract that matures at time T,

$S(t)$ is the value of the underlying stock price at time t,

r is the risk-free interest rate,

d is the annualized dividend yield between t and T.

Mispricing = (Actual Futures price – Theoretical futures price) / spot price

$$\text{Mispricing}= (F(mt,T) - Se^{(r-d)(T-t)/365}) / S_o \quad (2)$$

Where, $F(mt, T)$ is the actual market price at time t for a contact that matures at time T,

S_o is the spot price.

The mispricing is calculated as the difference between the actual futures price and theoretical futures price normalized by spot prices. The disconnect between the actual futures price and the theoretical futures price gives rise to pricing errors in the futures contract. Suppose the actual price of the futures contract is more than the theoretical price. In that case, the arbitrageurs will make a profit by undertaking a short position in the futures contract and a long position in the underlying index. On the other hand, if the actual price is less than the theoretical price, the arbitrageurs will prefer to buy the futures contract and sell the underlying index.

Since the near-term contracts have been considered to analyze the pricing errors, it would be interesting to note the week wise structure of mispricing in futures contracts. Ordinary least square (OLS) is used to study the pricing errors for a week to expiry effect. In our regression equation, the dependent variable is the daily mispricing series. The independent variables are dummy variables such as D1, D2, D3, D4, D5 for the first week to expiry, the second week to expiry, the third week to expiry, the fourth week to expiry and the last week to expiry respectively. The equation is as follows:

$$R_t^{mp}=\sum_{i=1}^{5} \alpha_i D_{it}+\gamma R_{t-1}+\varepsilon_t \quad (3)$$

Where D_{it} assumes the value 0 and 1 in the form of a dummy variable, $D_{it}=1$ for the first week to expiry, 0 otherwise. Here 'i' depicts the first, second, third, fourth and last week to expiry. Furthermore, the lag value of the dependent variable that is the mispricing series has been introduced in the model to avoid the autocorrelation in the error term. The presence of autocorrelation is confirmed with the low values of the Durbin-Watson statistic. Considering the lag ruled out the autocorrelation in the error term, making it fit for the regression model.

With the help of regression analysis, the week wise structure of mispricing in different sectoral indices has been analyzed. The dummy variables include D4 for the months which have four weeks to expiry in a near month contract and D5 for the months having five weeks to expiry in a near month contract.

The weekends have been excluded while allocating the dummy variable to the near-term contracts to avoid the weekend effect. The last week to expiry, i.e. D5 or D4 (as the case may be) has four days before last Thursday, other weeks, i.e. except last week has five days.

The choice of the sectors is based on the trading activity among the indices and the liquidity. Among the seven indices, only three have been considered fit for the study as the rest have either low trading activity or negligible liquidity in the futures contracts. The selected indices are distinct in the behaviours as they represent entirely different sectors indicating the movements in specific industries.

3. Results and Discussion

In this section, we examine the key findings of the study. The paper deals with the mispricing among the sectoral indices and not only the benchmark index. The primary outcome remains consistent with the theory that as the liquidity decreases, the magnitude of mispricing increases. The results are in line with the previous studies Butterworth and Holmes (2000), Oehmke (2009) and Shankar et al. (2015). It is reported that the in all three indices the first week of expiry, observes significant mispricing and towards the last week of expiry the magnitude of mispricing becomes insignificant as the theoretical futures price converges to the actual futures price.

Table 1: Results for ADF test for stationarity

	Mispricing
Nifty	-7.4306 (0.0000) **
Bank Nifty	-8.9425 (0.0000) ***
Nifty IT	-8.9877 (0.0000) ***

Note: To check the stationarity, the Augmented Dickey-Fuller (ADF) test has been applied in the study. The result of table 1 shows that the rejection of the null hypothesis, thereby indicating that the data is stationary.

Table 2: Summary statistics of week wise mispricing in Nifty

	D1	D2	D3	D4	D5
Mean	0.0002	0.0001	0	-0.0007	-0.001
Maximum	0.0118	0.008	0.0225	0.0094	0.0203
Minimum	-0.0101	-0.01779	-0.0194	-0.0179	-0.0084
Std dev	0.0008	0.0011	0.0013	0.001	0.0012
Skewness	1.5391	-7.3726	4.1819	-4.6128	5.1051
Kurtosis	97.8924	119.3634	148.5593	79.5916	103.6418
obs.	1231	1231	1231	1231	1231

Note: This table reports the summary statistics of mispricing in Nifty calculated by cost of carry model $[(F(mt,T) - Se^{(r-d)(T-t)/365}) / S_o]$. The sample consists of 1231 observations for the time period 2014-2018.

Table 3: Summary statistics of week wise mispricing in Bank Nifty

	D1	D2	D3	D4	D5
Mean	0.00005	0.0001	-0.0001	-0.0005	-0.0014
Maximum	0.0033	0.005	0.0053	0.0059	0.0088
Minimum	-0.0035	-0.005	-0.0047	-0.0072	-0.0099
Std dev	0.0005	0.0008	0.0009	0.0011	0.0011
Skewness	-0.5229	-0.1496	-0.1769	-1.8814	-2.9502
Kurtosis	18.8256	14.3677	10.9386	15.03706	25.7606
obs.	1231	1231	1231	1231	1231

Note: This table reports the summary statistics of mispricing in Bank Nifty calculated by cost of carry model $[(F(mt,T) - Se^{(r-d)(T-t)/365}) / S_o]$. The sample consists of 1231 observations for the time period 2014-2018

Table 4: Summary statistics of week wise mispricing in Nifty IT

	D1	D2	D3	D4	D5
Mean	0.0002	0.0001	0	-0.0007	-0.001
Maximum	0.0266	0.0168	0.0127	0.0176	0.0407
Minimum	-0.0306	-0.035	-0.0231	-0.0216	-0.0213
Std dev	0.0015	0.0019	0.0015	0.0015	0.002
Skewness	-1.03494	-9.2509	-3.7752	-2.1931	6.4059
Kurtosis	218.9431	153.5895	65.9674	57.7752	174.7106
Obs.	1231	1231	1231	1231	1231

Note: This table reports the summary statistics of mispricing in Bank Nifty IT calculated by cost of carry model $[(F(mt,T) - Se^{(r-d)(T-t)/365}) / S_o]$. The sample consists of 1231 observations for the period 2014-2018.

The summary statistics of mispricing among the sectoral indices in India clearly shows the existence of mispricing in the futures market. The indices are highly underpriced for the year 2014-2018. The possible explanation for persistent underpricing in the futures market could be the restrictions on short selling. If the actual price of the futures contract is less than the theoretical price, the arbitrage trade would include a long position in the futures and short position in the respective underlying index. The mispricing is found to be more in the sectoral indices than the benchmark index. For time to maturity, it is noticed that the findings are entirely different for the different sectors. The results are consistent with the previous studies of larger underpricing than overpricing Lin *et al.,* Kempf (1998), Pope and Yadav (1994), Brenner et al. (1989), Gay and Jung (1999), Vipul (2005), Cummings and Frino (2011), Lepoene (2019), Cornell and French (1983) and Modest and Sundaresan (1983). Both the sectoral indices and the benchmark index observe the underpricing in the futures contract.

Table 5 reports the result of the OLS regression. We observe that last week to expiry effect is not statistically significant in all three indices, which is consistent with the literature. Further, if we analyze our result indices wise, we find that in the Nifty IT is having mispricing (statistically significant) in all weeks except last week. Further, Nifty (benchmark index) is having mispricing (statistically significant) in the first two weeks, and Bank Nifty is having significant mispricing in the only first week of the contract. This highlights that Nifty IT mispricing has the most extended life as compared to the other two indices.

The possible explanation for such an exciting finding could be liquidity scenario in all three indices. The liquidity is observed highest in the Bank Nifty and the lowest in the Nifty IT. Liquidity implies more trading activities in those indices, which further means more information in the market. It explains the difference in the mispricing in these indices. Indices with the highest liquidity are having the shortest life of mispricing and vice versa.

Table 5: Regression results of sectoral indices with a week to expiry effects

	D1	D2	D3	D4	D5
Nifty	-0.0009 (4.4894) ***	-0.0005 (3.7818) ***	0.00004 (0.7589)	0.0000 (0.6596)	0.0002 (0.1693)
Bank Nifty	-0.0006 (-5.6732) ***	-0.0001 (-1.2472)	0.0000 (0.5852)	0.0000 (0.7119)	-0.0000 (-0.4459)
Nifty IT	-0.0009 (-2.9845) *	-0.0007 (3.4720) ***	-0.0005 (-2.4701) *	-0.0005 (2.6402) ***	-0.0001 (-0.4627)

Note: This table reports the regression results of sectoral indices, namely Nifty, Bank Nifty and Nifty IT with a week to expiry effects. The dependent variable is the daily mispricing series, and the independent variables are dummy variables such as D1, D2, D3, D4, D5 for the first week to expiry, the second week to expiry, third week to expiry, fourth week to expiry and last week to expiry respectively. We estimate the pricing errors for a week to expiry effect using equation $R_t^{mp}=\sum_{i=1}^{5}\alpha_i D_{it}+\gamma R_{t-1}+\varepsilon_t$ where D_{it} is the week wise dummy variable and 'i' depict for the first week to expiry, the second week to expiry, the third week to expiry, the fourth week to expiry and last week to expiry. The numbers in the parentheses indicate the t statistics. The level of significance is depicted as * at 0.05, ** at 0.01 and *** at 0.001.

4. Conclusion

The study highlights the pricing errors in the three indices in India. It highlights that life of pricing errors are different in the different index, which proves why it is essential to study the sectoral indices apart from the benchmark index. Along with this, the study empirically demonstrates the inverse relationship between liquidity and life of mispricing. The higher liquidity gives lesser mispricing, which is consistent with the theory as well as previous studies such as Butterworth and Holmes (2000), Ohemke (2009) and Shankar et al. (2015). For time to expiry, the mispricing is reported to be insignificant in the last week of expiry as the traders tend to wind up their positions minimizing the scope for profitable opportunities in the last week of expiry. Furthermore, in the first week to expiry, the magnitude of mispricing is relatively large as compared to the other weeks. The study focuses on the magnitude of the mispricing rather than the direction, emphasizing the inverse relationship between liquidity and the life of the mispricing. The higher chances of the mispricing in the less liquid index have strings attached to it as it will also have a greater risk.

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EFFECT OF PERCEPTION DIFFERENCES IN MONEY COMMUNICATION BETWEEN PARENT-ADOLESCENTS ON FINANCIAL AUTONOMY: AN EXPERIMENTAL STUDY USING FINANCIAL EDUCATION WORKSHOPS

JARIWALA HARSHA VIJAYKUMAR[1*]

1. IES's Management College and Research Centre, Bandra, Mumbai, India

* Corresponding Author: Jariwala Harsha V., Finance Department, IES's Management College and Research Centre, Bandra, 'Vishwakarma', 791 S. K. Marg, Bandra Reclamation, Bandra, Mumbai - 400050, India
☎ +91 (22) 50001772 ✉ callharsha@gmail.com

Abstract

This study evaluates the effect of parent-child money communication on financial autonomy of the adolescents by considering the gender of the parent as a controlled variable by utilizing pre- and post-survey based experimental research design. The sample consisted of 300 female parents and their children under the adolescence stage of life. Assuming parents often make that claim regarding their frequent money communication with their children, their children were asked to rate their perception towards parent's money communication with them. Later, their female parent (mother) was invited for financial education workshops series and asked to complete pre-survey before they attended the first financial education workshop. The follow-up survey was done for female parents and their adolescent children six months after completion of the financial education workshop series. In both the surveys, 300 responses were collected from female parents and adolescents on nineteen pairs of money communication, wherein parents were not told that their children were also asked to rate the matching pair of each item of parent money communication scale and vice versa. The financial autonomy was measured by using pre- and post- surveys, wherein only adolescents participated in the surveys. The results of paired t-test provide a noticeable conclusion that financial education given to the parent positively enhances money communication among parent-adolescent by reducing the disparity in the responses collected from the parents and adolescents on each matched pairs separately and collectively and this reduced disparity leads to enhance the financial autonomy of the adolescents. The findings may help policymakers and financial educators to design and implement such workshops which may open lines of "money communication" between parents and children.

Keywords: financial education workshops, parent-adolescent money communication, financial autonomy.

1. Introduction

The joint family system which developed in India for centuries did not leave much scope for interaction in money matters amongst the family members. Typically, in a joint family, many family members lived together with the senior-most male in the family as the head of the family known as 'Karta'. The 'Karta' was bestowed with the power to make the final decision on behalf of the family in every matter, including managing the household finances of the family. However, in the search of employment, continuous migration of the family members towards urban areas is increased, due to this traditional joint family system disintegrated and was replaced by the system of a nuclear family, wherein the adult male member of the family usually takes care of his family finances and future financial securities. This change in the family paradigm has meant that children now also need to

be involved while taking important financial decisions. Moreover, the rapidly changing economic climate makes management of personal finances more challenging than ever before, especially for the adolescents who are about to enter the financial markets in the next decade. With the growing significance of personal money management, financial literacy becomes a key skill set in ensuring the development of a society where there is optimum utilization of the financial resources leading to greater economic development of the nation.

In India, policymakers, N.G.O.s, financial planners and educators are grappling with a situation where they need to upgrade the financial literacy level of their citizens, particularly young college students. With the improvement in lifestyle in general, the avenues for spending money have increased manifold without a corresponding similar rate of increase in income generation avenues. Since adolescents get easily attracted and are more prone to waste their money on unimportant expenses and with the plethora of personal loans and credit cards available luring the people to spend their money, there is a danger that with their limited knowledge about savings, investment and credit, adolescents may not be able to manage their finances properly which may put a strain on their own lives and in turn on the society later on.

With the traditional belief of the Indians wherein discussion about financial matters in the family is still considered as a taboo, children are still generally not encouraged to discuss the same in their families. As a result, children often have no clue about the family's financial situation. Therefore, when they grow up and start earning money themselves, they may lack the skills to manage their own money, and at some instances,they receive absurd opinions, outlooks and worries towards money (Atwood 2012).

Parents typically assume the primary role in educating their children about money management. Though, parents either lack money management skill themselves or they do not realize the significance of discussing money matters with their children. This may be due to parents' assumption that with the passage of time, their children will on their own learn these skills through observing their own habits and behaviours (Lyons et al. 2006). The literature strongly supports that the financial skills, attitudes, autonomy and behaviours can be improved through financial education (DeVaney et al. 1996; Jariwala and Sharma, 2013; Jariwala and Dziegielewski, 2017), although the parents are still considered the most influential socialization agent (Jorgensen & Salva, 2010) and also act as a distinctive and primary source for not only gaining financial knowledge but also for developing financial autonomy for their children (Fox et al., 2000) and are considered as the essential foundation for developing positive money practices across all the generations.

Autonomy is commonly understood as a multidimensional concept that can have different scopes, such as independence, confidence (in oneself, others, and the environment), self-efficient optimism, self-control, among others. An autonomous individual takes the initiative and can recognize potentialities and weaknesses. This requires putting this knowledge into action while taking responsibility for the outcomes that result.

Existing studies on family financial communication pattern have been largely confined to spouses. Consideration of children in money communication is equally important. In every family structure directly or indirectly, money matter is discussed among family members through frequent discussions wherein parents provide the appropriate lessons and learning to their children for managing their personal finances. The Theory of Social Learning Opportunities strongly supports that the parent-children interactions on personal finances are the crucial attributes to develop positive financial practices and financial autonomy (Kalil et al., 2005). This supports the presence of an association between parent, child and financial education, which is yet not explored by the researchers.

In India, under the present financial education efforts of the government authorities, financial literacy efforts are manifested through financial education workshops under the aegis of regulatory authorities such as Securities and Exchange Board of India, Reserve Bank of India, Insurance Regulatory and Development Authority of India and Ministry of Corporate Affairs. The financial

education material is designed and developed and is used at financial education workshops conducted for specific target groups such as school students, college students, middle-income groups, retirees and homemakers etc. Further, all the regulatory authorities have joined hands to promote financial literacy on a common platform by establishing a National Centre for Financial Education which takes care of promoting financial literacy among school children through various strategies. However, there are not many research studies available onthe effectiveness of financial education program evaluation. This point is emphasized by Lusardi (2011) who observed that there is scope to assess impact evaluation of such programs studying other behavioural outcomes.

The instant study is an attempt to bridge the above gap. It is an outcome-based experimental study that has attempted to answer several research questions and contributing to behavioural finance that has implications for managerial decisions at the macro level. The study attempts to address firstly whether the financial autonomy of the adolescents is affected by the parent-child money communication and secondly, whether the parent-child money communication can be enhanced if the financial education is given to the parents? Lastly, if the parent-child money communication is enhanced by financial education, then does this reduced gap of money communication among them leads to enhance the financial autonomy of the adolescents.

This paper follows a definite structure that discusses the literature review based on financial education program evaluation, theoretical support, research method and procedure, and discussion of the results of this empirical study. The paper concludes with a discussion on suggestions to various stakeholders based on the inferences derived and provides direction for future research in this area.

2. Literature Review

Literature in sociology and psychology explainsthat autonomy includes the attributes of independence, confidence, optimism, self-control, and conformity to parents and peers (Steinberg & Silverberg, 1986). Noom et al. (2001) blended three forms of autonomy, attitudinal/reflexive, emotional, and functional. Attitudinal/reflexive autonomy was described as the ability to set goals and think before acting and encompasses the notions of knowledge, consciousness, and responsibility. Emotional autonomy brings confidence in one's own choices, whether being expressed to parents, relatives, or peer groups. Lastly, functional autonomy encompasses a regulatory dimension where different approaches may be selected to achieve the goal. With each approach, selected competence, control and responsibility is displayed. One important aspect of autonomy is self-motivation. When people feel empowered, they are generally got motivated to attempt the change-making strategy. Several theorists believe in the importance of motivation and self-determination (Ryan & Lynch, 1989; Connell, 1990;), and self-efficacy (Bandura 1989; 1997). Autonomy is evident in intrinsic motivation to engage in certain behaviours and joy in choosing to engage in certain behaviours rather than others. Different strategies to achieve goals are attempted, and choice of a specific strategy is founded on knowledge-based decision-making, that has been derived from the attributes at a personal level, family relations and the parent-children interactions (Kalil et al., 2005) and the distinctive and primary source for gaining financial knowledge for the children (Fox et al., 2000) and are considered as the essential foundation for developing financial autonomy across all the generations.

The literature argues that the autonomy is an "integrative model" (Noom, et al. 2001), where measuring fluctuating domains of financial autonomy is equally important as the autonomy is basically developed in the stage of adolescence and throughout the lifecycle span, the autonomy improves and falloffs as individuals develop new competencies, previously acquired skills may also decline, and changing conditions will continue to require altered behaviour (Baltes& Silverberg 1994). Throughout adulthood, autonomy continues to develop especially when someone is

confronted to act with a new level of self-reliance that requires the specific skills to display the best outcomes. Literature documented that one of the significant attributing factors in the parental [financial] socialization education is involvement in direct and open discussions regarding buying judgments, cash, credit, and topics related to money (Allen, 2008).

In recent times, money communication with children has become a complex issue with a plethora of complex information overload and a variety of financial markets and products. Furnham and Argyle (1998) pointed out that there is no agreement about how to teach children about money; however, there is a common opinion that money management should be taught to children and it is the parents who should initiate their children into money education. Mandell (2001) explained that children's financial knowledge and skills could be enhanced by the financial management discussions between parents and children. Violato et al. (2011) explained that through money communication, parents may explicitly transfer financial knowledge and skills to their children and the children can then further that knowledge and skill to be able to deploy more complex and sophisticated financial strategies. (Otto, Schots, Westerman, & Webley, 2006). Koonce et al. (2008) also observed that teens who exhibited mature financial behaviour and set financial goals and were savers are the ones with whom their parents regularly discussed finance and investment. Webley &Nyhus (2006) acknowledged money communication by explaining that adults who had greater interaction with their parents about money matters during childhood had more propensities to save and not spend their excess income. Thus, parent-child money communication means that children are more confident in making financial choices.

Previous studies also confirm that the emotional atmosphere in the family also plays an important role to develop financial autonomy among adolescents. It is always observed that the parents often interact, communicate, monitor set the rules, provide the guidance, and monitor the same regarding financial attitudes and practices to nurture future adaptive financial practices in their children. Many studies confirm that the existence of the emotional climate in the family is equally important in encouraging adaptive monetary practices. Laible& Thompson (2007) argue that for children, the warm parent-child interactions nurture inspiration to accomplish and cooperate with parents. In a supportive emotional climate, children always feel free to discuss money matters with the parents, and this ultimately results in the enhancement of financial autonomy.

Financial Literacy & Education Commission (2006) had pointed out the lack of personal financial knowledge as a major barrier to an individual's sound financial practices. "The …absence of this knowledge and skill poses a variety of risks to individuals, society and economy as a whole" (Sharma & Jariwala 2011).In current times, financial skills are essential prerequisite to manage personal finances. Complex financial products and services, attached to financial engineered innovations, continuous transfer of financial risk from the government to households have put massive responsibilities and stress on individuals for securing and maintaining their economic well-being. Kim (2001) explained the significance of financial knowledge to enhance the financial well-being of the people. Financial education plays a pivotal role in helping people to acquire the requisite skills and exercising optimum choices and taking appropriate informed and autonomous financial decisions. (Joo, 2008).

Prior studies suggest that financial education not only improves financial literacy but also leads to an improvement in the way people deal with financial matters. Hogarth et al. (2003) observed that financial education leads to better financial choices being made by people in their personal financial matters. Mandell (2009) stressed that though financial literacy develops positive financial behaviour, its effect on long-term financial behaviour is still not certain. Lyons et al. (2006) studied how financial education changed people's behaviour and concluded that education has the greatest effects on short-term financial behaviours. Lusardi (2004) confirmed that after attending retirement seminars, not only the participants' private financial wealth increased but also there was an improvement in pension and social security wealth. DeVaney et al. (1996) assessed what impact financial education had on women credit card customers and came out with the result that as a result of financial education workshops, many of these women have minimized the usage of their

credit cards and at the same time started saving more money. Germam et al. (1999) explained that after attending financial education workshops, participants not only made "better and more informed financial decisions but also felt more confident while making investment decisions. Indian studies also confirmed that financial education not only profoundly improves the way people manage their cash flows, saving, investment and credit behaviour (Jariwala and Sharma, 2013), but also enhancement of various types of financial autonomy such as reflexive autonomy, emotional autonomy and functional autonomy (Jariwala &Dziegilewski, 2017) among the women participants.

2.1 Research Questions

The above literature presented on evaluation of financial education workshops concluded that financial education leads to positive financial outcomes whereas the literature discussed the importance of parent-child money communication in the family concluded that money communication plays an essential role in developing the desired positive financial practices, financial behaviour and financial autonomy of their children during their adulthood. Considering the importance of money communication in parental financial direct teaching, this study has attempted to answer the following key research questions. Firstly, whether the financial autonomy of adolescents is affected by parent-child money communication? Secondly, whether the parent-child money communication can be enhanced if the financial education is given to the parents by considering the parental gender as a controlled variable as there is evidence that in an Indian family, parents generally find it uncomfortable to talk about money with their children? The studies in this regard have found that parents in India are very sensitive about discussing money with their children and deem money in the same category as puberty and sex which according to them are taboo topics that should not be discussed with children. Lastly, if the parent-child money communication is enhanced by the financial education, then does this reduced gap of money communication among them leads to enhance the financial autonomy of the adolescents.

2.2 Theoretical framework

The Communication Privacy Management Theory (Petronio, 2002), Social learning theory (Bandura, 1986) and the Transtheoretical model of behavioural Change (Prochanka,1979) provide theoretical support to this study.

The Communication Privacy Management Theory proposes three assumptions. Firstly, individuals are unsure about whether to share personal information or not. Secondly, individuals make their boundaries to control the movement of their private information wherein; these boundaries help an individual to establish whom the information will be shared with, as well as to what extent information sharing will occur assuming that as soon as private information is shared with someone else, this person then becomes co-owner of the information and is included within the boundary set, irrespective of the person's characteristics or how receptive the individual is. The third hypothesis proposes that people construct own rules on how open or close these boundaries will be and how much they will reveal or conceal of their personal information wherein these mental boundaries are set by considering risk-benefit principle. If an individual perceives that more benefits will accrue than the risk of revealing personal information, then they would prefer to reveal such information. On the contrary, if they feel that the risk is more than the benefit, then they will feel apprehensive and therefore, prefer to conceal the information (Petronio, 2002). Applying this to parent-child money communication, the huge divergence found from the responses collected on money communication perception from parents and adolescent children in the pre-survey data confirmed that parents either have limited or no conversation with their children on the subject of money (supported by the first hypothesis). This may be due to a child may not be mature enough to understand the sensitive matters related to money (supported by the second hypothesis). Lastly, if a parent fears being judged by their child on the money matter, they would rather conceal the information. Individuals, who are ashamed, feel guilty or attach their self-esteem to their financial situation, would perceive the risk of revealing personal financial information as too risky and would therefore be reluctant to disclose information (supported by the third hypothesis).

Social Learning Theory (Bandura, 1986) also provides theoretical support to this study, and it suggests that parent's communication about financial topics with their children is essential. It explains that children are explicitly and cognitively influenced by their parents through direct education, instruction, reinforcement and purposive modelling held with them. Further, the socialization process originates in childhood, and it progresses during the entire lifespan. Financial socialization is learned in such a waythat individuals acquire knowledge about money, money management and enhance their abilities and expertise in numerous financial practices through direct instructions from the parent or their observation. Danes (1994) proposes that the family is always considered as a key and primary source of children's socialization; wherein children observe their parents, participate in financial practices, and receive direct objective instruction from parents.

Lastly, the Transtheoretical Model of Behavior Change (Prochanka, 1979) underpins the different levels of readiness to change problem behaviour or develop a desirable new behaviour, that includes six steps which are (a) pre-contemplation, (b) contemplation, (c) preparation, (d) action, (e) maintenance, and (f) termination. The movement to a higher level of readiness to change behaviour is influenced by the processes of change which include activities and experiences that individuals engage in as they attempt to modify their behaviour. The purpose of this study was to assess the behavioural change in money communication among the parent-adolescent after providing financial education to the parents, controlling the parent's gender. In this study, the money communication perception divergence was higher among parent-adolescent, and later this was drastically reduced signifying that parents have developed behaviour that supports the money communication with their children that was depicted in the follow-up survey of this study. This continuous level of change behaviour is depicted in the Transtheoretical Model of Behavior Change, as suggested by Prochanka (1979).

3. Research Methodology and Procedure

This study was conducted in the Gujarat State of India. According to the population census of India (Government of India, 2011), the literacy rate in Gujarat shows an upward trend and is 79.31 per cent. Out of this, the male literacy rate stands at 87.23 per cent, whereas female literacy rate is at 70.73 per cent. The geography of this state is divided into twenty- two districts. Out of these, the district of Mehsana was selected at the convenience of the researcher. In this region, there are total thirty-nine Grant-in-Aided secondary schools registered under Gujarat State Secondary Education Board, wherein the medium of instruction is Gujarati (i.e. the regional language of the state of Gujarat). The researcher has randomly approached the Principal of total six schools at the beginning of the academic year 2018-19, i.e. the month of July 2018, out of this, three school Principals granted their permission to conduct financial education workshops and further to collect the pre-workshop and post-workshop follow-up data collection in the school premises.

The literature on family socialization reports that gender plays an important role in socialization. Hence, in this study, the gender of the parent was controlled to assess the effect of financial education on money communication among parent-adolescent.

The financial education workshops were targeted at female parent because of following reasons. Firstly, the school record of previous three parent-teacher meetings was studied in the selected schools, and it was found that these meetings were attended mostly by the female parent. The records also showed that many of the male parents were employed in the private sectors wherein taking leave from their workplace to attend the meetings were difficult for them. It was assumed that if male parents were also invited to attend a financial education workshop series at school, then it was difficult for them to take leave from their workplace to attend such a workshop series. Secondly, the women from this region were mainly homemakers who are engaged in daily household duties.

Due to the male-dominated social structure, the male takes care of all personal finances. Sometimes, it is observed that due to the male-dominated social structure, women voluntarily exclude themselves from actively participating in household money management. Thirdly, there is evidence that women are less financially literate (Lusardi and Mitchell, 2009), less confident (Taylor, 2003) and less knowledgeable (Chen and Volpe, 1998) than men in the subject of personal finance and compared to men; women are more conservative in investment practices (Bajtelsmit and Bernasek, 1996). Thus, females are in urgent need of financial education. This study assumes that if financial education is given to women (parent), then this will not only enhance their confidence while dealing with financial matters but also help them to build their wealth and proper asset allocation of their family.

Accordingly, the overall objective of the financial education workshop series was to make female parent aware of the topic of personal finance and enhance their capability to identify financial opportunities and likely consequences. However, the primary objective of this study was to assess the impact evaluation of the financial education workshop series on parent-adolescent money communication by controlling parents' gender.

The population of the study was a female parent and adolescent children since in this stage; children start to develop their autonomy, wherein autonomy refers to an adolescent's growing ability to think, feel, make decisions, and act on his/her own. Autonomy concerns the experience of integration and freedom (Desi & Ryan, 2000) and the development of financial autonomy also takes place which refers to individual's ability to decide freely on his/her financial affairs. The ability to manage the funds independently enables him/her to set and realize his financial goals. This ranges from freedom from the constraints of (financial) dependence on others to freedom to make (financial) choices, pursue (financial) goals, and so forth (Collins, Gleason, &Sesma, 1997) and resulting into financial autonomy.

For the selection of the participants, the Principal of respective schools understudy was requested to allocate two classes in which adolescent children pursue their study. In the Indian context, this age of adolescence is considered as of 10 to 19 years (Population Census, Government of India, 2011). Accordingly, the classes of having students in the age group of 13 years to 15 years were selected. The students of this age group were found in Standard VII, VIII, IX. Each standard consists of three sections namely Section A, Section B, and Section C. Out of these, two sections were selected randomly to reduce the effect of potential biases that may happen due to self-selection of the respondents under study. Total 120 students from two sections of Standard VII from "School 1", 110 students from two sections of Standard VIII from "School 2" and 105 students from two sections of "School 3" were approached during their regular classes. On the suggestion of two School Principals, the students in the extreme lowest age and highest age of adolescence were not considered since at the respective life stages, children are either too immature or might have already developed some sense of autonomy.

The total number of students from the schools mentioned above was 335 adolescents. Firstly, these students were approached in August, 2018, i.e. after completion of one of the academic years and a questionnaire that consisted of nineteen matching paired items of money interaction scale prepared for children on the five-point likert scale ranging from 1=Always, 2= Sometimes, 3=Neutral, 4= Almost never and 5=Never were circulated to them, and they were requested to rate each variable by recalling money communication held between them and their mother and fifteen items of financial autonomy.

After collecting filled up a questionnaire, these students were given information that school authority along with one of the certified trainers for financial education as certified by the national authority who also works as a resource person for promoting financial literacy is going to teach basic money management to their female parent (mother) through financial education workshop series. For this, their mothers need to come to schools on six occasions at a regular interval of twenty days to attend two to three hours during noon on working days. All the students confirmed that their mother would

come to take advantage of this workshop series. The students were also requested not to share with either of their parents about the questionnaire that they have filled up.

The workshop series consisted of four workshops of approximately two hours, out of this five workshops covered various topics on management of personal finances such as (i) difference between want, need and demand, (ii) prioritization of financial needs (iii) spending choices (now and later) (iv) basics of budgeting, (v) planning expenditure, (vi) creating fund for unplanned expenses/ emergencies, (vii) S.M.A.R.T. goal setting, (viii) basics of saving and saving bank accounts (ix) investment options with risk and return trade off, (x) interest rate and its method for calculation, (xi) rule of 72 (xii) power of compounding, (xiii) taxation aspects, (xiv) choosing right investment avenue (xv) inflation and its effect on investment (xvi) need for risk cover, (xvii) types of life insurance policies and factors to be considered while getting insured, (xviii) need for health insurance policy and other aspects of the same (xix) understanding credit and its handling, credit score (xx) retirement planning (xxi) importance of careful reading of document before investing or taking credit, (xxii) identification of Ponzi schemes (xxiii) investor protection and grievances redressal mechanisms and taking consumer action. The last (i.e.), the fourth workshop consisted of the importance of family communication on the topic of household finances and its likely consequences. Each workshop was followed by question-answer sessions. The language of subject delivery was Gujarati, which is the regional language of Gujarat state. The financial education material developed by various authorities such as Securities and Exchange Board of India, Reserve Bank of India, Insurance Regulatory and Development Authority of India and educational institutes of national repute such as National Centre for Financial Education was downloaded from their respective websites and used for this workshop series. The financial education subject material developed by the Securities and Exchange Board of India for homemakers in the Gujarati language was distributed to the participants free of cost.

