SUMMER INTERNSHIP REPORT
ON
EQUITY DERIVATIVE RESEARCH OF IOC, MARICO AND NCC

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ABSTRACT

The purpose of this project is to understand the derivative market and analyze the behavior of underlying of the few derivatives. For that the past ten years of data for the given companies is collected and analyzed. With this data the historical volatility and implied volatility for the stocks are calculated and analyzed. Then some predefined strategies are tested for the given derivative stocks. After that analysis of those strategies are done and on the basis of that a new concept for trading was built. Then the viability of that concept is tested and a strategy is built on that concept. The rules are formed for trading through that strategy. At the end the comparison among all the strategies is done.

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PART A

CHAPTER 1

COMPANY OVERVIEW

1.1 INTRODUCTION

The Money Roller believes in the moto that was written in their logo which is Reap What You Invest. It is a Mumbai based research firm which was established in 2014. In this era of fake and paid research this company believes in own research for trading in the market. To continue with this, believe the company wants to change the research culture and turn it towards more genuine research in India. To create the genuine research, it is giving away the live projects for the young minds to train them and make them learn from real life experience. The company also conducts the workshops across the country at different B-schools. Their expertise lies in dealing with the research in different financial markets whether it is equity, derivatives, currencies, commodities, etc.

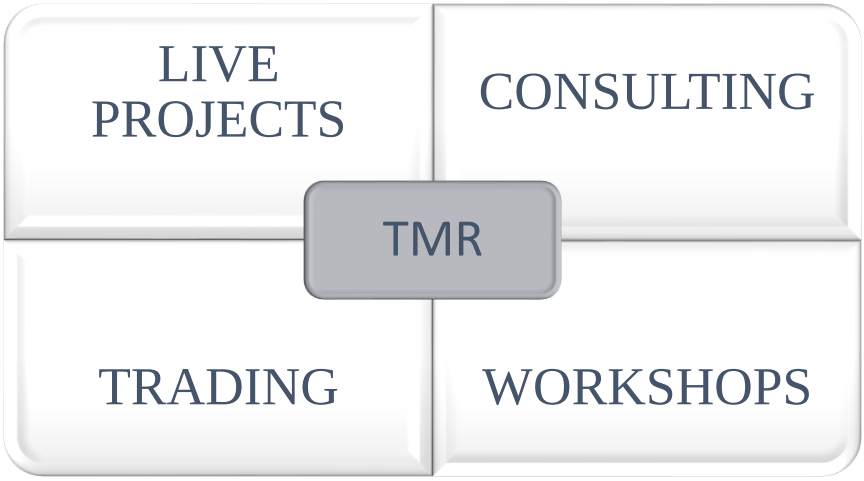
1.2 VISION

"To utilize our expertise in designing contemporary training modules for effecting wider market participation amongst the masses who have less access to the financial markets but have the inclination to do so.**"**

1.3 MISSION

"To consult and build wealth of our stakeholders by providing expertise over the whole gamut of capital market instruments, be it long term or short-term investment or trading in equity cash, futures and options, forex, commodities metals/bullion/energy."

1.4 PRODUCTS / SERVICES



The company provides the live projects through a different web portal than its official site which is TMRLive.com and to be a part of it students has to take a quarterly subscription of that portal which will cost Rs. 2500/-. Then after the subscription the students has to pass the test after completing the modules given on the portal. Within the live project we get three options i.e., equity research, derivative research and data analytics. For the data analytics project the fees is different.

1.5 BUSINESS MODEL

The company has a business model based on subscription. The customers which are generally the MBA pursuing students has to subscribe through the TMRLive.com and pay the subscription amount as per their convenience whether they want it monthly quarterly or yearly. The portal is further divided into two parts one consists of the "Finance Universe" where the students can pursue the live projects on equity research or derivative research. In the other section it gives access to the "Data Science Universe" where students can pursue the data analytics live project which consist of python language.

1.6 FINANCIAL PERFORMANCE

The TMR is not listed on any exchange and it is a partnership firm therefore a financial performance can not be measured as it is not public.

CHAPTER 2

INDUSTRY OVERVIEW

2.1 INDUSTRY INTRODUCTION

TMR comes under the eLearning industry and if we go through the report published by KPMG in 2017 then we will find that this industry has a potential to reach a $ 1.96 billion mark by 2021. The increasing rate of internet users in India is fuelling this growth. In India this sector is of $ 100 million as expected. And the new generation whose internet consumption is increasing rapidly is playing a huge role in its growth. Also, the Indian government initiatives to digitise the country is also playing a big role in this.

