

“LEAD-LAG RELATIONSHIP BETWEEN FUTURES & SPOT RETURNS”

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Abstract:

This paper attempts to explore the empirical relationship between the spot and future returns in the context of selected banking stocks in the Indian stock market. The main objective of the study is to determine the causal relationship of returns between the two markets. The data used in the study include the daily closing prices and the futures prices for the period of three years, from November 2008 to November 2011. The study adopts linear regression model, co-integration technique and Granger Causality Test for analysing the data. The major findings of the study indicate the volatility to be positive during the period. There is a long-run relationship between the Spot and futures market of selected banks' stocks. The results also indicate bi-directional causality between the spot market and futures market among the selected banks stock.

Keywords: *Volatility relationship, spot returns, future returns, lead-lag*

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1. INTRODUCTION

India's capital markets have experienced eliciting changes since the beginning of the last decade. Bombay stock exchange (BSE) began its formal trading in the year 1875, making it one of the oldest in Asia. Over the last few years, there has been a rapid change in the Indian securities market. In terms of the number of companies listed and total market capitalization, the Indian equity market is considered large relative to the country's stage of economic development. The national stock exchange (NSE) is India's leading stock exchange covering various cities and towns across the country. National Stock Exchange has played a catalytic role in reforming the Indian securities market in terms of microstructure, market practices and trading volumes. The NSE of limited commenced trading in derivatives with the launch of index futures on June 12, 2000. The futures and options segment of NSE has made mark for itself globally. In the futures and options segment, trading in S&P CNX Nifty index, Bank Nifty index, Nifty midcap 50 Indexes and single stock are available. The average daily turnover in the F&O segment of the exchange during 2009-2010 was Rs. 72392 crore (US \$ 16,097 million). Futures and options (F&O) segment of NSE provides trading in derivatives instruments like index futures, index options, stock options and stock futures. Futures on individual securities were introduced on Nov 09, 2001. Futures and options on individual securities are available on 9 major indices and 226 securities by SEBI. Since the launch of the index derivatives on the popular benchmark S&P CNX Nifty index in 2000. NSE today has moved ahead with a varied product offering in equity derivatives.

Objectives of the study are:

- (i) To examine the interrelationship between spot market and futures market returns.
- (ii) To examine the long run relationship between spot market and futures market returns.
- (iii) To study the lead lag relationship on selected banking company stocks and relevant futures contracts.

2. THEORETICAL BACKGROUND AND HYPOTHESES

Kalok Chan (1992) and UlkemBasdas (2009) studied the lead- lag relationship between the cash market and stock index futures market Indian. The study examined the intraday lead lag relation between returns of the major cash index and returns of the major market index futures and the S&P 500 futures. The result shows that strong evidence that the cash index lead the futures.

Kawaller, Stoll and Whaley (1990), BhaskkarSinha(2005)and Anthony F. Herbst, Joseph and Elizabeth (1987) Investigated the casual relationship between spot and futures market by making use of intraday for S&P 500 and the Major Market Index (MMI). The results reveal that the futures lead much stronger than that of the cash index lead.

Abyankar (1995)studied the lead lag relationship in return and volatilities between FTSE 100 stock index futures and underlying cash marketsand found a strong contemporaneous relationship between the futures and cash prices along with some significant evidence that futures markets lead spot market during times of high volatility.

Kawaller Koch and Koch (1987)showedin their article thatS&P 500 spot and futures markets are related simultaneously minute-to-minute basis throughout the day of trading, and there is a presence of a lead lag relationship. From this paper it can be inferred that the lead from futures market to cash market is more pronounced one.

PradhanChandra (2009)examined the price discovery, causality and forecasting in the S&P CNX Nifty futures and Nifty Index. The results of the study showed that the spot market leads the futures market.

Srinivasan(2009) studied the spot and futures markets of selected commercial banks in Indiahis research indicated mixed results i.e. in almost half of the selected sample futures market led the spot market, in the other half spot market was found to lead the futures market prices.

Christos Floros&Dimitrios V. Vougas (2007) in their study on examinedthe lead-lag relationship between futures and spot markets in Greece. For both available stock index futures contracts (FTSE/ASE-20 and FTSE/ASE Mid 40) of the Athens Derivatives Exchange (ADEX), they employ a Bivariate GARCH model to explain price discovery of futures market over the crisis period 1999 to 2001. Empirical results confirm that futures market plays a price discovery role, implying that futures prices contain useful information about spot prices.