Looking to the efforts and monetary resources employed in designing and implementing financial education workshops, numerous researchers have suggested the standard structure to evaluate financial education programs that can serve as a guideline not only for the designers of financial education programs for its effective outcomes but also for the researchers for employing the best practices for program evaluation. O'Connell (2009) proposed a new version of a five-tier framework. He suggested that financial education workshops are to be assessed by identifying program needs, accountability, fine-tuning, micro- and macro impacts of such programs. Accordingly, it is assumed that "parent-adolescent money communication" can be enhanced (in other words impacted positively) when parents are empowered about personal finance. Thus, analysis of the program impact comes under macro-impact of program evaluation as suggested by O'Connell. Further, Lusardi (2011) explained the existence of enough scope to study the effect of a financial education program on various outcomes, as the existing literature on effects of evaluation of financial education programs is limited.

The present study utilizes before-and-after without control design under the experimental research designs, wherein a test group is selected, and the dependent variable is measured before the introduction of the treatment. The treatment is then introduced, and the dependent variable is again measured after the treatment has been introduced. The effect of treatment would be equal to the level of the phenomenon after the treatment minus level of the phenomenon before the treatment.

3.1 The survey instrument

The survey instrument consisted of nineteen items of money communication (interaction) scale adapted from money interaction scale (Moore & Stephens, 1975; Moschis, 1978) and consumer activity scale (Moschis& Churchill, 1978) and fifteen items of financial autonomy scale (Micarello, Melo, Marcelo et al., 2012). The money communication (interaction) scale consisted on matched pairs (of each money communication questions for parents) for adolescent of total nineteen items of communication about money between parent and adolescent (Refer Appendix 1). As discussed earlier, initially questionnaire consisting of matching paired questions of each variable of the scale

was distributed to the adolescent students in the classroom before conveying that their mother would be given financial education. These students were asked to rate their perception towards their existing money communication with their female parent (i.e. mother) on the likert scale on each matched pair ranging from 1=Always, 2= Sometimes, 3=Neutral, 4= Almost never and 5=Never. Similarly, when their mother came to attend the first financial education workshop, before starting of the first workshop, each mother was asked to fill up the questionnaire that consisted of their demographic and socio-economic variables and nineteen items of money communication for a parent. They were asked to rate each item on likert scale ranging from 1=Always, 2= Sometimes, 3=Neutral, 4= Almost never and 5=Never.

The financial autonomy index consisted of 15-items divided into three sections: reflexive autonomy, emotional autonomy and functional autonomy were circulated among the adolescent students before it is conveyed that their mother would be invited for attending financial education workshops and were asked to rate each variable. Each of the 15 statements was calculated on a 5-point scale: "This sentence is a very bad description of me" = 1; "This sentence is a bad description of me" = 2; "This sentence is an average description of me" = 3; "This sentence is a good description of me" = 4; and "This sentence is a very good description of me" = 5. Questions related to the autonomy measure were designed to capture the adolescent's confidence, independence, and willingness to participate and influence (household) financial decisions. For example, the survey asked the adolescents the extent to which they agree or disagree with statements on (i) reflexive/attitudinal autonomy, such as "I like to think carefully before deciding to buy something;" (ii) emotional autonomy, such as "I feel prepared to talk to my parents about money matters;" and (iii) functional autonomy, such as "I always try to save some money to do things I really like." Five questions were asked in each category, totalling 15 questions.

Assuming that parents always claim that they usually discuss money importance and its management with their children, but their children don't 'hear' them, the matched pair of each money communication item of nineteen variables framed in the structured questionnaire was also rated by children who were in adolescence stage of life on each matching item pair of the parent scale. However, parents were not told that their children were also asked to rate the matching pair of each item of parent money communication scale and vice versa. Accordingly, these adolescents rated the matching version of parent-adolescent money communication scale twice, before conducting the first financial education workshop and six months after completing the last workshop of their female parent along with the financial autonomy scale.

The workshop series was conducted fromSeptember 2018 to January 2019. The follow-up survey was conducted after six months of the completion of the last workshop at each school. For this, students were approached in the same classroom and were asked to rate the questionnaire consisting of the same items previously. Similarly, after approximately six months of the completion of the workshop series, during mid-year parent-teacher meeting, once again these female parents were approached and were requested to fill the same questionnaire and complete the follow-up survey. It was found that the financial education workshop series was started with 335 female parent participants (as total students were 335). However, 17 participants dropped out voluntarily, while 18 female parents did not attend the follow-up survey. Thus, the sample size for this study came to 300 female parents. The profile of the sample is presented in Table 1.

Money communication score was calculated by taking the absolute value of the differences between the rating given by the female parent and the child of the adolescent stage on every nineteen comparable items and then summing up those differences. E.g. the lowest possible score was zero, and the highest possible score was 76. The higher the score, the greater the disparity between the parent and adolescent regarding their perception of their money communication. Accordingly, money communication score was calculated twice, i.e. based on the analysis of the responses given by the parent and adolescent in the pre-survey and the post-survey. These

calculated values of money communication were used to develop the research hypothesis for this study.

4. Data Analysis and Interpretation

Descriptive statistics, reliability analysis and paired t-test, were conducted to study the research objective.

The profile household is presented in Table 1 (A) and (B).

Table 1a: Sample Profile of Adolescent students (Children)

Variables	Categories	Frequency	in per cent
Age	13 years	92	30.67
	14 years	95	31.67
	15 years	113	37.67
Gender	Male	188	62.67
	Female	112	37.33
How much Pocket money you receive monthly	Below Rs. 50	48	16.00
	Rs. 51 to 100	65	21.67
	Rs. 101 to Rs. 150	104	34.67
	Above Rs. 150	83	27.67
With whom you discuss your personal matters	Mother	218	72.67
	Father	82	27.33
Total		**300**	**100**

Table 1b: Sample Profile of Female Parent

Variables	Categories	Frequency	in per cent
Age	30 to 35 years	52	17.33
	35 to 35 years	142	47.33
	35 to 40 years	70	23.33
	Above 40 years	36	12.00
Household Monthly Income	Below Rs. 15,000	42	14.00
	Rs. 15,001 to Rs. 30,000	78	26.00
	Rs.30,001 to Rs. 45,000	76	25.33
	Rs. 45,001 to Rs. 60,000	84	28.00
	Above Rs. 60,000	20	6.67
Education	Upto Class 10	32	10.67
	Upto Class 12	48	16.00
	Graduate	158	52.67
	Postgraduate	62	20.67
Total		**300**	**100**

4.1 Data reliability

Cronbach's coefficient was used to check the scale reliability. The Cronbach's a was calculated at two stages: (i) Pre-survey and (i) Post-survey. The value of Cronbach's a coefficient for money communication scale for the pre-survey were 0.879 and 0.783 for the parents and adolescents. Similarly, these values arrived at 0.756 and 0.767 from the analysis of responsescollected from parents and adolescents in the post-survey. The Cronbach's a coefficient value for the financial autonomy scale were 0.844 and 0.747 in the pre-survey and post-survey, respectively. Thus, the a values for money communication scale under both the surveys indicate an acceptable level of internal

consistency among the variables confirming that the scale is reliable enough to use. Similarly, data quality was checked by using Skewness, Kurtisis and t-test values, showing data are normal.

4.2 Data analysis

Data analysis is done to check the following research hypotheses that are framed based on in-depth literature review and primary research questions of this study.

1. $H0_1$: There is no significant difference between parent-adolescent money communication disparity score before and after providing financial education to the female parent.
2. $H0_2$: There is no significant effect of money communication (interaction) gap on the financial autonomy of the adolescents.

Paired t-test was conducted to check the study hypothesis 1. Table 2 displays the calculated mean, standard deviation, and standard error of the means of all nineteen pairs of money communication under study. The effect of financial education provided to the female parent (as gender is the controlled variable) can be seen by analyzing the mean values of each variable of money communication of pre-workshop survey and post-workshop survey. The careful examination of mean values of each pair as presented showed that for all the variables mean value for the pre-workshop survey and post-workshops survey show significant differences (see Table 2).

The results of the paired t-test are presented in Table 3. The t-test values presented in the last column of Table 3 shows the significance values for the two-tailed test at the at 5 per cent level of significance. The differences in mean value reported in the third column of Table 3, shows that there is a difference between pre-survey and post-survey money communication perception among parent-adolescent is improved significantly six months after the completion of workshop series for all 19 pairs of money communication items. E.g., for Pair 1 decoded as "I talk to my child about buying things" (parent scale) and "This parent and I talk about buying things" (matching pair for adolescent scale), the mean value for the disparity in money communication perception reported by parent-adolescent in the pre-survey was 1.98 (SD = 0.836) and in the post-survey was 0.97 (SD = 0.786) (t (299) = 19.27, $p<0.05$). This reports that financial education given to the parent has significantly improved money communication perception between parent and adolescent. Similarly for "I go for shopping with my child" (parent scale) and "I go for shopping with this parent" (adolescent scale) that is coded as pair two reported that the disparity in the mean value of money communication perception of parent-adolescent for this variable is improved to 1.20 (SD = 0.787) in the post-survey from the mean value of 2.68 (SD = 0.833) as reported in post-survey.

The careful analysis of mean values for each pair of parent-adolescent money communication presented in Table 2 suggests that the disparity in the mean value of perception of parent-adolescent for pair 16, pair 15 and pair 6 was the highest. Among these, the mean value disparity for pair 16 decoded as" I allow my child to manage their own money" (parent scale) for which is matched pair for adolescent was "This parent allows me to manage my own money", was the highest among all 19 pairs, and was found to be 2.91 (SD = 0.813) in pre-survey and 0.80 (SD = 0.700) (t (299) = 32.65, $p<0.05$) in the post-test, that was followed by the Pair 15 presented as "I help my child developfinancial goals" (parent scale) for which matched pair was "This parent helps me develop financial goals" (adolescent scale), for which reported disparity in the mean value was improved from 2.57 (SD = 0.984) in pre-survey 0.58 (SD = 0.581) (t (299) = 29.78, $p<0.05$) in post survey; compared with Pair 6 represented as "I tell my child why I bought some things for myself" (for parent scale) for which matched pair was "This parent tells me why they bought some things for themselves" (adolescent scale), for which disparity in the mean value was 2.34 (SD = 1.175) in pre-survey 0.78 (SD = 0.946) (t (299) = 16.78, $p<0.05$).

The analysis of all matched pairs of 19 items of parent-adolescent money communication also reported disparity in the mean value of perception of parent-adolescent for Pair 3, Pair 7 and Pair 4 was the lowest. Among these, for pair 3 decoded as "I tell my child what things he or she should or

should not buy" (parent scale) for which is matched pair for adolescent was "This parent tells me what things I should buy or not buy", was the lowest among all 19 pairs, and was found to be 1.96 (SD = 0.635) in pre-survey and 0.97 (SD = 0.628) (t (299) = 111.98, p<0.05) in the post-test, that was followed by the pair 7 presented as "I talk to my child about saving and investing money" (parent scale) for which matched pair was "This parent and I talk about saving and investing money." (Adolescent scale), for which reported disparity in the mean value was improved from 1.71 (SD = 0.999) in pre-survey 0.71 (SD = 0.663) (t (299) = 21.47, p<0.05) in post survey; compared with pair 4 represented as "I tell my child what to do with his or her money" (for parent scale) for which matched pair was "This parent tells me what they do with their money" (adolescent scale), for which disparity in the mean value was 1.98 (SD = 0.936) in pre-survey 0.96 (SD = 0.919) (t (299) = 14.07, p<0.05).

Table 2: Paired Samples Statistic

Pairs	Money communication scale for parents	Codes	Mean	N	Std. Deviation	Std. Error Mean	*Cohen's d*
Pair 1	I talk to my child about buying things. (MC1)	MCE1 MCP1	1.98 0.93	300 300	0.836 0.786	0.048 0.045	1.294
Pair 2	I go shopping with my child. (MC2)	MCE2 MCP2	2.68 1.2	300 300	0.833 0.787	0.048 0.045	1.815
Pair 3	I tell my child what things he or she should or should not buy. (MC3)	MCE3 MCP3	1.96 0.97	300 300	0.635 0.628	0.037 0.036	1.558
Pair 4	I tell my child what to do with his or her money. (MC4)	MCE4 MCP4	1.98 0.96	300 300	0.936 0.919	0.054 0.053	1.103
Pair 5	I talk to my child about things we see or hear advertised. (MC5)	MCE5 MCP5	1.91 0.79	300 300	1.074 0.667	0.062 0.039	1.249
Pair 6	I tell my child why I bought some things for myself. (MC6)	MCE6 MCP6	2.34 0.78	300 300	1.175 0.946	0.068 0.055	1.459
Pair 7	I talk to my child about saving and investing money. (MC7)	MCE7 MCP7	1.71 0.71	300 300	0.999 0.663	0.058 0.038	1.172
Pair 8	I talk to my child about things I should save for. (MC8)	MCE8 MCP8	2.12 0.71	300 300	0.906 0.548	0.052 0.032	1.883
Pair 9	I communicate with my child about money management. (MC9)	MCE9 MCP9	1.7 0.7	300 300	0.774 0.756	0.045 0.044	1.307
Pair 10	I discuss the importance of saving with my child. (MC10)	MCE10 MCP10	2.14 0.64	300 300	0.907 0.748	0.052 0.043	1.804
Pair 11	I discuss the importance of a budget with my child. (MC11)	MCE11 MCP11	2.15 0.7	300 300	0.862 0.586	0.05 0.034	1.963
Pair 12	I discuss household finances with my child. (MC12)	MCE12 MCP12	2.42 1.37	300 300	0.765 0.653	0.044 0.038	1.48
Pair 13	I help my child open and maintain an account at a financial institution. (MC13)	MCE13 MCP13	2.02 0.72	300 300	0.763 0.806	0.044 0.047	1.656
Pair 14	I allow my child to make decisions about household spending. (MC14)	MCE14 MCP14	2.57 0.99	300 300	1.014 0.832	0.059 0.048	1.383
Pair 15	I help my child develop financial goals. (MC15)	MCE15 MCP15	2.57 0.58	300 300	0.984 0.581	0.057 0.034	2.467
Pair 16	I allow my child to manage their own money. (MC16)	MCE16 MCP16	2.91 0.8	300 300	0.813 0.7	0.047 0.04	1.789
Pair 17	I discuss the trade-offs & consequences of my child's money management decisions. (MC17)	MCE17 MCP17	1.88 0.77	300 300	1.02 0.669	0.059 0.039	1.295
Pair 18	I tell my child why I save and invest. (MC18)	MCE18 MCP18	2.35 1.23	300 300	0.818 0.72	0.047 0.042	1.449
Pair 19	I tell my child what he or she should do with his or her savings and investments. (MC19)	MCE19 MCP19	2.2 0.94	300 300	1.029 0.736	0.059 0.043	1.408
Overall	**Overall Money Communication (MC)**	**MCE** **MCP**	**2.17** **0.88**	**300** **300**	**0.215** **0.172**	**0.012** **0.009**	**6.625**

The results of paired t-test also reports that the overall money communication between parent-adolescent on collectively 19 items of this matched paired scale is derived from taking the average of disparities in the mean value of the 19 pairs in pre-survey and post-survey measures suggested that the disparity between the mean score of parent-adolescent money communication is reduced from 2.17 (SD = 0.215) to 0.88 (SD = 0.172) (t (299) = 101.26, p<0.05). This finding concludes that financial education given to the parent has positively enhanced money communication among parent-adolescent by reducing the disparity of the responses collected from the parents and adolescents on the matched pairs during pre-survey and post-survey.

Table 3: Paired Samples Test (Paired Differences)

Pairs	Codes	Mean	Std. Deviation	Std. Error Mean	95% Confidence interval of the Difference Lower	Upper	t-value	df	Sig. (2-tailed)
Pair 1	MC1	1.05	0.944	0.054	0.943	1.157	19.273	299	0.00
Pair 2	MC2	1.473	0.983	0.057	1.362	1.585	25.966	299	0.00
Pair 3	MC3	0.983	0.152	0.009	0.966	1.001	111.982	299	0.00
Pair 4	MC4	1.023	1.26	0.073	0.88	1.167	14.065	299	0.00
Pair 5	MC5	1.117	1.114	0.064	0.99	1.243	17.365	299	0.00
Pair 6	MC6	1.557	1.607	0.093	1.374	1.739	16.779	299	0.00
Pair 7	MC7	0.993	0.801	0.046	0.902	1.084	21.471	299	0.00
Pair 8	MC8	1.41	0.969	0.056	1.3	1.52	25.211	299	0.00
Pair 9	MC9	1	0.164	0.009	0.981	1.019	105.889	299	0.00
Pair 10	MC10	1.5	1.22	0.07	1.361	1.639	21.296	299	0.00
Pair 11	MC11	1.447	1.002	0.058	1.333	1.561	25.009	299	0.00
Pair 12	MC12	1.053	0.301	0.017	1.019	1.088	60.549	299	0.00
Pair 13	MC13	1.3	0.909	0.052	1.197	1.403	24.774	299	0.00
Pair 14	MC14	1.283	0.945	0.055	1.176	1.391	23.526	299	0.00
Pair 15	MC15	1.993	1.159	0.067	1.862	2.125	29.776	299	0.00
Pair 16	MC16	2.117	1.123	0.065	1.989	2.244	32.653	299	0.00
Pair 17	MC17	1.117	0.945	0.055	1.009	1.224	20.471	299	0.00
Pair 18	MC18	1.117	0.413	0.024	1.07	1.164	46.869	299	0.00
Pair 19	MC19	1.26	0.907	0.052	1.157	1.363	24.074	299	0.00
	MCO	**1.297**	**0.222**	**0.012**	**1.271**	**1.322**	**101.261**	**299**	**0.00**

p<0.05

In order to check the extent of change, i.e. effect of financial education workshop series on each item of money communication scale, *Cohen's d* effect sizes were calculated, for each dependent measure by dividing the value of mean differences of pre-survey to post-survey between groups by their pooled standard deviation. For calculating effect size following formula was used.

$$d = \frac{M1 - M2}{\sqrt{(SD1 + SD2)/2}} \quad (1)$$

Where M1 represents the mean score of pre-survey and M2 represents mean post-survey score of measure that is expected to be positively related to the independent variable. SD1 and SD2 show the standard deviation of disparity of responses collected from parent and adolescent in pre-survey and post-survey, respectively. A positive effect size of *Cohen's d*indicates a financial education workshop series enhances the parent-adolescent money communication by reducing the disparity of money communication perception among parents and adolescents. To know the effect size of each item of parent-adolescent money communication, *Cohen's d*was calculated for each separate variable and presented in Table 2. From the last column of Table 2, it can be seen that for all 19 pairs of parent-adolescent communication, the positive value of *Cohen's d*indicates that

financial education workshop series has a positive but diverse effect on various items of parent-adolescent money communication.

Similarly, to check hypothesis 2, the linear regression analysis was performed. For this difference in the money communication gap score found from pre-survey and post-survey was taken as an independent variable and financial autonomy score reported in pre-survey, and post-survey was considered as a dependent variable. Before performing linear regression, the correlation coefficient between these two variables was found and was -0.686, reported a strong negative correlation between the independent variable (money communication score) and dependent variable (financial autonomy) as the value is close to -1. In other words, if the gap frequency in money communication among parent-child is decreased, this led to the enhancement in the financial autonomy of the adolescents.

To check the significant influence of parent-child money communication gap and financial autonomy of the adolescents, the linear regression tests were used as a bi-variate statistical tool. It is used to model the dependence of a variable (single variable) on another explanatory variable (single variable). The functional affiliation then correctly specified as an equation, with associated statistical values that define how well this equation fits the data. The objective of the researcher is to ascertain the causal effect of one variable upon another. The researcher has also assessed the "statistical significance" of the estimated relationship.

The result of regression analysis is presented in Table 4. The correlations co-efficient of financial socialization variables and financial autonomy was -0.682, reflecting a strong positive correlation between these variables as the value is close to -1. R^2indicates the proportion of variance that can be explained in the dependent variable by the independent variable. This measures the strength of the relationship. This displays that 46.5% of the variation in financial autonomy is explained by the parent-child money communication gap.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	-0.682[a]	0.465	0.465	0.5807042	1.200

a. Predictors: (Constant), MonCom
b. Dependent Variable: FinAuto

F-statistic shown in Table 5 represents the significance of the test of the relationship between independent variables and dependent variable. The p-value is below 0.05 ($p<0.01$), therefore it is concluded that predicting financial autonomy based on parent-child money communication gap is statistically significant. This means that parent-child money communication gap does have a significant influence on the financial autonomy of the adolescents.

Table 5: ANOVA

Model		Sum of Square	dfa.	Mean Square	F	Sig
1	Regression	175.575	1	175.575	520.657	.000
	Residual	201.656	598	0.337		
	Total	**377.231**	**599**			

a. Predictors (Constant), MonCom
b. Dependent Variable: FinAuto

Table 6 supports to predict the prediction about financial autonomy by a parent-child money communication gap. Accordingly, the following equation is formed:

Y (Financial Autonomy) = 4.721 - 0.799 (Money communication gap score)

Table 6: **Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig
		B	Std. Error	Beta		
1	(Constant)	4.721	0.058		80.807	0
	MonCom	-0.799	0.035	-0.682	-22.82	0

The unstandardized coefficient shown in Table 6 is the value for the intercept (a) in the regression equation, while, the standardized regression coefficient Beta (β), allows the researcher to compare the relative strength of independent variable's relationship with the dependent variable. In other words, it provides us with information about how much change can be expected in the dependent variable with a one-unit change in each independent variable. Moving through the equation, the value of unstandardized coefficient indicates that on an average one unit increase in parent-child money communication gap will lead to a decrease in financial autonomy by 0.799 unit, keeping other factors constant. The negative t-value for parent-child money communication gap differences suggests the negative effect on the associated financial autonomy of the adolescents. The results of the β value show the strength of the association between the independent variable and dependent variable. The negative value of β (-0.682) reports the strong negative association between parent-child money communication gap and financial autonomy of the adolescents.

5. Discussion

The results of this study have valuable implications for regulatory authorities and providers for financial education, particularly, for the countries where there is no baseline data is available such as India. This study discusses one of the indirect outcomes of financial education workshops implemented for female parents, wherein responses collected from adolescents provide confirmation or crosschecking of the parents' responses about money communication perception. The overall findings of this study provide evidence that the disparity among parent-adolescent money communication (perceptions) is largely reduced by financial education and it is concluded that financial education enhances parent-adolescent money communication, suggesting that workshop series was effective in reaching the participants in their parent-adolescent money communication regarding the management of personal finances at home.

The overall results of paired t-test support the success of financial education workshop series, although, this effect is varied on each item of parent-adolescent money communication which can be identified by *Cohen's d* as shown in the last column of Table 2.

For interpreting the effect of treatment, Cohen suggested d=0.2 considered as a 'small' effect size, d=0.5 represents a 'medium' effect size and 0.8 a 'large' effect size. This means that if two groups' mean values do not differ by 0.2 standard deviations or more, the difference is trivial, even if it is statistically significant. The critical analysis of values of *Cohen's d* calculated for every 19 items of parent-adolescent communication also suggests that for all the matched pairs of parent-adolescent money communication items, *Cohen's d* is higher than 0.5 and positive in nature, signifying that financial education workshop series has a larger effect on all the variables of parent-adolescent money communication with a positive change. From the values of *Cohen's d* as presented in Table 2 show that among all the items of parent-adolescent money communication. The largest positive change is found on pair 15 (MC15), i.e. "I help my child to develop financial goals" (*Cohen's d* = 2.467) followed by pair 11 (MC11), i.e. "I discuss the importance of a budget with my child" (*Cohen's d* = 1.963) compared to other items of communication.

Similarly, the *Cohen's d* effect size for the rest of pairs of parent-adolescent money communication in descending order was found to be for pair 8 (MC8), i.e. "I talk to my child about things I should save for" (*Cohen's d* = 1.883), pair 2 (MC2), i.e. "I go for shopping with my child" (*Cohen's d* = 1.815), pair 10 (MC10), i.e. "I discuss the importance of saving with my child." (*Cohen's d* = 1.804), pair 16 (MC16), i.e. "I allow my child to manage their own money" (*Cohen's d* = 1.789) and henceforth. While Cohen's d effect size on the rest of pairs of parent-adolescent money communication in ascending order from the lowest was found to be for pair 4 (MC4), i.e. "I tell my child what to do with his or her money" (*Cohen's d* = 1.103), pair 7 (MC7), i.e. "I talk to my child about saving and investing money" (*Cohen's d* = 1.172), pair 5 (MC5), i.e. "I talk to my child about things we see or hear advertised" (*Cohen's d* = 1.249), pair 1 (MC1), i.e. "I talk to my child about buying things" (*Cohen's d* = 1.7294).

The close observation of the value of *Cohen's d* effect size for entire parent-adolescent money communication scale is found to be 6.625. This large value is of *Cohen's d* is higher than 0.5 and positive in nature, signifying that financial education workshop series has a larger effect on collectively all the variables of parent-adolescent money communication with a positive change. In other words, after providing financial education to female parents through financial education workshop series, the money communication among parent-adolescent is drastically enhanced by reducing the discrepancies of perception of parents and adolescent money communication with each other wherein the follow-up data was collected after six months of the completion of the financial education workshops.

The results of linear regression analysis performed to check the effect of parent-child money communication gap on the financial autonomy of the adolescents suggest that on an average one unit of decrease/increase in parent-child money communication gap will lead to increase/decrease in financial autonomy by 0.799 units considering other factors are constant. The results also report that 46.5% of the variation in financial autonomy is explained by the parent-child money communication gap.

6. Conclusion

The study was conducted in the state of Gujarat, India. Knowing that financial education empowers the participant parents to manage their household money, this research study was initiated with the assumption that financial education may improve the parent-adolescent money communication which would improve the financial autonomy of the adolescents. Starting with this assumption, it was explored whether this improvement in parent-adolescents money communication has any co-relation with the financial autonomy of the adolescents. In other words, whether improved parent-adolescent money communication also leads to improvement in the financial autonomy of the adolescents? Accordingly, the objective of the research study was to assess whether financial education enhances the parent-adolescent money communication, which in turn leads to improvement in the financial autonomy for the adolescents. To fulfil this research objective, a financial education workshop series was conducted for female parents, as a parent's gender was considered as a controlled variable.

The responses were collected from 300 female parents on parent-adolescent money communication scale consisting of nineteen items before conducting the first financial education workshop and after six months of the completion of the last financial education workshop. Assuming that parents always claim that they usually discuss money importance and its management with children, but their children don't 'hear' them, the matched pair of each money communication item of nineteen variables were framed in the structured questionnaire for adolescents to rate and their children who were in adolescence stage of life were requested to rate each matching item pair of the parent scale. However, parents were not told that their children were also asked to rate the matching pair of each item of parent money communication scale and vice versa. Accordingly,

these adolescents rated the matching version of parent-adolescent money communication scale twice, once before conducting the first financial education workshop and then six months after completion of the last workshop for their female parent.

The analysis of primary data reveals that enhanced parent-adolescent money communication because of financial education does enhance the financial autonomy of the adolescents not only on the overall scale but also for each paired item under study. The value of *Cohen's d* also confirms that financial education has a larger positive effect on such type of communication. Thus, this study provides a noticeable conclusion that financial education given to the parent positively enhances money communication among parent-adolescent by reducing the disparity between the responses collected from the parents and adolescents on the matched pairs during pre-survey and post-survey in the context of India and that this reduced disparity between the responses also indicates greater financial autonomy for the adolescents.

Overall, the findings from this study have several implications for financial educators and policymakers. Firstly, enhanced parent-adolescent money communication as a result of financial education workshops appear to strengthen the perception that imparting financial education to the female parent does have a positive impact on the way the adolescent children behave in terms of money matters. Considering that such desired financial autonomy cannot be strengthened in the long run only by one workshop, there must be a series of workshops for the participants. Secondly, post-survey responses revealed that as a result of financial education workshops, the adolescent children might have developed a strong intention to improve their money communication with their parent during the workshop series which has changed their financial habits positively, which has been confirmed by the reduced disparities found from parents' and adolescents' responses. This important outcome provides a likely assumption that developing financial autonomy in adolescents may have been constrained by factors such as "parents' inability or unwillingness to discuss financial matters" and the same is improved by empowering the parents on the subject of personal finance. Thirdly, financial educators and policymakers need to be aware that parents play a crucial role in the socialization process of their children and parents. Parents' instructions and communication with their children not only impacts the children's financial choices but also makes them feel more competent about managing their finances. Hence, along with designing financial education program material and workshops only for children, college students or adults, there is room to design and implement "family-based financial education workshops", which may provide them with an opportunity to learn about household money management to the entire family instead of one family member, this may open the lines of "money communication" between parents and children and lead to greater financial autonomy for the future generations which will bode well for the future of the country on a large scale.

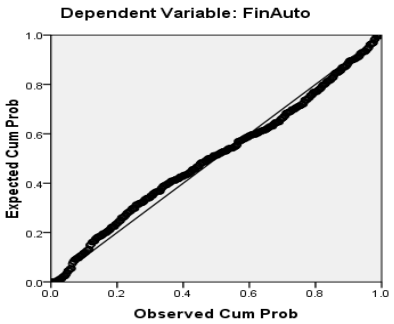
7. Limitations and Suggestions for Further Research

This study has several limitations. Firstly, the feedback of the program organizer and educator was not collected. Secondly, the study covered the households from only one district of the state of Gujarat. This limits the generalizability of the findings. Thirdly, the gender of the parent was controlled while the gender of the adolescent (child) was not controlled. This may lead to differences in the responses towards perceptions of female adolescents and male adolescents towards their parent's money communication. Lastly, there is an absence of a control group in this study.

This study provides enough scope for researchers to carry out rigorous experimental research design by employing a control group and much larger sample size from various states. This study can also be extended by controlling the gender of the children so that chances of difference in the responses due to gender bias in parent-child money communication can be overcome. It is also suggested that future studies should employ longer-term follow-up surveys of one or more years to explain the

sustainable effect of financial education on various financial attitudes, behaviours, and other outcomes.

Figure 1: Normal P-Plot of Regression Standardised Residual



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Appendix 1

Parent-adolescent money communication scale for parent and adolescent matched pairs		
Pairs	**Money Communication (Scale for parents)**	**Matching question for Adolescents**
1	I talk to my child about buying things.	This parent and I talk about buying things.
2	I go for shopping with my child.	I go for shopping with this parent.
3	I tell my child what things he or she should or should not buy.	This parent tells me what things I should buy or not buy.
4	I tell my child what to do with his or her money.	This parent tells me what they do with their money.
5	I talk to my child about things we see or hear advertised.	This parent talks about things we see or hear advertised.
6	I tell my child why I bought some things for myself.	This parent tells me why they bought some things for themselves.
7	I talk to my child about saving and investing money.	This parent and I talk about saving and investing money.
8	I talk to my child about things I should save for.	This parent and I talk about things I should save for.
9	I communicate with my child about money management.	This parent talks to me about money management.
10	I discuss the importance of saving with my child.	This parent discusses the importance of saving with me.
11	I discuss the importance of a budget with my child.	This parent discusses the importance of a budget with me.
12	I discuss the household finances with my child.	This parent talks to me about household finances.
13	I help my child open and maintain an account at a financial institution.	This parent has helped me open and maintain an account at a financial institution.
14	I allow my child to make decisions about household spending.	This parent allows me to participate in decisions about household spending.
15	I help my child develop financial goals.	This parent helps me develop financial goals.
16	I allow my child to manage their own money.	This parent allows me to manage my own money.
17	I discuss the trade-offs and consequences of my child's money management decisions.	This parent discusses trade-offs and consequences of my money management decisions.
18	I tell my child why I save and invest.	This parent tells me for what they save and invest.
19	I tell my child what he or she should do with his or her savings and investments.	This parent tells me what they do with their savings and investments.

Appendix 2: Financial Autonomy Statements

Pre-survey code	Post-survey code	FINANCIAL AUTONOMY VARIABLES
		Reflexive Autonomy
E1	P1	I like to think thoroughly before deciding to buy something.
E2	P2	I like to research prices whenever I buy something.
E3	P3	I make sure to get information on warranty periods.
E4	P4	I always try to obtain more information on product quality.
E5	P5	I pay attention to news about the economy as it may affect my family.
		Emotional Autonomy
E6	P6	I like to participate in family decision making when we buy something expensive for home.
E7	P7	I usually have a critical view of the way my friends deal with money.
E8	P8	I take part in domestic expense planning.
E9	P9	I try to advise my children on money matters.
E10	P10	I feel prepared to talk to my children and spouse about money matters.
		Functional Autonomy
E11	P11	I always try to save some money to do things I really like.
E12	P12	I always like to negotiate prices when I buy.
E13	P13	I suggest at home that we keep money aside for emergencies.
E14	P14	I keep an eye on promotions and discounts.
E15	P15	I am willing to make sacrifices now to buy something important.

