

Expiration-Day Effects of Equity Derivatives in India: An Opinion Survey

Rachna Mahalwala

Assistant Professor, Bhagini Nivedia College, University of Delhi, New Delhi, India.

Abstract

The present study focuses upon the impact of derivatives trading on underlying stock market behaviour at and around expiration-days of these contracts. Expiration-day effects may arise from a variety of reasons such as unwinding of arbitrage positions, activities of speculators and manipulators, and market settlement procedure. The study is using primary data collected through opinion survey of stock brokers for finding causes for abnormal behaviour of underlying stock market at expiration-day of derivatives contracts and to get an insight into probable measures to deal with undesirable expiration-day effects, if any. The results of the study indicated expiration-days of derivative contracts are not catastrophic in Indian stock market and thus, no alteration in existing regulations of stock market seems desirable.

Keywords: Expiration-day, derivatives, arbitrageurs

Introduction

India's experience with the launch of equity derivatives market has been extremely positive. Within 13 years of its inception, the turnover of derivatives on the NSE increased from Rs. 2,365 crore in 2000-01 to Rs 3,15,33,003.96 crore in 2012-13 recording an impressive compound annual growth rate (CAGR) 120.67%. The rapid expansion in the derivative segment of the financial market in India and the temporal relationship between spot and equity derivatives prices has raised concerns regarding the effects of introduction of equity derivatives on the behaviour of the cash segment of the stock market. One of the significant areas for empirical investigation in stock market dynamics is the existence of expiration-day effects of derivatives trading on underlying spot market. Evidences have been found of an abnormal behaviour of the underlying stock market around expiration-dates of derivative contracts. The expiration-day effect is well-documented in the United States; however, the empirical evidences of this effect in other markets are not vast and ambiguous, especially in emerging markets, including India.

In India, "expiration-day" refers to the last Thursday of the month, when all contracts (index futures, index options, stock futures, stock options) expire and "expiration-hour" refers to the last half-hour of the expiration day as the last half-hour weighted average price of the underlying index/stock is used in cash-settling all open equity derivatives contracts. Although the occurrence of expiration-day is expected but the direction of the price movement and the size of order imbalances on expiration days are uncertain. Therefore, the traders who appear with market orders to sell (buy) when an expiration is pushing prices down (up) may be hurt.

Literature review

Empirical evidence indicating abnormal increase in trading volume, abnormal volatility and economically insignificant price pressures on expiration-days was first documented by Stoll & Whalley (1986, 1987) for the U.S. market. The evidence from other developed viz., Chamberlin, Cheung, and Kwan (1989) for Canada, Pope and Yadav (1992) for the United Kingdom (U.K.), Schlag (1996) for Germany, Stoll & Whally (1997) and Lien

and Yang (2003) for Australia, Joensuu (2010) for Europe and from emerging markets viz., Chou et al. (2003) for Taiwan, Chay and Ryu (2006) for Korea, Bhaumik and Bose (2007) and Maniar, Bhatt and Maniyar (2009) for India, though differ in the details due to distinctive microstructure of the market, coincides more or less with the above results.

Though most of the previous empirical works point out that the trading volume in the underlying asset to be abnormally high around expiration-days, literature review does not give clear-cut results of expiration-day effects on underlying spot market prices i.e. return, and volatility. No study till date to the knowledge of researcher is conducted to get the feel of the market from stock market operators on the issue under consideration. Having first-hand practical information of the market, they may provide concrete information about the possible causes of abnormal behaviour of stock market around expiration-days of derivatives contracts and thus, may extend realistic suggestions regarding the probable necessity to bring out certain policy measures to eradicate those expiration-day effects which are unwarranted. Therefore, the present study has attempted to conduct an opinion survey of stock brokers on expiration-day effects in India.

Objectives of the Study

The main objectives of the study are as follows:

1. To enquire whether expiration-day effects of derivatives trading exist in Indian stock market.
2. To identify the causes for the presence (or absence) of expiration-day effects in Indian stock market.
3. To assess whether an alteration in existing regulations of stock market is needed for dealing with the problem of undesirable expiration-day effects, if any.