Chan Sok Gee &MohdZainiAbdKarim (2005) reveal in their study the difference in trading mechanisms in the stock index futures and spot markets in Malaysia is argued to contribute to the lead-lag relationship between the two. Hence, the aim of this paper is to analyse the lead-lag relationship between spot and futures markets of the Malaysian Kuala Lumpur Composite Index (KLCI) by employing the co integration and error-correction approach. Results of the study

suggest that cash market and futures market are co integrated. The results of the Error-correction model (ECM) suggest that futures price lead spot price and the change in futures price is relatively more efficient as compared to spot price. The results also indicate that spot price lead futures price.

Kawaller, Koch and Koch (1987) in their study estimated the lead-lag relation between S&P 500 index futures and S&P 500 index using simultaneous equation model. A model was constructed to describe the dynamic intra-day price relationship between the index and futures prices. Their study attributed the stronger leading role of the futures market to the infrequent trading of component stocks.

Schwarz and Laatsch (1991) investigated the price leadership of index futures over the spot market and tested the dynamic efficiency of index futures. The study was done on the Major Market Index for the sample period 1985 to 1988. The results showed that the spot and futures market were integrated such that average mispricing leading to arbitrage was eliminated within one to seven days.

Chan (1992) in a study estimated the lead-lag relation between Major Market Index and Major Market Index futures under conditions of good and bad news, different trading intensities and under varying market wide movements. ARMA models were used and it was observed that the futures market led the spot market, and this was primarily due to faster information processing by the futures market. However, the results showed under bad news it was the cash index that led over the futures market while, there was no effect on the lead-lag relation during different trading intensities.

Teppo, Jukka and Vesa (1995) studied the two-way causality between the Finnish stock index futures and the stock index for a period of one year from 1989 - 1990. Granger Causality tests were applied on the daily returns due to non-availability of intra-day data. The results indicated that the futures market provided predictive information for both frequent and infrequently traded stocks while the reverse causality was found to be weak.

Frino and West (2002) in their study examined the lead-lag relationship in returns on stock index futures and the underlying stock index for the Australian market between 1992 and 1997. They found that futures returns lead index returns by twenty to twenty-five minutes and there was some evidence of feedback from the equities market to the futures market. Analysis conducted on a

year-by-year basis suggested that the extent to which the futures market leads the equities market had decreased over time and the relationship between the two markets had generally strengthened. This was consistent with an increase in the level of integration between the markets.

Pati and Kumar (2007) in their study found a positive contemporaneous relationship between futures price volatility and volume. Their study concluded that time-to-maturity is not a strong determinant of futures price volatility, but the rate of information arrival proxied by volume and open interest are the important sources of volatility.

2.1 HYPOTHESES

H₁: Interrelationship between spot market returns and futures market returns is significant

H₂: There is no long run relationship between spot market returns and futures market returns

H₃: There is no lead lag relationship of returns on selected banking company stocks and relevant futures contracts

3. RESEARCH METHODOLOGY

3.1 SAMPLE

The study has used the data from the National Stock Exchange website *www.nseindia.com*. The universe consists of 23 banking companies trading in single stock futures. As the coherent data are available only for 18 banking companies, these 18 trading banks are selected as the sample of the study. Convenience Sampling was adopted to select the 18 banking company stocks. Daily price of stocks as well as futures contracts on the stocks were used to compute returns.

3.2 LIMITATION OF THE STUDY

The following are the limitations of the study:

- 1) Data used in the study were secondary in nature. Therefore all the limitations associated with secondary data are applicable to this study also.
- 2) This study has employed daily closing price for both spot and futures market. Intra-day minute-to-minute prices were not considered for analysis.
- 3) This study is applied only to daily closing prices of selected banks in India for the trading period of 3 years.

- 4) As futures data were not completely available for the entire study period owing to the difference in commencement data of futures trading for the selected stocks, the study was limited to 18 banks.

4. ANALYSES OF RESULTS

The focus of this paper is on the returns from spot market and futures market. Therefore, the descriptive statistics showing the daily average returns for both the Cox (1976) demonstrates that if futures returns are quick to adjust to new information and if this process is transferred to the spot market through arbitrage mechanisms, spot market volatility and market efficiency would increase simultaneously. Ross (1989) shows that, under no-arbitrage conditions and when stock returns follow a martingale process, stock return volatility is proportional to the volume of information created, and stock return variance is equal to the variance of information flows. These two studies suggest that if more information is created as a result of futures returns and if such information is reflected quickly in spot returns, spot return volatility would increase following the introduction of futures returns. From this analysis, Daily closing price of bank stocks, returns were calculated for spot and futures market. The volatility measured as standard deviation of daily stocks return below the tabulated for during the period.