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FUND MANAGERS ADDING VALUES? MEASURING PERFORMANCE WITHOUT BENCHMARK – A STUDY OF INDIAN MUTUAL FUND SCHEMES

KAUSHIK BHATTACHARJEE[1], DIGANTA MUKHERJEE[2], MUNAWAR SAYYAD[3*]

1. ICFAI Business School, Hyderabad, India
2. Indian Statistical Institute, Kolkata, India
3. ICFAI Business School, Hyderabad, India

* Corresponding Author: Munawar Sayyad, Department of Finance and Accounting, ICFAI Business School, Hyderabad, India, IFHE-IBS Campus, Donthanapally, Shankarapalli Road, Hyderabad, Telangana India
☎+ 91 8688484387 ✉munawar0013@ibsindia.org

Abstract

This paper calculates the Portfolio Change Measure (PCM) developed by Grinblatt and Titman for a sample of 744 equity schemes of Indian mutual funds over a minimum period of more than two years and less than 11 years. PCM, based on holding of assets, is a measure which is free from 'benchmark' biases arising out of usage of a 'benchmark' portfolio. So, by using PCM as a measure, this paper, without using any benchmark, attempts to assess whether the selected mutual fund managers were able to add value and exhibit superior skills on the average and thus making a case for active fund management over a passive buy and hold strategy. Using the monthly holding statement of each scheme's portfolio, rolling PCM has been calculated monthly with a rolling window of one year. The results of our analysis supported by robustness checks, which include periods of pre-and post-Global Financial Crisis, shows strong evidence of active fund management adding value in the stock selection and hence in return generating process, thus justifying the possession of superior skill or superior information of fund managers at an aggregate level. Finally, using Quantile Regression, we identify some characteristics of the scheme like scheme size and ownership category, which influence PCM significantly.

JEL Classification: G14, G23

Keywords: Performance Measurement, Mutual Funds, Benchmark, Holdings

1. Introduction and Literature Review

Mutual funds are one of the main pass-through financial instruments through which investors, both retail and institutional; participate in the traded securities market. Though several fund managers follow 'passive' management simply linking the corpus to a particular benchmark index, yet it is also a fact that majority of them claim to add value by managing the portfolios 'actively'. Thus, the long-standing question the academicians, regulators, and investors alike face is whether active fund managers can deliver superior performance, justifying their fees?

Consequently, starting from the sixties, since the development of the Capital Asset Pricing Model (CAPM), the literature on the evaluation of active fund management has grown enormously. Starting from the Treynor ratio (Treynor, 1965), Sharpe ratio (Sharpe, 1966) and Jensen's alpha (Jensen, 1968) up to Fama and French (1993) three-factor model, to which Carhart (1997) added momentum as the fourth factor (known as Carhart's alpha) and more recently 'Information ratio' (Sharpe (2007)) - all these measures have looked into 'risk adjusted return' over and above a benchmark portfolio return. In other words, these measures, collectively referred to as 'return based measures' which have

been developed in the framework of 'risk adjusted return' are essentially a comparison of returns of the concerned portfolio with another portfolio, often referred to as the 'benchmark' portfolio, scaled by some measure of risk. Hence depending upon whether the portfolios chosen are truly comparable (i.e. they are not only based on the same assumptions of risk-return trade-off but also bound by similar constraints); such measures are subject to "benchmark bias" (Roll 1978, Roll 1981). Javier Rodriguez (2018) has used a modified Herfindahl Index to calculate the portfolio diversification in the regional mutual funds for three regions of Asia Pacific, Europe, and Latin America.

So far as benchmarks are concerned, they have to be based on an objective consideration of the needs of the fund manager; otherwise, they are merely arbitrary indicators.[1] Roll (1978) has clearly shown that the choice of the benchmark can result in a bias in the estimation of alpha *(a)*'s. These traditional return-based measures generally result in similar inferences when using the same benchmark, but inferences can vary, even reverse, when using different benchmarks (Grinblatt and Titman 1991, Grinblatt and Titman 1994). As an extension to the existing literature on the selection of benchmarks, Bailey (1992) suggested a set of criteria. However, it is a very rare occasion where a benchmark is readily found satisfying all the criteria. Academic studies[2] have computed benchmarks based on risk-adjusted native portfolios using an asset pricing model such as CAPM (which is like Jensen's measure, except for the risk-adjusted benchmark). Another major limitation of these traditional return and benchmark-based measures of portfolio performance is that they are indirect measures of skill and performance of a fund manager as they cannot reveal the underlying reasons as to why the portfolio produced the returns it did.

Another strand of relatively recent research has propagated another approach to examine portfolio performance by analysing the holding statement of the funds, i.e. to view investment performance in terms of which securities the manager buys or sells from the portfolio. By examining how the portfolio's holdings change over time, the intelligent investor can establish at a more detailed level which stock or bond positions were responsible for creating that performance. Thus, using a holdings-based measure can provide additional insights into the qualities of the portfolio manager, like stock picking and timing ability.[3]

Till date the most prominent holding-based measure is the measure proposed by Grinblatt and Titman (1993): The Portfolio Change Measure (henceforth called PCM).[4] By utilizing the changes in the composition of the portfolio assets over a period of time, PCM eliminates the need to compare the return of a portfolio to a benchmark portfolio and consequently avoids its associated benchmark bias.[5]

PCM as a measure of fund returns and fund managers ability to add value was introduced in earlier studies such as by Grinblatt and Titman (1993). It has been used in studies involving Momentum Investment Strategies, Portfolio Performance, and Herding (e.g. Grinblatt et al. (1995), Daniel et al. (1997), Warmers (2000), Chen et al. (2000), and Warmers (2005))

These studies analysed the extent to which mutual funds purchase stocks based on their past returns as well as their tendency to exhibit "herding" behaviour (i.e., buying and selling the same stocks at the same time). On average, using PCM as a measure, it has been found that funds that invested in momentum realized significantly better performance than other funds. Bruce et al. (2014) analysed

[1] Ansella and Molesa (2003).
[2] Grinblatt and Titman (1989, 1994); Grinblatt, Titman and Wermers (1995)
[3] For a detailed discussion on how the portfolio holdings data might provide new insights into managed fund performance refer Warmers (2006).
[4] Also known as Average GT measure.
[5] By construction it also avoids survivorship bias. However, the main issue with PCM is non-availability of holding data at a higher frequency than month – but it is also a fact that analysis with very high frequency (e.g. daily) or ultra-high frequency (e.g. intra-day) might introduce undesirable noises. (Grinblatt and Titman, 1993)

equity funds using the Carhart Four-factor model by carrying out rolling regression for the Australian market for investigating fund manager performance.

In this paper, we calculate PCM for a sample of 744 Indian mutual fund schemes over a minimum period of 2 years, and a maximum 11 years, with a view of understanding whether at an aggregate level the selected mutual fund schemes can perform over and above a simple buy and hold strategy. India is an important emerging market so far as inflow of funds in the mutual fund industry and hence its importance in the investment scenario of the country is concerned. The Indian mutual fund industry has shown impressive growth in the past two decades both in terms of Asset under Management (AUM) and several folios (i.e. mutual fund accounts).[6] However, in Indian context till date, to the best of our knowledge, no comprehensive long term study has been done to evaluate the efficacy of active management of the schemes (i.e. which tries to evaluate the stock-picking ability by changing portfolio weights of the Indian fund managers) using PCM. Our study fills the gap. Another notable attribute of our paper is adhering to nonparametric methodologies. Due to non-normality and skewness of the return distributions of various stocks and even return distributions of Net Asset Value (NAV) of different mutual fund schemes. Consequently, even the visual inspection itself (e.g. histogram in Appendix C) for PCM indicates sufficiently that the distribution is too skewed and highly deviates from normality. Since traditional parametric methods of testing hypotheses (i.e. t-test s or ANOVA) which are extremely sensitive to non-normality and skewness, in this paper, we predominantly employ nonparametric techniques (i.e. Quantile Regression, Kruskal-Wallis test, Wilcoxon Signed Rank test etc.) for drawing an inference, so that the issue of biased inference can be mitigated to a large extent.

Primarily, our results, based on substantial analysis of PCM suggest that for equity mutual fund schemes, on the average and in the long run, active fund management by the professional fund managers do add value over and above a simple buy and hold strategy. Additionally, as a part of the robustness check process, we analysed the behaviour of PCM during the Pre, post and in the Global Financial Crisis (GFC). We also show that while management fees do not influence PCM yet, it does get affected by the size of the scheme, AUM of the AMC and several other ownership categories to which a fund belongs.

The remainder of the paper is organized as follows: Section 2 introduces the PCM measure, describes the data, the methodology adopted for (i) calculating the PCM and (ii) drawing the inferences from the results obtained. It also discusses the effect of transaction cost on the behaviour of PCMs. Section 3 presents the result and discusses it along with robustness checks for time periods and ownership structure. Section 4 concludes the paper. It also discusses the limitations and scope of future research.

2. Methodology and Data

In this section, we outline the formula for PCM, its estimating methodology and calculation using the data, followed by the formation of Hypothesis. Also, in this section, we establish the irrelevance of management fees and expenses so far, the calculation of PCM is concerned.

2.1 Statistical background and properties of PCM:[7]

Suppose there are N assets available for a fund manager to invest for a given amount of fund. If the one period expected return on *j*-th asset is $E(R_j)$ and the expected holding of the same asset are

[6]The industry size almost doubled in the past three years to Rs. 21.8 lakh crore in FY17-18($312 bn) from Rs. 10.8 lakh crore ($166 bn) in FY14-15 and quadrupled in the past 10 years from Rs. 5.1 lakh crore($100 bn) in FY07-08, as per a white paper from CARE Ratings, Refer to Figure 1.(https://www.moneylife.in/article/equity-mutual-fund-aum-grew-290-percentage-over-the-past-five-years-report/56261.html
Also refer to Appendix B for a discussion on phases of mutual fund Industry in India

[7]This section has been adopted from Grinblatt and Titman (1993)

denoted by $E(W_j)$. The following sum (SUM) is the sum of differences between the actual expected return of the portfolio managed by the fund manager and the expected return of the same portfolio if returns and weights of all the assets are not correlated.

$$SUM = \sum_j \left[E(W_j R_j) - E(W_j) E(R_j) \right] \quad (1)$$

The same *SUM* can be looked upon as covariance[8] between asset return and portfolio weights.

$$\text{cov} = \sum_j \left[E\left(W_j - E(W_j)\right) R_j \right] \quad (2)$$

This covariance is the foundation of PCM and holds at sample covariance level as well, since

$$S\text{cov}(w_j, R_j) = \sum_t \left(W_{jt} - \bar{w}_j\right)\left(R_{jt} - \bar{R}_j\right)/T = \sum_t \left(W_{jt} - \bar{w}_j\right)\bar{R}_{jt}/T \quad (3)$$

Where,
*S*cov = Sample covariance between weights and returns of asset *j* of period *t*.
W_{jt}= the portfolio weight at the beginning of the portfolio *t* (with sample mean $\bar{w}_j$)
R_{jt}= the portfolio returns from date *t*-1to*t*
T = the number of discrete-time intervals during the period *t*.

Here if it is assumed that period *t* + *k* return for each asset is used as a proxy for its expected return during the period *t* and its period *t* - *k* holding as a proxy for its expected holding during period *t*. The PCM can be expressed as follows:

$$PCM = \sum_t \sum_j \left[R_{jt}\left(w_{jt} - w_{jt-k}\right) \right] / T \quad (4)$$

Under the assumption of no superior information available to the fund manager, both the past and current weights should be uncorrelated with current returns. So, over some time PCM should ideally be zero for large samples for any mutual fund scheme. The inner summation is an ex-post estimate of the covariance between returns and weights of the assets in a portfolio at a point in time.

The test employed by Grinblatt and Titman (1993) for testing significance of PCM is a t-test based on the time series of zero-weight portfolio returns, symbolically $t = \sqrt{T} \quad (\frac{\overline{PCM}}{SD})$, where $\overline{PCM}$ the sample time series average and SD is the sample time-series standard deviation of the PCM calculated. The justification being, if securities returns are serially uncorrelated, the central limit theorem can be applied, and asymptotic z-tests and chi-square tests are valid for non-normal portfolio returns. These results are valid so far as the returns distributions are not so thick-tailed such that second and higher moments do not exist. However, the existence of such thick tails in financial data is often documented in the empirical finance literature (CLM, 1997 and Ruppert, 2004).

2.2 Data

The data contain the monthly security holding statement information for 28 Mutual Fund Houses or Asset Management Companies (AMCs) with more than 1000 open-ended equity schemes since their inception as on March 31. 2016. [9]*We would like to mention here that the sample thus chosen is free from survivorship bias*. However, if the period of existence of any scheme is less than 24 months, we

[8] Actual sum of covariance's; however, both weights and returns are unit free quantities and hence the aggregation is valid.
[9] It is a random sample out of 44 AMCs existing at that point of time. These AMCs together covers more than 80% of the AUM of the entire Mutual Fund Industry. Though one of the largest, we have not considered UTI MF because of being outlier in different parameters. Also, the longest holding statement goes back up to January 2005.

have not considered it for analysis, and finally, the number arrived for calculation is 744.[10] The schemes are collectively named as 'Equity' schemes as more than 90% of each scheme invests in pure equity. (Table A1 of Appendix-A provides the names of the AMCs). The data has been obtained from NAVINDIA database of CAPITALINE.

2.3 Calculation of PCM

For any given scheme from the monthly holding statement,[11] we arrive at monthly GT by using the formula

$GT_t = \sum_{j=1}^{N}(w_{jt} - w_{jt-1})R_{jt}$ (Taking k=1 in (4), since we have monthly holding data) and next we arrive at yearly PCM_T by using the formula $PCM_T = \frac{\sum_{t=1}^{T} GT_t}{T}$ by taking T=12 and calculate the rolling PCMs by using a rolling window of estimation of 12 months.[12]

2.4 An Important Property of GT and PCM: Indifference of the Effect of Transaction Cost

It is a fact that without information about administrative and management fees, it might be challenging to reach any conclusion based on any measure of mutual fund performance. However, in this section, we demonstrate that both GT and PCM are measures which are indifferent to such expenses, in the following manner:

Assuming administrative and management fees (as a proxy by TER, i.e. Total expense ratio[13]) for a given scheme remain constant over a given period of time (e.g. a year) the change in the GT measure after accounting for the transaction cost would be given by

$$GT_t^{\tau} = \sum_{j=1}^{N}(R_{jt} - \tau)(w_{jt} - w_{jt-1}) \text{ ---------- (5)}$$

Where τ is the TER

Now a simple algebra shows that both GT_t^{τ} and GT_t would be equal

$$GT_t^{\tau} = \sum_{j=1}^{N}(R_{jt})(w_{jt} - w_{jt-1}) - \tau\sum_{j=1}^{N}(w_{jt} - w_{jt-1}) \text{ ---------- (6)}$$

$$\text{Since, } \because \tau\sum_{j=1}^{N}(w_{jt} - w_{jt-1}) = 0 \forall \text{ t we have } \therefore GT_t^{\tau} = \sum_{j=1}^{N}(R_{jt})(w_{jt} - w_{jt-1}) = GT_t \text{ ---------- (7)}$$

[10] Less than 24 months' data was excluded because while calculating the rolling PCM calculations there would be too few observations only to make any valid comparison.

[11] As per the regulation of SEBI the holdings are to be disclosed on the last working day of any calendar month for each scheme of an AMC/fund house.

[12] Hence in this paper PCM stands for PCM_{12}. Less than 24 months' data was excluded because when taking the rolling data for PCM calculations there would be few observations only.

[13] TER is the Total expense ratio calculated based on the recurring expenses of the scheme. The recurring expenses includes investment and advisory fees, marketing and selling expenses, brokerage and transaction cost, audit fees, custodian fees, expenses on fund transfer, expenses charged to a scheme on this basis divided by its net assets give the base total expense ratio TER etc.

I.e. if transaction cost is remaining unchanged over a period, then it does not affect the GT as a measure. In other words, whether the return has been calculated before or after management fees, the conclusion drawn does not alter qualitatively.

So far, the PCM is concerned; the literature is unclear about how to incorporate the transaction cost in the measurement of PCM. (Instead of GT) Assuming it to be deducted just like in the case of Return or Net Asset Value (NAV) we get

$$GT_t^{\tau} = GT_t - \tau_t \text{ ---------- (8)}$$

$$PCM^{\tau} = \frac{1}{T}\sum GT_t^{\tau} - \frac{1}{T}\sum \tau_t = PCM - \overline{\tau} \text{ ---------- (9)}$$

Since empirically $PCM >> \overline{\tau}$ (Typically for most schemes PCM values are in the range of -450 to 1000, averaging between 30-50, whereas $\overline{\tau}$ values are in the range of 0.003 to 0.0268). The absolute PCM values are greater than $\overline{\tau}$ values. Hence, we get for all practical purpose $PCM^{\tau} = PCM$. *In* other words, even if we consider the transaction cost explicitly, it does not alter the results of the ranking or rating exercises of the schemes.

2.5 Hypothesis

Given the data and the estimation procedure and statistical properties of PCM, we formulate the following hypotheses:
H_{01}. The mean of the rolling PCM is not different from zero.

The rationale behind the above Hypothesis is the fact that under the assumption of no superior information (or stock-picking skill) available to the fund manager, PCM should ideally be zero for large samples.

Hence, if found the contrary it would imply a strong indication of possession of superior information by those professional fund managers. Hence, it would justify the active fund management over simple buy and hold strategy.

3. Empirical Analysis and Results:

The test result of the first Hypothesis concerning the mean performance of the rolling PCM has been given in Table 1.

Table 1: *Performance of means of rolling PCM (with a rolling window of 12 months)*

No. of schemes	Mean	Standard error	p-value of t-statistic	Sign test statistic (Z)	p-value of Z	Shapiro-Wilk statistic (W)	p-value of W
744	34.14	3.54	0.00	309	0.00	0.47	0.00

Source: Authors' Calculation: The table reports the mean value of the PCM of the schemes along with standard error and p-value (probability of a larger value of test statistic under the null Hypothesis) of t-statistic, which is 0.00 suggesting that the PCMs on the average are significantly different from zero. It also gives the Shapiro-Wilk statistic (W) for the sampled firms with p-value (probability of a larger value of test statistic under the null Hypothesis) being zero indicating non-normality of the distribution of the PCMs.

Therefore, we can observe that there is sufficient evidence to doubt the null Hypothesis that the rolling PCMs are not significantly different from zero on the average so far as the monthly returns are concerned. The t-test confirms that. However, given the fact that the departure of the sampling distribution of the mean of the rolling PCM from normality is significant (as implied by the W statistic

and its p-value); we refer to the nonparametric sign test which also clearly indicates its significant difference from zero.

3.1 Robustness Checks with respect to Median, Subsamples and Winsorizing:

Table 2: Performance of median of rolling PCM (with a rolling window of 12 months)

No. of schemes	Median	Standard error	p-value of t-statistic	Sign test statistic (Z)	p-value of Z	Shapiro-Wilk statistic (W)	p-value of W
744	18.23	0.88	0.00	349	0.00	0.54	0.0

Source: Authors' calculation: The table reports the median value of the PCMs of the schemes along with standard error and p-value (probability of a larger value of test statistic under the null Hypothesis) of t-statistic which is 0.00 suggesting that PCMs on the average are significantly different from zero. It also gives the Shapiro-Wilk statistic (W) for the sampled firms. With p-value (probability of a larger value of test statistic under the null Hypothesis) being zero indicating non-normality of the distribution of the PCMs.

Since the distribution of the mean of the rolling PCM is non-normal and infested with extreme observations, as a robustness check of our findings, we test the same Hypothesis on the median.[14]Table 2 displays the result.

Therefore, we can conclude that there is sufficient evidence to doubt the null Hypothesis that the rolling PCMs are significantly different from zero on the average in case of monthly returns. The conclusion is consistent at all the conventional levels of significance as implied by both parametric and nonparametric tests.

Next, as another robustness check, we consider schemes which are in existence for more than 24 months but not more than seven years. This is to exclude any scheme which was in existence during the subprime recession or 'bear phase'. We conduct the same analysis. The results are in Table 3.

Table 3: Performance of means of rolling PCM (with a subsample of schemes in existence up to 7 years)

No. of schemes	Mean	Standard error	p-value of t-statistic	Sign test statistic (Z)	p-value of Z	Shapiro-Wilk statistic (W)	p-value of W
416	30.55	5.34	0.00	167	0.00	0.46	0.00

Source: Authors' Calculation: The table reports the median value of the PCMS of the schemes along with Standard error and p-value (probability of a larger value of test statistic under the null Hypothesis) of t-statistic which is 0.00 suggesting that PCMs on the average are significantly different from zero It also gives the Shapiro-Wilk statistic (W) for the sampled firms. With p-value (probability of a larger value of test statistic under the null Hypothesis) being zero indicating non-normality of the distribution of the PCMs.

In this case, as well we can observe that there is enough evidence to doubt the null Hypothesis that the rolling PCMs are not significantly different from zero on the average so far as the monthly values are concerned. Firstly, the t-test confirms that. However, given the fact that the departure of the sampling distribution of the mean of rolling PCM from normality is significant (as implied by the W statistic and its p-value); we refer to the nonparametric sign test which also clearly indicates its significant difference from zero.

[14] Hypothesis H_{01A}: The median of the rolling PCM is not significantly different from zero.

Table 4: ***Performance of means of rolling PCM (Winsorized)***

Percent Winsorized	*Mean*	*Standard error*	*LCL(Lower Confidence Limit)*	*UCL(Upper Confidence Limit)*	*t-stat*	*p-value*
5%	25.26	1.86	21.59	28.93	13.53	0.00
10%	25.14	1.03	23.11	27.17	24.37	0.00

Source: Authors' Calculation: The table reports the median value of the Schemes along with Standard error and p-value (probability of a larger value of test statistic under the null Hypothesis) of t-statistic which is 0.00 suggests that PCMs on the average are significantly different from zero. It also gives the Shapiro-Wilk statistic (W) for the sampled firms. With p-value (probability of a larger value of test statistic under the null Hypothesis) being zero indicating non-normality of the distribution of the PCMs. The sample consists of Winsorized extremes at 5% and 10% levels.

Next, we winsorized the extreme upper 5% and 10% values and then repeated the analysis. The results are in Table 4. It can be observed that even after Winsorizing, we get similar results that are supporting the original conclusion.

3.2 Effect of Market Conditions on GT (and PCM)

Since our data set spans several years (2016 to 2005) for many a scheme, it becomes imperative to test for different market conditions as an influencing factor affecting the overall performance of PCM, especially controlling for bearish and bullish phases. The most prominent macroeconomic event affecting the equity markets all over the worlds during this period is undoubtedly "Global Financial Crisis" (GFC). Thus, we proceed to test if the performances of the fund managers, as indicated by the PCMs, are contingent upon market conditions as implied by the GFC. Following, Ben-David et al. (2012), we define "Before Crisis", "After Crisis", and "During Crisis" as up to November 2007, December 2007 to June2010 and after June 2010, respectively. This is also the reason we identify and segregate schemes that were 'live' spanning all the three-time periods.[15] In this case, also we find that both parametric and nonparametric tests are indicating that under all the three market conditions, the PCM is significantly different from zero.

Table 5: Comparison of Mean &Median of Rolling PCM Pre, Post & During Global Financial Crisis

Period	Test	Median	Mean	Test Stat Value	p-value
Crisis	Sign (M)	12.86		1246	<0.0001
Crisis	Signed Rank (S)	12.86		1651174	<0.0001
Crisis	t-test		30.75	11.79	<0.0001
Before Crisis	Sign (M)	8.92		1359	<0.0001
Before Crisis	Signed Rank (S)	8.92		2036068	<0.0001
Before Crisis	t-test		44.29	2.91	0.0037
After Crisis	Sign (M)	5.75		4624	<0.0001
After Crisis	Signed Rank (S)	5.75		24564092	<0.0001
After Crisis	t-test		34.50	8.16	<0.0001

Source: Authors' Calculation: The table reports the median and the mean values of the combined schemes after being segregated based on pre, post and during the crisis periods. The table shows, along with test statistic the corresponding p-values which are much lower than 0.01 suggesting that PCMs on the average are significantly different from zero during all the three sub-periods that is the pre, post and in the crisis periods.

Indeed, the next stage of analysis should find whether the PCM on the average were significantly different from each other. To answer that we employ the Kruskal Wallis Test (KW), which can be looked upon as the nonparametric counterpart of one-way Anova[16]. Results of KW test indicate

[15] The number of AMCs boils down to 11 and the number of schemes boils down to 157.

[16]Because of non-normality and highly skewed distribution we do not perform one-way ANOVA parametric testing as the underlying assumptions for the parametric ANOVA would be violated

that there are significant differences between PCMs at the mean level: during the crisis period, it is least, followed by after crisis period and highest being before the crisis period started. It supports the conjecture that at a collective level, information asymmetry or superior stock-picking skill is lowest across the fund managers during that crisis period.

Table 6: Kruskal- Wallis Test for testing

Chi-Square	562.97
DF	2
Prob>Chi square	<0.0001

Source: Authors' Calculation: The table reports the Kruskal Wallis test. The value of the test statistic is 562.97, which follows a Chi-Square distribution with 2 degrees of freedom (since there are three levels). The p-value (probability of a larger statistic under the null Hypothesis) is <0.001. This leads to the rejection of the null Hypothesis that there is a difference in location parameter for PCM among the different market conditions, i.e. pre, post and during the GFC.

3.3 Comparison of active funds with Index funds

Next, we proceed to test if the means of the rolling PCM is different from zero significantly since the portfolio of Index funds also change weights from time to time due to change in the market capitalization of the constituent stocks. We calculated PCM for Index funds[17] , the number being 52 for the study period by considering quarterly time intervals[18] instead of monthly. Next, we test the same against Ho (*The mean of the rolling PCM is not different from zero), and we find that H0 is being rejected (at 1% level) by both parametric and nonparametric tests.*

Table 7: *Performance of means of rolling PCM of Index funds*

No. of schemes	Mean	Standard error	p-value of t-statistic	Sign test statistic (Z)	p-value of Z	Shapiro-Wilk statistic (W)	p-value of W
52	0.682	0.068	0.000	282	0.00	0.59	0.00

Source: Authors' Calculation: The table reports the mean value of the PCM of the schemes along with standard error and p-value (probability of a larger value of test statistic under the null Hypothesis) of t-statistic, which is 0.00 suggesting that the PCMs on the average are not significantly different from zero. It also gives the Shapiro-Wilk statistic (W) for the sampled firms with p-value (probability of a larger value of test statistic under the null Hypothesis) being zero indicating non-normality of the distribution of the PCMs.

Apparently, this result seems to be counterintuitive at first glance and thus not supporting the basic premise of Grinblatt& Titman (1993) that for a passive 'buy and hold' fund, the PCM should be ideally zero and H_0 should ideally not be rejected at a given significance level. However, according to our observations, it is not so. This is because that while analysing the holdings of index funds, we find that the portfolio of these schemes changes the weights based on the change in the performance of constituent stocks in the index. In fact, the weights do change on a monthly as well as a quarterly basis for most of the stocks. This change in weights (compelled by the change of weights of stocks in the index due to their performance change) makes the index funds not passive 'buy and hold' funds in true sense. Over and above, many of the index funds do not mimic the index cent-percent. We find, about 80% of the funds shadow the index only to the extent of 85-90 percent (e.g. it is natural to observe that an indexing scheme following Nifty 50 index has 40-45 stocks of Nifty index in its portfolio). Hence the effect of change of weights of stock in the composition of the index is often influencing

[17]It would have ideal to consider the same for ETFs too. However, ETFs gained popularity in India in recent past especially from 2015 onwards. For our sample period the number of ETFs having enough historical data points is very less compared to other funds and hence we did not cover the ETFs in our study. Further studies may be conducted with respect to ETFs and its influence towards Indian Mutual fund industry.

[18]Assuming that quarterly changes would be more prominent and higher in magnitude.

in an out of proportion magnitude in the PCM of the Index fund. However, even with significant positive PCM, these index funds scores much less when compared to their actively managed counterparts. In other words, we find that on the average the PCM of these index funds (0.68) is much less than the average PCM of the actively managed funds (34.14)

In the following table, we report the test of equality of mean PCM of Index funds vs the same for the Active funds

Table 8: Equality of Mean PCM of Index funds vs Active funds

Method	Variance	t_value	p_value
Pooled	Equal	6.81	<0.001
Satterwhaite	Unequal	29.15	<0.001

From the above table, we observe that the null of equality of means is being rejected under both equal and unequal variance with levels much less than 0.01. Hence, in summary, we may conclude that though the rolling PCM of index funds are not quietly significantly different from zero, it is much less than their actively managed counterpart. This corroborates the basic premise of Grinblatt& Titman (1993) that active fund managers should ideally add more value to through their stock-picking skills than passive fund managers who simply mimic the index.

3.4 Transaction Costs

In section 2.3 of the paper, we have demonstrated that GT is indifferent of transaction cost if the transaction cost is unchanged over a period. We have also shown that PCM as a measure also remain unaffected even when it is changing over time provided the average transaction cost is small enough. However, if we consider the transaction cost is also changing over time, i.e. τ (Tau) is not fixed rather changes with changes in the period, it is not possible to show mathematically (and hence the need for empirical validation) that GT is independent of the transaction cost. In such a case at best, we may investigate the effect of changing transaction cost empirically using actual values. We first find the change of the transaction cost (as measured by Total expense ratio (TER)) on a monthly as well as every quarter. Next with this transaction cost data, we recalculate the PCM for a sample of 153 diversified equity schemes which were actively managed. We observe that monthly the change of the expense ratio of those selected schemes is less than 0.02 percent on the average. Even if we consider the quarter on quarter change in expense ratio, there is not much increase with average being 0.038 per cent. As a result, we find that the decrease in the value of PCM is only 1.76% on the average. Needless to mention that statistically to the resultant PCM is significantly greater than zero.

Here we would like to reiterate that literature on the effect of transaction cost is not unanimous on its effect on the mutual fund performance. Though it is usually considered that after accounting for transaction cost the performance of mutual funds loses its sheen, there are several earlier studies which have shown that transaction cost does not affect the performance of the mutual fund to a great extent. Wermers (2002) suggested that the transaction costs affect 1.6% for mutual fund performance. In the European context, Bams and Otten (2002) also suggest that active managers tend to outperform market despite transaction costs. Several other studies, like Chen et al. (2004), Ferreira et al. (2013) demonstrated no significant impact of transaction cost on fund performance. However, in this paper, we are examining to what extent PCM, as a measure of value addition through changes in the portfolio weights gets affected by transaction cost. Overall, our findings suggest that the effect of transaction cost is not significant.

Table 9: Performance of means of rolling PCM with transaction cost (with a rolling window of 4 quarters)

No. of schemes	Mean	Standard error	p-value of t-statistic	Sign test statistic (Z)	p-value of Z	Shapiro-Wilk statistic (W)	p-value of W
153	33.53	3.248	0.000	277	0.00	0.66	0.00

Source: Authors' Calculation: The table reports the mean value of the PCM of the schemes along with standard error and p-value (probability of a larger value of test statistic under the null Hypothesis) of t-statistic, which is 0.00 suggesting that the PCMs on the average are not significantly different from zero. It also gives the Shapiro-Wilk statistic (W) for the sampled firms with p-value (probability of a larger value of test statistic under the null Hypothesis) being zero indicating non-normality of the distribution of the PCMs.

3.5 Effect of Large Cap, Mid-Cap and Small-Cap funds

As per the sample data which we have considered in our analysis evidence that categorization, such as large-cap, mid-cap and Small-cap (though the classification itself is somewhat arbitrary) does affect the PCM values, in order to investigate this effect of classification we first define (as there was no standard definition in the Indian context before 2018) large-cap funds as schemes, which at any given point in time, invested more than 50% of its corpus (or AUM) in stocks of companies which fall into the categories of large market cap stocks (approximately top 10% of the universe of stocks).

Table 10: Performance of means of rolling PCM with transaction cost (with a rolling window of 12 months)

Type. of schemes	No. of schemes	Mean	Standard error	p-value of t-statistic	Sign test statistic (Z)	p-value of Z	Shapiro-Wilk statistic (W)	p-value of W
Large	416	43.95	2.67	0.00	99	0.00	0.51	0.00
Mid	97	35.82	3.12	0.00	29	0.00	0.51	0.00
Small	62	13.81	3.42	0.00	26	0.00	0.82	0.00
MultiCap	169	16.47	2.19	0.00	27	0.00	0.79	0.00

Source: Authors' Calculation: The table reports the mean value of the PCM of the schemes along with standard error and p-value (probability of a larger value of test statistic under the null Hypothesis) of t-statistic, which is 0.00 suggesting that the PCMs on the average are not significantly different from zero. It also gives the Shapiro-Wilk statistic (W) for the sampled firms with p-value (probability of a larger value of test statistic under the null Hypothesis) being zero indicating non-normality of the distribution of the PCMs.