Different companies have different expertise and their target customers also differs. The data from KPMG is shown in the picture below: -

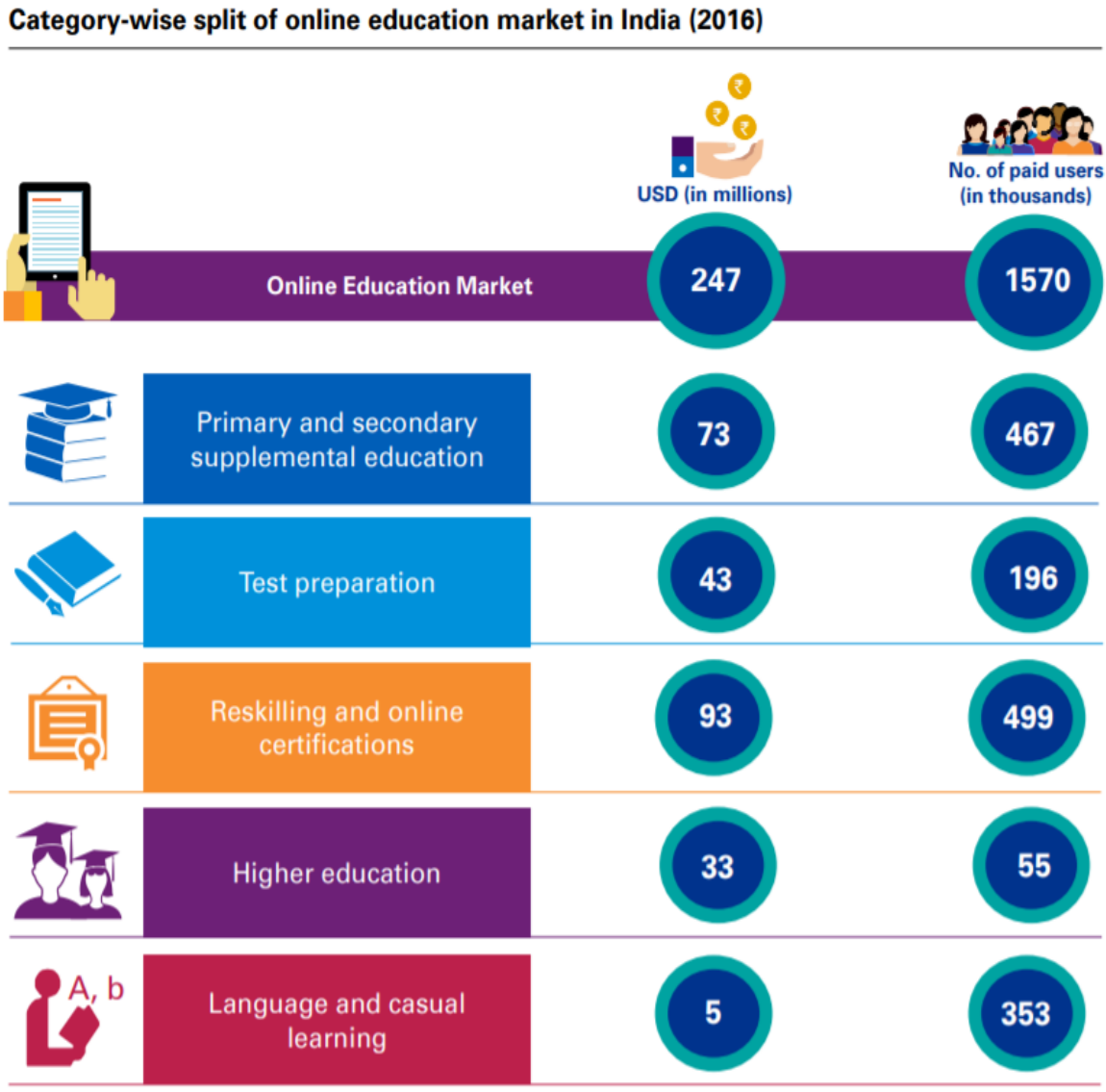


Fig 2.1.1. Category-wise split of online education market in INDIA *Source: KPMG*

2.2 INDUSTRY PLAYERS

TMR provides a specialized learning course not the generalise course. Therefore, it automatically eliminated many online learning competitors. Some of the few competitors left are: -

CHAPTER 3

GROWTH AND COMPETITION ANALYSIS

3.1 GROWTH STORY OF THE COMPANY

The company has 5 co-founders their name is listed below: -

In these years since its inception 3 of these co-founders left the company and the company is left with only 2 which are Mr. Janak Shah and Mr. Rahul Ingle. The company has started with the believe of establishing the genuine research culture in India and to continue that it has started offering the live projects. In its early days the company use to offer live projects in only one field which is equity. Later on, it has started to offer in the derivative and data science field. It also provides workshops in the institute itself.