Table: 1

DESCRIPTIVE STATISTICS FOR DAILY SPOT AND FUTURES RETURNS

BANKS	SPOT RETURNS		FUTURES RETURNS	
	Mean	Std. Deviation	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic
ALLAHABAD	0.17	2.55	0.18	2.58
ANDRA	0.13	2.34	0.13	2.37
AXIS	0.10	2.84	0.02	2.52
CANARA	0.16	2.57	0.16	2.55
ICICI	0.11	3.03	0.11	3.04
IDBI	0.09	2.87	0.10	2.98
DENA	0.14	2.94	0.14	3.01
FEDERAL	0.15	2.41	0.15	2.45
HDFC	0.01	3.52	0.01	3.53
INDIAN	0.08	2.84	0.08	2.83
IOB	0.06	2.67	0.06	2.72
KARNATAKA	0.10	3.42	0.09	3.43
ORIENTAL	0.13	2.73	0.13	2.70
PNB	0.11	2.24	0.11	2.32
SYNDICATE	0.12	2.50	0.12	2.60
UNION	0.09	2.38	0.09	2.34
VIJAYA	0.12	2.65	0.12	2.69
YES	0.21	3.16	0.22	3.19

Table: 1 shows that the standard deviation of daily closing price of selected banks stocks returns of futures and spot market. The average returns of mean and standard deviation values of both the

markets exhibit similar value. Futures return is found to be the mirror image of the spot market. It is clear that volatility is positive during the study period, 1st Nov, 2008 to 31st Nov, 2011.

