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## Analysis of equity derivatives

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### Abstract

The equity derivatives are an agreement or a derivative whose value is gotten from other underlying equity securities. There are a few equity derivatives that are exchanged however the most well-known equity derivatives are the options and the futures. In this study the aim to do an analysis of equity derivatives of different firms. To do such an investigation, a specific proportion (Numbers of agreement/turnover) and the Analysis of Variance (ANOVA) is utilizing amid this examination. The ANOVA is the great instrument in measurements for tests of significance.

**Keywords:** Equity derivatives, turnover, ANOVA, ratio

### 1. Introduction

The turnover is an accounting term that is used to estimate how fast a firm collects the cash from accounts receivable or in other words we can say that how fast the firm sell its inventory. In the case of an investment firm, the turnover represents the percentage of a portfolio that is sold in a particular period. The equity derivatives are a class of contracts whose value is derived from another underlying asset security. The options and the futures are the most common equity derivatives. Initially, some definitions of various contracts are given in section (2) such as derivatives, options, futures etc. The data have been collected from the [www.nseindia.com](http://www.nseindia.com) (as on August 11, 2017). In this paper, the graphs represent which firm sells the contract more and later we will compare all the firms with some ratios. The ANOVA is a statistical technique based on the F-distribution. There are some assumptions, that is: the observations are independent and the data is following a normal distribution. According to the Sir R A Fisher, the ANOVA is "separation of variance ascribable to one group of causes from the variance ascribable to the other group". The ANOVA is using to do an experiment on the basis of equity derivatives. It shows that whether there is any mean difference between the groups.

### 1.1 Main objective

To test the equality of the mean that is the homogeneity of different ratios. Hence, the null hypothesis is:

$$H_0 = \mu_{JK \text{ Bank}} = \mu_{SBI} = \mu_{IOB} = \mu_{CANARA \text{ BANK}}$$

The alternative hypothesis is:

$$H_1 = \text{at least two of the means are different}$$

### 1.2 Methodology

The data have been collected from the [www.nseindia.com](http://www.nseindia.com) (as on August 11, 2017) as shown table 1.

**Table 1:** Instrument wise Volume

| products      | JK Bank          | JK Bank        | SBI              | SBI            | IOB              | IOB            | Canara Bank      | Canara Bank    |
|---------------|------------------|----------------|------------------|----------------|------------------|----------------|------------------|----------------|
|               | No. of contracts | Turnover (cr.) | No. of contracts | Turnover (cr.) | No. of contracts | Turnover (cr.) | No. of contracts | Turnover (cr.) |
| Index Futures | 1,27,993         | 10,318.58      | 1,23,145         | 9,885.56       | 1,32,238         | 10,690.52      | 1,37,295         | 11,134.56      |
| Stock Futures | 4,24,804         | 29,943.23      | 4,17,739         | 29,435.52      | 4,30,876         | 30,393.52      | 4,40,639         | 31,125.75      |
| Index Options | 23,24,095        | 1,92,813.40    | 22,53,026        | 1,86,546.82    | 23,92,098        | 1,98,919.54    | 24,91,869        | 2,07,575.52    |
| Stock Options | 3,09,003         | 23,520.18      | 3,03,773         | 23,113.24      | 3,13,351         | 23,851.07      | 3,20,681         | 24,436.93      |
| Total         | 31,85,895        | 2,56,595.39    | 30,97,683        | 2,48,981.14    | 32,68,563        | 2,63,854.65    | 33,90,484        | 2,74,272.75    |

**Note:** \* In case of Option Contracts "Turnover" represents "Notional Turnover

**2. Terminology**

**2.1 Derivative**

The derivatives have become increasingly important in the finance from last thirty years. It is the financial contract between the two parties in which one party agrees to sell and another party agrees to buy an underlying asset at some future date at some specific price. A derivative is a security or a contract which promise to make a payment at a future date. Derivatives are traded on many exchanges throughout the world.

**2.2 Futures Contract**

It is an agreement between the two parties in which one party agrees to buy and another party agrees to sell an underlying asset at a certain future time for a certain price (that will mention at the beginning of the contract). Unlike a forward contract, the buyer and the seller do not enter into an agreement with one another. Normally the futures contract is traded on an exchange market. The exchanges market act as an intermediate in a futures contract. It is standardised and the two parties are guaranteed that the contract will be honoured. The Chicago Board of Trade (CBOT) and Chicago Mercantile Exchange (CME) are the two largest exchange markets where the futures contract is traded. A non-obligatory contract to buy/sell an asset on or before a future date at a price specified today. It is standardized and traded on exchange. The underlying assets often traded in future contract are cattle, sugar, wool, copper, gold, tin, stock indices, currencies, treasury bonds etc.