Next, we define mid-cap funds as schemes, which at any given point in time, invested more than 50% of its corpus(or AUM) in stocks of companies which fall into the categories of mid-market-capitalization stocks(approximately between top 10% to top 50% of the universe of stocks) and finally, we define small-cap funds as schemes, which at any given point in time, invested more than 50% of its corpus(or AUM) in stocks of companies which fall into the categories of small-market-capitalization stocks(approximately between below top 50% of the universe of stocks). Otherwise, we considered a fund as hybrid or multi-cap as mentioned earlier that we started with 744 diversified equity funds and according to this categorization, the percentage of such firms were 56% Large Cap, 23% multi-cap, 13% Mid Cap and 8% in Small Cap. The PCM values for Large Cap and mid-cap were 38.95 and 35.82, respectively whereas the same for multi-cap and small-cap were 15.6 and 13.81 respectively. We find that these mean PCMs are all significantly different from zero, and also, they are statistically significantly different from each other. Thus, our preliminary analysis (as presented in

Table10) suggests that managers managing large-cap and mid-cap funds have better stock-picking ability than multi-cap and small-cap funds.[19]

3.6 Effect of Different Mutual Fund Size and Ownership Categories

Given the structure of the Indian Mutual Fund Industry (See Appendix D) it also becomes imperative to test whether the size of the scheme, size of the Fund House (or AMC) or the ownership structure of the AMC have any bearing on the PCM. Similarly, as we have done for Market Conditions, we have tested whether on the average PCM is significantly different from zero for Large Cap, Mid Cap, and small-cap funds. In all the cases mentioned above, we find that the PCM on the average is significantly greater than zero. Therefore, instead of repeating the same type of analysis further what we do next is to try to find out if there exists any significant relationship for a scheme's PCM and its other characteristics like NavSize, AMCSize and Ownership structure.

Hence, we ran Quantile regression[20] of PCM (dependent variable) on NavSize, AMCSize, Category and Type as the independent variables.

$$PCM = \alpha + \beta_1 NAVSize + \sum_{i=1}^{2} \beta_{3i} Type_i + \sum_{i=1}^{4} \beta_{4i} Category_i + \beta_2 AMCSize + \varepsilon \quad (10)$$

Here NavSize (Total NAV of the scheme) and AMCSize (a proxy for AUM) are continuous variables whereas rest of the variables are categorical. Since this is a cross-sectional regression, we have taken the monthly average of 2015-16 for all the continuous variables. The variable 'Type' has three levels, i.e. Private, Bank Sponsored and Institution sponsored, and the variable 'Category' has five levels viz. Foreign, Indian, Joint venture predominantly Indian, Joint Venture Predominantly Foreign and Others.

The choice of Quantile regression (introduced by Koenker and Bassett (1978)) over OLS regression in our case is natural and logical since the unconditional distribution of PCM is characterized by non-normality and skewness (appendix C): Quantile regression, which includes median regression as a particular case, provides a complete picture of the effect of the independent variables when a set of percentiles is modelled. Thus, it can capture important features of the data that might be omitted by models that average over the conditional distribution. As quantile regression makes minimal distributional assumption concerning the error term, it offers substantial model robustness. Quantile regression is flexible because it does not involve a link function that relates the variance and the mean of the response variable. Quantile regression also offers robustness concerning outliers in data. Unlike OLS regression, quantile regression is robust to extreme values in the response direction.

Table 11: Model information and Summary Statistics

Variable*	Q1	Q2	Q3	Mean	S.D.	MAD
NavSize	68.14	263.6	952.0	944.6	1841.9	351.7
AMCSize	8043.3	52283.8	159369	76929.8	70115.3	75028.6
No. of Independent Variables			2 + 8 dummy variables for category and type			
Optimization Algorithm			Simplex			
Methods for confidence limits			Resampling			

Both the variables are in Rs. Crore.1Crore=10 Million. 1USD=Rs.70 (approx.)

[19]This is an interesting finding which could have been taken up for future exploration.

[20] We ran both OLS regression with White's heteroscedasticity corrected covariance estimators as well as Quantile regression. Interestingly both are qualitatively similar. However, here we present the results of Quantile regression at the quantile level 10%, 50% and 90% to get a comprehensive idea.

By examining all the three regressions, we find that size of the schemes (as represented by NavSize) have a positive influence on PCM. The same cannot be said for AMCSize, which implies it is the scheme that is more important in the performance that the brand or size of the AMC to which it belongs. Foreign, bank-sponsored, and institutional ownership categories create more variability in the distribution of PCM values (lower quantile dummy has a negative coefficient, whereas higher quantile dummy has a positive coefficient). The reverse is seen in case of ownership category of a joint venture (predominantly foreign). This implies that the PCM data is heterogeneous in terms of its determinants or covariates so far ownership and size are concerned. This asymmetric response of PCM owing to its covariate's heterogeneity needs to be further investigated.

Table 12: Parameter Estimates of the Quantile Regression-10% Quantile

Parameter	Estimate	SE	P-Value
Intercept	55.72	14.45	<0.0001
NavSize	0.0281	0.0061	<0.0001
AMCSize	0.0001	0.0009	0.0837
Category_Foreign	-45.159	15.0	0.0027
Category_Indian	-29.45	13.64	0.0310
Category_Joint venture predominantly Foreign	71.27	19.70	0.0003
Category_Joint venture predominantly Indian	-3.2727	11.86	0.7826
Type_BankSponsored	-44.80	6.07	<0.0001
Type_Institution	-48.96	6.94	<0.0001

Description: Observations at 10% quantile level Regression output: 1) Intercept is significant and positive at 1% level 2) NavSize is significant and positive 3) AMCSize is significant and positive at 10% level 4) Type Dummies are significant at 1% level 5) All Category dummies are significant except Category_Joint venture predominantly Indian with Category_Joint venture predominantly Foreign dummy having the maximum impact of magnitude.

Table 13: Parameter Estimates of the Quantile Regression-50% Quantile (Median)

Parameter	Estimate	SE	P-Value
Intercept	-5.49	0.83	<0.0001
NavSize	0.0003	0.0002	0.0836
AMCSize	0.00001	0.0001	0.0015
Category_Foreign	8.79	0.9514	<0.0001
Category_Indian	11.69	0.9298	<0.0001
Category_Joint venture predominantly Foreign	15.15	1.0064	<0.0001
Category_Joint venture predominantly Indian	7.69	0.7659	<0.0001
Type_BankSponsored	5.64	0.4993	<0.0001
Type_Institution	1.22	0.6265	0.0515

Description: Observations at Median level Regression output: 1) Intercept is significant and negative 2) NavSize is significant at 10% level 3) AMCSize is significant at 1% level 4) All Ownership category dummies are significant at 1% level. 5) Type_BankSponsored is significant at 1% level whereas Type_Institution is significant at 10% level.

Table14: Parameter Estimates of the Quantile Regression-90% Quantile

Parameter	Estimate	SE	P-Value
Intercept	-13.62	4.27	0.0015
NavSize	0.0003	0.0001	<0.0001
AMCSize	0.0001	0.00001	<0.0001
Category_Foreign	4.30	3.77	0.2546
Category_Indian	-5.58	3.88	0.1515
Category_Joint venture predominantly Foreign	-6.68	7.91	0.3991
Category_Joint venture predominantly Indian	-9.7721	3.53	0.0059
Type_BankSponsored	10.05	3.08	0.0012
Type_Institution	22.24	1.53	<0.0001

Description: Observations at 90% quantile level Regression output: 1) Intercept is significant and negative 2) NavSize is significant at 1% level 3) AMCSize is significant at 1% level 4) Only category dummy Joint Venture predominantly Indian significant at 1% level. 5) Type_BankSponsored and Type_Institution are significant at 1% level with Type Institution having more variability.

Table15: Goodness of Fit (GOF) Statistics

GOF Measure	Quantile	Value
R1	10	0.55
R1	50	0.57
R1	90	0.63

Table 15 shows the Goodness of Fit Statistics for all the three quantiles, and for all the three cases we find the fit is satisfactory.[21]

4. Conclusion

Measurement of mutual fund portfolio performance and hence the performances of the fund managers is a long-standing area of interest for both academic as well as managerial practice point of view. Since the traditional returns-based measures of judging portfolio performance suffer from a severe 'benchmark bias', we have made use of PCM measure, which is free from such bias, on several Indian equity mutual fund schemes. The results obtained are commensurate with the original findings of Grinblatt and Titman (1993) what they obtained on mutual fund schemes using quarterly holding data. Thus, we may conclude by saying that there are positive signals of information asymmetry in the Indian market with mutual fund managers having superior information about the performance of stocks as a whole and that gets reflected in the adjustment of portfolio weights, making the PCMs significantly greater than zero on the average. This broad conclusion holds even when we divide the time horizon into pre, post and during the global financial crisis or when we

[21]It is to be noted that the underlying rationale of calculating Goodness of Fit in a quantile regression is very different from the ones employed in OLS or GLM regressions. For instance, the most popular coefficients of determination i.e. R-square is not applicable in the quantile regression anymore. Instead, a statistic called "R1" should be used which is estimated as 1 minus the ratio between the sum of absolute deviations in the fully parameterized models and the sum of absolute deviations in the null (non-conditional) quantile model. The values are useful for comparisons between quantile models, but they are not comparable to standard coefficients of determination. The latter is based on the variance of squared deviations, whereas goodness of fit values for quantile regression is based on absolute deviations.

classify the schemes based on market capitalization, Size of Total NAV, Size of the AMC and Ownership structure, albeit at varying degrees. Thus, we have found empirical support of the fact that at a collective level, either information asymmetry or superior stock-picking skill was lowest during that crisis period implying the conjecture of lower level of information flow across markets, adversely affecting the liquidity. We also find that transaction costs that are existing in the market do not affect the PCM significantly as a measure of a fund manager's ability to add value. Also, when compared with the PCM of index funds, we find that actively managed funds are adding values through their adjustments of portfolio weights. So far as the managerial implication is concerned, there is substantial evidence that fund managers having superior information plays a vital role in deciding the directions of the markets and managers with superior information and skills (as indicated by higher PCM) can perform better during 'bad', 'bearish' or 'recession' period. There are, however, two caveats attached to these conclusions; firstly, though PCM as a measure is unaffected by the level of Transaction cost, yet to what extent this significant positive PCM could prove to be profitable, i.e. fund managers can deliver an above-average return, especially after accounting for the expenses that cannot be ascertained. This is because PCM by construction is not a measure of profitability per se. Secondly, in order to identify which are the specific actions that made the PCMs significantly higher than zero; further detailed studies looking into the attribution analysis of PCMs are required.

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Appendix A

Table A1: *Details of the fund houses and the number of schemes in each fund house*

Mutual fund house	Number of schemes analysed	Percentage
BARODAPIONEER	5	0.67
CANARAREBECO	21	2.82
EDELWISES	20	2.69
ESCORTS	10	1.34
IDBI	13	1.75
AXIS	5	0.67
DSP	46	6.18
FRANKLIN	20	2.69
HDFC	49	6.59
HSBC	24	3.23
ICICI	82	11.02
IDFC	41	5.51
INDIABULLS	3	0.4
INVESCO	24	3.23
JM	8	1.08
JPMORGAN	14	1.88
KOTAK	10	1.34
LIC	25	3.36
LT	25	3.36
MIRAE	8	1.08
MOTILAL	6	0.81
PEERLESS	6	0.81
PRINCIPAL	25	3.36
RELIANCE	65	8.74
SAHARA	48	6.45
SBI	76	10.22
Total	**744**	**100**

The table reports the number of Asset Management Companies and the scheme analysed data which consists of 744 mutual fund schemes across 26 Asset Management Companies (AMC's)

Figure 1.

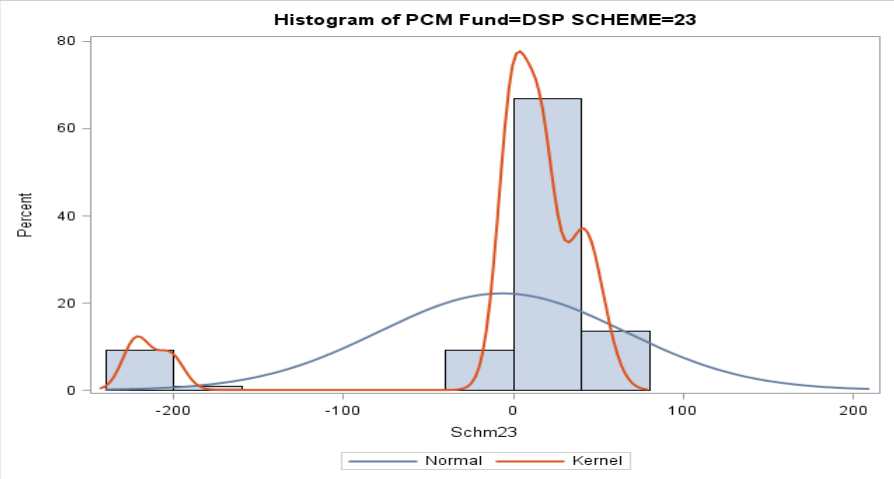
Source: AMFI website https://www.amfiindia.com/research-information/mf-history

The recession period during 2008-2010, overall, we have seen an increase in the AUM. Although the AUM declined during the subprime crisis at the initial year for the period 2008-09 but had increased subsequently for the period 2009-10

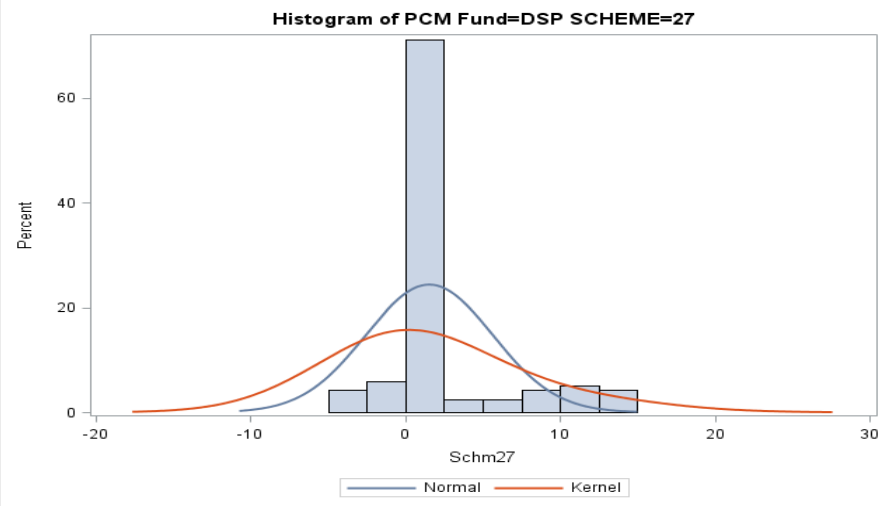
Appendix B: Background and Phases of the Mutual Fund Industry in India

There were 4 phases in the growth of the Indian mutual fund industry. First Phase - 1964-1987 whereby the end of 1988 UTI had Rs. 6,700 crores of assets under management (AUM). Second Phase - 1987-1993 (Entry of Public Sector Funds) where many public sector firms entered such as LIC, GIC,SBI Mutual Fund which was the first non-UTI Mutual Fund established in June 1987 followed by Can-bank Mutual Fund (Dec 87),At the end of 1993, the mutual fund industry had AUM of Rs. 47,004 crores which are rapid growth. Third Phase - 1993-2003 (Entry of Private Sector Funds) 1993 was the year in which the first Mutual Fund Regulations came into existence, under which all mutual funds, except UTI which needed to be registered and governed. The Kothari Pioneer (now merged with Franklin Templeton) was the first private sector mutual fund registered in July 1993. By the end of January 2003, there were 33 mutual funds with total assets of Rs. 1, 21, 805 crores. The Unit Trust of India with Rs. 44,541 crores of AUM were ahead of other mutual funds. Fourth Phase - since February 2003; In February 2003, due to the repeal of the Unit Trust of India Act, 1963 UTI was bifurcated into two separate entities. The MF Industry's AUM has grown from Rs.10.96 trillion as on October 31, 2014, to Rs.26.33 trillion as on October 31, 2019, about two and a half times increase in 5 years.

Appendix C: Histogram of PCMs



The graph shows the histogram for the PCM for the fund for a particular scheme.
The graph shows that the distribution is highly skewed and away from normal.



The graph shows the histogram for the PCM for the fund for a particular scheme.
The graph shows that the distribution is highly skewed and away from normal.

Appendix D: Types and Categories Mutual Fund Industry in India[22]:

There exist several ways to classify mutual funds:

The first could be based on **functional classification.** i.e. 1) Open Ended scheme and 2) Closed-ended scheme.

Mutual funds can also be classified based on **portfolio,** i.e. 1) Income funds 2) Growth fund and, 3) Balanced Funds.

They can also be classified based on **investment objective,** i.e. 1) Equity fund 2) Debt fund and, 3) Hybrid fund.

In our study, we have analysed Open-Ended equity schemes which predominantly belong to Income and growth funds. For the regression, the ownership and AMC structure classifications were done were classified as per the AMFI website into three types based on sponsorships.

1) Type_1 Bank sponsored, e.g. Canara Robeco Asset Management Co. Ltd,
2) Type_2 Institution, e.g. LIC Mutual fund Asset Management Co. Ltd.
3) Type_3 Private, e.g. Sahara Asset Management Co. private limited.

Also based on ownership structures of the AMC, the following categories were formed:

1) Category 1 for Foreign-owned AMCs, e.g. Franklin Templeton Asset Management (India) Private Ltd.
2) Category 2 for Indian owned AMCs, e.g. L&T Investment Management Ltd.,
3) Category 3 for Joint venture is predominantly Foreign, e.g. HSBC Asset Management India Private Ltd.
4) Category 4 for Joint venture predominantly Indian, e.g. Axis Asset Management Company Ltd.
5) Category 5 for all the others.

Source: https://www.amfiindia.com/

[22] This section is based on Sankaran (2018), Handbook of Mutual Fund Distributors by AMFI and Pathak (2011)

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RESPONSIBLE INVESTING: A STUDY ON NON-ECONOMIC GOALS AND INVESTORS' CHARACTERISTICS

RENUKA[1] SHARMA, KIRAN MEHTA[1], VISHAL VYAS[2*]

1. Chitkara Business School, Chitkara University, Punjab, India.
2. ABV-IIITM, Gwalior, Madhya Pradesh, India.

* Corresponding Author: Vishal Vyas, ABV-IIITM, Morena Link Rd, IIITM Campus, Gwalior, Madhya Pradesh (474015), ✉ vishalkvyas@gmail.com

Abstract

The current research has explored the responsible investing behaviour of Indian investors. The terms like socially responsible investing, non-economic goals, ethical investing, and responsible investing are interchangeably used by researchers. The notion of responsible investing is not attuned with the idea of rational investing. The responsible investors are not confined to financial gains only as it is observed in the case of a traditional or conventional investor. There are certain attributes or characteristics of an individual which affects their responsible investing decisions or non-economic goals. The prime objective of the study is to establish the relationship between non-economic goals and different characteristics of individuals. For this, we have used a standardised scale to measure responsible investing behaviour. The research is based on primary data for which a sample of 378 individual investors was considered. The findings are obtained through hierarchical multiple regression models. The findings of the study are useful for fund managers, regulators and researchers as the study have provided useful insights regarding the behaviour of Indian investors for responsible investments.

JEL classification: G41, G40, D91

Keywords: Non-economic goals, Socially Responsible Investing, Religiosity, Collectivism, Environmental Attitude, Materialism.

1. Introduction and Background

The contemporaneous global ecosphere is anticipating a remarkable success story of the Indian economy in the contiguous future. Many companies in India have made their place in topmost global companies. These companies are mindful for their responsibility towards environmental, social and governance (ESG) concerns. A global company must understand that all international organisations, as well as international investors, are worried about ESG risk in emerging markets. Countries like Brazil, China, and South Africa are actively focusing on ESG challenges and making various attempts to create an investment climate to promote sustainable portfolio investment. The introduction of various ESG indices across the global bourses indicates the relevance of the issue on responsible investing. World-renowned companies like Standards & Poor's, MSCI and Thomson Reuters are some of the leading examples, which have launched a large number of ESG indices for various counties, and Emerging markets. The countries using ESG, sustainability or responsible investing indices have already recognised that an investor while constructing his portfolio, do not depend exclusively on risk-return characteristics of different asset classes but also employ certain qualifiers to incorporate Economic, Social, Governance (ESG) linked considerations to supplement their investment decision. The next obvious question to this discussion can be to examine the

difference in the performance of socially responsible investments and other investment classes available in the market. If the socially responsible investments cannot beat the market, then the whole idea of putting so much thrust to endorse responsible investment avenues will be palisaded. The existing literature on the performance of socially responsible investment (SRI) gives variegated cues to investors' preference for SRIs. Generally, the investors appreciate investing in SRIs if their risk-return profile remains at a parity level when compared with other investment alternatives. When a company follows eco-friendly practices and takes care of its employees, then it can outperform the market too (Edmans, 2011).

Statman and Glushkov (2008) found evidence for SR funds in US market and indicated the poor performance of these funds in comparison to the market benchmark. Renneboog et al. (2008) depicted the poor performance of socially responsible (SR) funds in seventeen countries of Asia, Europe, North America, and Oceania. Cortez et al. (2012) also revealed similar results for several European countries, the UK, and the USA. In a research-based on Netherland, the authors investigated the investors' behaviour for the socially responsible bank. The findings of the study revealed that socially responsible investors expect higher returns from SRI funds in comparison to other investments (Bauer& Smeets, 2015). The researchers have also revealed that sometimes the socially responsible investors accept the lower return than market returns due to their social preference (Riedl and Smeets (2014).The selection of responsible investment avenues implies that the investors are more fretful about the accomplishment of their non-economic goals rather than fulfilling economic goals. Mclachlan et al. (2004) established the difference in the investment decision criterion of conventional investors and socially responsible investors. The study revealed the difference between beliefs of socially responsible investors and conventional investors.

Gambhir et al. (2017) emphasised that there are many social and intangible gains associated with socially responsible investments. Therefore, under such a situation, one should use social return on investment (SROI) instead of using a conventional method of calculating return on investment (RoI) for the valuation of the investment. For the past two decades, investors have revealed a burgeoning concern in (often equity-related) different instruments of SRIs (Schueth, 2003). These mounting tendencies can be noticed through an increase of 10-15 per cent in the market share of equity SRI products in the USA and 10 per cent increase in Europe (Robeco, 2008). In the wake of the recent financial crisis, the growth in SRI has plunged (European Sustainable Investment Forum, 2012) which confronted the concept of rational investment by stressing on the issue that short-term financial success. It may have extended the negative consequences not only on social goal setting but also for economic objectives of the investors (Giannarakis and Theotokas, 2011). Ortas (2012) revealed that during a bullish market scenario, the ethical investors need not worry about the overall performance of their socially responsible investment. However, in case of financial turmoil, ethical investors were not able to fetch the same amount of profits due to several institutional and social factors. In a study based on Brazilian firms following sustainable practices, the authors examined the difference in their financial performance with the firms, which are not following sustainable practices. Remarkably there was no difference in the financial performance of companies based on their investment in responsible activities. However, the difference in the performance was due to other factors like sector representation etc. (Santis, 2016). But the results obtained for Italian firms contrasted with Brazilian firms. The more investment in environmental practices reduced the profit of 45 waste management companies in Italy (Bartolacci et al., 2018).

However, like other emerging markets, SRI funds have not been able to depict substantial growth in India. In the current scenario, socially responsible funds are almost non-existent, and therefore, there would be uncertainty in terms of the SRI products. The information related to SRI funds is also completely new to the investment market. Investors think these funds to be riskier, but in reality, these funds are less risky. The growth of such funds is not as fast as found in western countries; therefore, investors perceive these funds to be riskier and are less tolerant in such an opaque investment environment. The evidence of socially responsible behaviour of investors can be observed during the Vietnam war when the investors did not consider firms having any linkage with

this war. The Social Investment Forum (1995) has also indicated the increasing concern for social criteria among US investors while selecting an investment criterion.

Likewise, the increasing concern for SRI in the context of Japanese investors is also reported at the beginning of the 20th century (Hiraki et al., 2003). The researchers said that SRI is a new area, and it will take time to evolve. Investing in pension funds allocating their funds in SRI based portfolios does not benefit the investors in Japan (Jin et al., 2006). In initial research based on the Domini 400 Social Index, the author revealed that the investors need not compromise with their belief and ethical values. They can invest in a fund which has a social concern, and it can outperform the market portfolio too and thus without compromising with the returns, the socially responsible funds can be considered as an investment alternative (Sauer, 1997). The firms which are screened for socially responsible behaviour can prove to be more robust than their competitors in terms of profitability and stability (Herremans, Akathapom and McInnes, 1993). McGuire, Sundgren and Schneeweis (1988) exhibited that the employees' loyalty increases in case a company follows socially responsible practices. Usually, firms are concerned for increased cost, lower profits, less scope of diversification and additional cost in identifying socially responsible opportunities while executing socially responsible screening (Temper 1991). Socially responsible mutual funds reported lower returns than the market benchmark (Goldberg, 1993; Mueller (1991). The initiatives taken by UNCTAD, Global Compact and Principal of Responsible Investment (PRI) during the first decade of 20th century to establish Sustainable Stock Exchanges (SSEs) is an indicator of future of responsible investing and responsible financial markets.

The number of SRI funds is very less in India. "Tattva", the socially responsible equity investment program by Yes Bank, is one of few such examples. Other noticeable SRI mutual fund is ABN Amro Sustainable Development Fund, which was launched in 2007. It was India's first SRI fund. The companies, which become the part of this fund, are screened by CRISIL on an ESG scale. The lack of ESG (Economic, Social, and Governance) measurement and disclosure practices and code of conduct are the major reasons for the lesser number of SRI funds in India. In 2008, an ESG index called S&P ESG India index was made, which is composed of 50 best-performing equity stocks of Indian market on three ESG parameters. Companies like Wipro, Infosys, Mahindra & Mahindra, ITC, TCS, L&T, Tata Chemicals, ACC, HCL Technologies and Dr Reddy's Laboratories are part of this index. Similarly, many other indices based on environmental, social and governance performance of companies were launched in Indian stock markets. These include Nifty 100 ESG index, Nifty 100 Enhanced ESG index, Nifty 100 Sector ESG Leader, and S&P ESG 100 index etc.

The disclosures of ESG parameters for companies are not similar in developed and emerging countries. The European, UK and US markets have shown more stringent practices of following the disclosures related to ESG in comparison to the rest of the world. The concept of socially responsible investment is actually transmuted into ESG practices. The ideology of investing in SRI has become more customary with the mounting significance of ESG disclosures around the world. All institutional investors, portfolio managers and cognizant individual investors give due attention to ESG compliances by a company before investing in them. In a country like India, where individuals are highly motivated by their personal values, a company's assurance to meet ESG challenges can help it to find a place in the portfolio of investors. The responsible investment by investors speaks about their priority for non-economic goals in place of economic goals. Further, the individual investor's economic and non-economic goals are affected by various factors, which are not similar to what has been identified in the western world (Mehta, 1994). The study indicated that the desire for social achievement is the primary determinant of an individual's behaviour in India. Pareek (1986) indicated that the need for an extension is the primary determinant of individual behaviour in India. India is a diverse country with individuals having many languages, religions, castes, communities, and other social and cultural aspects. Under such a diverse environment, an individual is influenced by various psychic and spiritual benefits he/she is going to get from the investment. The socially responsible investing behaviour of Indian individuals is the result of the impact of various forces. Consequently, it is critical to know which factors imitate the individual

investor's behaviour towards SRI decisions in India. Moreover, the role of the retail investor in the Indian equity market is noteworthy during 2018-19. Even after a volatile market scenario, the mutual funds reported a surge of 11.4 per cent in their assets due to the increased participation of retail investors. The growth in mutual fund in cash market segment is also indicative of individual investors' contribution to the growth trajectory of the Indian stock market. The contribution of mutual funds in the cash market on the NSE platform got increased from 7.3 per cent (2017-18) to 7.5 per cent (2018-19). The individual investors are holding more than 95 per cent of total AUM (asset under management) of both public sector and private sector mutual funds (source: Security Exchange Board of India (SEBI) Annual Report 2018-19, www.sebi.gov.in). Therefore, the existing trend of retail investors' participation in Indian stock markets and potential for enormous space to augment their contribution insinuate to study the individual investor behaviour more thoughtfully.

In this milieu, the present study attempts to comprehend characteristics of the Indian investors affecting their non-economic goals, i.e. ethical goals of investment. A study conducted by Iyer and Kashyap (2009) on investor characteristics postulated that social investing efficacy (SIE) affects the individual's characteristics to take non-economic investment decisions. This study indicated that the SIE characteristic of the investors makes them believe that a company remains stick to all those essential values, which are considered by their investors.

2. Literature Review and Theoretical Background

The existing literature on individual investors' characteristics affecting socially responsible investing behaviour is largely based on five significant attributes obtained from extant literature available on related issues. These attributes are 1) Collectivism, 2) Religiosity, 3) Materialism, 4) Environment Attitude, and 5) Risk Tolerance (it is categorised into individual risk propensity and individual risk propensity). Most of the studies revealing above said characteristics of individual investors are based on the US market. Broadly, the individual investors' investment goals can be labelled as economic goals and non-economic goals. Any SRI fund or SRI scheme introduced for investors entails an evident thoughtfulness of above cited five features, as these are likely to affect the individual's investment decision.

For example, Collectivists always emphasised on group welfare; hence, in such a culture, pro-social behaviour is given high priority (Hui and Triandis, 1986). Douglas and Wildavsky (1982) developed Cultural theory of risk and mentioned that the cultural values, social institutions, and the ways of life (hierarchical, individualist, egalitarian, and fatalist) influence the risk perceptions of individuals. The five attributes, as mentioned above, have been considered by past researchers incessantly to examine the behaviour of socially responsible investors and their non-economic goals.

Previous evidence suggested that Western culture is more individualistic, and religiosity is in second control. Ger and Belk (1996) revealed in a cross-cultural study and found that dramatic cultural or social change events bring a higher level of materialism. They also found that materialism exists across distinctive cultures, but the extent of materialism was classified as different between developing and developed economies. Likewise, the study also concluded that in Western culture, investors' attitude to the environment is formed by development in science, and it promotes risk-taking among individuals as it laid emphasis on individual freedom. The ESG criteria affect the valuation of firms too. In a research-based on five-factor mode, the authors incorporated sustainability premium as an additional factor loading and found a negative relationship between the cost of capital and sustainability performance (Gregory, Stead & Stead, 2020). The researchers have used experimental methods to investigate investors' behaviour towards socially responsible investments. In one such study based on Japan, the investors were given a certain amount and asked to select an investment alternative among two equity investment avenues. The investors were required to make an investment decision based on risk, return and money spent on corporate

social responsibility by two firms. The purpose of the study was to capture the psychological features of potential SR investors (Nakai et al., 2018).

In the Indian scenario, greater emphasis is given on collectivist behaviour because the history of India has shown a trend of families being more prominent in size and multi-generational. In a study, Bauer and Smeets (2012) concluded that deliberation in social responsibility investment by investors while allocating their money could be caused by the beliefs and by the preferences of the investors. Both religion and religiosity have an impact on the economic set of a country. The religious values and religion have stood at the marketplace. The religious belief results in religion motivated enterprises (Klein, Laczniak and Santos, 2016). Religion has an impact on the consumption behaviour of individuals, too (Hirschman1982). In a country like India, religion is discussed for the conduct of a political party (BJP) with their governance style (Corbridge and Harriss 2013) while Du et al. 2014 examined the impact of religion on the conduct of a business. The spiritual values, along with organisational theories, give direction to businesses in taking various decisions (Brophy 2015; Cui, Jo, and Velasquez 2015). Renneboog et al. (2011) studied the monetary flow of ethical funds around the globe by adopting Petersen's approach (2009) and found that US ethical funds were less responsive to returns than US conventional fund flows implementing the difference and GMM techniques.

In addition to above, various evidence has been obtained in the studies conducted by Dhawan et al. (1995) where Indian investors have demonstrated more intensity for the attribute of collectivism as they are depended upon each other to take their decisions while it is not identical in the case of American individuals. India is a diverse country, and within a specific group, viz., people belong to a specific caste, language, religion, or cultural background, etc., individuals help each other. Therefore, collectivism is found as a significant attribute of Indian individuals. Shavitt et al., (2006) have stated four dimensions of the individualism. These are Vertical individualism (VI), Horizontal Individualism (HI), Vertical Collectivism (VC) and Horizontal Collectivism (HC). The horizontal individualism places an individual's tendency to be independent as a priority, whereas vertical individualism put emphases on the prominence of competition. Further, horizontal collectivism emphasises the importance of social relations with equality for individuals and vertical collectivism emphasises the importance of social relations with superiors. These four attributes are found in individuals and vary from one group to another group. Thomas and Au (2002) documented that vertical collectivism and horizontal individuals are the outcomes of cultural differences. Misra Srivastava & Banwet (2019) emphasised the place of religiosity and consciousness in predicting the investors' behaviour. The researchers also revealed that a religion-based workplace develops spirituality at the workplace and bring resilience instead of emotional tumult. Nevertheless, religious beliefs may result in cognitive biases which can be a cause of irrational thinking too (Pennycook et al., 2014). Zuckerman et al. (2013) also divulged an inverse relationship between intelligence and religiosity. The religiosity can result in risk aversion behaviour of investors. The investors having some religious belief tend to avoid raising debt and prefer to invest in intangible and fixed asset securities (Jiang et al., 2015).