Data and Methodology

For collecting primary data from stock brokers on behaviour of cash segment of Indian stock market around expiration-days, the method of questionnaire-based opinion survey has been employed. As the data desired is mainly perceptual in nature, the opinion survey is carried out through personal interviews of the respondents. In order to collect this primary data, a draft questionnaire was prepared and was pilot-tested with three market participants. Based on their feedback, the draft questionnaire was duly revised and a well structured questionnaire was framed which containing 16 questions.

Though an effort was made to approach 40 respondents, only 21 respondents showed inclination to participate in the survey. Some potential respondents simply refused to be interviewed due to paucity of time at their end and some told that they have a small level of understanding on the issue under consideration. Thus, the final sample consists of 21 respondents. These respondents are on senior positions of their respective trading and stock broking organisations and have been selected on the basis of convenience of approach.

The primary data collected through survey has been analysed by creating a frequency distribution i.e. a count and proportion of respondents who gave a specific answer to a

particular question. For this an excel spreadsheet was prepared and COUNTIF and SUM functions were used. Some of the unique or diverse observations given by respondents have been used in summarising and concluding the results of opinion survey.

Findings of Opinion Survey

In this section of the study, the opinions of stock brokers as gathered through questionnaire have been analysed and interpreted. The findings of the survey are reported below in the order in which questions have been put in the questionnaire.

Type of Trader

The question was: “Which type of trader are you? – Hedger; Speculator; Arbitrageur; All of these. Table 1 shows that nearly 14 percent of the respondents are basically hedgers, 48 percent are speculators, 14 percent are arbitrageurs and 24 percent carry out all types of deal. Thus, speculators are mainly ruling the market.

Table.1: Type of Trader

| Type of Trader | Frequency | Proportion |
|----------------|-----------|------------|
| Hedger | 3 | 14.2857143 |
| Speculator | 10 | 47.6190476 |
| Arbitrageur | 3 | 14.2857143 |
| All of these | 5 | 23.8095238 |
| Total | 21 | 100 |

Active Involvement in Arbitrage between Derivatives and Spot

The respondents were asked: “Are you involved in arbitraging between equity spot and equity derivatives instruments? – Yes / No.” Table 2 shows that about 48 percent of traders are doing arbitrage trades and 51 percent are not involved in arbitrage between derivatives and underlying equity stocks/indices.

Table 2: Active Involvement of a Trader in Arbitrage between Derivatives and Spot

| Whether involved in Arbitrage | Frequency | Proportion |
|-------------------------------|-----------|------------|
| Yes | 10 | 47.6190476 |
| No | 11 | 52.3809524 |
| Total | 21 | 100 |

Contract Having Heavy Arbitrage Opportunities

The respondents were questioned: “Where do you find the opportunity of the arbitrage to be frequent and of higher magnitude? - Stock index futures; Stock index options; Single stock futures; Single stock options.” As per the results of survey depicted in Table 3, nearly 38 percent of respondents favoured stock index futures for frequent arbitrage opportunities, about 24 percent saw much arbitrage deals in stock index options, around 29 percent favoured single stock futures and only 10 percent were in favour of single stock options.

Table 3: Contract Having Heavy Arbitrage Opportunities

| Contract Type | Frequency | Proportion |
|----------------------|-----------|------------|
| Stock Index Futures | 8 | 38.0952381 |
| Stock Index Options | 5 | 23.8095238 |
| Single Stock Futures | 6 | 28.5714286 |
| Single Stock Options | 2 | 9.52380952 |
| Total | 21 | 100 |

Experience of Abnormal Change in Trading Volume on Expiration-Days

The next question was: “Do you experience an abnormal change in trading volume of underlying stocks/ indices during expiration-days of derivative contracts on such stock/ indices? – Yes/No.” As indicated by Table 4, a majority of nearly 88 percent of respondents experience high trading volume on expiration-days. Only 14 percent observed no change in trading volume on expiration-days as compared to other trading days.