**2.3 Options**

It is contract between individuals or firms in which one party is ready to buy and another party is ready to sell. Option is a contract that gives owner the rights but not obligation to buy or sell an underlying asset at a fixed price

(exercise/strike price) on the future date (maturity/exercise). Options are traded in the over-the-counter and the exchange market.

**2.4 Equity Derivatives**

The equity derivatives are a contract or a derivative whose value is derived from other underlying equity securities. There are several equity derivatives that are traded but the most common equity derivatives are the options and the futures. This section provides you with an insight into the daily activities of the equity derivatives market segment on NSE. The major products under Equity derivatives are Futures and Options, which are available on Indices and Stocks.

**2.4.1 Index futures:** It is a contract to buy a range of shares at a strike price but it will deliver and paid at future date. The S&P Index is one of most popular and widely traded index futures contracts in the US.

**2.4.2 Stock futures:** It is a contract between the two parties in which one party agrees to buy and another party agrees to sell a specified number of stocks in a firm at a strike price but it will deliver and paid at a future date.

**2.4.3 Index options:** It is a financial contract that gives the owner the rights but not obligation to sell or buy the value of an underlying index, such as S&P at the strike price on or before the maturity date of the option.

**2.4.4 Stock options:** It is a financial contract that gives the owner the rights but not obligation to sell or buy the value of the stock.

**3. Result**

**Table 1:** Number of contracts

| Products      | JK Bank          | SBI              | IOB              | Canara Bank      |
|---------------|------------------|------------------|------------------|------------------|
|               | No. of contracts | No. of contracts | No. of contracts | No. of contracts |
| Index Futures | 1,27,993         | 1,23,145         | 1,32,238         | 1,37,295         |
| Stock Futures | 4,24,804         | 4,17,739         | 4,30,876         | 4,40,639         |
| Index Options | 23,24,095        | 22,53,026        | 23,92,098        | 24,91,869        |
| Stock Options | 3,09,003         | 3,03,773         | 3,13,351         | 3,20,681         |

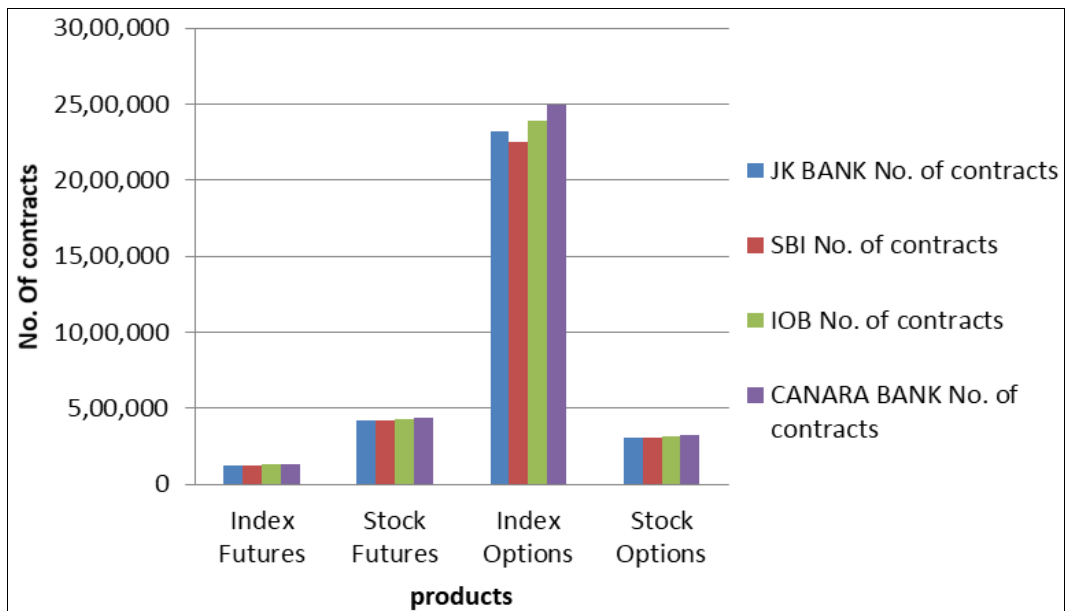


Fig 1: Number of contracts

The figure 1 clearly shows that all the firms traded "Index options" more than that means its demand is too high in the market and the index options are traded less as compared to other derivatives. The Canara Bank traded

highest index options and SBI traded fewer index options. In the case of index futures again SBI traded less and the Canara Bank traded more look at the above figure 1.