In India, nature is revered, and rudiments of nature are termed as God. Hence, religiosity and environment consciousness may be associated in the Indian context, and somewhere such beliefs may affect an individual's rational economic choices. Religion plays an important role in day-to-day decisions but fewer roles in economic decisions. Environmental attitude includes the preservation of natural resources or environment. Further, collectivism would relate to giving weight to values and beliefs advocated by one's community, locality, village, or neighbourhood while making economic decisions. With changing demographic features now, Indians are more interested in owning things for pleasure. Materialism implies enjoying the luxuries of life and giving due weightage to owning a house, car, and other material goods. In India, attitude towards risk is changing, and it is related to the change in economic, society and profile of the population. As mentioned above, the present study is destined to examine the relationship between individual attributes, i.e., religiosity, environmental attitude, collectivism, materialism, risk tolerance and social

investing efficacy, and non-economic goal setting or investors' behaviour towards socially responsible investments.

2.1 Defining Different Attributes of Individual Investor's Characteristics Contemplated

Considering the relevance of factors mentioned above and after obtaining evidence from the literature survey, the study under consideration is confined to examining the impact of following factors on the determination of socially responsible investment behaviour of individuals, which is reflected through non-economic goals of individuals.

Religiosity: Research conducted by Sood and Nasu (1995), Johnson, Jang, Larson and Li (2001), Essoo and Dibb (2004) and Lindsay (2007) documented that an individual's dedication towards religion is reflected in his behaviour and all decision. Religion affects a person' values and attitudes, and these are personal. Religion and economic decision have been found as mutually exclusive (Zerubavel, 1991), but later, these two are also seen as influencing each other (Lindsay, 2007). Many times, it is noticed that the individuals do not prefer their investment in some 'negative list' industries. These are the companies, which are producing harmful products under the category of 'sin' by the definition of religion. The increasing importance of Islamic finance is also an example to understand the relationship between religion and investment behaviour. Similarly, Islamic funds exclude companies involved in products that deal with beef or alcohol. The attention paid by Islamic mutual fund managers to social responsibility aspect is a beautiful case of understanding the importance of religiosity in decision making (Abdelsalam et al., 2014). Du et al. (2014a) found that religious belief affects the investment decision in socially responsible investment alternatives. A company located in a community having firm religious belief gives more charity. Klein, Turk, Weill (2017) also stated that religion affects the investment decision of an individual. Therefore, empirical research has shown a strong positive association between business ethics and religiosity (Mokhlis, 2006). Li et al. (2019) examined the impact of religious belief on entrepreneurs' decision making. Socially responsible investments and religious belief affect the cost of debt of a firm too, and the religious belief of an entrepreneur affects its decision of raising debt. Usually, individuals' having religious belief have a low cost of debt, and the importance of religion to an individual affects his behaviour and attitude. Thus, the present study proposes the following hypothesis.

H1: Religiosity has a significant impact on non-economic goals of individuals.

Environmental Attitude: The companies' efforts towards green marketing imply that the consumers' attitude towards the environment is changing. The environmental concerns have influenced the finance and investment aspects too. Although the wakefulness towards environmental concerns is very low, now individuals have begun paying attention to green concepts of the companies. Poloinsky et al. (1995), Bidappa and Kaul (2011) are few studies among many which have focused on the green practices. The environment externalities affect the decisions of both environment-conscious investors and companies following environment-friendly practices. The cost of capital for raising equity by such company is less in consideration to meet the risk of environmental externalities. Likewise, investors also think of premium for bearing environment risk while selecting an equity portfolio for them (Kakeu, 2017). So, the literature supports that the environmental attitude may have a positive relationship with the individual's choice of non-economic goals.

H2: Environmental attitude has a significant impact on non-economic goals of individuals.

Collectivism: Hofstede (1980), Diltz (1995), Wagner (1995), Sirmon and Lane (2004), Ramamoorthy et al. (2005 and 2007), Kulkarni, et al., 2010 have supported the evidence that individualism and collectivism affect the cultural differences and hence the behaviour of individuals. Many of these studies say that the cultural differences in social behaviour in several countries are because of individualism-collectivism (IC). The individual investors' behaviour is affected by the culture to which they belong. In a research-based on nine European countries, i.e., Austria, Sweden, Denmark, Belgium, Greece, Finland, Portugal, Norway, and Ireland, the authors found that culture has a

significant impact on investors' response to risk (Lee et al., 2018). In the Indian context, Collectivism has been ascribed to the Indian culture's prominence on family, sense of empathy and community (Kulkarni et al., 2010). Finding cues from these studies, the present study has also considered collectivism as a vital attribute affecting the individuals' decision making.

H3: Collectivism has a significant impact on non-economic goals of individuals.

Materialism: Materialism is related to an individual's worldly possessions. Voluminous studies have documented a negative correlation between materialism and non-economic goals. Material possession may have a different meaning for different individuals, and they interpret these possessions differently depending on their own possession of material things (Sagiv and Schwartz, 2000). Highly materialistic individuals tend to spend more on consumption to corroborate social expectations, while low materialists are projected to have less material possession for a sense of belongingness. Numerous studies, Belk (1984), Richins & Dawson (1992), and Chatterjee, Hunt and Kernan (2000) are among the early studies documenting the relationship between materialism and individual's decision making. Contemplating the prominence of materialism, the following hypothesis has also been tested. The financial market is also affected by materialism. Both individuals and institutional investors behaviour are influenced by attributes like materialism and post-materialism (Jordaan, Dima and Golet, 2016; Alesina and Giuliano, 2015).

H4: Materialism has a significant impact on non-economic goals of individuals.

Risk Tolerance (Individual Risk Propensity and Individual Risk Affinity): Different individuals have different risk tolerance. Most individuals undertake investments with an objective of future reward. However, the size and certainty of reward are not fixed. The investors do not behave rationally all the time. The risk tolerance of an individual is dependent upon how the individual assesses risk and uncertainty. In simple terms, in case of well-known events, the risk is less and when an individual dread of something, then the quantum of risk increases. Moreover, this perception of risk is also swayed by the community culture and social norms. The tendency to bear risk and preference for an opaque situation specifies the risk tolerance capacity of the individuals. However, Kahneman and Tversky (1974) and Slovic et al. (1982) documented that individuals assess the risk in different ways. Consequently, they are not rational in every decision taken by them. Baxi (2011) conducted a study on the Asian Pacific region and concluded that Indian investors are less risk-taking as compared to others in this region. The responsible investors use the term 'grrenium' which they expect as a reward for bearing risk in investing in responsible enterprises (Patridge and Medda, 2020). The present study measure risk tolerance of the individual's inclination to take the risk or individual risk propensity and preference for vague circumstances. In lieu of this discussion, the following additional hypotheses have been examined.

H5a: Individual risk propensity has a significant impact on non-economic goals of individuals.

H5b: Individual risk affinity has a significant impact on non-economic goals of individuals.

Social Investing Efficacy (SIE): Block and Keller (1995), Diamond & Iyer (2007) and Iyer and Kashyap (2009) documented how perceived effectiveness/efficacy influence the individual attitude and behaviour on various issues. SIE is one's view that one's actions will be able to get a much-required societal change. As per the Protection Motivation Theory proposed by Rogers (1975), effectiveness is significant to bring about a change in behaviour and attitude of the individuals. If an individual has this perception that his/her actions will do well for society, then he/she will do good for society by taking reasonable actions. The responsible individuals believe that their environmental concern can force companies to take actions to follow the green and responsible actions (Zavali and Theodoropoulou, 2018). SIE is supported by how strongly a person believes that their investment strategies would be capable of influencing corporate behaviour. Having such a belief investor can transmit their social values to the corporations by adopting appropriate investment strategies. Such

characteristics guide investors to have a trade-off between economic and non-economic goals. SIE influences the force of the relation between investor characteristics and the quest for non-economic goals. The role of social investing efficacy is examined as a mediating variable too. Therefore, two hypotheses were established as under.

H6a: Social investing efficacy has a significant impact on non-economic goals of individuals.

H6b: Social investing efficacy has a mediating effect on the relationship between individual investors' characteristics and their non-economic goals.

3. Sampling Design and Data Collection

Table 1: Profile of respondents

Profile of respondents	Number of respondents	Percentage of respondents
Gender		
Male	304	80.42
Female	74	19.58
Total	**378**	**100.00**
Education/Qualification		
Up to matriculation	34	8.99
Undergraduate	118	31.22
Undergraduate with a professional degree	87	23.02
Postgraduate	39	10.32
Postgraduate with a professional degree	81	21.43
PhD.	19	5.03
Total	**378**	**100.00**
Amount of investment per year (INR)		
>=5 Lakh	58	15.34
5 lakh-10 lakh	117	30.95
10 lakh-15 lakh	93	24.60
15 lakh-20 lakh	71	18.78
Above 20 lakh	39	10.32
Total	**378**	**100.00**
Experience of Investment		
5-6 years	49	12.96
6-7 years	67	17.72
7-8 years	155	41.01
More than 8 years	107	28.31
Total	**378**	**100.00**

Source: Author's compilation

The study under consideration is based on primary data, which is collected through a survey, i.e., both online and offline. Total of 500 respondents was targeted, and the final sample composed of 378 respondents only as the rest of the respondents either provided incomplete information or did not respond in the set time frame. The sample consisted of only those respondents having more

than five years' experience of investing in various financial and non-financial assets. The required data is collected from Tricity (Chandigarh-Mohali-Panchkula). Chandigarh contributes INR 2,517 crore as cash turnover and in the list of top 20 cities in BSE cash segment and Tricity contributes INR 28,005 crore in cash turnover at NSE and hold a place in top 20 cities in this segment at NSE (Source: Security Exchange Board of India, Annual Report, 2018-19, www.sebi.gov.in). A convenience sampling method was adopted to collect the data and investors visiting various banks, brokerage houses and financial advisers were targeted to collect information. We followed best practices to control the researchers' biases in selecting the respondents. Table 1 given below describe the profile of respondents. A structured questionnaire was taken as an instrument of data collection. The questions were asked on a seven-point Likert scale anchored at "Strongly Disagree" and "Strongly Agree" to measure the constructs. Individual characteristics of the investors were measured using scales with three to eight items. The collected data was tested for reliability analysis, and all scale items were found in the acceptable range for Cronbach's alpha (More than 0.68).

3.1 Data Analysis Tool

In order to empirically test the hypotheses, the present study has applied a hierarchical multiple regression model. The regression model applied on the survey data has considered non-economic goals of the investors as dependent variable and religiosity, environmental attitude, collectivism, materialism, risk propensity and risk affinity as independent variables. The social investing efficacy has been used as a mediating variable. Baron and Kenny (1986) gave a four-step method of testing the mediation. Under this, the regression coefficients are calculated, and their significance is tested at each step. Table 2 has explained the four-step process of testing mediation. The C' in the above equation indicates the direct effect.

Table 2: Steps of Mediation Effect

	Analysis	Visual Depiction
Step 1	Conduct a simple regression analysis with X predicting Y to test for path c alone, $Y = B_O + B_1X + e$	c X Y
Step 2	Conduct a simple regression analysis with X predicting M to test for path a, $M = B_O + B_1X + e$	a X → M
Step 3	Conduct a simple regression analysis with M predicting Y to test the significance of path b alone, $Y = B_O + B_1M + e$	b M → Y
Step 4	Conduct a multiple regression analysis with X and M predicting Y, $Y = B_O + B_1X + B_2M + e$	c X M → Y b

If the first three equations result in one or more insignificant relationships, then it is said that no mediation effect is found. And assuming that some significant relationship is found in first three steps and one move to step four, some mediation is said to exist if the effect of M remains significant after controlling for X. If even after controlling the M, the X remains insignificant then the findings will support full mediation and still if X remains significant, the findings will support only partial mediation. In the context of the present study, four regression models have been run, as mentioned above.

The regression results thus obtained will help us to understand the following:

- Relationship between the mediator and independent variables,
- Relationship between mediator and outcome variable, and,
- Relationship of independent variable with the outcome variable with and without the mediating variable.

4. Findings of the Study

As stated above, the analysis begins with establishing a causal relationship between mediator variable, i.e., SIE (Social Investing Efficacy) and independent variables, i.e., religiosity, environment attitude, collectivism, materialism, individual risk propensity and individual risk affinity. The SIE is the dependent variable, and individual attributes of investors are independent variables. The regression results are mentioned in Table 3 given below. The results have reported that Environmental Attitude (β= 0.515, t = 4.696) and Collectivism (β = 0.228, t = 2.139) were found significantly at 5% level of significance. It indicates, environmental attitude and collectivism significantly affect the social investing efficacy attribute of individual investors.

Table 3: Regression Result of Social Investing Efficacy on Individual Variables

	Beta Coefficient	t-test
Religiosity	0.107	1.216
Environmental Attitude	0.515	4.696*
Collectivism	0.228	2.139*
Materialism	0.029	0.289
Individual Risk Propensity	0.106	1.207
Individual Risk Affinity	-0.069	-.767
R-Square	0.689	
Adjusted R-Square	0.671	

*significant at 5% level.

Religiosity (β = 0.107, t = 1.216), Materialism (β = 0.029, t = 0.289), Individual risk Propensity (β = 0.106, t = 1.207) and Individual risk affinity (β = -0.069, t = -0.767) were found statistically insignificant. The individual attributes of investors taken in the study have judicially explained the SIE variable as adjusted R-square is found 0.671 which is fairly acceptable when compared with related studies (Iyer and Kashyap, 2009 reported adjusted R-square =0.11, Misra Srivastava & Banwet (2019) reported adjusted R-square = 0.145 and 0.275). Next, Table 4 has disclosed the regression results attained for the relationship between a median variable and the outcome variable. In other words, the next regression results were obtained for the impact of SIE variable on non-economic goals of investors. The social investing efficacy (β = 0.746, t = 11.703) was found significant at the 5 per cent level. Hence, it has a significant impact on setting the non-economic goals of individuals. The outcomes of this regression result supported the arguments in favour of hypothesis H6, and henceforth, it can be stated that Social Investing Efficacy significantly affects the non-economic goals of individual investors.

Table 4: Regression Results from Non-economic Goals on Social Investing Efficacy

	Beta Coefficient	t-test
Social Investing Efficacy (SIE)	0.746	11.703*
R-Square	0.557	
Adjusted R-Square	0.553	

*significant at 5% level.

In the end, the impact of individual investors' attributes is examined on their non-economic goals and impact of the mediating variable (SIE) is tested. All these results are reported in Table 5. Column (1) and (2) have shown the results of direct effect, i.e., direct effect of individual investors' attributes on their non-economic goals and column (3) and (4) have shown the indirect effect or effect of mediation (SIE) of The religiosity (β = 0.282, t = 3.049) and environmental attitude (β = 0.301, t = 2.610) were found significantly and positively affecting noneconomic goals of investors while collectivism (β = 0.149, t = 1.431), materialism (β = -0.078, t = -0.709), individual risk propensity (β = 0.057, t = 0.617) and individual risk affinity (β = 0.157, t = 1.654) were found statistically insignificantly. The adjusted R-square is found at 0.653. Accordingly, the regression results have supported the first two hypotheses related to religiosity and environmental attitude, i.e., H1 and H2 are accepted while the statements of hypotheses mentioned in H3, H4, H5a and H5b are not supported by these regression results.

Table 3: Regression Result of Social Investing Efficacy on Individual Variables

	Beta Coefficient (1)	t-test (2)	Beta Coefficient (3)	t-test (4)
Religiosity	**0.282**	**3.049***	**0.247**	**2.778***
Environmental Attitude	0.301	2.610*	0.134	1.107
Collectivism	0.149	1.431	0.140	1.403
Materialism	-0.078	-0.709	-0.004	-0.035
Individual Risk Propensity	0.057	0.617	0.023	0.256
Individual Risk Affinity	0.157	1.654	0.144	1.416
Social Investing Efficacy (SIE)			0.323	3.280*
R-Square	0.657		0.689	
Adjusted R-Square	0.653		0.668	

*significant at 5% level.

Further, the next regression model was run on non-economic goals as the dependent variable, and individual investors' attributes were taken as independent variables in the presence of social investing efficacy as mediator. The coefficients obtained with the mediation effect were also found attenuated. Religiosity (β = 0.247, t = 2.778), environmental attitude (β = 0.134, t = 1.107), collectivism (β = 0.140, t = 1.403), materialism (β = -0.004, t = -0.035) and risk tolerance [individual risk propensity (β = 0.023, t = 0.256), and individual risk affinity (β = 0.144, t = 1.416)] were lower than the coefficient found in regression without considering social investing efficacy (SIE) as a mediator variable. The R-square with mediation effect is improved in the second regression model, i.e., 0.668. It supports H6b, i.e., the existence of mediation effect, but this effect is not found significant for all variables. The impact of social investing efficacy (SIE) is also found significant with at-coefficient 3.280 and improved adjusted R-square (0.668). The results thus obtained confirm the existence of partial mediation in case of religiosity and full mediation effect in case of remaining variables.

5. Conclusion and Discussion

SRI has been effectively executed in different parts of the world, but in case of India, albeit a prudently developed capital market and a culture of active investment decisions among the Indian individuals, there are only a few socially responsible funds available in for investors. The findings of the current study can be recapitulated as under. The results have indicated that religiosity is one of the significant antecedents to individual investor's non-economic goals in India. It indicates that the investors do not prefer a company producing and selling products, which is considered as 'sin' product. Religiosity drives the Indian investor's pursuit of non-economic goals, which is reflected by the excellent performance of Shariah funds in Indian markets. The results obtained for religiosity are in conformity with the evidence obtained by Iyer and Kashyap (2009). But in case of the impact of religiosity on SIE (social investing efficacy), the results are contradictory. The present study has not supported a significant impact of religiosity on social investing efficacy of individual investors while opposite results were obtained by Iyer and Kashyap(2009). Likewise, the current research has shown a prominent and significant impact of environmental attitude and collectivism on SIE while Iyer and Kashyp (2009) indicated that collectivism and individual risk propensity are insignificant variables and remaining all attributes have a significant impact on non-economic goals of investors. Misra, Srivastava & Banwet, (2019) also produced evidence in favour of a significant impact of religion on individual investor's decision making. Another significant attribute of current research in environmental attitude. But its effect got vanished due to the mediating variable. Many other researchers have also stated the increasing concern of investors for the environment and green practices adopted by the corporate (Kakeu, 2017; Edmans, 2011). Further, while studying the direct relationship between individual attributes and non-economic goals of investors, the collectivism has also been found as a significant attribute affecting the investors' decisions regarding non-economic goals. Evidence is reported for other European countries, too, where the impact of culture is found significant on an individual's decision making (Lee et al., 2018). But current research has produced results in contrast to this and collectivism is found as an insignificant attribute. The conclusions are quite robust as expected and need further investigation. The social investing efficacy has been found as significant and positively related coefficient affecting the individuals' socially responsible investing behaviour. The SIE has a partial mediation effect on religiosity and full mediation effect on other individual attributes.

6. Implications of the Findings

The findings of the present study will be useful for fund managers to understand that individual investor decision is just like any other consumer choice process and there are several factors which influence the decision of the individuals' while setting their non-economic goals. Fund houses need to recognise the ethics that would impel Indian investors to pursue non-economic goal by investing in SRI funds. Many Indian corporations have already started considering this as part of their corporate social responsibility. Such initial talks in India are giving an indication that there will be a paradigm shift in investors' awareness as well as perception regarding socially responsible investment avenues and more fund managers will come forward with a strategy of offering socially responsible investment funds for investors.

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APPLIED FINANCE LETTERS

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HETEROGENEITY OF CASH MARKETS AT PHYSICAL DELIVERY POINTS AND THE HEDGING EFFECTIVENESS OF AGRICULTURAL COMMODITY FUTURES IN INDIA – LESSONS FOR CONTRACT OPTIMIZATION

SANJAY MANSABDAR*, HUSSAIN C. YAGANTI

Birla Institute of Technology and Science, Pilani, Hyderabad, India

* Corresponding Author: Sanjay Mansabdar, Department of Economics and Finance, Birla Institute of Technology and Science, Pilani, Hyderabad Campus, Jawahar Nagar, Hyderabad 500078, India ☎ +91- 9966882614 ✉ p20160504@hyderabad.bits-pilani.ac.in

Abstract

Agricultural commodity futures in India are settled by physical delivery, and the seller can choose the location of delivery from a list described in the contract specifications. Cash markets at these locations represent the deliverable basket for the futures contract and are the underlying assets for the delivery options granted to the seller by virtue of contract design. These cash markets are generally heterogeneous. This paper studies the impact of heterogeneity of the underlying cash markets in different locations on the hedging effectiveness of the associated futures contract. The hedging effectiveness of cottonseed oilcake and soybean futures is regressed against several variables that represent heterogeneity of the underlying cash markets using ridge regression. We find that, in general, the greater the heterogeneity, the poorer the hedging effectiveness of the contract. This paper is unique in that it provides a framework for guidance for contract designers at exchanges and regulators who will find this research useful in optimizing delivery specifications for agricultural futures contracts. This is especially important given the declining volumes in Indian agricultural commodity futures.

Keywords: Delivery Options; Hedging Effectiveness; Agricultural commodity derivatives, Ridge Regression

1. Introduction

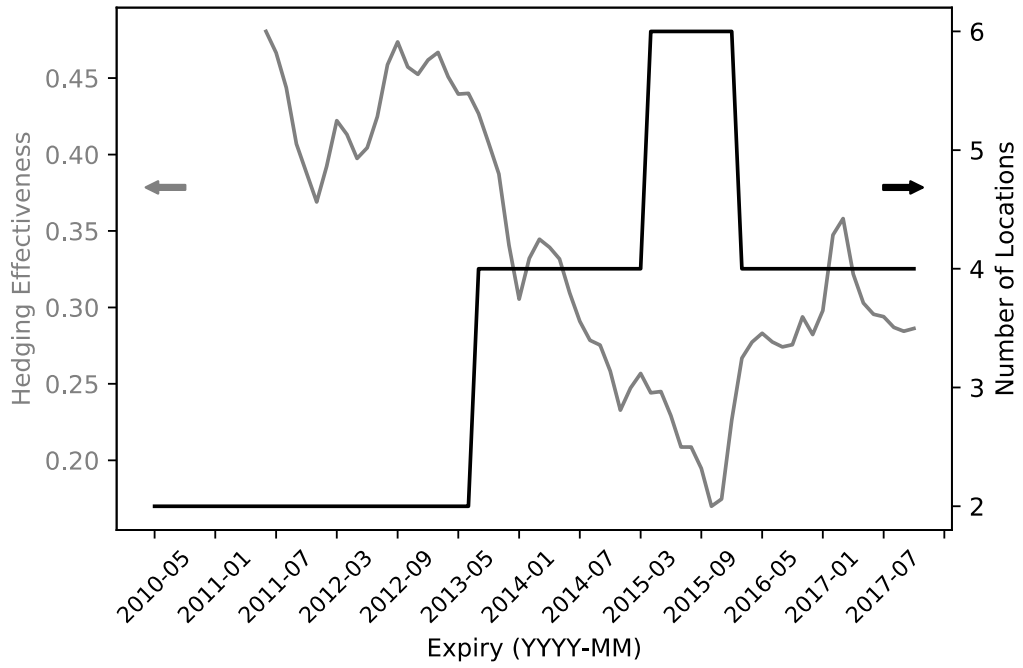
Hedging effectiveness is a key determinant of the success of futures contracts, as outlined by Tajishian (1995), Chance and Hemler (1993) and Yaganti and Kamiah (2012). Several studies have demonstrated that the hedging effectiveness of agricultural commodity futures contracts in India is in general poor. Yaganti and Kamiah (2012), for instance, suggest that only 40% of commodity derivatives are useful from a hedging effectiveness perspective. Aggarwal, Jain and Thomas (2014) find that the hedging effectiveness of agricultural commodities is low but variable. The problem is perhaps so acute that the Department of Economic Affairs, Government of India has set up a

committee[1] in the year 2017 to look into the issues causing the poor integration of cash[2] and derivative markets for commodities.

As Gulati, Chatterjee and Hussain (2017) have shown, the volumes of agricultural commodities futures in India has been on a decline since 2012, quite in contrast to volumes in other countries with agricultural commodity futures markets such as China and the US. The importance of hedging effectiveness for the success of futures contracts suggests that one could look for clues for this poor performance in diminished hedging effectiveness of such contracts. The data do appear to show that hedging effectiveness of agricultural futures has generally been on the decline over the period studied by Gulati et al., (2017). There has been a concomitant increase in the number of delivery locations for many contracts such as cottonseed oilcake (increased from 2 to eventually 6) and soybean (from 6 to eventually 9). Figures 1 and 2 show this trend for cottonseed oilcake (cocud) and soybean.

In Figure 1 and Figure 2, the moving average of hedging effectiveness over twelve expiries has been plotted along the left y-axis, with the number of deliverable locations for each expiry on the right y-axis with contract expiration on the x-axis (in YYYY-MM format). The moving averages convey the trend better as the hedging effectiveness data are noisy. The declining trend of hedging effectiveness and the concomitant increase in the number of locations over the same time period is evident, and the changes in direction also appear to be related. This suggests that perhaps the multiplicity of delivery locations along with some associated factors have a role to play in the declining hedging effectiveness of these contracts.

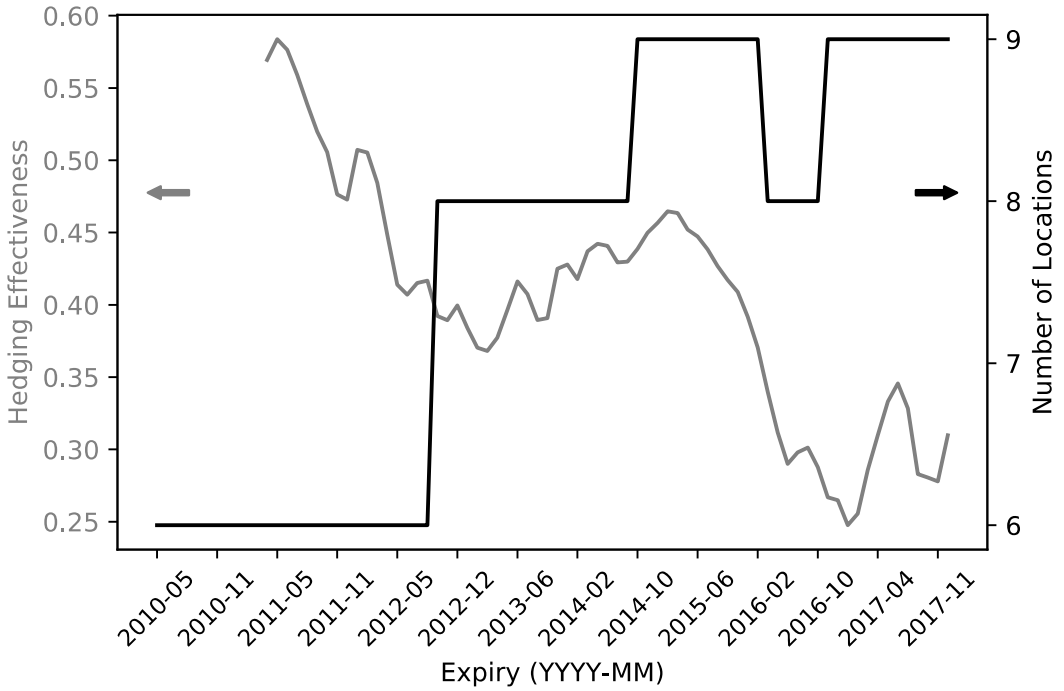
Figure 1: Evolution of hedging efficiency and number of delivery locations by contract - cottonseed oilcake



[1] This committee was set up as a part of the Government of India's thrust on doubling farmer income by 2022.

[2] In India cash markets are commonly referred to as spot markets.

Figure 2: Evolution of hedging effectiveness and number of delivery locations by contract-soybean



Agricultural commodity futures contracts in India are generally settled by delivery. The seller with an open position at expiration can choose to deliver at any of the delivery locations that are specified in the contract specifications. In other words, the very design of the contract furnishes the seller with an embedded[3] option that allows him/her to decide where to make delivery. Cash markets for the underlying commodity exist at the different delivery locations permitted under the contract. The most important of these is generally chosen to be the reference asset or the par asset for the contract and hedging effectiveness of the futures contract is measured with respect to this cash market.

These deliverable cash markets, while being markets for the same underlying commodity, reflect local realities over and above the general conditions that determine the price of the commodity. For instance, it may be possible that for a commodity future with three deliverable locations A, B and C with A being the par asset location, the underlying commodity traded in the cash market at C has a higher moisture content as compared to that at location A due to agro-climatic factors, and hence may be of a slightly different grade. The commodity traded in the cash market in location B may be affected by local demand and supply factors that may lead to a different volatility and price change over a period of time as compared to the commodity traded in the cash market at A. Different regulations and taxes may apply to participants and markets at the different locations, leading to different conditions of demand and supply.

Such factors make the underlying cash markets heterogenous. It is generally assumed that the futures contract has a specific, narrowly defined commodity as the underlying reference asset in order to facilitate proper pricing and hedging. With many deliverable locations, the uncertainty with respect to what the underlying commodity is increases, and this brings about a change in standard no arbitrage pricing models for the future, which impacts its hedging effectiveness. The economic

[3] These are embedded in the sense that the delivery option is traded as a package with the future they are associated with.

mechanism via which this happens are the embedded delivery options that the seller has, one of which is the location option described above. The inclusion of delivery options tends to reduce the value of futures contracts (Boyle, (1989)), which then reduces hedging effectiveness. Tajishian & McConnell (1989) have shown that excessively high delivery option values are accompanied by impaired hedging effectiveness for a financial futures contract. This impaired hedging effectiveness led to the demise of the contract. It stands to reason from the above arguments that the greater the optionality, the greater the impact on hedging effectiveness. Many studies have highlighted the importance of the number of deliverable assets and their inter-se correlations on option values. Boyle (1989) has used order statistics to theoretically value the location option when there are a varying number of equi-correlated assets with identical starting prices and volatilities and finds that the greater the number of assets and the poorer the correlations, the higher the value of the options, and hence the greater the expected impact on hedging effectiveness. In a more general case, the relative values of the deliverable assets, their inter-se correlations and volatilities will tend to affect option values as shown by Boyle and Tse (1990), with its concomitant impact on hedging effectiveness.

It should be noted that the notion of heterogeneity as described above is strongly related to these ideas - the greater the number of deliverable assets, the greater the expected heterogeneity and the poorer the expected correlations between the deliverable assets, and the greater the value of embedded options. While the option valuation formulation suggests a mechanism of evaluating the extent of impact to hedging effectiveness, it does not provide any direct guidance as to what specific heterogeneity factors affect hedging effectiveness via the mechanism. These specific heterogeneity factors are those which contract designers and regulators have control over, and hence the knowledge of such dependence can be used to inform and optimize contract design. Optimizing the delivery specifications can help, therefore, in reversing the declining volume trends for agricultural commodity futures in India. Motivated by these practical considerations, we study the impact of various heterogeneity factors on hedging effectiveness. While contract design is not an exact science, such an understanding may perhaps provide guidance. We use some variables that are logical candidates to represent heterogeneity of the underlying cash markets. We assess the variation of the hedging effectiveness of the futures contract with that of these variables.

There is not much in the literature by way of prior studies in the area. It is generally well understood (see Boyle (1989) and Pirrong, Kormendi and Meguire (1994)) that underlying delivery assets for a futures contracts need to be highly correlated, which would imply some requirement of homogeneity. Tajishian (1995) discusses the cash markets characteristics required for optimal contract design, focusing on the need for high hedging effectiveness and the form of physical delivery design. (Gulati, Chatterjee, & Hussain, 2017) suggest some characteristics of contracts that may be successful in the Indian context based on macro commodity characteristics. The lack of literature in this area is probably a consequence of the fact that extended time series of prices in multiple cash markets pertaining to an underlying commodity are not easily available. The National Commodities and Derivatives Exchange (NCDEX), which has the largest market share (over 80%) of agricultural commodities derivatives volume in India, has a robust process for collecting and disseminating cash prices (see NCDEX (2018)) in several locations for the same commodity. This offers a unique opportunity to study, among other things, the impact of heterogeneity of the underlying cash markets on hedging effectiveness.