Chart: 1

DESCRIPTIVE STATISTICS FOR DAILY SPOT RETURNS

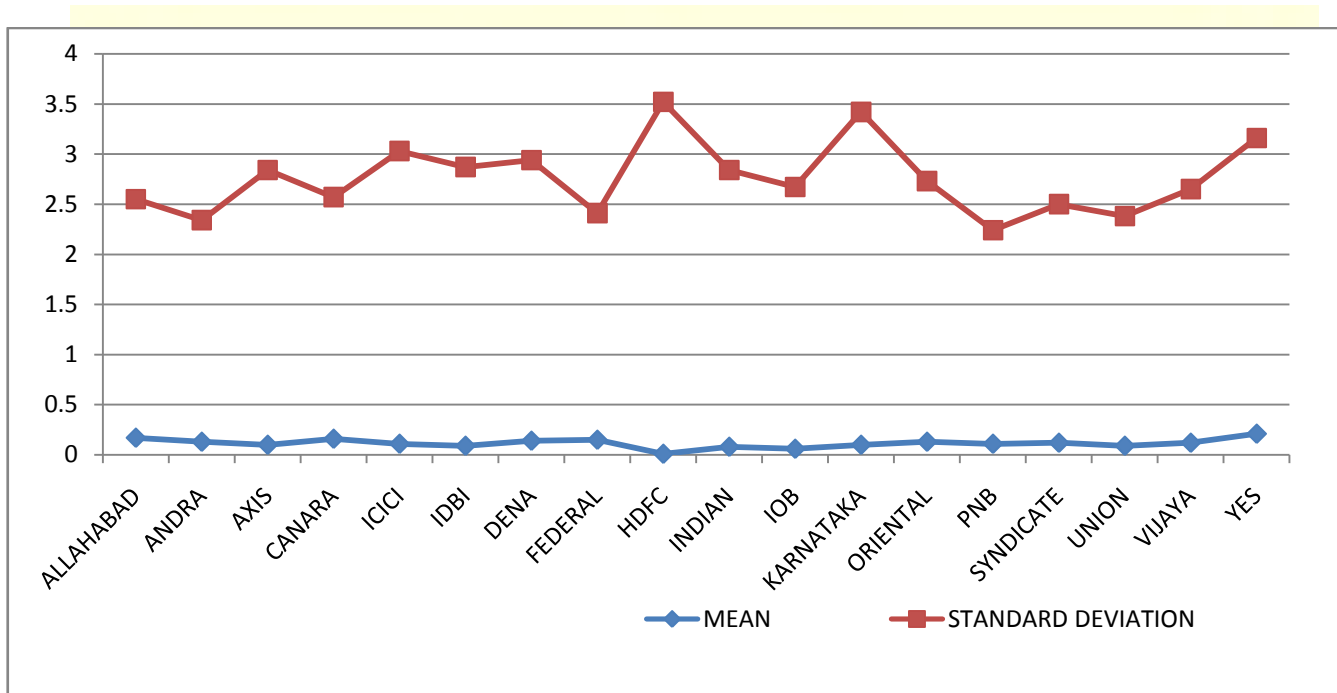


Chart: 2

DESCRIPTIVE STATISTICS FOR DAILY FUTURES RETURNS

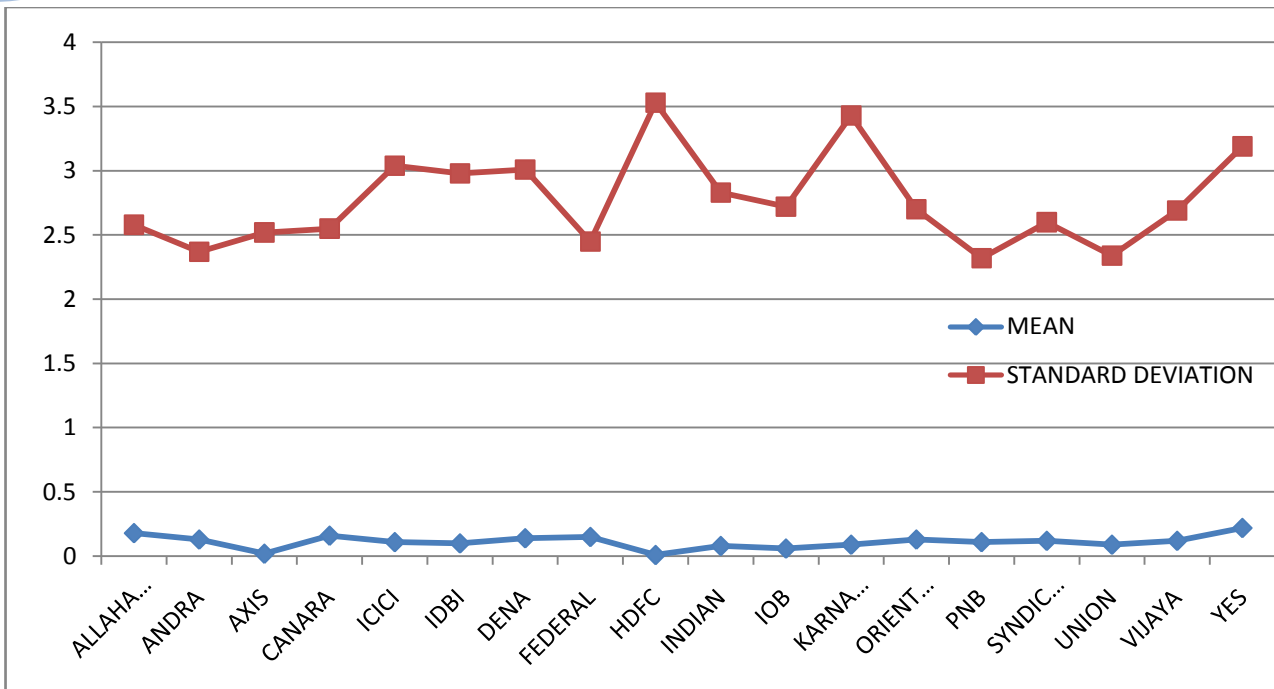


Table: 2

COEFFICIENT OF DETERMINATION 'R²' VALUES AND STANDARDISED COEFFICIENT OF THE SPOT AND FUTURES RETURNS

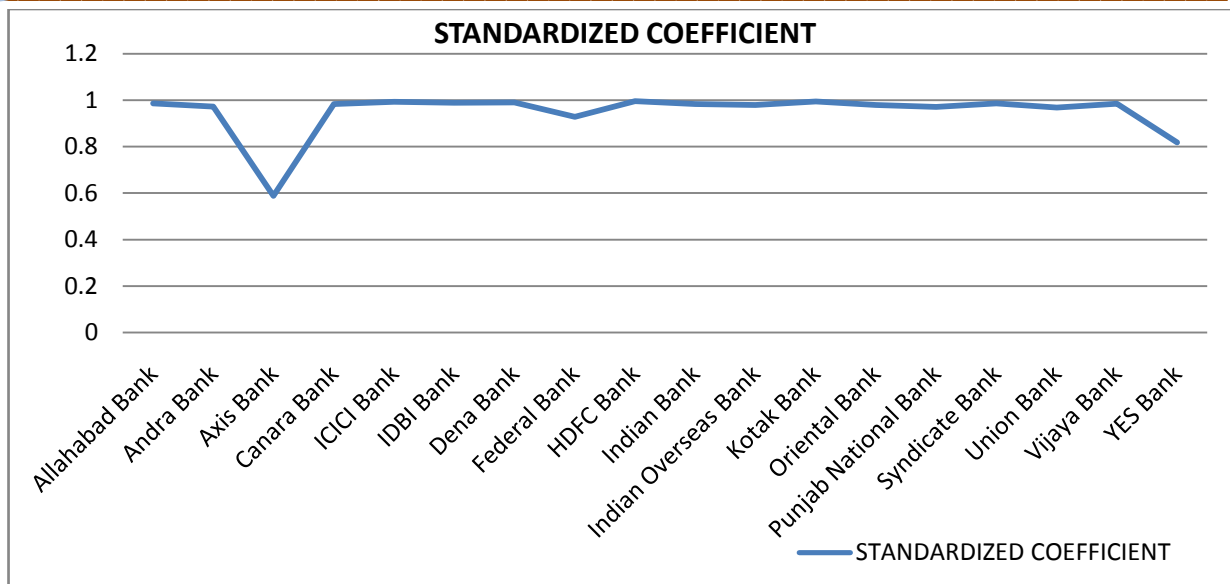
BANKS	R ² VALUES	STANDARDIZED COEFFICIENT
Allahabad Bank	0.946	0.973
Andra Bank	0.975	0.987
Axis Bank	0.346	0.588
Canara Bank	0.969	0.984
ICICI Bank	0.987	0.993
IDBI Bank	0.978	0.989
Dena Bank	0.980	0.990
Federal Bank	0.861	0.928
HDFC Bank	0.991	0.996

Indian Bank	0.968	0.984
Indian Overseas Bank	0.958	0.979
Kotak Bank	0.988	0.994
Oriental Bank	0.959	0.979
Punjab National Bank	0.942	0.971
Syndicate Bank	0.973	0.986
Union Bank	0.937	0.968
Vijaya Bank	0.971	0.985
YES Bank	0.669	0.818

Normally, when the R^2 values are 0 to 1, it indicates that the relationship between the spot returns and futures returns is strong. Table.3 indicates that R squared values for all the banks are more closely at 1. It reflects that the relationship between the spot returns and futures returns is strong, except for AXIS Bank which is at 0.346 and YES Bank at 0.669. There is moderate performance between the spot and future returns in the market.

Chart: 3

COEFFICIENT VALUES OF THE SPOT AND FUTURES RETURNS



The standardized coefficient (called Beta) expresses the impact of the futures returns in terms of standard deviation units. It tells us the number of standard deviations the spot returns increases or decreases with a one standard deviation increase in the futures returns. From the above chart, it can be inferred that Axis Bank has the least standardized coefficient at 0.588 and the second least standardized coefficient is YES Bank at 0.818. All the other banks are at the average of 0.949 standardized coefficients.

Table 4

CO-INTEGRATION OF SPOT AND FUTURE RETURNS

BANK NAME	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5% Critical Value
ALLAHABAD	None**	0.189674	278.9380	15.49471
	At most 1 **	0.147537	120.3576	3.841466
ANDRA	None**	0.241390	336.7696	15.49471
	At most 1 **	0.156653	128.4638	3.841466
AXIS	None**	0.189384	275.6750	15.49471
	At most 1 **	0.144146	117.3647	3.841466
CANARA	None**	0.228654	344.2928	15.49471