Table 3: Turnover of Equity Derivatives

| Products      | JK Bank Turnover (cr.) | SBI Turnover (cr.) | IOB Turnover (cr.) | Canara Bank Turnover (cr.) |
|---------------|------------------------|--------------------|--------------------|----------------------------|
| Index Futures | 10,318.58              | 9,885.56           | 10,690.52          | 11,134.56                  |
| Stock Futures | 29,943.23              | 29,435.52          | 30,393.52          | 31,125.75                  |
| Index Options | 1,92,813.40            | 1,86,546.82        | 1,98,919.54        | 2,07,575.52                |
| Stock Options | 23,520.18              | 23,113.24          | 23,851.07          | 24,436.93                  |

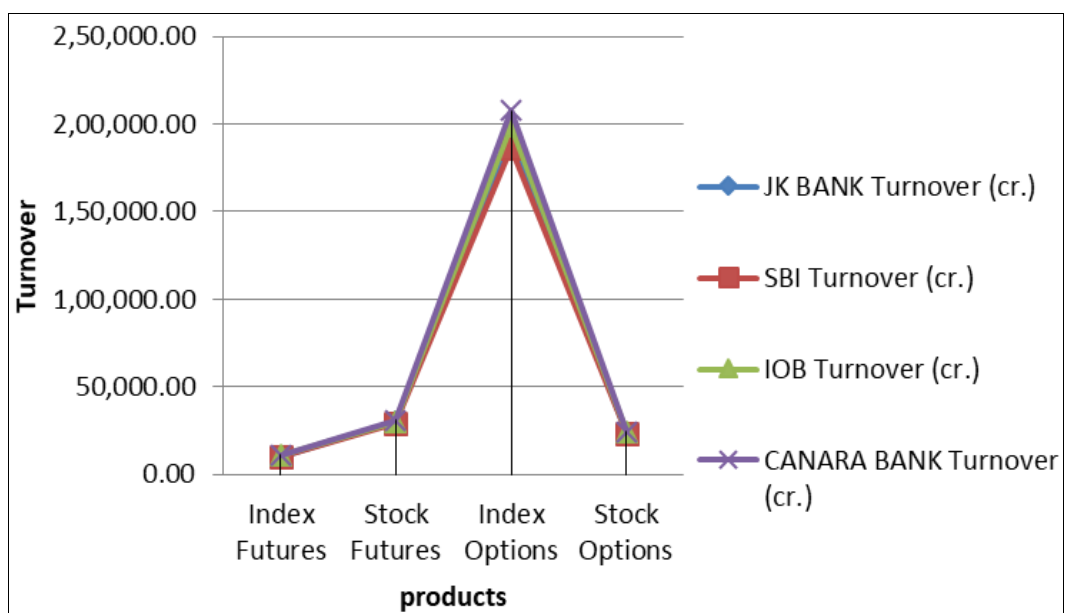


Fig 2: Turnover

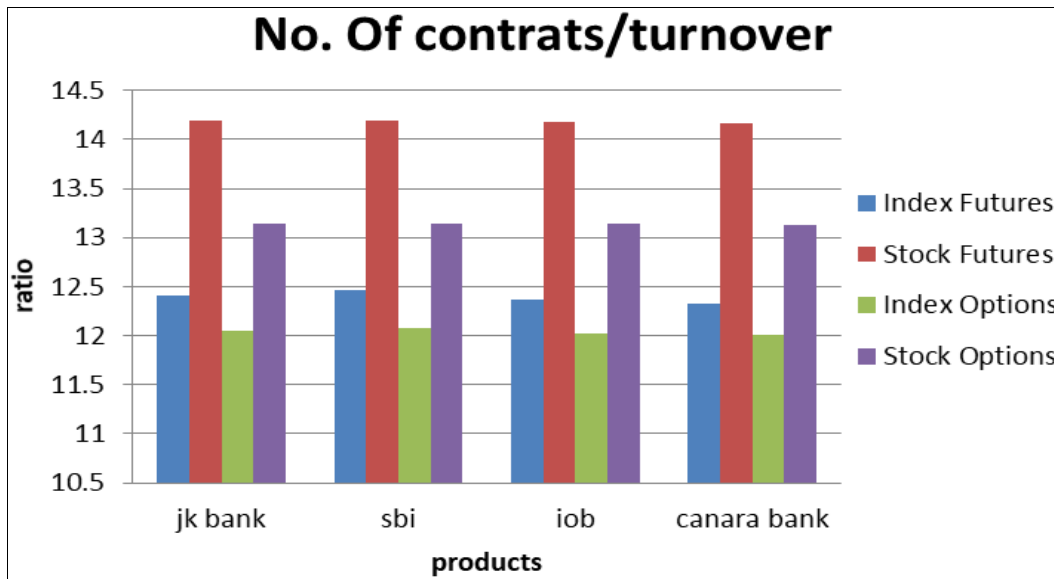
The figure 2 shows the turnover of all firms, the turnover of the Canara Bank is high in all the cases. The SBI has fewer turnovers in all contracts. But we cannot say as per figure 2 how fast a firm collects the cash from accounts receivable because the number of contracts is different for all firms.