The remainder of this paper proceeds as follows - Section 2 discusses the approach considerations for and the choice of variables that represent heterogeneity of the underlying cash markets. Section 3 discusses the methodology, data and its availability, Section 4 the results and Section 5 concludes and highlights some policy implications.

2. Variables representing Heterogeneity

2.1 Hedging Effectiveness

We define hedging effectiveness in accordance the work of Ederington (1979). Hedging effectiveness is defined as the R^2 of the regression of returns of futures (R_F) and the returns of the cash market in the par asset location ($R_{S,A}$). In other words, it represents the coefficient of determination of the regression model

$$R_F = \alpha R_{S,A} + \beta \tag{1}$$

The par asset defines the underlying reference asset for the commodity future and is, in general, the most important of the underlying deliverable assets. Delivery of any asset different from the par asset invites adjustments to the settlement price called premiums and discounts that are set with reference to this par asset. The benefits of addition of delivery locations should be weighed against the concomitant degradation of hedging effectiveness with respect to the par asset location. While futures contracts could be designed to optimize hedging effectiveness across some combination of delivery locations, presumably, the par asset location is chosen as such because it is the most important location when viewed in terms of number of participants, trading volumes, warehousing capacity and so on. Hence, at a minimum, hedging effectiveness at such a location should be high, to ensure success of a contract. We use hedging effectiveness as our dependent variable.

2.2 Heterogeneity

Studying the impact of heterogeneity of underlying cash markets requires defining alternative variables that represent heterogeneity of the underlying commodity market. In this regard it is important to clarify that it is the heterogeneity of the deliverable cash markets for underlying commodity that is being considered, i.e. assessing how different they may be within themselves. While there is no single parameter or variable that measures heterogeneity, it is instructive to look for available data that pertain to the differentiation between the various underlying cash markets as measures of heterogeneity. We consider the following candidates:

2.2.1 Number of delivery locations

The greater the number of delivery locations, the greater the possibility of heterogeneity of delivery location cash markets as discussed in Section 1.

2.2.2 Number of states in which the delivery locations are geographically located

In India agriculture is a state subject, with each state responsible for setting the regulations pertaining to the trading of agricultural commodities. These regulations could have different implications for the price behaviour of the local cash market. For instance, some governments have in the past restricted holding stocks beyond a maximum quantity. The consequent rush to liquidate inventories to ensure compliance has caused local cash markets to decouple from the general price trend of the commodity. The greater the number of states in which deliverable locations are situated, the greater the expected heterogeneity of the cash markets.

2.2.3 The maximum distance between the delivery locations

Commodities are expensive to transport and hence such costs act as friction in the transmission of a price change in one cash market to others. However, absent other transaction costs, once the price differential between two delivery locations is greater than transportation cost, it should be profitable to arbitrage by shipping the commodity from the lower priced location to the higher priced location. The greater the transportation cost, the greater the possible non-arbitrageable divergence in the prices at the cash locations. The greater the distance between locations, the greater the anticipated difference in behaviour of the cash markets. The maximum distance between two delivery locations is used as another variable representing heterogeneity of the underlying commodity.

2.2.4 Maximum volatility difference

It appears reasonable to expect that the greater the difference in volatility, the greater the heterogeneity of the underlying commodity.

2.2.5 Maximum price difference

If cash prices in the underlying markets diverge significantly, the heterogeneity of the underlying commodity is likely to be high. Exchanges use premiums and discounts to account for price differences, so the prices used in computing these differences are actual cash prices adjusted by the premium/discount. Where a delivery location is accorded a discount, cash prices are adjusted upwards by the discount and where a delivery location is accorded a premium, the cash prices are adjusted downward by the amount of the discount. The maximum difference in the adjusted underlying cash market prices is used as a representation of heterogeneity. See Pirrong et al., (1994) for details on the use of premiums and discounts by exchanges and the adjustment of cash market prices. In general, a seller who delivers the cheapest to deliver instead of the par asset would be expected to realize a gain of

$$S_{1,T} - \min\left(S_{1,T}, S_{2,T} + d_2, S_{3,T} + d_3, \dots, S_{n,T} + d_n\right) \quad (2)$$

where $S_{1,T}, S_{2,T}, \dots, S_{n,T}$ are the cash market prices in the n deliverable locations, at the time of expiration T and $d_2, d_3, \dots, d_n$ are the discounts applicable for all non-par delivery locations. The subscript 1 represents the cash market at the par asset location and hence has no corresponding discount term. This leads to the idea that it is price differences between adjusted prices that are pertinent for this analysis. We use prices adjusted by the discount/premium in order to compute this variable.

2.2.6 Proportion of delivery that takes place at the par asset delivery location

It is to be expected that if delivery decreases in the primary delivery location pertaining to the commodity, the heterogeneity of the commodity is likely to greater, as other delivery locations attain greater prominence at the expense of the primary delivery location. If this happens, clearly there are reasons for more than one underlying cash asset to become attractive to participants from a delivery perspective, indicating increased heterogeneity.

Our initial hypothesis is that for each commodity, the hedging effectiveness is dependent on each of these six heterogeneity variables with an inverse dependence on the first five and a positive dependence on the last.

3. Methodology and Data Sources

We recognize that contract design is based on judgment that considers several different variables. Specifically, the choice of delivery locations pertaining to a contract settled by delivery will depend on several variables, some of which have been identified above. There may be several others for which data is unavailable.

3.1 Estimation Technique

Our goal in this paper is to provide some guidance for contract designers to consider the heterogeneity of the underlying commodity cash market via the variables listed above. In assessing the impact of each of the above variables, it is important to recognize that these variables suffer from multicollinearity. To account for this, we use ridge regressions, a technique that is often used in such situations. The advantage over using this over other techniques such as principal component analysis in this situation is that the original observable variables are not transformed into others that are difficult to relate to. Given the goal of this paper, we believe that this is an important

consideration. Ridge regression requires the selection of an optimum ridge[4] parameter, for which several approaches exist. We use the methodology of Cule and De Iorio (2012), which has the advantage that the ridge parameter is chosen automatically by controlling the variance of the model predictions. Our initial hypothesis suggests that the model for each commodity is:

$$h = \sum_{i=0}^{n} \beta_i V_i + \alpha \tag{3}$$

where h is the hedging effectiveness of a futures contract, V_i represent the various heterogeneity variables, β_i represent the corresponding regression coefficients and α the intercept. We test whether the coefficients β_i are statistically different from zero to assess whether the variable has an impact on hedging effectiveness.

3.2 Data sources

Publicly available data on the NCDEX website include the following:

- Cash Prices in the par asset location and some additional delivery locations
- Futures prices
- Premium and discount values for the locations where delivery is allowed
- Delivery values at each location per contract on expiration

We choose contracts that are highly liquid and figure in the top ten commodities traded on the NCDEX between the years 2010 and 2017, for which cash price data is available for the par asset location as well as at least one other delivery location. The years are chosen to reflect a combination of recency along with adequateness of data for the study. Additionally, we focus on commodities that show adequate variation in the variables listed in Section 1. Only soybean and cocud have adequate variability in the number of locations, with different contracts being deliverable at 6, 8 and 9 locations and 2, 4 and 6 locations, respectively. For other commodities, the number of delivery locations change only by one, and hence it is difficult to draw any conclusions from the data. For cocud and soybean the other variables also vary in reasonable ranges and hence these two commodities are chosen for study. Since for the two chosen commodities the number of states does not change at all, we drop this variable on account of lack of data, even though we believe that such a variable should strongly reflect heterogeneity of the underlying commodity market.

The variables are calculated from the publicly available raw data as described above as follows:

1. Number of delivery locations (V_1): these are directly observed from contract specification for each expiry.
2. Maximum Distance between locations (V_2): The delivery locations were geocoded, and a distance formula applied to calculate the pairwise distance between delivery locations. The maximum of these was taken as the variable value.
3. Maximum volatility difference (V_3): cash prices for the delivery locations (where cash prices are available) were obtained for the two calendar months prior to the commencement of the expiry month. Given the bidirectional causality that is seen between futures and cash price changes, we consider, for a given futures contract, cash prices during the time that the futures contract is most liquid. This period comprises the two calendar months prior to the expiry month of the future, on account of the fact that as a contract enters the expiration month, the exchange imposes stringent position limits and margins, which lead to lower liquidity. Daily returns were calculated from these cash price series, and volatility of these

[4] The ridge parameter is variously referred to as the penalty or suppression parameter

series were computed. Pairwise differences between these volatilities were calculated, and the maximum difference was chosen as the value of the variable for a particular contract.

4. Maximum price difference (V_4): As discussed in Section 2, prices are first adjusted for the exchange specified premium/discount. The pairwise adjusted price differences on each day in the two calendar months preceding the contract expiry month are calculated, and the maximum of these is chosen as the daily maximum difference. The maximum of all the calculated daily maximum differences is the value if this variable for a given contract.
5. Par asset delivery proportion (V_5) : From contract level delivery data, the quantity of commodity delivered in the par asset location as a proportion of total delivered quantity across all delivery locations is taken as the value of this variable. Where the total delivery value is zero, the proportion is also taken to be zero.

For variables V_3 and V_4, data are incomplete in that time-series data for only a subset of all the delivery locations is available. We compute these variables on the basis of available data. Hedging effectiveness (h) is calculated, as explained in Section 2. Par asset cash market returns and futures returns are calculated for the two months in which the futures are expected to be the most liquid as explained for the variable "Maximum Volatility Difference" above. Based on our hypothesis that increased heterogeneity is a cause of degraded hedging effectiveness, it is our expectation the regression coefficients for V_1, V_2, V_3 and V_4 are negative and the coefficient for V_5 is positive.

4. Results and discussion

The results for cocud and soybean are presented in Table 1 and Table 2 respectively.

Table 1: The impact of heterogeneity variables on the hedging effectiveness of cottonseed oilcake (cocud) futures. Correlation coefficient = 0.679, ridge parameter = 0.1133

Variable	β	$scaled\ \beta$	Standard Error	p value
Number of locations (V_1)	-0.0334	-0.3901	0.1469	0.0079**
Max distance between locations (V_2)	-0.0006	0.25118	0.1499	0.0939+
Max volatility difference (V_3)	-0.0752	-0.0323	0.1334	0.8088
Max price difference (V_4)	-1.5937	-0.5447	0.1326	3.97e-05***
Par asset delivery proportion (V_5)	0.05368	0.1574	0.1253	0.2088

Significance codes: '***' = 0.001; '**' = 0.01; '*' = 0.05; '+' = 0.1
Scaled β refers to the regression coefficient when the variable is scaled such that it lies between 0 and 1. This procedure is necessary for ridge regression.

Table 2: The impact of heterogeneity variables on the hedging effectiveness of soybean futures. Correlation coefficient = 0.637, ridge parameter = 0.1534

Variable	β	$scaled\ \beta$	Standard Error	p value
Number of locations (V_1)	-0.0050	-0.0567	0.1411	0.6878
Max distance between locations (V_2)	-0.0005	-0.4849	0.1382	0.0005 ***
Max volatility difference (V_3)	-0.0987	-0.0373	0.1262	0.7674
Max price difference (V_4)	-1.1303	-0.5899	0.1213	1.14e-06 ***
Par asset delivery proportion (V_5)	0.0934	0.2004	0.1209	0.0975+

Significance codes: '***' = 0.001; '**' = 0.01; '*' = 0.05; '+' = 0.1
Scaled β refers to the regression coefficient when the variable is scaled such that it lies between 0 and 1. This procedure is necessary for ridge regression.

4.1.1 Number of locations

It is seen that the greater the number of locations, the poorer the hedging effectiveness as indicated by negative coefficients for both cocud and for soybean. The p value is significant only for cocud at the 1 percent level and does not appear to be significant for soybean. The coefficients indicate a 3.3 percent degradation in hedging effectiveness on addition of a location for cocud.

4.1.2 Maximum distance between locations

For both cocud and soybean there appears to be an inverse dependence of hedging effectiveness on the maximum distance between locations. The negative coefficients are statistically different from zero for soybean at a 0.1 percent significance level and cocud at a 10 percent significance level as indicated by the p value. The result appears to suggest than when the maximum distance between locations increases by 100 kilometres, the hedging effectiveness appears to fall by 5 percent for soybean and 6 percent for cocud.

4.1.3 Maximum volatility difference

For both cocud and soybean an increase in the maximum volatility difference has a negative impact on hedging effectiveness. However, the coefficients do not appear to be statistically different from zero for either commodity.

4.1.4 Maximum price difference

For both cocud and soybean, an inverse dependence of hedging effectiveness on max price difference is seen. The p values are significant at the 0.1 percent level implying coefficients that are statistically different from zero for both commodities. A 1 percent increase in the maximum price difference seems to degrade hedging effectiveness of cocud contracts by 1.6 percent while the corresponding figure for soybean is 1.1 percent.

4.1.5 Par asset delivery proportion

Cocud and soybean contracts both exhibit similar behaviour in that the hedging effectiveness appears to be positively related to the par asset delivery proportion. Coefficients are statistically different from zero only for soybean at the 10 percent level. For soybean, a 10 percent increase in the par asset delivery proportion appears to increase hedging effectiveness by about 0.9 percent.

The regression coefficients do have the signs hypothesized, though they are significant in varying degrees.

5. Conclusions and policy implications

The results appear to favour the hypothesis that the greater the heterogeneity of the underlying commodity cash markets at the multiple permitted delivery locations, the poorer the hedging effectiveness of the corresponding futures contract. Regressions yield coefficients that are statistically significant for at least one commodity for all variables except for the maximum volatility difference variable, and the direction of the dependence is consistent across both commodities, as are relative orders of magnitudes of the coefficients and the correlation coefficients.

These results have important implications for policymakers, regulators, and exchanges. For exchanges and regulators, providing contracts that deliver adequate hedging performance is a critical aspect in ensuring their acceptance by market participants and their consequent success. These results provide a framework for optimizing contract design and suggest that heterogeneity of the underlying deliverable commodities needs to be reduced or kept to a minimum to maximize hedging performance. The heterogeneity variables used in this study point to some concrete guidelines that can be followed in this endeavour. Specifically,

- the number of delivery locations should be kept as low as practicable, as indicated directly, as well as the fact that increasing the number of delivery locations will increase the chances that one of these many cash markets may diverge significantly from the par asset,
- the delivery locations should be as close as practicable to each other,
- the premiums and discounts should be adjusted frequently to minimize large price differences between the delivery locations, and
- conditions for ensuring that a large proportion of delivery happens at the par asset delivery location (such as adequate warehouse capacity, appropriate premium/discounts, and ease of transportation) should be put in place.

In the context of making sense of the declining volumes of agricultural commodity futures in India, these results may present some guidance. The addition of many locations as shown in Figure 1 and Figure 2, perhaps in an attempt to expand the appeal of the contract to clientele in diverse geographies, may have simply resulted in excess heterogeneity in the underlying deliverable cash markets, thereby degrading hedging effectiveness. Such an approach at trying to make the contract work for many may have resulted in a situation where it has not worked for anyone consistently over the medium term.

Many of these results have intuitive appeal from the perspective of adjusting the impact of delivery optionality. By focusing on specific controllable variables, this study offers a framework for relating contract optimization to specific design parameters. Taken together with ongoing monitoring of delivery option values and hedging effectiveness, the framework offers a compelling vision for the design and ongoing optimization of agricultural commodity futures contracts. Such an approach may ultimately provide the optimal balance between hedging effectiveness and heterogeneity arising from delivery options necessary to prevent manipulation and squeezes, with a concomitant reversal in the trend of declining volumes in Indian agricultural commodity futures.

For policymakers such as the Department of Economic Affairs in the Ministry of Finance, Government of India, these results point to hitherto unrecognized areas that contribute to the problem their committee had attempted to resolve. The report of this committee (see Expert Committee on the Integration of Commodity Spot and Derivative Markets (2018)) does not appear to have considered the impact of contract design based on physical delivery on hedging effectiveness of futures, which creates a direct link between cash and derivative markets. These results suggest that some solutions for the problem of poor integration between cash and derivative markets that require only coordination with regulators and exchanges in optimizing contract design and are relatively low hanging fruit in this endeavour. Finally, coordination with state governments to establish orderly cash markets that are as homogenous as possible may also yield positive results in this direction, and the report has made a similar recommendation.

Finally, these results suggest further lines of research. Firstly, the maximum price difference appears to be a significant determinant of hedging effectiveness. Clearly, these are dependent on the premium and discount set by the exchange. These premiums and discounts are likely to affect the par asset delivery proportion, as participants will deliver at a location that is most economically favourable to them. Research into setting these premia and discounts optimally will help exchanges optimize contract design further. Secondly, this study could be extended by defining hedging effectiveness more broadly to be a combination of hedging effectiveness at all the delivery locations to meet the goal of maximizing contract appeal. Finally, approaches that focus on integrating the impact these variables via valuing embedded delivery options are likely to help complete the continuous monitoring, and optimization framework suggested earlier.

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LIQUIDITY IN ASIAN FINANCIAL MARKETS: CROWDING OUT OR SPILLOVER EFFECT

SONAL THUKRAL[1], **RAHUL SIKKA**[1*]

1. Delhi Technological University, India

* Corresponding Author: Research Scholar, Delhi School of Management, Delhi Technological University, Shahbad Daulatpur, Main Bawana Road, Delhi – 110042, India. ✉ rahulsikka123@yahoo.co.in

Abstract

The paper attempts to explore the relationship between the stock market and the corporate bond market, with a focus on the inter-dependency of liquidity between the two markets. The study employs a panel dataset to assess the impact of stock market liquidity on the corporate bond market liquidity for the top five Asian economies (ranked by GDP) for the period 2008-2017. In contrast to a limited number of earlier studies that reported a spillover effect of liquidity among the markets for stock and government bonds, the results of the present study convey that an increase in stock market liquidity tends to eat up the liquidity of the corporate bonds, even after controlling for government bond yield and inflation rate changes. The findings indicate a crowding-out effect instead of a spillover effect, as indicated by related studies. The 'flight-to-quality' argument provides one possible explanation of liquidity moving away from one market to the other. This implies that if regulators' policies are focused on developing only one type of market, it may crowd out the liquidity and the development of the other market. The study suggests that the government focus more on the corporate bond market, which is yet to flourish in the Asian markets as compared to its stock market counterparts. The paper is one of the few attempts that focus on the corporate bond market and its liquidity and aims to ignite a debate on the possible linkages between the liquidity of the corporate bond market and the stock market.

Keywords: Liquidity, corporate bond market, stock market, turnover ratio, crowding out, spillover effect

1. Introduction

Financial Market liquidity has garnered increased interest in the past with close lens on the stock market. While focusing on the stock market, some studies have explored the effect of market liquidity on the prices and returns in the market (Amihud, 2002; Amihud and Mendelson, 1986; Jacoby et al., 2000; Jones, 2002; Jun et al., 2003; Pástor and Stambaugh, 2003). At the same time, others have explored factors that influence liquidity in the stock market (Correia and Amaral, 2014; Grossman and Miller, 1988; Hameed et al., 2010; Heflin et al., 2002; Kim et al., 2006). With regards to the bond market, the extant literature has analyzed the determinants of bond market development, but most of the work has focused on the size or capitalization of the market (Bhattacharyay, 2013; Eichengreen and Luengnaruemitchai, 2011; Maurya and Mishra, 2016; Mu et al., 2013; Smaoui et al., 2017; Teplova and Sokolova, 2018), and only a few studies examine the liquidity aspect of the bond market. Goyenko et al. (2011) and Gündüz et al. (2018) explore the factors that influence liquidity in the bond markets, while Lin et al. (2011) study the impact of liquidity on corporate bond returns. Further, the literature exploring the interlinkages of liquidity between the bond market and the stock market is almost missing as per our knowledge. Chordia et al. (2005) found liquidity shocks to be positively correlated across the two markets. In contrast, Goyenko and Ukhov (2009) found bond market

liquidity acting as a channel between monetary policy effects and the stock market liquidity, spilling over the money supply shocks from one market to another.

The limited studies that examine liquidity interlinkages between the bond and the stock markets overlook the corporate bond market and limit their focus to the treasury bond markets. Moving away from previous studies and in an attempt to fill this large gap, the present study attempts to explore the relationship between stock market liquidity and corporate bond market liquidity. Previous studies have explained stock market liquidity as a determinant of prices and returns of the stock market; however, our study differs by studying the stock market liquidity as a determinant of corporate bond market liquidity.

Further, the limited studies that focus on the liquidity of the corporate bond markets have concentrated on well-developed markets such as the United States (Bao et al., 2011; Chakravarty and Sarkar, 1999; Lin et al., 2011). Liquidity in the Asian corporate bond markets, which has been suffering (Sharma, 2001) has often escaped the attention of the researchers. To address this issue, our paper focuses on a cross country sample of Top five Asian economies.

A well-functioning corporate bond market makes it easier for corporations to avail credit and reduce the pressure on the banks leading to a reduction in the risk to the economy (Hakansson, 1999). A developed bond market promotes effective fundraising, which assists in stimulating economic activities (Hue and Trâm, 2019). Some studies establish a causal link between bond market development and economic growth (Fink et al., 2003; Pradhan et al., 2015), further emphasizing the importance of a bond market. Despite the importance of the bond market established in the literature, studies exploring its different aspects are relatively scarce, thereby heightening the importance to examine the functioning of these markets deeply. One of the significant reasons for scant literature can be attributed to the lack of trading level data as pointed out by Harrison (2002).

Asian economies have been growing at an impressive rate. Currently, the share of Asian economies in the global output is at 38%, rising from 26% in the 2000s and 2020, Asian economies are expected to surpass rest of the world in terms of Purchasing Power Parity (Romei and Reed, 2019). Asian corporate bond markets have been growing in size, measured by the number of outstanding issues, for the past few years, and in March 2018, reached a valuation of $5.3 trillion (CARE Ratings Ltd., 2018). However, when we compare it with the US market, which stands at more than $8.8 trillion, Asian countries seem to have lagged. The vast potential in the Asian markets provides impetus to explore the corporate bond market scenario in Asia.

To study the effect that stock market liquidity has on the liquidity in the corporate bond market, the present study employs a panel of top five Asian economies ranked by their GDP for the period 2008 to 2017. Utilizing insights from the extant literature, our study also controls for two other variables that could have a possible effect on the corporate bond market liquidity – government bond yield and inflation rate in the economy. The results of the study show a negative relationship between the corporate bond market liquidity and the stock market liquidity. The negative relationship observed in our results points towards a crowding-out effect between the two markets explaining that higher liquidity in the stock market seems to eat up the liquidity in the corporate bond market. The relationship remains significant, even after controlling for government bond yields and inflation rates in the economy.

The contribution of the present study lies in its attempt to draw the attention of the researchers to the highly overlooked area, the corporate bond market liquidity. Existing literature assesses the liquidity linkages between the treasury bond markets and stock markets; however, our study explores the linkages of liquidity pertaining to the corporate bond market and the stock market. The crowding-out effect observed in the study provides an interesting aspect of the dynamic relationship between the two markets. Previous studies, ostensibly similar to our present study that examines the linkages between the stock market and bond market liquidity (Chordia et al., 2005; Goyenko and Ukhov, 2009) have found evidence of a spillover effect rather than the crowding-out

effect. The present study also observes that stock market liquidity in our overall sample surpasses the liquidity in the corporate bond market, possibly owing to the lucrativeness of the stock market for investors. The lucrativeness can be attributed to the efficiencies brought in the stock markets by concentrated efforts of the government to uplift these markets. Thus, the crowding-out effect of stock market development emphasizes the need of developing policies which not only targets one market (stock market, in this case) but similar and simultaneous efforts are required to uplift other markets (corporate bond markets, in the present case) to prevent the flight of trades to "quality" markets.

2. Bond Market Trends in Asia

Asian bond markets are growing in size; however, they still lag behind the western countries, primarily the USA. In addition to this, the contribution of each Asian economy towards the total size of the Asian market is quite skewed, with only China contributing close to 51% of the total market size. China's bond market is ranked among the top bond markets of the world in terms of size; however, the market is dominated by the Government or treasury bonds and the interbank market, with only about 21% being contributed by the corporate bonds (ACRA, 2019). The Republic of Korea follows China in terms of bond market size, which is followed by Japan and India, respectively. However, Indonesia, when compared to its Asian peers' lags in size (CARE Ratings Ltd., 2018). According to the same report, however, we see the turnover ratio of the Indonesian corporate bond market is the highest in 2018, whereas Japan and China lag at the bottom. The size (measured by the stock market capitalization) of the stock markets in the above countries far exceed the size of their corporate bond markets. Japan's exchange alone has a capitalization of more than $5 trillion (Statista, 2019), compared to their bond market size of only $700 billion. Even in India's case, we observe a similar difference, while their bond market size was around $400 billion, the market capitalization of BSE in 2018 was close $2 trillion. These differences shed light on the lack of development of the corporate bond markets in comparison to the stock markets in the Asian economies.

3. Background of the Study

3.1 Stock market liquidity and Bond market Liquidity

Limited studies in the past explore the interlinkages of the stock market and bond market, especially the liquidity aspect. Volatility in the market returns primarily is positively correlated among the two markets (Fleming et al., 1998). On the other hand, there have also been studies in the past highlighting the impact of 'flight-to-quality', where the funds have moved from the stock market to the bond market on the assumption that bond markets are a safer option, especially in times of uncertainty (Bayraci et al., 2018; Connolly et al., 2005). There is consensus among the researchers about the negative return correlations among the two markets; however, when comparing the liquidity of the bond and stock markets, results have been different. While studying the relationship between the liquidity of the stock market and that of the treasury bond market, previous works have found a positive association between the two (Chordia et al., 2005). While studying the impact of monetary policy on illiquidity, Goyenko and Ukhov (2009) observed a spillover effect where a liquidity shock in the bond market was subsequently transmitted to the stock market. These studies offer insights into the liquidity relationship across markets; however, the lack of studies examining the corporate bond liquidity leaves a gap to be explored.

Liquidity becomes a critical component of any financial market, and with meagre literature that examines the liquidity of the corporate bond market, the present study attempts to bridge this gap. Studying the liquidity element of the financial markets has important implications. The trading activity has been found to have a positive correlation with the returns of the markets (Edelen and

Warner, 2001). Level of trading activity often signals the level of confidence that investors have regarding the market conditions. Markets with higher liquidity experience lower transaction costs and enhanced market efficiency (Chordia et al., 2008). Since liquidity act as a market signal, lower liquidity in the stock market would reduce investor confidence and investors could move onto the relatively stable corporate bond market, resulting in higher trading activity in the corporate bonds.

H1: Stock market liquidity is negatively related to corporate bond market liquidity.

3.2 Government Bonds Yields and Liquidity of the Corporate Bond Market

While studying the liquidity effect on yield spreads, Chen et al. (2007) found an inverse relationship. They found higher yield spreads to be associated with more illiquid bonds, indicating that liquidity is priced in the market. These results were further backed by Favero et al. (2010), who found liquidity risk results in yield differentials in the eurozone sovereign bonds. A higher yield in the government bond market would suggest a fall in liquidity. Amihud and Mendelson (1991) highlight the implications of high yield and low liquidity in the market. Issuers would not prefer a less liquid market as they would not be able to sell securities at a desirable price. Also, they propose that investors demand less of illiquid instruments. The insights from these works suggest that a higher yield in the treasury bond market would negatively affect its desirability and would provide investors and issuers, both, an incentive to explore other markets. The negative association between the treasury bonds and corporate bonds have been explored in the work of Duffee (1998). The author found a significant negative relationship between the yields of the two markets. Results from the study show a fall in the yields of the investment-grade corporate bonds as the yields of the treasury market rises. The discussion suggests that a higher yield in the government bonds will result in a drop in corporate bond yields. Consequently, this would be associated with higher liquidity in the corporate bond market as it becomes more desirable for both investors and issuers, based on the implications provided by Amihud and Mendelson (1991). Therefore, we hypothesize a positive relationship between government bond yields and liquidity in the corporate bond market.

H2: Government bond yield is positively related to corporate bond market liquidity.

3.3. Inflation rate and Corporate Bond market liquidity

Supply of money in the market has a positive impact on liquidity (Ariff et al., 2012). Extra supply of money in the market pushes the interest rate down, through the 'liquidity effect' (Christiano, 1991); fall in interest rates boosts the economic activity and investment, resulting in a positive effect on the trading activity in the financial markets. Inflation in an economy is a significant result of money supply shocks, with a strong positive association between the level of money and consumer prices (Browne and Cronin, 2010) and a rise in inflation signals quantitative easing. A quantitative easing strategy tends to reduce the price frictions and provides a boost to trading activity, thus having a positive impact on market liquidity (Christensen and Gillan, 2013). Thus, higher inflation rates should result in higher liquidity in the corporate bond market.

H3: Inflation rates are positively related to corporate bond market liquidity.

4. Data and Methodology

The study first presents the trends in turnover ratios in the Asian economies, followed by descriptive statistics. Next, to study the impact of stock market liquidity on the corporate bond market liquidity, we employed a panel dataset. Our sample consists of the top five Asian economies, ranked by GDP (IMF, 2019b) viz., China, India, Japan, Republic of Korea and Indonesia for the period 2008-2017. The model includes bond turnover ratio as the dependent variable, stock turnover ratio as independent variable and government bond yield and inflation rate as control variables. The data for all the variables have been collected on an annual basis. The proxies for variables and the respective

sources of data collection have been explained in the following sections and summarized in Table 1.

4.1. Measures of Liquidity

To study the relationship between the liquidity of the stock market and the corporate bond market, we utilize the turnover ratios of the two markets for our sample Asian countries. The turnover ratio is calculated using the definition given by Asian Bonds Online, as the ratio of the total value of securities traded in the market in a year and the average market capitalization or the number of outstanding issues in the market in that year. The bond market development indicators given by World Bank lists the turnover ratio as an essential variable for testing the efficiency of the market (The World Bank, 2006). The turnover ratios have also been previously utilized by researchers to study market liquidity (Chan et al., 2007; Jun et al., 2003; Sarr and Lybek, 2002).

4.1.1 Corporate bond market liquidity (btr) –The liquidity of the corporate bond market in an economy is proxied by the corporate bond turnover ratio (btr). Corporate bond turnover ratios of the countries in our sample except for India has been extracted from the data portal of Asian Bonds Online (AsianBondsOnline, 2019). For India, the amount of trading in the corporate bond market and the number of outstanding issues in the market have been extracted from the Securities Exchange Board of India's (SEBI) 'Reports and Statistics' on corporate bonds (SEBI, 2019). For maintaining consistency, the bond turnover ratios for the same period for India have been calculated using the same definition as Asian Bonds Online.

4.1.2 Stock Market Liquidity (stock turnover) – Stock market liquidity has been proxied by the stock turnover ratio. The stock turnover ratio for all the economies in the dataset has been extracted from The World Bank's 'Global Financial Development Database' (The World Bank, 2019).

4.2. Control variables

4.2.1 Government Bond yields (gbond) – Yields of the 10-year Treasury bond have been taken as a proxy. The data for government bond yields have been extracted from the International Monetary Fund's (IMF) International financial statistics database for all the economies in our dataset (IMF, 2019a).

4.2.2 Inflation Rate (infperc) – The second control variable is the inflation rate, We extract inflation rates from the IMF's World Economic Outlook Database, October 2019 edition (IMF, 2019b).

4.3. Model Specification

Table 1: Description of Variables

Variable	Symbol	Proxy	Role	Data Source
Corporate Bond liquidity	btr	Corporate bond turnover ratio	Dependent Variable	Extracted from Asian bonds online and SEBI – Reports and Statistics
Stock Market Liquidity	Stock-turnover	Stock turnover ratio	Independent Variable	World Bank's Global Financial Development Database
Government/Treasury Bond market	gbond	Annual yield of the 10-year treasury bond.	Control Variables	IMF's International Financial Statistics
Inflation rate	infperc	Annual inflation rate		IMF's World Economic Output database

Given the panel structure of our dataset and the need to test the impact of stock market liquidity on bond market liquidity, we employ panel regression. Controlling for heteroscedasticity and autocorrelation by using Arellano specification (Arellano, 1987), the model was checked for the

presence of fixed effects or random effects using the Hausman Test (Hausman and Taylor, 1981). The results suggested for fixed effects, and hence the same was applied. The following specification model was used:

$$\log(btr)_{ti} = \alpha + \beta_1 * \log(stockturnover)_{ti} + \beta_2 * \log(gbond)_{ti} + \beta_3 * \log(infperc)_{ti} + \mu_{ti.} \quad (1)$$

5. Results and Analysis

Summary statistics for the variables are reported in Table 2. The mean turnover ratio of the corporate bond market is found to be lower when compared with the stock market, and similar observation is noted for the median values. Lower liquidity in the corporate bond market across our sample indicates more activeness of the investors in the stock. The difference in the mean liquidity could point towards a lack in the development of the corporate bond market and shows how the stock market is preferred over the former. When comparing the individual countries in the sample (refer Table 3) based on the liquidity of the markets, we observe China's mean turnover ratio for the bond market is close to 2.848, much higher than all other countries in the sample, with the second-highest turnover being that of the Indonesian bond market at only 0.8. India, in comparison, lags with a mean turnover ratio of only 0.6 in the sample period. The corporate bond market of China has seen a rapid fall in its turnover ratio in the past ten years. The average turnover ratio for the first five years is found to be around 4 for the Chinese bond market, whereas for the next five years, it falls to approximately 1. Surprisingly, in the same period, the size of the Chinese corporate bond market has seen a significant expansion, with its size in 2017 being eight times the size in 2008 (AsianBondsOnline, 2019). This observation indicates that size may not be a strong determinant of liquidity, and merely increasing the issuance will not guarantee a rise in liquidity. Figure 1 and 2 display the trends of bond turnover ratio and stock turnover ratio, respectively, of individual countries in our sample. Indian corporate bond market has not seen much variability in its turnover ratio, and it has remained almost stagnant in-sample period.