	At most 1 **	0.178812	148.5405	3.841466
ICICI	None**	0.272693	375.9061	15.49471
	At most 1 **	0.164849	135.8278	3.841466
IDBI	None**	0.325854	419.9821	15.49471
	At most 1 **	0.150151	122.6735	3.841466
DENA	None**	0.282311	389.9948	15.49471
	At most 1 **	0.169324	139.8786	3.841466
FEDERAL	None**	0.332264	427.6631	15.49471
	At most 1 **	0.150689	123.1506	3.841466
HDFC	None**	0.299601	401.6761	15.49471
	At most 1 **	0.161904	133.1731	3.841466
INDIAN	None**	0.268299	369.9056	15.49471
	At most 1 **	0.163232	134.3690	3.841466
INDIAN OVERSEAS	None**	0.191918	265.2152	15.49471
	At most 1 **	0.129469	104.5437	3.841466
KOTAK	None**	0.272715	377.1157	15.49471
	At most 1 **	0.166163	137.0147	3.841466
ORIENTAL	None**	0.209262	316.6263	15.49471
	At most 1 **	0.169013	139.5960	3.841466
PUNJAB NATIONAL	None**	0.251776	344.9315	15.49471
	At most 1 **	0.154153	126.2321	3.841466
SYNDICATE	None**	0.214064	299.0478	15.49471
	At most 1 **	0.144215	117.4248	3.841466
UNION	None**	0.263023	355.1066	15.49471
	At most 1 **	0.152755	124.9869	3.841466
VIJAYA	None**	0.266248	390.6646	15.49471
	At most 1 **	0.188230	157.2377	3.841466
YES	None**	0.225466	318.2639	15.49471
	At most 1 **	0.153467	125.6214	3.841466

** Trace test indicates 2 co-integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Table 3 shows the result of co-integration between spot market and futures market. It is clear that there is a co-movement between the trace value and critical value. The trace value is greater than

the critical value at 5% significant level. Hence it indicates the long-run relationship between spot and futures market of selected bank stocks is significant.

Table 5

GRANGER CAUSALITY TEST FOR SPOT AND FUTURES RETURNS

S.NO	BANKS	F-STATISTICS	PROBABILITY
1.	ALLAHABAD BANK	2.44653	0.08728
		5.30704	0.00514
2.	ANDRA BANK	2.06053	0.12811
		2.15146	0.11703
3.	AXIS BANK	1.48174	0.22791
		1.57620	0.20744
4.	CANARA BANK	0.47938	0.61936
		0.83884	0.43261
5.	ICICI BANK	0.50588	0.60318
		0.33064	0.71857
6.	IDBI	0.97840	0.37639
		0.01683	0.98331
7.	DENA BANK	0.54141	0.58215
		0.71718	0.48846
8.	FEDERAL BANK	12.2104	6.02506
		0.72949	0.48249
9.	HDFC BANK	1.04145	0.35345
		2.12975	0.11958
10.	INDIAN BANK	1.95681	0.14203
		4.67624	0.00959
11.	IOB	3.26394	0.03878
		4.76737	0.00876
12.	KOTAK BANK	5.34043	0.00498
		11.5446	1.204705
13.	ORIENTAL BANK	0.86647	0.42085
		2.31963	0.09901
14.	PNB	1.16565	0.31228
		4.83591	0.00819
15.	SYNDICATE BANK	3.16645	0.04272

		1.61770	0.19904
16.	UNION BANK	1.51641	0.22017
		1.33005	0.26509
17.	VIJAYA BANK	0.34032	0.71165
		0.86899	0.41979
18.	YES BANK	0.91148	0.40237
		1.31413	0.26932

Granger causality is used for examining the relationship between spot returns and futures returns. Granger causality is a technique for determining whether one time series is useful in forecasting another. A time series of spot returns (X) is said to granger cause of futures returns (Y) F-test on lagged value of (X) and (Y) also. Statistical values of X provide the significant information about futures values of Y. Table 5 shows the statistical significance at the 1%, 5% and 10% respectively. It can be inferred for Alahabad Bank, Andra Bank, Axis Bank, Canara Bank, Dena Bank, HDFC Bank, Indian Bank, IOB, Kotak Bank, Oriental Bank, PNB, Vijaya Bank, and YES Bank that the F value does not exceed F critical value. The F statistics value for ICICI Bank, IDBI, Federal Bank, Syndicate Bank, and Union Bank show the F value exceeds critical value. There is bi-directional causality between the spot and futures market. Therefore, the study pointed out the markets is integrated in a two-way causality.

5. CONCLUSION

In this paper, we examine empirically the dynamic relationship between the spot returns and the future returns. The study is concerned with comparing the volatility of returns from the two markets. The daily share prices and the futures prices for the three years period from November 2008 to 2011 have been used as the data for the study. In addition, this study used a well characterised regression process distinct from the existing literature. Further, we adopt co-integration technique and Granger causality test to evaluate the hypotheses in the study. From the analysis, standardised coefficient and R^2 values for all banks indicate high performance in the market other than AXIS Bank and YES Bank. Johansen's co-integration technique results depicts there is long-run relationship between the spot and futures market of selected bank stocks. Granger causality indicated that bi-directional causality between the spot and futures market among the selected bank stock.

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