Table 4: Experience of Abnormal Change in Trading Volume on Expiration-Days

| Change in Volume Experienced | Frequency | Proportion |
|------------------------------|-----------|------------|
| Yes | 18 | 85.7142857 |
| No | 3 | 14.2857143 |
| Total | 21 | 100 |

Probable Reason for High Trading Volume on Expiration-Days

The respondents were asked; “Which is the main reason for larger trading volumes on expiration-days? - Index arbitrage windings; Speculation; Manipulation; All of these.” Table 5 reveals that all the forces mentioned in question were playing their role for causing higher trading volume on expiration-days. Nearly 29 percent of respondents opined that unwinding of arbitrage positions to be a factor behind high trading volume around expiration, also nearly 29 percent were of the opinion that speculation is resulting high trading volume on expiration, only about 10 percent were seeing manipulative activities to be a reason for high trading volume. A majority of 33 percent of respondents answered that all of the above forces are causing expiration-day high volumes in India.

Table 5: Reason for High Trading Volume on Expiration-Days

| Reason for higher Volume | Frequency | Proportion |
|-------------------------------|-----------|------------|
| Arbitrage Positions Unwinding | 6 | 28.5714286 |
| Speculations | 6 | 28.5714286 |
| Manipulations | 2 | 9.52380952 |
| All of These | 7 | 33.3333333 |
| Total | 21 | 100 |

Experience of Unexpected Order Imbalance Causing Sharp Price Movements

Then the respondents were questioned: “Have you ever faced a situation of unexpected order imbalance on expiration day leading to sharp price movement? – Yes/No.” From Table 6, it is inferred that those who experienced order imbalance hover around 67 percent and those who did not experienced order imbalance causing sharp price movements were around 33 percent.

Table 6: Experience of Unexpected Order Imbalance Causing Sharp Price Movements

| Experience of Sharp Price Swings Due to Order Imbalance | Frequency | Proportion |
|---|-----------|------------|
| Yes | 14 | 66.6666667 |
| No | 7 | 33.3333333 |
| Total | 21 | 100 |

Side of Trade Where Price Pressure Normally Built due to Order Imbalance

The next question for respondents was: “If yes, which side of trade you feel the price pressure is created due to order imbalance of trade? Upward; Downward; No clear pattern.” The Table 7 shows that a majority of 50 percent of respondents experienced no clear pattern, around 14 percent were of the opinion that pressure is build upwards and nearly 36 percent saw a downward pressure on returns from market due to heavy trading and order imbalance around expiration.

Table 7: Side of Trade Affected Frequently by Order Imbalance

| Side of trade Affected Frequently | Frequency | Proportion |
|-----------------------------------|-----------|------------|
| Upward | 2 | 14.2857143 |
| Downward | 5 | 35.7142857 |
| No Clear Pattern | 7 | 50 |
| Total | 14 | 100 |

Experience of High Volatility around Expiration-Days as against Other Trading Days

Then the respondents were asked: “Did stock market become more volatile around expiration-days as compared to other trading days when high trading volume and/ or imbalance were observed?” As inferred from Table 8, a majority of around 81 percent of respondents replied that stock market becomes volatile around expiration-days due to heavy trading by market participants. Nearly 19 percent of respondents opined that they do not observe higher volatility around expiration-days.

Table 8: Experience of High Volatility around Expiration-Days

| Experience of Higher Volatility | Frequency | Proportion |
|---------------------------------|-----------|------------|
| Yes | 17 | 80.952381 |
| No | 4 | 19.047619 |
| Total | 21 | 100 |

Probable Time for Volatile Market Behaviour

“If yes, exactly during which time did you experience the volatile behaviour of stock market? Expiration-day; Expiration-week; Expiration-hour; All of these” This question was asked to those respondents who observe high volatility around expiration-days. Table 9 indicates, nearly 18 percent observed expiration-weeks to be more volatile, 29 percent found expiration-days to have higher volatility, yet another 29 percent opined that market gets much volatile during the expiration-hour and about 24 percent found that volatility increases during all expiration-periods mentioned.