In contrast, China experienced a considerable dip in the bond turnover ratio. Rest of the economies also do not observe much variability in the bond turnover ratios. Studies that focus on the development of the Indian corporate bond market associate lack of market makers as a reason for low liquidity (Banerji et al., 2012). Indian Insurance companies and pension funds, both of which are huge players in the market and act as market makers, are restricted by mandates specified by the regulators and are permitted to invest only in bonds recognized as 'investment' grade (PFRDA, 2014; IRDAI, 2016).

Table 2: Descriptive Statistics- Overall Sample

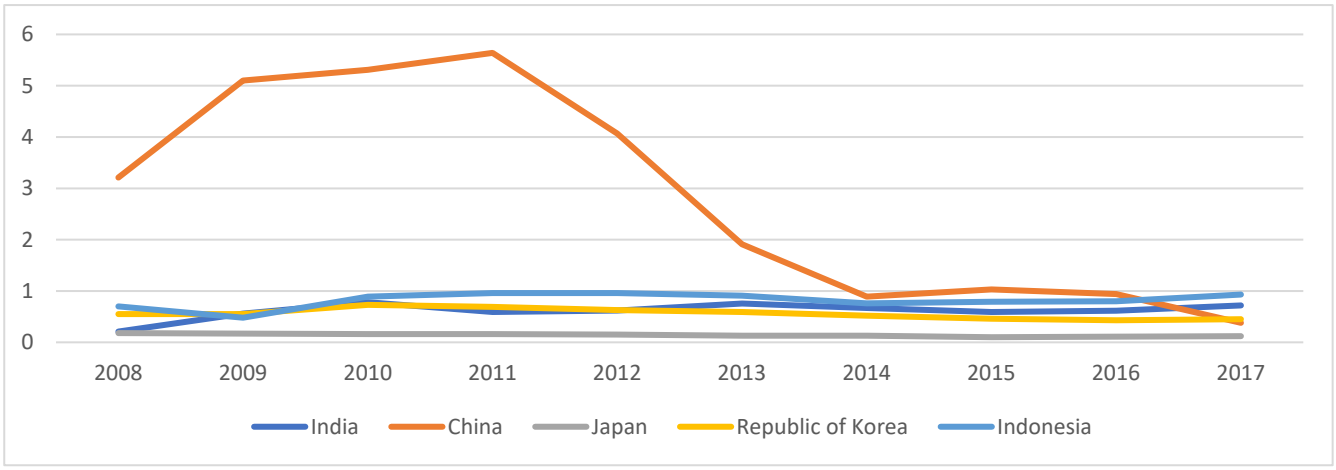
	Bond Turnover Ratio	Stock turnover Ratio	Government Bond Yields	Inflation rates
Mean	0.996	1.219	4.814	3.752
Median	0.624	1.133	4.178	3.12
Standard Deviation	1.31	0.938	3.082	3.302
Sample Variance	1.717	0.881	9.498	10.903
Minimum	0.1	0.196	-0.066	-1.35
Maximum	5.64	5.569	12.2	12.314
Count	50	50	50	50

Table 1: Descriptive Statistics - bond turnover ratio - Country-wise for the period 2008-2017

India		China		Japan	
Mean	0.61	Mean	2.85	Mean	0.14
Median	0.62	Median	2.56	Median	0.14
Standard Deviation	0.16	Standard Deviation	2.06	Standard Deviation	0.03
Minimum	0.21	Minimum	0.38	Minimum	0.10
Maximum	0.78	Maximum	5.64	Maximum	0.18

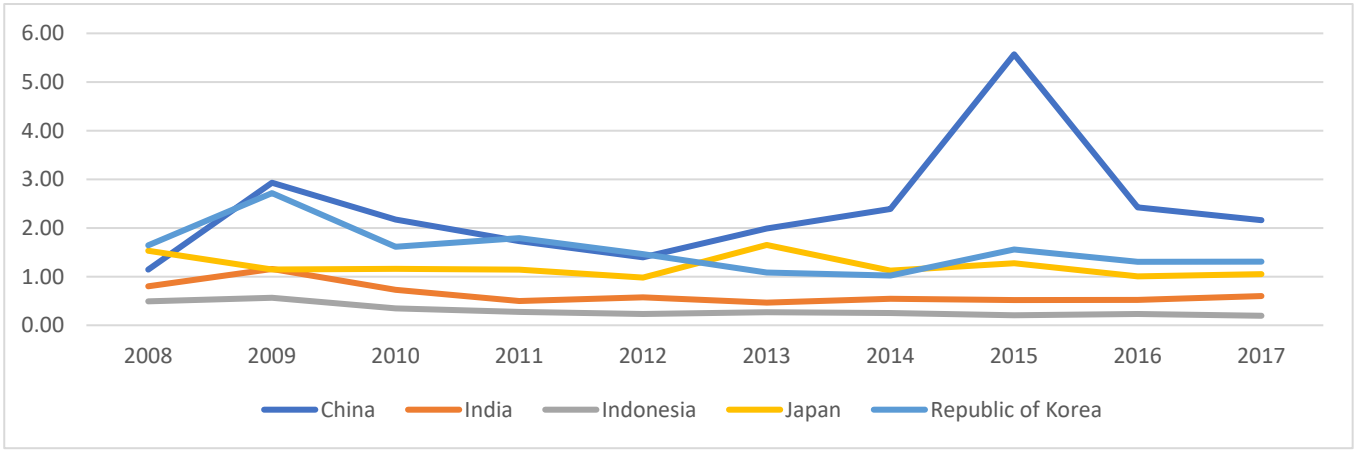
Republic of Korea		Indonesia	
Mean	0.56	Mean	0.82
Median	0.55	Median	0.85
Standard Deviation	0.10	Standard Deviation	0.15
Minimum	0.43	Minimum	0.48
Maximum	0.73	Maximum	0.96

Figure 1 - Bond Turnover Ratios of the top five Asian Economies



Source: Asian Bonds Online and SEBI – Reports and Statistics.

Figure 2 - Stock Turnover Ratios of the top five Asian Economies



Source: World Bank – Global Financial Development Database

Next, we applied the fixed effects model to test the impact of stock turnover ratio on bond turnover ratio; results are summarized in Table 4. First, we ran the model, including only the dependent variable and the independent variable (omitting the control variables). Results are reported in column 2 of Table 4. It was found that the stock turnover ratio had a negative coefficient and was significant, indicating that a rise in the liquidity of the stock market would result in a fall in liquidity in the corporate bond market. However, the model resulted in a low coefficient of determination and to improve the explanatory power of the model; we included the two control variables.

Table 2: Fixed effects model results

Variables (1)	**Model with only independent variable** (2)	**Model with control variables and robust standard errors** (3)
log(stockturnover)	0.0426* (-0.4573)	0.000*** (-0.5833)
log(gbond)		0.7112 (0.0467)
log(infperc)		0.0467 (0.3237)
R^2	0.0902	0.274
F statistic (p-value)	0.0426*	0.0086**

Note: Numbers in the parenthesis indicate respective variables estimates. ***, **, * indicate significance at 0.1%, 1% and 5% levels, respectively.

With the inclusion of control variables viz. government bond yield and inflation rates, also controlling for autocorrelation and heteroscedasticity by calculating robust standard errors (reported in column 3 of Table 4), results indicate that stock turnover ratio is still highly significant and is negatively related to the bond turnover ratio. The observed negative relationship between the liquidity of the corporate bond market and the stock market is an interesting finding of the study. Whereas previous studies found stock market liquidity and treasury bond market liquidity to be moving in tandem, our results show liquidity to moving away from one market to another. The argument of 'flight-to-quality' has been previously used to explain the negative relationship between price movements in the bond market and the stock market. According to the argument, in times of market turbulence, investors prefer a stable bond market over the stock market (Ilmanen, 2003; Bayraci, Demiralay and Gencer, 2018). Fang et al. (2017) found similar results, where the level of certainty in the economy affected the correlation in the price movements among the bond and stock markets. We can extend this explanation of negative price relationship between the two markets to the negative relationship of liquidity, we observed in our results. In a stable market scenario, the trading in equity rises whereas a negative sentiment would transfer the trading activity towards the bond market, which is relatively less risky and investors look to diversify their risk (Connolly et al., 2005). Stock market liquidity is regarded as one of the predictors of the business cycle and the future state of the economy (Næs et al., 2011). Higher liquidity in the stock market is associated with a favourable economic situation and vice-versa. These observations further provide support to our results, as lower liquidity in stock market signals a relatively volatile economic situation and thus, the transfer of liquidity to the more stable bond markets. Also, another interesting aspect of the discussion is the relatively lower liquidity of the corporate bond markets. The regulations in these markets restrict particular types of investments in non-investment grade bonds which reduces the ability of institutions to trade in the market effectively and further diminishes their market-making capabilities. Due to such regulations, much of the liquidity that could have been otherwise in the bond market is being crowded out by the liquidity and hence the attractiveness of the stock market.

Our results also show a positive relationship between inflation and bond turnover ratio; however, the relationship is not found to be significant. Inflation has often been linked with the increase in money supply (Orphanides and Solow, 1990). As the money supply improves, the funds allocated to various assets improve, thereby increasing the trading activity. Money supply and liquidity have been reported in the past as having a strong positive relationship (Ariff et al., 2012), and a similar effect is

reported in our results. Government bond yield is found to be positive but not significantly related to bond turnover ratio. Duffee (1998) found a negative relationship between the yields of the treasury bond market and the corporate bond market, as the yields in the treasury bond market increases, yields in the corporate bond market fall. Lower yields in the corporate bond market signal higher liquidity (Chen et al., 2007). In short, results from our study suggest that corporate bond market liquidity is not only affected by the liquidity in the stock markets, but their relationship is found to be inverse in nature. Higher liquidity in the stock market tends to crowd out the liquidity in the corporate bond market.

6. Conclusion

In our paper, we attempted to explore the nature of the relationship between the stock market liquidity and the corporate bond market liquidity. The study included a sample of the top five Asian economies for the period 2008-2017. Studies on the liquidity linkages between the bond market and stock market have been limited in the literature, and most of the research focuses on the Treasury bond markets. Our study expands on the scant literature on the corporate bond market liquidity and its relationship with the stock market. Our analysis begins with studying the levels and trends of liquidity of the stock and the corporate bond market in the countries included in our sample. It was observed that the overall corporate bond market liquidity had lagged that of the stock market. Another interesting observation made in the paper is the difference between the size of the corporate bond market and the respective liquidity. China, despite having a considerable market size, saw a fall in liquidity in the last few years.

On the other hand, Indonesia, which has the smallest bond market in the sample, had overall liquidity as the second highest in the sample, ahead of the larger markets of India and Japan. These observations signal that size alone may not be a determinant of liquidity. Further, Fixed effects model was employed to assess the impact of stock market liquidity on the corporate bond market liquidity. Even after controlling for government bond yields and inflation rate changes, a significant inverse relationship was found among the liquidity of the two markets, indicating that the liquidity of the two markets moves in the opposite direction. Thus, the results point towards a crowding-out effect, which is not explicitly explored in extant literature. Close to our present paper, the relationship between treasury bond market and the stock market has been explored in the past (Chordia et al., 2005; Goyenko and Ukhov, 2009), which has indicated a spillover effect of liquidity in the treasury bond market on liquidity in the stock market. Under this spillover effect, a liquidity shock in one market is followed by a liquidity shock in the other; however, our results indicate that a rise in liquidity in one market eats up the liquidity in the other market. The negative relationship between the liquidity of the two markets can be explained through the 'flight-to-quality' argument (Connolly et al., 2005; Bayraci et al., 2018). According to the 'flight-to-quality' explanation, any disturbance in the stock market may result in the movement of funds from the stock market to a relatively less risky market, the bond market, thereby increasing the trading activity (liquidity) in the latter market.

The fact can also support the crowding out effect of the stock market liquidity on the corporate bond market liquidity, that the Asian economies in our sample have a more liquid stock market compared to the corporate bond market, as observed through the descriptive statistics. The plausible reason for the same seems to be a lack of regulatory policies in making the bond market as lucrative as the stock market. For instance, the market regulators in India, restrict financial corporations, like the insurance companies, to invest in non-investment grade bonds, thus, hindering their ability to act as market makers (Banerji et al., 2012).

The findings of the present study support the opposing relationship between the liquidities of the stock and the corporate bond market and provide evidence of a crowding-out effect. This calls for a more concentrated effort by the regulators to develop not only one market but to have simultaneous developments in other markets as well. The paper aims to provide insights into the relatively unexplored corporate bond market liquidity, and our results bring attention to the need for

simultaneous efforts to promote liquidity in both the markets. Policies that focus on liquidity and not just the size of the market are essential, calling for the reforms needed to boost market activity, particularly in the case of the corporate bond market. The paper aims to ignite the debate on the interlinkages between the stock market and the corporate bond market.

7. Limitations and Future Research Scope

The paper leaves some scope for future research. A high-frequency data of turnover ratio of the stock and corporate bond markets, besides extending the analysis to other economies for an extended sample period would shed light on more delicate nuances of the inter-linkages between the two markets. The present paper skips the impact of various economic conditions on the inter-linkages between the liquidity of the two markets and is left for future researchers to explore. A comparison of developed and developing economies may provide further insights. One of the reasons for low liquidity in the corporate bond market can also be attributed to the attractiveness of the treasury bond market. Researchers may explore if a crowding-out effect exists between the corporate bond market and the treasury bond market. A model that incorporates the impact of macroeconomic factors in explaining the liquidity impact of the stock market on the corporate bond market may also be explored with a specific focus on the regulatory environment in the markets.

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IMPACT OF MANAGERIAL ABILITY AND POWER ON CEOS COMPENSATION – AN EMPIRICAL EVIDENCE FROM INDIAN COMPANIES

SRIKANTH POTHARLA*

ICFAI Business School (IBS, A Constituent of IFHE, deemed to be a University), Hyderabad, India.

* Corresponding Author: Srikanth Potharla, Assistant Professor, Department of Finance and Accounting, ICFAI Business School (IBS), (A Constituent of IFHE, deemed to be a University), Hyderabad, India.
☎ +(91) 9703664124 ✉ srikanthyadav444p@gmail.com

Abstract

The present study aims to test whether the rent extraction or efficient contracting which significantly influences the compensation of CEOs in Indian companies. By drawing the sample from all the listed companies providing data on CEO characteristics from the year 2006 to 2018, the study tests the empirical model using ordinary least squares regression and quantile regression. The results of analysis reveal that CEO compensation is tenure-variant and there is a trivial difference between the impact of CEO power and CEO tenure. It is in line with the bargaining theory of managerial ability view on CEO compensation. It supports efficient contracting in CEO compensation. The results of the analysis also reveal that impact of CEO power is comparatively less for long-tenured CEOs. It implies that managerial ability view is maintained, and CEO compensation is influenced by their bargaining power. The results also prove that power premium is more in case of group companies compared to non-group companies.

Keywords: CEO Compensation, Rent Extraction Theory, Efficient Contracting Theory, CEO Power, CEO Tenure, Indian Companies.

1. Introduction

Academics, government officials and media have expressed concern about the high level of compensation for CEO of Indian enterprises and observed that corporate governance and regulation have failed to curb excessive compensation and rent extraction (Chakrabarti et al., 2012; S. Ghosh, 2010; M. Jaiswall & Firth, 2009; S. S. K. Jaiswall & Bhattacharyya, 2016; Pande and Dubey, 2014; Rai, 2009; Singh, 2007). Against this backdrop, research on factors influencing the compensation premium of CEOs is drawing the attention of the academic researchers and policymakers. The extant literature was mainly confined to developed economies (Core et al., 1999; Morse et al., 2011; Murphy, 1985; Song & Wan, 2019). The findings and implications which are derived from the studies in developed economies cannot be applied verbatim to emerging economies. Several economists have already made strong enough argued that the corporate structure, market, and organization of developed and developing countries have some fundamental institutional structural differences. It is also argued that there is no apparent difference between ownership and control in emerging economies. The perennial problems in emerging economies like India are underdeveloped managerial markets, interference of founders of the companies in the appointment of CEOs.

There are two opposite views relating to executive compensation in academic research. One is 'managerial power' view, and another one is 'efficient contracting' view. Managerial power view suggests that more powerful CEOs receive higher compensation compared to less powerful CEOs. It reflects the rent-extraction ability of CEOs. The extract literature as also evidenced it(inter-alia, Core et al., 1999; S. S. K. Jaiswall & Bhattacharyya, 2016; Murphy, 1985; Song & Wan, 2019). Managerial power view hypothesizes that rent-extraction ability of CEOs positively associated with their tenure. Because one of the primary sources of CEO power is they influence the appointment of a board of directors who in turn decide the compensation structure of the CEOs. It is more legitimate to hypothesize that the directors who are nominated by the CEOs are more loyal to the CEOs, and they hesitate to influence the decisions taken by the CEOs. As the incumbency of the CEOs increases, there will be more possibility of appointing a greater number of directors by such CEOs, which in turn improves the power of the CEOs. In other words, the impact of CEO power is more for long-tenured CEOs compared to that of short-tenured CEOs.

On the contrary, managerial ability view proposes efficient contracting theory which hypothesizes that managerial talent influences CEOs power premium in an efficient managerial executives' market. Efficient contracting theory suggests two sub-theories. One is Ability Matching Theory which states that managerial talent is tenure-invariant and large firms attract talented managers by offering more competitive compensation(inter-alia, Baranchuk et al., 2011; Gabaix & Landier, 2008; Rosen, 1981; Song & Wan, 2019). Another one is bargaining theory which suggests more talents CEOs possess better bargaining power and negotiation skills and can demand greater compensation (Rosen, 1981). The Bargaining Theory also hypothesizes that managerial talent is tenure-variant (Hermalin & Weisbach, 1998). Though, both the Managerial Ability Theory and Bargaining Theory suggests that CEO compensation influenced by their talent, those two theories differ on the view that talent is tenure-variant or tenure-invariant. (Rosen, 1981).

Against this backdrop, the present study aims to test whether the rent extraction or efficient contracting, which significantly influences the compensation of CEOs in Indian companies. By drawing the sample from all the listed companies providing data on CEO characteristics from the year 2006 to 2018, the study tests the empirical models using ordinary least squares regression and quantile regression. The final sample used in the study is the pooled data of 3070 CEO-years which are having complete data of CEO compensation and other CEO characteristics. To mitigate the impact of the extreme value of CEO compensation, the present study excludes all the observations of CEO compensation beyond the z-score value of three. The data of other controlling variables are winsorized at the top 5% and bottom 5%.

The results of empirical analysis reveal that CEO compensation is tenure-variant, and there is a trivial difference between the impact of CEO power and CEO tenure. It is in line with the bargaining theory of managerial ability to view on CEO compensation. It supports efficient contracting in CEO compensation. The studies like (Core et al., 1999; Morse et al., 2011; Murphy, 1985; Song & Wan, 2019) in developed economies and (S. S. K. Jaiswall & Bhattacharyya, 2016) in the Indian context have evidenced similar results. The results also disclosed that financial performance(ROA), size of the firm(LnSales) and growth opportunities(PBV) have a significant positive impact on CEO compensation while risks of the firm(STDEV.ROA) has a significant negative impact which is in line with the hypothesized relationship of such variables with CEO compensation. The extant literature has also evidenced qualitatively similar results for controlling variables(inter--alia, Chakrabarti et al., 2012; A. Ghosh, 2006; Guthrie et al., 2012; S. S. K. Jaiswall & Bhattacharyya, 2016; Murphy, 1985; Ryan & Wiggins, 2001; Song & Wan, 2019).

The Managerial Ability View proposes 'Efficient Contracting Theory' which emphasizes that CEO compensation should be commensurate with their talent. At the same time, the managerial power view suggests that rent-extraction ability of the CEO influences their compensation. Moreover, managerial talent and rent-extraction ability also grow with CEO tenure. So, the power premium of new or short-tenured CEOs represents mainly their managerial talent while power premium of long-tenured CEOs represents their talent and rent-extraction ability. So, the power premium of long-

tenured CEOs hypothesized to be more than that of short-tenured CEOs, when managerial power view is maintained.

On the contrary, when managerial ability view is maintained, there should be no significant difference in the power premium of short-tenured and long-tenured CEOs. Against this backdrop, the present study sub-divides the sample into long-tenured and short-tenured CEOs. The results of the analysis reveal that the impact of CEO power is comparatively less for long-tenured CEOs. It implies that managerial ability view is maintained, and CEOs' bargaining power influences their compensation. The results are in line with studies like Song & Wan (2019).

Group companies are the most common phenomenon in corporate India. In group companies, founder members play a dominating role in the appointment of CEOs or founder members or their relatives act as CEOs. Against this backdrop, it is hypothesized that power premium is more in case of group companies compared to non-group companies. The results are consistent with the hypothesis. Extant literature in the Indian context also evidenced similar results (inter-alia, Chakrabarti et al., 2012; S. Ghosh, 2010; M. Jaiswall & Firth, 2009). Based on the findings of the analysis, it can be inferred that CEO compensation in Indian companies is more tenure-variant supporting the efficient contracting view. However, in group companies, CEO compensation is more influenced by their power compared to that in non-group companies.

It can be concluded that though, the professional market of CEOs is becoming more efficient, rent extraction still exists strongly in group companies in India. It draws the attention of regulators, stock exchanges and market players and expected to make them more focused on enhancing the transparency in group companies in India.

2. Literature Review and Theoretical Background of the Research Problem

The existing literature documents that the characteristics of companies (e.g. company size and performance) and managers (e.g. tenure of employment and gender) explains the variability of the executive compensation partly. The scope of academic research in this area extends to contract theory, corporate finance, corporate governance, and socio-economic issues like unequal distribution of income. The studies like Lucian Arye Bebchuk & Fried (2005); Choe et al., (2014) and Morse et al., (2011) proved the same, and it has drawn the attention of not only the academic researchers but also the policymakers. Consequently, in the United States, SEC has imposed disclosure requirements relating to managerial compensation like mandatory disclosure of the ratio of CEO compensation to median employee pay in the company. In the year 2013, the European Union also came out with a new regulation to limit the bonus paid to bankers.

There are two opposite views relating to executive compensation in academic research. One is 'managerial power' view, and another one is 'efficient contracting' view. On one side, the "managerial power" view argues that CEO compensation is not determined by the board, keeping the shareholders' value maximization in view. While decisions relating to compensation of CEOs are made by the CEOs themselves, in such a way that it maximizes their rent. It is also called 'rent-extraction'. The managerial power view argues that the board does not operate at arm's length in structuring the CEO compensation. Instead, the board is influenced by the CEOs because of their power. The bargaining power of CEOs determines the strength of the positive association between CEO power and their compensation (Choe et al., 2014). Chief Executive Officers (CEOs) dominate the decisions of the board by virtue of their power. The power of a CEO stems from various sources like holding various positions by CEOs like managing director, promoter, chief finance officer etc. The underlying theory on executive power posits that powerful CEOs can play an instrumental role in the selection of new directors to the company who decides the compensation for the CEOs. It makes the independent directors loyal in reciprocating with the CEOs. Moreover, they hesitate to question the CEOs because it may ruin their cordial relationship with the CEOs (Haldea, 2010;

Shivdasani & Yermack, 1999). Besides, in many companies, CEOs also hold the position of managing director and dominate the board decisions. Studies like Shivdasani & Yermack (1999) have also evidenced the role of CEOs in the selection of directors.

The powerful CEOs may also try to get excessive compensation which is more than their ability when their compensation is linked to the performance of the company. There is a raft of performance measures, and each measure has its pros and cons. Due to the varying nature of inputs used to estimate the measure, there is also a possibility of showing a varying performance by each measure of performance. Powerful CEO's can influence the board to assign more weightage to those performance measures which are showing better performance than other performance measures, and thereby, they try to get better pay. It is proved by studies like (Bizjak et al., 2008; Morse et al., 2011) and also appoints a compensation adviser who can help them in awarding higher compensation (Murphy & Sandino, 2010).

The 'rent-extraction ability' of the CEOs will have a limit due to possible adverse reactions from shareholders of the company. To avoid such reactions from the shareholders, CEOs always try to mask their rent extraction activities through obliquely structuring their compensation arrangements like using stock options etc. (Song & Wan, 2019).

Higher CEO pay may be associated either with competition on the labour market or with the rent extraction (Core et al., 1999). CEO compensation, on the one side, is higher due to a higher equilibrium pay for a skilled CEO (Core et al., 1999), representing efficient contracting (Helfat, 1991). Not only will talented CEOs receive more compensation because of increased demand for their talent, but they will probably work hard and use their skills to benefit their businesses and improve their performance. They earn more while improving firm performance, in line with efficient contracting.

If governance mechanisms play a role in efficient contracts, CEO compensation for governance characteristics will show a positive link with future corporate success (Core et al., 1999). CEO compensation, on the other hand, may be higher, as a consequence of a CEO's rental extraction, which shows a failure of management in the compensation contracts and the curbing of agency problems. When the structures and processes of corporate governance are weak, the monitoring is less effective, and CEOs can take rents at the expense of the company. They can collaborate with the board of their firm to obtain higher compensation and more favourable terms than the interests of the company (Lucian Arye Bebchuk et al., 2002; Bizjak et al., 2008; Core et al., 1999; M. Jaiswall & Firth, 2009). if the governance structure of the company is more efficient and effective, it becomes more difficult for the CEOs to extract rent. Organizations with more robust governance have more significant income generation, low agency expenses and less future performance in comparison to organizations with poorer governance. There are also negative correlations with potential business success between CEO's rewards for corporate governance and management skills when CEOs extract rent (Core et al., 1999).

3. Indian Context and Institutional Environment

India has a hybrid system of corporate governance with features both in the countries with common law and in the countries with code of law (Sarkar & Sarkar, 2000). The security market is monitored by the Securities and Exchange Board of India. Corporate governance standards have been continued to improve, and listed companies ensure compliance. Although investment protection laws and corporate governance rules are strong, enforcement is weak (La Porta et al., 2000). Companies are seldom penalized because of infringement of corporate governance standards (Balasubramanian et al., 2010).

Management of firms rests with either government or private parties in India. Companies are, therefore, divided into public and private sectors. Non-governmental entities, such as Indian

Business Groups, multinational corporations, and corporate investors, own and manage Indian private sector companies. Of the 500 top Indian companies listed on stock exchanges, 89% are private and represent 78% of total market capitalization and rest of the companies are from Public sector (Chakrabarti et al., 2008). The public sector companies are either owned and controlled by the central government or the state governments. The public sector companies in India are concentrated mainly in selected industries such as banking, defence, oil, and natural gas, etc. The public sector companies in India were nationalized to promote non-commercial goals and public interests, for example, job creation, equal distribution of wealth, growth of the fundamental and strategic industries, etc. Their legal charter allows them to follow government-specific public priorities and social agendas (Varottil, 2013). Therefore, their activities are not always geared at maximizing profit.

The dominance of private-sector firms affiliated with group businesses is an essential characteristic of the Indian corporate sector (Narayanaswamy et al., 2012). A group of companies consists of legally separate companies linked by a common promoter. Such firms usually identify the promoter of the business in their Annual Report. Although companies in India are in control of cross-ownership, interlocking directors, etc. as their main feature, such companies may also share their managerial personnel. The studies like Chakrabarti et al., (2012) documented that average shareholdings of the promoters in the Indian companies is 50.4% and they also own at least 38% of the equity in three out of four companies in India. In another study by Sarkar & Sarkar, (2000), institutional shareholders hold more than one-third of the total equity shares of 6.7% of Indian firms.

3.1 CEO Compensation and Corporate Governance in Indian Firms

Total compensation from CEOs in Indian companies usually includes performance bonuses, commissions, allowances, perquisites, and retirement benefits. The Indian government assesses the companies ' performance and grants an annual performance ranking based on which a public sector corporation calculates its employees and management's performance-related compensation (Bhattacharyya, 2013). According to the guidelines of the Securities and Exchange Board of India (SEBI) and section 217 of the Indian Company Act 1956, the company shall report the remuneration of the CEO and other Executive Directors along with the personal information, if the payment exceeds the threshold level. The stock options as CEO compensation are not standard; less than 15 per cent of the top 500 Indian firms grant stock options to their CEOs, and the value of such stock options are minimal (Balasubramanian et al., 2010).

In the case of developing economies, transparency in fixing the compensation of CEOs and other directors is emphasized by various committees like Kumar Mangalam Birla's report (1999) in India, the report of the king's committee (2002), in South Africa, etc. These committee reports also argue that any compensation to the managers, including independent directors, should be fixed by the board of directors, and approved in general meetings by the shareholders. In India, as per the provisions of corporate laws, the remuneration committee of BOD will determine CEO compensation. Nevertheless, the law requires companies to disclose in their annual report, the amount of compensation for CEOs; it does not require a specific statement on how the compensation was decided. Therefore, the outside researchers cannot assess the process of compensation determination in India.

Indian businesses have concentrated ownership. Their promoters usually hold the largest share of their shareholdings, followed by financial institutions (Chakrabarti et al., 2012; Sarkar & Sarkar, 2000). Given, a large amount of wealth at stake, block holders have an opportunity to track and monitor the management and also curb rent extraction aggressively. The studies like Sarkar & Sarkar (2000) and Shleifer & Vishny (1986) document that large shareholders are providing efficient monitoring and thereby, contributing to the improved performance of Indian corporates. The present study, therefore, hypothesizes CEO compensation to be linked to ownership structures.

Academics, business media and policymakers have expressed their apprehensions about high CEO salaries in Indian businesses. They have argued that the present corporate governance system is struggling to minimize rent extraction. As found by A. Ghosh (2006), more than 90% of board compensation in Indian firms goes to executive or insider directors only. Against this backdrop, the present study tests the relation of the CEO's compensation with CEO power and tenure in order to examine whether the higher CEO remuneration reflects rental or efficient contracting. Dr Manmohan Singh, the then Prime Minister of India, urged Indian business leaders in 2007 to "resist excessive remuneration to promoters and senior executives" (Singh, 2007). Studies like Chakrabarti et al. (2012) suggest that rent extraction in Indian companies mirrors the presence of agency costs and the inefficient regulatory system. The presence of rent extraction in family-controlled Indian companies was evidenced by M. Jaiswall & Firth(2009).

Saravanan, Srikanth and Avabruth (2017) examined the relationship of managerial compensation with corporate governance and firm performance on the sample of 284 Indian firms from the year 2005 to 2014. The study found that a proportion of independent directors has a significant negative impact on the financial performance of the firm. The study also focused on the cross-holding of directorships in family business groups and found the positive association of cross-holdings of executive directors with the financial performance of the firm. Kaur and Singh (2018) found a positive association between CEO remuneration and firm performance, and study also found the CEO nationality has its impact on this relationship.

Kohli and Gill (2019) examine the relationship between corporate strategy and CEO compensation in the case of family firms in India by using a sample of 106 listed pharmaceutical companies in India. The study found that family firms have a positive moderating impact on the relationship between corporate strategy and CEO compensation. On the contrary, standalone firms have a liberal approach towards CEO compensation policy. The study supports behavioural agency theory. Patnaik and Suar (2020) examine how CEO compensation is influenced by ESG (environment, social and governance) disclosure practices and the characteristics of corporate governance by using the data of 282 Indian manufacturing firms from the year 2013-14 to 2018-19. The findings of the study reveal that corporate governance characteristics (like board size, board independence, board diversity, CEO duality, etc.) are negatively associated with CEO compensation. The study also reveals that the ESG disclosures streamline CEO compensation.

In family-controlled firms, CEOs use their power to get high compensation. In such firms, ownership structure, board structure and processes, or the CEO's own experience and status may be the sources of power (Finkelstein, 1992; Shivdasani & Yermack, 1999). The present study tries to provide more insights into the dynamics of CEO compensation in the emerging economy, where most of the companies are family-owned, and many board members are affiliated to the company's founder.