So, for that, we need a ratio in order to estimate that how much fast a firm will collect the cash.

$$RATIO = NUMBER\ OF\ CONTRACTS / TURNOVER$$

**Table 4:** Ratio

|               | No. of contract/turnover |          |          |             |
|---------------|--------------------------|----------|----------|-------------|
|               | JK Bank                  | SBI      | IOB      | Canara Bank |
| Index Futures | 12.40413                 | 12.45706 | 12.36965 | 12.33053    |
| Stock Futures | 14.18698                 | 14.19166 | 14.17657 | 14.15674    |
| Index Options | 12.0536                  | 12.07754 | 12.02546 | 12.00464    |
| Stock Options | 13.13778                 | 13.14281 | 13.13782 | 13.1228     |



**Fig 3:** Number of contracts divided by turnover

The figure 3 indicates that which firm will collect cash more. The SBI collect cash while traded the equity derivatives. It is because of the ratio between the numbers of contracts by turnover, it gives more ratios as compared to the other firms. As per the previous figure 2, which indicates that the Canara Bank collect more cash while trading the derivatives but the Canara Bank also traded more Derivatives. So, the ratio gives the perfect answer that which one is good.

The main problem is: Is there any significant difference between the means of the ratio.

In order to find the solution to the problem we need a statistical test known as ANOVA.

**4. ANOVA Result**

In order to find the solution to the problem we need a hypothesis that is:

The null hypothesis is:

$$H_0 = \mu_{JK\ Bank} = \mu_{SBI} = \mu_{IOB} = \mu_{CANARA\ BANK}$$

The alternative hypothesis is:

$$H_1 = \text{at least two of the means are different}$$

**Table 5:** Summary

| Groups      | Count | Sum      | Average  | Variance |
|-------------|-------|----------|----------|----------|
| JK Bank     | 4     | 51.78249 | 12.94562 | 0.888939 |
| SBI         | 4     | 51.86907 | 12.96727 | 0.860632 |
| IOB         | 4     | 51.7095  | 12.92737 | 0.909767 |
| Canara Bank | 4     | 51.6147  | 12.90368 | 0.918314 |

Table 5 shows the basic statistics of the ratio of all firms. If we talk about the standard deviation, less standard deviation means good. Here SBI is having less standard deviation as compared to other firms which indicate that it is better as compare to other firms.

**Table 6:** Anova

| Source of Variation | SS       | df | MS       | F        | P-value  | F crit   |
|---------------------|----------|----|----------|----------|----------|----------|
| Between Groups      | 0.008758 | 3  | 0.002919 | 0.003264 | 0.999728 | 3.490295 |
| Within Groups       | 10.73296 | 12 | 0.894413 |          |          |          |
| Total               | 10.74172 | 15 |          |          |          |          |

The tabulated (Critical (crit)) value of F(3,12, 0.05)=3.490395 (3,12→degree of freedom and α=0.05,means 95% confidence interval). Since the calculated value of the test statistics, F=0.003264 is less than the critical value, it is not significant i.e., it does not fall in the rejection level. Hence, we fail to reject the null hypothesis.

**5. Conclusion**

The turnover is an accounting term that is used to estimate how fast a firm collects the cash from accounts receivable. The equity derivatives are a class of contracts whose value is derived from another underlying asset security. The ratio between the numbers of contract by turnover gives the accurate answer which firm collect fast cash from the traded

derivatives. In this case, we got SBI collect fast cash as compared to other. The standard deviation, less standard deviation means good for a firm. The SBI is having less standard deviation as compared to other firms which indicate that it is better. In above both the cases the ratio and the standard deviation match with each other that indicate our result is accurate. The main purpose of ANOVA is to test the homogeneity of different means. We got a result that there is no significant difference between the average ratios of the four firms.

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