Table 9: Probable Time for Volatile Market Behaviour

| Exact Time of Volatility in Market | Frequency | Proportion |
|------------------------------------|-----------|------------|
| Expiration-Week | 3 | 17.6470588 |
| Expiration-Day | 5 | 29.4117647 |
| Expiration-Hour | 5 | 29.4117647 |
| All of These | 4 | 23.5294118 |
| Total | 17 | 100 |

Existence of Strong market Mechanism to Deal with Undesirable Price effects

Then the question “Do you feel that order imbalance of trade around expiration-days is well taken care by market mechanism to limit undesirable price effects? – Yes/No” was asked. As given in Table 10, nearly 76 percent of the respondents were of the opinion that Indian stock market system is strong enough to absorb temporary price effects created on expiration-days. Around 24 percent of respondents answered that a much well-equipped risk-management system is needed so that expiration-days could not create a chaotic situation in stock market.

Table 10: Existence of Strong market Mechanism to Limit Price effects

| Ability of Market Mechanism to Limit Price effects | Frequency | Proportion |
|--|-----------|------------|
| Yes | 16 | 76.1904762 |
| No | 5 | 23.8095238 |
| Total | 21 | 100 |

Method Effective in Limiting price Effects on Expiration-Days

The next question for the respondents was: “The presence of which of the following forces is effective in limiting price effects on expiration-days? - Trading by long-term Institutional investors; Spreaders into the market; Short-term traders; All of these.” Table 11 shows that nearly 33 percent of the respondents expressed that big market players like FIIs, mutual funds, financial institutions etc., offset order imbalance and limit price effects, 14 percent responded that spreaders limit unwanted price effects, 24 percent were of the opinion that short-term traders help in bringing back the market to equilibrium and 29 percent said that all these forces operate together to remove objectionable price effects.

Table 11: Market Forces Effective in Limiting price Effects on Expiration-Days

| Force working to Limit Price Effects | Frequency | Proportion |
|--|-----------|------------|
| Trading by Long-Term Institutional Investors | 7 | 33.3333333 |
| Spreaders into the Market | 3 | 14.2857143 |
| Short-Term Traders | 5 | 23.8095238 |
| All of These | 6 | 28.5714286 |
| Total | 21 | 100 |

Probable Reason for abnormal behaviour of Stock Market on Expiration-days

Then the respondents were asked: "Which is the main reason for abnormal behaviour of stock market at expiration-days of derivatives contracts? - Frantic trading; Heavy unwinding by arbitrageurs, News from international markets; fundamental news; Any other." As indicated in Table 12, more than 23 percent of the respondents opted for frantic trading, more than 52 percent blamed heavy unwindings by arbitrageurs, another 14 percent opined news from international market coinciding with expiration created a mess and around 9 percent said that instability arose due to some fundamental news. No respondent opted for any other factor.

Table 12: Reason for Abnormal Behaviour of Stock Market on Expiration-days

| Reason for Crash like Situation | Frequency | Proportion |
|----------------------------------|-----------|-------------|
| Frantic Trading | 5 | 23.80952381 |
| Heavy Unwindings by Arbitrageurs | 11 | 52.38095238 |
| News from International Markets | 3 | 14.28571429 |
| Fundamental News | 2 | 9.523809524 |
| Any Other | 0 | 0 |
| Total | 21 | 100 |

Efficiency of Existing Cash Settlement System of Derivatives Contracts

The next question for respondents was: "Do you feel that the present system of cash settlement of derivative contracts in India is efficient? - Yes/No. Give reasons." Table 13 clearly indicates that 76 percent of respondents answered in favour of efficiency of present system of cash settlement of derivatives contracts on the grounds that normally both sides i.e. sell and buy get their counterparties and no liquidity problem arises and thus no defaults are reported. About 24 percent only were of the view that present system is not efficient as around expiration-days sudden increase in the flow of market orders lead to some liquidity problems. They advised that changes in existing settlement system are desirable in reducing speculation and manipulation around expiration-days.