4. Data and Methodology

The present study uses the data of all the listed companies in India for 13 years from 2006 to 2018. Before the year 2006, minimal data is available on the variables required for the empirical analysis. Hence, the year 2006 is chosen as the starting year for the sample period. The data relating to CEO compensation and other characteristics of CEOs is available only for 3070 CEO-year observations during the sample period. So, the sample of the baseline regression model is only 3070 CEO- year observations which consist of 845 listed companies in India. The sample is broader, extending to a longer period and covering all the data available on CEO characteristics of listed companies. It is more reflective of Indian companies than the samples used in many of the earlier studies in the Indian context (inter-alia, Ghosh, 2006; Jaiswall & Bhattacharyya, 2016; Parthasarathy et al., 2006). Therefore, the findings of the study are more generalizable.

4.1 Econometric Specification of the Baseline Regression Model

The following baseline model is applied with ordinary least squares regression and quantile regression to test the hypothesized relationship between CEO power and CEO tenure with CEO compensation while controlling the other economic determinants of CEO compensation.

$$Ln\,Re\,muneration_{it} = \alpha_0 + \beta_1 CEOPower_{it} + \beta_2 CEOIncumbency_{it} + \gamma_1 ROA_{it} + \gamma_2 LnSales_{it} + \gamma_3 Stdev.ROA_{it} + \gamma_4 MBV_{it} + +\gamma_5 CapitalIntensity_{it} + \varepsilon_{it} \quad (1)$$

In equation(1),$Ln\,Re\,muneration_{it}$is the total remuneration paid to a CEO; $CEOPower_{it}$ is CEO power index; $CEOIncumbency$ is the incumbency of the CEO; ROA_{it} is 'return on assets' which is a proxy for the financial performance of a company; MBV_{it} is 'market-to-book' ratio which is a proxy for growth opportunities for a company; $LnSales_{it}$is the natural logarithmic values of sales which is a proxy for the size of a company; $Stdev.ROA$ measures the volatility in the financial performance of the company; $CapitalIntensity_{it}$ is the ratio of tangible assets, to total assets.

4.2 Handling of Outliers and Missing Values

All the controlling variables used in the model are winsorized at the top 5% and bottom 5% of the data points. Moreover, observations with CEO compensation more than the z-score value of three, are excluded to avoid the impact of outliers on the results of the analysis. The observations with the missing values of the two leading independent variables, i.e. CEO power and CEO tenure, are excluded from the analysis. The missing values of other controlling variables range between 10% to 15% only and so, mean imputation has been applied to fill the gaps.

4.3 Construction of CEO Power Index and its hypothesized effect on CEO compensation

To conduct our analytical research, it is required to measure how much decision-making power is concentrated in the CEO's hands. "Power" is a concept with different dimensions, not easily observed. In its work on the influence of persons in senior management teams, Finkelstein (1992) described four different sources of power: structural power (related to the allocation of official positions within the organization), ownership power, expert power and prestige power. The present study focuses primarily on structural power, due to limitations on the availability of data relating to required variables to measure other dimensions of power. The studies like Main et al., (1995)found that when a CEO is appointed before the appointment of the other directors, there will be a higher level of compensation than the CEOs appointed after the board of directors.

In the present study, the operational definition of CEO power is developed with reference to the extant literature (Humphery-Jenner et al., 2018; Khanna et al., 2015; Li et al., 2019; Morse et al., 2011; Song & Wan, 2019). The other designations of a CEO are the pivotal sources of their power. The studies like (Finkelstein & D'aveni, 1994) have evidenced that CEO, being a chairman of the board also, can exercise greater influence in nominating the new directors and such directors will be loyal to CEO. Moreover, CEO duality weakens the power of the board to replace the CEOs when the financial performance is not good. It means such companies will experience lower sensitivity of CEO turnover to the change in financial performance (downwards) of the firm. It was also evidenced by the studies like Goyal & Park (2002). When the CEO is also the promoter, such persons can influence strategic corporate policies, including their compensation, as evidenced by the studies like Guthrie et al. (2012). When a CEO holds any additional administrative role like chief finance officer, in the company, the power concentration will be more in such case. The extant literature has also evidenced the same(Adams et al., 2009; Humphery-Jenner et al., 2018; Morse et al., 2011).

The extant literature, like Song & Wan(2019), has constructed a power index using only three binary measures, including the duality of CEO, founder status and holding any other executive position. As an extension to it, the present study uses eight different combinations of the designations of CEOs and values are assigned based on the combination of CEO designation with other positions in the organization. If the CEO holds no other designation, the value is '1'; if the CEO is also a director, the

value is '2'; if the CEO holds the position of president, the value is '3'; if the CEO holds the position of executive director, the value is 4; if the CEO is also a joint managing director, the value is '5'; if CEO holds the position of managing director, the value is '6'; if the CEO holds the position of vice-chairperson, the value is '7'; if the CEO holds the position of chairperson, the value is '8'; if CEO holds the position of both the chairperson and managing director, the value is '9'. The value assigned based on the hierarchy of designations in the organization. So, the value of CEO power ranges from 1 to 9. CEO power is positively associated with the compensation paid to them as suggested by managerial power view. More powerful CEOs receive higher compensation compared to less powerful CEOs (inter--alia, Core et al., 1999; Morse et al., 2011; Murphy, 1985).

Powerful CEOs play an instrumental role in the selection of new directors who decide the compensation of the CEOs. It means directors will be biased in determining the compensation of the CEOs. Besides, as the tenure of the CEO grows, the number of directors selected by the CEOs will also increase. It provides more rent-extracting ability to the longer-tenured CEOs (Lucian A. Bebchuk et al., 2010; Shivdasani & Yermack, 1999). Based on this argument, a positive association of CEO power with their compensation is hypothesized.

4.4 Measurement of CEO Incumbency and its hypothesized relationship with CEO compensation

The Prowess Database, from which the data relating to CEO characteristics has been retrieved, does not provide the data on CEO tenure. As the sample consists of all the listed companies and 3070 CEO-year observations, it is practically challenging to collect company-wise primary information about the tenure of the CEOs. The Prowess database provides data relating to CEO characteristics from the year 2000. So, the year 2001 is considered as the starting year for all the company to measure the CEO incumbency. Based on the incumbency of the CEOs from the year 2001, the incumbency of the CEO is computed. So, the variable does not measure CEO tenure; instead, it measures the incumbency of CEOs over the period from 2001 to 2018.

Ability Matching Theory suggests that managerial talent is tenure-invariant. So, if the tenure of the CEO is not having a significant impact on compensation, it signifies that CEO compensation depends on their talent (Baranchuk et al., 2011; Gabaix & Landier, 2008; Rosen, 1981, 1982). Bargaining Theory provided the contrary view. It hypothesizes that managerial talent is tenure-variant, as the CEOs gain experience, their managerial ability and talent will also grow(Hermalin & Weisbach, 1998).

4.5 Hypothesized relationship of controlling variables with CEO compensation

Firm Size and CEO Compensation: Firm size is measured as the log value of sales. Most of the earlier studies on key drivers of managerial pay focus on the role of the corporate size in compensating the CEO. The uncertainty in operation always rises as the organization grows in size. Uncertainty in the operations makes the role of CEOs more challenging and demanding for higher compensation. The extant literature supports a positive association between firm size and CEO compensation(inter-alia, Murphy, 1985; Ryan & Wiggins, 2001; Song & Wan, 2019).

Firm performance and CEO compensation: Usually, the incentives included in CEO compensation are usually liked to the performance of the company. Hence, a positive association between firm performance and CEO compensation is hypothesized. The extant literature reflects on the effect of company performance on the CEO's compensation. It was empirically proven that CEO pay increases as the company's performance increases(inter-alia, Bhattacherjee et al., 1998; Jensen & Murphy, 1990; Lewellen & Huntsman, 1970; Masson, 1971; Rose & Shepard, 1997; Song & Wan, 2019).

Risk of the firm and CEO compensation: The present study measures risk of the firm as a standard deviation of ROA. Firms with more risk of financial performance need more dynamic CEOs who can successfully handle the risk. Firms can employ such vibrant CEOs only when it can pay attractive salaries. Hence, a positive association between firm risk and CEO compensation is hypothesized. The extant literature has evidenced the same (inter-alia, Core et al., 1999; Ghosh, 2006; M. Jaiswall & Firth, 2009; S. S. K. Jaiswall & Bhattacharyya, 2016). On the other hand, when the relationship between risk

and CEO compensation is proved to be negative, it can be inferred that CEO cannot handle the risk effectively and consequently, he/she is losing compensation premium.

Growth Opportunities and CEO Compensation: In the present study, growth opportunities are measured by PBV ratio of the stocks of the firms. Firms with higher growth opportunities demand more talented CEOs who can unlock the growth potential more effectively. As discussed earlier, a firm can attract talented CEOs only when it pays competitively higher compensation. Hence, the positive association between growth opportunities and CEO compensation is hypothesized. The extant literature has also documented the same(inter-alia, S. S. K. Jaiswall & Bhattacharyya, 2016; Song & Wan, 2019).

5. Results of the Analysis

5.1 Descriptive Analysis of Trends in CEO compensation and Return on Assets (ROA)

Table 1: Year-Wise Distribution of the Descriptive Statistics of CEO Compensation from the year 2006 to 2018 (in Rupees lakhs)

Year	Mean	Median	Max	Min.	Observations (CEO-years)
2006	76.91	28.74	1,520.00	1.20	63
2007	98.89	50.89	1,390.00	1.44	72
2008	114.72	51.81	1,570.00	1.44	95
2009	127.76	60.09	1,970.00	1.00	103
2010	139.19	51.75	3,090.00	1.20	130
2011	132.88	79.05	1,260.00	0.70	133
2012	138.38	81.00	973.76	0.60	139
2013	188.05	100.02	3,280.00	0.60	168
2014	194.84	85.22	3,790.00	0.50	185
2015	211.53	108.41	4,460.00	0.72	281
2016	213.33	64.00	5,740.00	0.54	495
2017	214.92	72.00	5,970.00	0.60	565
2018	254.35	91.14	7,540.00	0.72	628

Figure 1: Trends in CEO Compensation from the year 2006 to 2018

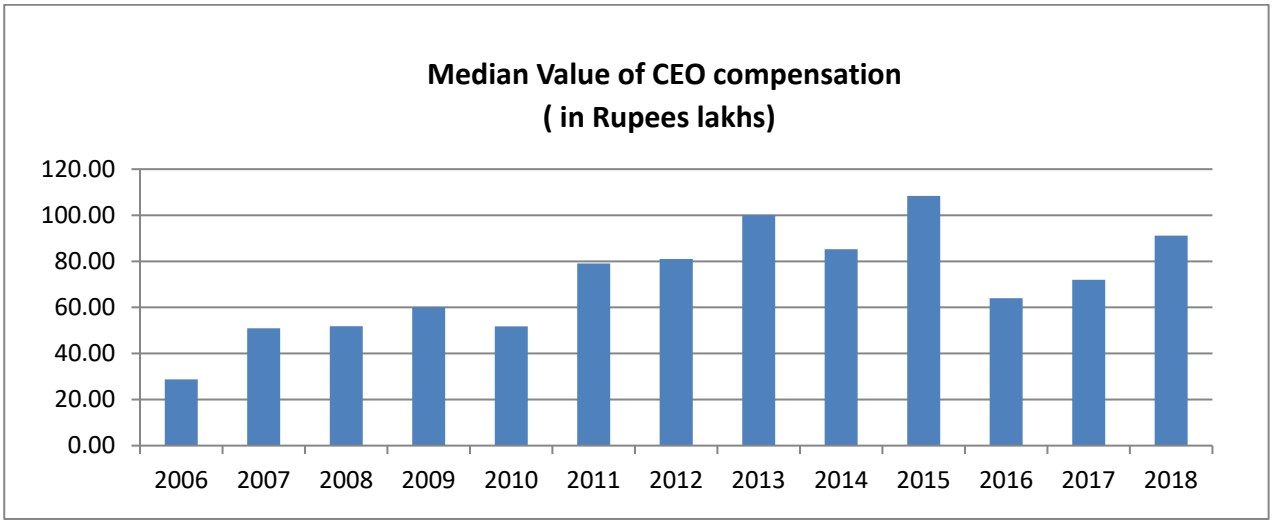

Table 1 and Figure 1 present the descriptive analysis of CEO compensation from the year 2006 to 2018. There has been a continuous rise in the median value of CEO compensation from the year 2006 (Rs. 28.74 lakhs) to 2009 (Rs. 60.09 lakhs). Next, the year 2010, witnessed a fall in the median value of CEO compensation (Rs. 51.71 lakhs). However, the mean value of CEO compensation has shown an increasing trend only. It indicates that companies which were paying a more considerable amount of compensation are not affected by the overall fall in CEO compensation. In other words, a fall in CEO compensation is mainly in the case of small companies. There is no significant change in CEO compensation between the years 2011 and 2012. However, the year 2013 witnessed a considerable rise in the median CEO compensation. (Rs. 100.02, crores). Highest median CEO compensation was recorded in the year 2015 at Rs. 108.41 crores and it was followed by considerable fall in the years 2016(Rs. 64 crores) and the year 2017(Rs. 72 crores). Finally, in the year 2018, there is a significant rise in the median CEO compensation (Rs. 91.14 crores). Besides, the difference the minimum and maximum values of CEO compensation indicate the considerable variations in the CEO compensation in the market.

Table 2: Year-Wise Distribution of the Descriptive Statistics of Return on Assets (ROA)

Year	Mean	Median	Max	Min.	Observations (CEO-years)
2006	8.83	6.59	34.78	-7.26	63
2007	10.52	8.05	34.78	-7.47	72
2008	8.13	7.04	34.78	-15.61	95
2009	4.75	3.58	34.78	-29.70	103
2010	6.96	5.22	34.78	-47.47	130
2011	5.89	4.35	30.86	-17.99	133
2012	4.45	3.88	34.78	-19.43	139
2013	4.22	3.00	33.52	-18.21	168
2014	3.72	2.73	34.78	-25.56	185
2015	4.59	3.40	34.78	-44.62	281
2016	4.13	3.23	34.78	-47.47	495
2017	3.75	3.50	34.78	-47.47	565
2018	3.99	3.80	34.78	-47.47	628

Figure 2: Trends in Median Value of Return on Assets (ROA)

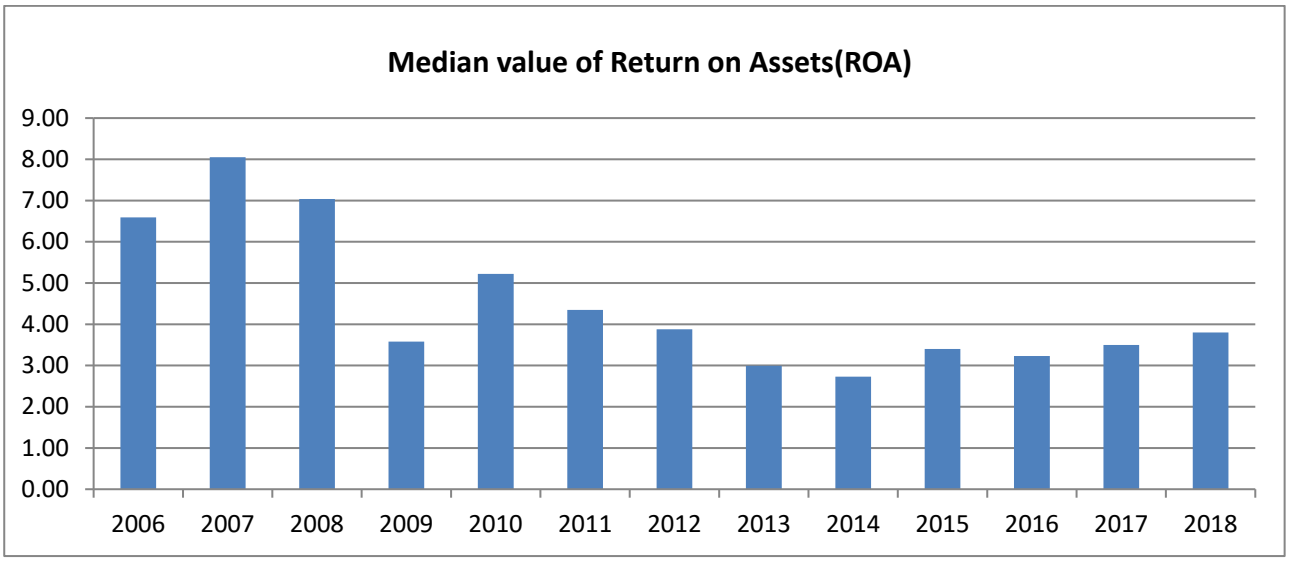

Table 2 and Figure 2 present the trends in the median value of Return on Assets (ROA) from the year 2006 to 2018. Highest median ROA was reported in the year 2007(8.05%). In the year 2009, a significant fall in the ROA of the sample companies can be observed. The lowest value of ROA was reported in the year 2014 (2.73%). Marginal change in the ROA values can be observed in the years 2013(3.00%) and 2014(2.73%). Table 2 also reveals that there are loss-making companies every year. The percentage of loss was very high in the years 2011, 2015, 2016, 2017 and 2018 (from 44% to 47%).

5.2 Results of Regression Analysis

Table 3: Baseline Regression Results [DV =Ln_Total Remuneration]

	OLS Regression			Quantile Regression		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
CEO_POWER	0.060187***	0.071705***		0.061792***	0.063701***	
CEO_TENURE	0.056993***		0.066872***	0.046320***		0.050471***
ROA	0.017952***	0.018076***	0.019145***	0.014406***	0.014929***	0.017851***
LNSALES	0.356022***	0.357855***	0.357347***	0.402335***	0.401619***	0.406830***
STDROA	-0.012622**	-0.012933**	-0.012553**	-0.006810***	-0.008122	-0.008488
PBV	0.028295***	0.028299***	0.028802***	0.032846***	0.033403***	0.026317****
CAPITAL INTENSITY	-0.048448	-0.045808	-0.045563	-0.015182****	-0.013716	-0.030575
Constant	12.31024***	12.42099***	12.54223***	12.01141***	12.13823***	12.25332***
Observations	3057	3057	3057	3057	3057	3057
R-squared	0.440638	0.431360	0.432235	0.288371	0.283078	0.281552
Adjusted R-squared	0.439354	0.430242	0.431118	0.286737	0.281667	0.280139

*** indicates 1% level of significance; ** indicates 5% level of significance; * indicates 10% level of significance

Table 3 shows the baseline regression results. The baseline regression model has been constructed in three different variants. In one model, CEO power and CEO tenure are used. In the other two models, CEO power and CEO tenure are used individually. The results of the baseline regression model reveal that CEO power and CEO tenure have a significant positive impact on CEO remuneration ($p<0.05$).

The results reveal that one unit increase in CEO power leads to a 6% increase in CEO compensation. In comparison, one unit increase in CEO tenure leads to a 5% increase in CEO compensation. The results also show that CEO compensation is tenure-variant which is in line with bargaining theory as evidenced by the studies like (Hermalin & Weisbach, 1998). The 'wald' test results reveal that there is no significant difference between the coefficient of CEO power and CEO tenure. It supports the bargaining theory of CEO compensation, which supports efficient contracting of CEO compensation. (interalia, Core et al., 1999; Morse et al., 2011; Murphy, 1985; Song & Wan, 2019). In India, S. S. K. Jaiswall & Bhattacharyya, (2016) also evidenced a positive association of CEO tenure with CEO compensation. However, the same study has not proved the statistical significance of the impact of CEO power (measured as holding another executive positive, promoter status, etc.). Other studies in Indian literature (Chakrabarti et al., 2012; Parthasarathy et al., 2006) have also proved a significant impact of CEO power. The results of quantile regression are qualitatively similar. However, a marginal decrease in the coefficient values of the variables is observed.

ROA has a significant positive impact on CEO compensation across all the six regression models shown in table 3. It implies that CEO compensation is linked to the financial performance of the firm. Model 1 with OLS regression indicates that a 1% increase in ROA leads to a 1.6% increase in CEO compensation, and it is 1.3% in case of quantile regression. The results are in line with the extant literature in India (S. S. K. Jaiswall & Bhattacharyya, 2016; Parthasarathy et al., 2006). However, the

study by Song & Wan, (2019) in the united states have shown the insignificant impact of ROA on CEO compensation. It shows a difference in the significance of the impact of performance measures on CEO compensation between emerging and developed markets.

Baseline results also highlight the significant positive impact of the size of the firm (LnSales) on CEO compensation. The results are consistent with the relationship hypothesized between size and CEO compensation. The quantile regression has also shown comparatively higher values of the coefficient for the variable 'size' indicating more robustness of the impact of size on CEO compensation. It implies that large-size firms attract comparatively more efficient CEOs by offering more compensation. The large size firms are usually in the limelight of the investors, and even a small decrease in the value of the firm will have a significant negative impact on the share prices in the market. Hence, maintaining sustainable market value is a challenging task to the CEOs. The extant literature supports a positive association between firm size and CEO compensation (Murphy, 1985; Ryan & Wiggins, 2001; Song & Wan, 2019). In the Indian context, studies like S. S. K. Jaiswall & Bhattacharyya(2016) and Chakrabarti et al. (2012) have also shown similar results.

Risk of the firm (STD_ROA) is having a significant negative impact on OLS regression, but the quantile regression has not proved the statistically significant negative impact of risk on CEO compensation. It implies that risk is not handled effectively by the CEOs, and hence, they are losing compensation premium. However, it is not true for the firms not having abnormal fluctuations in their ROA as evidenced by quantile regression. The study by (Song & Wan, 2019) has not proved the statistical significance of the impact of firm risk. On the contrary, Indian literature (Ghosh, 2006; Jaiswall & Bhattacharyya, 2016) has proved a significant negative impact of firm risk on CEO compensation.

Growth opportunities, as measured by, Price-to-Book Value (PBV) Ratio has a significant positive impact on CEO compensation. It indicates that growth firms in India are paying higher compensation to attract more talented CEOs who can effectively unlock the growth potentials and making the firms reach new heights. The results are in line with the extant literature in developed markets (Guthrie et al., 2012; Song & Wan, 2019) and also emerging markets like India(Jaiswall & Bhattacharyya, 2016). The R-squared and adjusted R-squared values range around 0.44 for all three OLS regressions, while it ranges around 0.29 for all the three quantile regressions.

5.3. Checking the Robustness of the Results against the Incumbency of CEOs

The 'efficient contracting view' and 'managerial power view' are two contradicting views on CEO compensation. The 'managerial power view' argues that CEO compensation premium is the result of the rent-extraction ability of a CEO. In contrast, 'managerial ability view' argues that compensation premium is the function of managerial talent. Managerial talent and rent-extraction ability are latent variables; they are positively associated with the power of a CEO. Again, the power of a CEO may stem from his/her talent and/or tenure, and it enables further rent-extraction. As CEO power is linked to both managerial talent and rent-extraction, we can effectively test managerial ability vis-à-vis executive power, only when we can divide CEOs based on their incumbency. For new CEOs, compensation is the function of their talent only. On the other hand, the compensation premium of the incumbent CEO is the function of both his talent and rent-extraction ability. Against their backdrop, the present study, dividends the sample into two parts, i.e., CEO-years with more than three years of CEO incumbency and CEO-years with three years or less than three years of incumbency.

Table 4: Robustness Test – based on the Incumbency of the CEO- OLS Regression [DV =Ln Total Remuneration]

	Above 3 years		Below 3 years	
	OLS	Quantile	OLS	Quantile
CEO_POWER	0.046116**	0.043759*	0.065947***	0.066394***
ROA	0.021990***	0.021588***	0.014606***	0.010790***
LNSALES	0.368938***	0.453202***	0.350386***	0.391254***
STDROA	-0.014213	-0.004114	-0.013577**	-0.008124
PBV	0.045415***	0.027658**	0.022864***	0.031448***
CAPITAL INTENSITY	-0.053118	-0.009831	-0.044937	-0.013427
Constant	12.56943***	11.89265***	12.46593***	12.18118***
Observations	917	917	2140	2140
R-squared	0.485142	0.321320	0.406625	0.263810
Adjusted R-squared	0.481747	0.316845	0.404956	0.261739

*** indicates 1% level of significance; ** indicates 5% level of significance; * indicates 10% level of significance

Table 4 shows the results of the robustness checking of baseline regression results against short-incumbent and long-incumbent CEOs. For this purpose, the sample is subdivided into two groups; one is with CEO with more than three years of incumbency, representing long-incumbent CEOs group and the other; CEOs with up to three years of incumbency, representing short-incumbent CEOs.

In the case of long-incumbent CEOs, one unit increase in CEO power results in a 4.6% increase in CEO compensation. In contrast, in the case of short-incumbent CEOs, one unit increase in CEO power leads to a 6.5% increase in CEO compensation. The results derived by quantile regression are qualitatively similar to baseline regression results. It indicates that power impact will be comparatively less in case of long incumbent CEOs. As per bargaining theory of CEO compensation, managerial talent is tenure variant. Because CEOs learn by experience and improve their talent. Hence, for incumbent CEOs, their compensation is influenced more by their talent rather than by their power. It is against the managerial power view. So, the results are consistent with the baseline regression results.

The results also reveal that the magnitude of the positive impact of ROA is more in case of long-incumbent CEOs compared short-incumbent CEOs. It implies that long incumbent CEOs compensation is more strongly related to the financial performance of the company compared to that of short-incumbent CEOs. There is a similar impact on the size of the company between long-incumbent and short-incumbent CEOs, as indicated by the coefficient values of 'LnSales'. It is in line with the results derived by Song & Wan(2019). However, quantile regression results show notable difference signifying the more positive impact on the size of the company on the compensation of long incumbent CEOs. Standard deviation in ROA which represents the risk of a firm is not having a significant negative impact on the compensation of long incumbent CEOs while it is having the significant negative impact on the compensation of short incumbent CEOs.

On the other hand, quantile regression results indicate non-significance of the impact of risk on both the sub-samples. Also, the positive impact of growth opportunities is more in case of long incumbent CEOs compared to short incumbent CEOs. It implies that long incumbent CEOs can more effectively unlock the growth potentials of the companies by virtue of their experience. The results are consistent with Song & Wan(2019). On the contrary, the reverse is true from the results of quantile regression results. It implies that outliers are considerably influencing the results of the analysis. In other words, if the firm has a very high PBV ratio or a very low PBV ratio, long incumbent CEOS are paid more. For high PBV ratio companies, sustaining the market value is a challenging task while for low PBV ratio companies, improving the market value is a challenging task. The R-squared value and adjusted R-squared value is around 0.49 for the sub-sample of long- incumbent CEOs while it is around 0.41 for short incumbent CEOs.

5.4. Checking the Robustness of the Results – Group Companies vis-à-vis Non-Group Companies

Group companies are the most popular in India, and the fundamental motives of CEO power and tenure vary between the group and non-group companies. In group companies, the founding shareholders play a dominant role in the management of the company. CEO control can be held directly or indirectly by founder shareholders. The robustness of the results between the group and non-group companies, therefore, needs to be tested.

Table 5: Robustness Test - Group Companies Vs Non-Group Companies- OLS Regression [DV =Ln Total Remuneration]

	Group Companies			Non-Group Companies		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
CEO_POWER	0.092813***	0.102236***		0.036866***	0.052065***	
CEO_TENURE	0.048973***		0.063471***	0.073058***		0.079528***
ROA	0.015207***	0.016876***	0.017028***	0.020479***	0.018429***	0.021221***
LNSALES	0.315478***	0.311018***	0.324635***	0.316972***	0.330467***	0.315828***
STDROA	-0.021860***	-0.023859***	-0.023633***	-0.000967	3.05E-05	-0.000630
PBV	0.041079***	0.039390***	0.040934***	0.013313*	0.015562	0.013940*
CAPITAL INTENSITY	-0.046700	-0.045512	-0.043959	-0.020365***	-0.012604	-0.017593
Constant	12.75874***	12.91014***	13.05839***	12.36380***	12.42423***	12.52028***
Observations	1701	1701	1701	1356	1356	1356
R-squared	0.389410	0.382505	0.369276	0.404881	0.385701	0.400760
Adjusted R-squared	0.386885	0.380318	0.367042	0.401790	0.382969	0.398095

*** indicates 1% level of significance; ** indicates 5% level of significance; * indicates 10% level of significance

Table 6: Robustness Test - Group Companies Vs Non-Group Companies-Quantile Regression [DV =Ln Total Remuneration]

	Group Companies			Non-Group Companies		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
CEO_POWER	0.101085***	0.112128***		0.030355**	0.048864***	
CEO_TENURE	0.037590***		0.058581***	0.056211***		0.057816***
ROA	0.012841***	0.014255***	0.013080***	0.019757***	0.017756***	0.020789***
LNSALES	0.353493***	0.350038***	0.365123***	0.355557***	0.366163***	0.356525***
STDROA	-0.014579*	-0.016798**	-0.020121**	0.005824	0.001996	0.007549
PBV	0.036944***	0.033254***	0.036419***	0.023367**	0.028844***	0.024999**
CAPITAL INTENSITY	0.019923	0.004381	0.021123	-0.001953	-0.001622	0.000249
Constant	12.48958***	12.62761***	12.79940***	12.13591***	12.18397***	12.24296***
Observations	1701	1701	1701	1356	1356	1356
R-squared	0.251602	0.247737	0.234120	0.243657	0.235122	0.241249
Adjusted R-squared	0.248507	0.245072	0.231408	0.239729	0.231720	0.237874

*** indicates 1% level of significance; ** indicates 5% level of significance; * indicates 10% level of significance

Table 5&6 shows the results of regression analysis done with the sub-samples of group companies and non-group companies. The model -1 results reveal that for Group companies' CEO power has more impact compared to CEO tenure and reverse is true for non-group companies. It implies that managerial power view maintained in case of group companies and managerial ability view for non-group companies. The results derived in quantile regression are also qualitatively similar. Notwithstanding to the impact of CEO power, when CEO tenure is only considered in the model (i.e., model 3), there is a marginal difference in the magnitude of the impact of CEO tenure between the group and non-group companies. It indicates that it is the power of the CEO, which differentiates their compensation in group companies with that of non-group companies. The Indian literature (Chakrabarti et al., 2012; S. Ghosh, 2010; M. Jaiswall & Firth, 2009)has also proved that CEOs of group firms get rent-extraction due to their power. However, the study like A. Ghosh(2006)have not proved the same. As shown in model 1, the positive impact of ROA is more for non-group companies compared to that of group companies. At the same time, the reverse is valid for the positive impact

of PBV between non-group and group companies. The results of quantile regression are qualitatively similar compared to the same derived by OLS regression for the group and non-group companies.

6. Conclusion and Policy Implications

The present study aims to examine whether it is rent-extraction or efficient contracting, which decides the compensation of CEOs in Indian companies. The study draws the sample of all the listed companies which are having the data relating to CEO characteristics from CMIE Prowess Database from the year 2006 to 2018. By using the sample of 3070 CEO-years in modelling the regression analysis under the framework of ordinary least squares and quantile regression, the study draws the findings. It provides inferences linking them to the extant literature in the Indian context and other countries.

The results of the baseline model reveal that bargaining theory is maintained in determining the CEO compensation in Indian companies because there is negligible difference between the impact of CEO power and CEO tenure. Bargaining theory assumes that CEO talent is tenure-variant (Hermalin & Weisbach, 1998). Based on the significant positive impact of the size of the firm on CEO compensation, it can also be inferred that large firms and the firm with growth potential are trying to attract more talented CEOs by offering more competitive compensation. The more insights into the findings of the baseline analysis were derived by subdividing the sample into long incumbent and short incumbent CEOs. The results reveal that managerial talent is tenure-variant supporting the bargaining theory of CEO compensation. The results also imply that long incumbent CEOs can more effectively unlock the growth potentials of the companies by virtue of their skill and talent learned through experience. Maintaining market value for high-value stocks and improving the market value for low-value stocks is a challenging task for CEOs which is highly rewarded.

In corporate India, group companies are most common, and the style of corporate governance in those companies is distinct from standalone companies. In group companies, founder members will have a more dominating role in all the companies in the group. They play an instrumental role in the appointment of CEOs, and CEOs are usually loyal to the founder members. In light of this, the present study tests the robustness of the baseline results against the group and non-group companies in India. The results reveal that in group companies, CEO compensation is strongly influenced by their power compared to that of non-group companies. It can be attributed to the fact that in group companies' CEOs are founder members or, close relatives of such founder members. The results are in line with extant literature in the Indian context.

The results indicate that the CEO professionals' market is becoming more efficient, and CEO compensation is more tenure-variant. Despite this, rent extraction exists in Indian companies which are under a common group. It is expected to draw the more attention of the policymakers to see that quality and transparency in group companies is improved and the fruits of increasing professionalism in CEO professionals market reach the group companies also. It will strengthen the confidence of institutional investors in group companies. To enhance the professionalism, transparency and unbiasedness of CEOs in India companies should be improved. The board of directors should also see that appointment of CEOs should be made impartially, keeping in view the interest of all the stakeholders. To empower the board in this regard, the independence of the board should be strengthened, and a search committee nominated for CEO appointment should be more transparent.

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