Table 13: Efficiency of Existing Cash Settlement System of Derivatives Contracts

| Whether Cash Settlement efficient | Frequency | Proportion |
|-----------------------------------|-----------|------------|
| Yes | 16 | 76.1904762 |
| No | 5 | 23.8095238 |
| Total | 21 | 100 |

Alteration in Existing Cash Settlement Procedure

The respondents who reported that current cash settlement at average price is not effective in meeting liquidity demands on expiration-days were asked: “If no, which of the following alteration you are expecting in existing cash settlement procedure?- Longer Time Window for determining Average Price; Using Single Price; Any Other – Yes/No.” As shown in Table 14, a majority of 60 percent of respondents opined that using a single price for determining settlement price is desirable as it eliminates basis risk for arbitrage trades and thus riskless profits could be earned and 40 percent said that using a longer time window would help in eliminating undesirable price effects as minimises the chances of manipulation.

Table 14: Desirable Change in Existing Cash Settlement

| Desirable Change in Existing Cash Settlement | Frequency | Proportion |
|--|-----------|------------|
| Longer Time Window for determining Average Price | 2 | 40 |
| Using Single Price | 3 | 60 |
| Any Other | 0 | 0 |
| Total | 5 | 100 |

Overall Experience with Market Mechanism in India and Expiration-Day Effects

Then the respondents were asked to give their opinion on the entire array of expiration-day effects in India in closed format. The following question: “Do you feel that stock market trading mechanism in India as a whole is handling efficiently all expiration-day effects resulting from sudden order imbalances? – Yes/No.” was asked from them. Table 15 shows that a majority of nearly 76 percent of respondents showed confidence in stock market trading mechanism in India in dealing with expiration-day problem. They said that as markets in India are purely computer-driven having an effective system of order-matching, margining and circuit-breakers and alerts, no severe expiration-period consequences arises. However, nearly 24 percent felt that stock market mechanism is not tackling well all the expiration-day effects. The sheer size of derivatives segment in terms of volume traded and turnover occasionally affects stock market behaviour reflected in its return and volatility. So, there is a need to overhaul the entire regulatory infrastructure in the light of current developments in stock market like high frequency trading.

Table 15: Overall Experience with Existing Market Mechanism to Deal with Expiration-Day Effects

| Whether Market Mechanism Well-Designed to Curb Order Imbalances | Frequency | Proportion |
|---|-----------|------------|
| Yes | 16 | 76.1904762 |
| No | 5 | 23.8095238 |
| Total | 21 | 100 |

Desirability of Alteration in Existing Regulations to Enhance Market Depth to Deal With Problems like Expiration-day Effects

On the basis of their experience in market around expiration episodes, the respondents were then asked: “In your opinion, does some alteration in existing regulation of the Stock market desirable in order to enhance its depth and deal with the problem of unwanted expiration day effects? – Yes/No.” Table 16 indicates that a vast majority of nearly 81 percent were of the opinion that the present system is working well and no alteration is required in existing regulation. Many of the respondents said that as expiration-days are not a serious problem in India, simply no changes in regulations are required. Still, to prevent the chances of situations like Korean stock market plunge of November 11, 2010, the surveillance system of exchange could become stricter around expiration-time and disclosure norms for large institutional investors could be improved. Only 19 percent expressed that some changes in regulations are needed to enhance its depth to deal with problems like expiration-day effects.

Table 16: Desirability of Alteration in Existing Regulations

| Whether Alteration Required in Regulation? | Frequency | Proportion |
|--|-----------|-------------|
| Yes | 4 | 19.04761905 |
| No | 17 | 80.95238095 |
| Total | 21 | 100 |

Conclusion

The overall results of this survey are more or less similar to the results of previous studies in the U.S. and other developed markets, which have indicated that expiration-days are associated with higher trading volumes and much greater volatility near the time of settlement of price determination, still some results are at odds than what is expected. Specifically, the results of survey indicate that around expiration-days, the trading volume becomes high and it lead to order imbalances as well. The price pressure built due to order imbalance of trades was found to have no clear pattern - upward or downward, however, market becomes volatile during the expiration-weeks, expiration-days as well as expiration hours. Some pointed out that the time of determination of settlement price becomes exceptionally choppy and volatile due to unwinding of large open positions towards the expiry. The major force working behind causing abnormal market moves came out to be a combination of heavy unwinding by arbitrageurs, speculation, and manipulation. Also some of the respondents pointed out though the arbitrage opportunities are many during the life of derivatives contracts in Indian market, the returns are often not as fantastic as desired due to heavy transaction costs including the cost of brokerage, securities transaction tax, stock exchange charges and stamp duty.

The survey revealed that though stock market shows somewhat abnormal behaviour with respect to volumes and prices, the market mechanism in India is effective enough to take care of liquidity demands resulting from heavy trading. Mainly the long term institutional investors and short-term traders help in offsetting order imbalances and limiting price effects. Floor brokers normally communicate with these players and mutually determine the trading

strategies for profiting from the imbalance. Most of the interviewees were of the view that they had not experienced a catastrophe situation due to volatile stock market moves on expiration in India as in case of U.S., Japan, Australia and recently Korea due to heavy arbitrage trading, however, they opined that with the advent of algorithmic trading and direct market access for foreign players, the chances of systemic failure due to flash crash have become inevitable. Majority of the interviewees were found to be satisfied with the existing system of cash settlement of derivatives contracts at average price and they argued that physical settlement is not desirable as market is dominated by speculators who are not interested in giving and taking deliveries. Regarding bringing any regulatory measures to limit expiration-day effects, most of the respondents argued that as liquidity of the market is rarely taxed on and around expiration-days because market system is mature enough to absorb temporary shocks to prices at expiration, thus, there is no necessity to bring alteration in existing regulations.

References

- Bhaumik, S & Bose, S. (2007), Impact of Derivatives Trading on Emerging Capital Markets: A note on Expiration Day Effects in India, *William Davidson Institute Working Paper Number 863*, March 2007.
- Chamberlian, T. W., Cheung, C. S. and Kwan, C. Y. C. (1989). Expiration-Day Effects of Index Futures and Options: Some Canadian Evidence, *Financial Analysts Journal*, 45(5), 67-71.
- Chou, H.C., Chen, W.N., and Chen, D.H. (2003), The Expiration effects of Stock index Derivatives: Empirical evidence from the Taiwan Futures Exchange, *Emerging Markets Finance and Trade*, 42, 81-102.
- Chay, J. B. and Ryu, H.S., (2006). Expiration-day effects of the KOSPI 200 futures and options, *Asia Pacific Journal of Financial Studies*, 35(1).
- Lien, D., & Yang, L. (2003), Options expiration effects and the role of individual share futures contracts. *Journal of Futures Markets*, 23, 1107–1118.
- Maniar H M, Bhatt R and Maniyar D M (2009), Expiration Hour Effect of Futures and Options Markets on Stock Market: A Case Study on NSE (National Stock Exchange of India), *International Review of Economics & Finance*, Vol. 18, No. 3, pp. 381-391.
- Pope, P.F., Yadav, P.K., 1992, The impact of option expiration on underlying stocks: the U.K. evidence, *Journal of Business Finance and Accounting* 19, 329–344.
- Schlag, C. (1996), Expiration Day Effects of Stock Index Derivatives in Germany, *European Financial Management*, Vol 1 (1), pp 69-95.
- Stoll, H.R. and Whaley, R.E. (1986). Expiration Day Effects of Index Options and Futures, *Monograph Series in Finance & Economics*, Monograph-3.
- Stoll, H.R. & Whaley, R.E. (1987), Program Trading & Expiration Day Effects, *Financial Analysts Journal*, Vol 43, pp. 16-28.
- Stoll, H.R. & Whaley, R.E. (1997), Expiration Day Effects of the All Ordinaries Share Price Index Futures: Empirical Evidence and Alternative Settlement Procedures, *Australian Journal of Management*, Vol 22, No 2, Dec, pp 139-174.