3.2 COMPETITIVE ANALYSIS

There are mainly 2 competitors of this company which are giving a similar kind of product and targeting customer base is also same. A table given below shows the comparative performance of the company.

Parameters	*TMR*	*FinShiksha*	*Alpha Derivatives*
Content Quality	2	1	3
Content Diversity	1	2	3
Corporate Connection	2	1	3
Website Handling	2	1	3
Market Share	2	1	3

Where,

- Rank 1 = Good
- Rank 2 = Average
- Rank 3 = Bad

From the above table we can say that TMR has a long way to go and it has to improve in various parameters.

3.3 MACKINSEY 7-S FRAMEWORK ANALYSIS

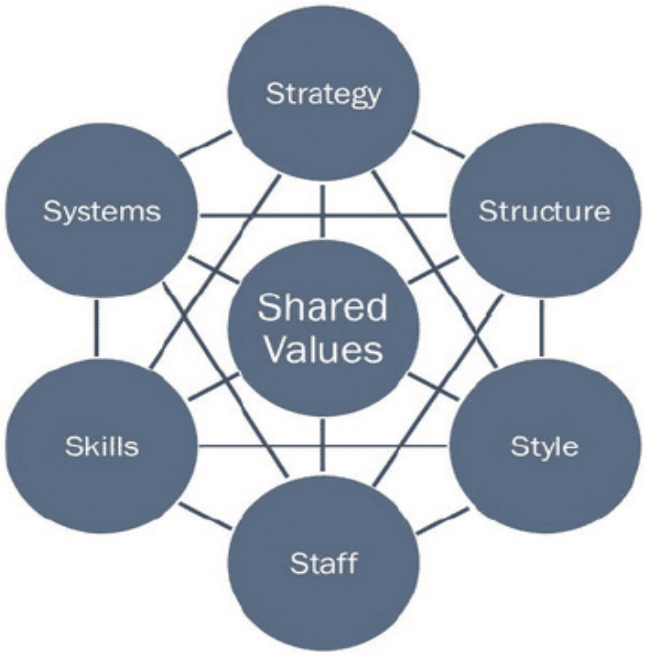


Fig 3.3.1. 7-S Framework

- Strategy: The strategy of the company is to diversify its product mix. Along with the live projects in equity and derivatives it has also started to offer the live projects for data science.
- Structure: The structure is very simple as it is operating with a very low staff force. In its structure one layer consists of its co-founders and the other is of its workers.
- Systems: For the purpose of trading the company uses the Sharekhan's platform other than that no specific system is needed.
- Shared values: The shared values in the company are trust along with appreciation for the genuine research.
- Style: The companies leadership style is participation type in which if someone has an idea then they can suggest freely.
- Staff: The company shows diversity in its staff as it inculcates of both commerce as well as engineering background employees. At the same time ¼ staff is female.
- Skills: The personnel of the organization are qualified and skilled which is leading their company to the success even in such a less time.

3.4 PORTER'S FIVE FORCES ANALYSIS

Fig 3.4.1. Porter's 5-Forces

Threat of New Entrants – High – As the main thing needed to enter in this industry is knowledge therefore it is highly likely that anyone can enter in this industry with very ease. Hence, the risk is high.

Bargaining Power of Suppliers – Low – As the business is basically driven by knowledge therefore there is not much availability or need of supplier. Hence, bargaining power of suppliers is low.

Bargaining Power of Buyers – High – As the switching cost of the buyers is very low and easy to switch. Hence, bargaining power of buyers is high.

Threats of Substitute – Low – As the product or the service given by the company is unique. Hence, the threat for substitution is low.

Competitive Rivalry – High – As there are existing firms which are giving the same services. Hence the competitive rivalry is high.

PART B

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

In today's world everyone is searching for their financial independence. This independence can be achieved when a person has enough money or have enough sources of income to live their life without doing any job and are able to pay their all expenses. So, to get that money stock market is a very good source which can give the extra income to a person for their early financial independence. There is saying that the stock market is very risky or it is a gambling and you will lose all the money and cannot be able to make a profit. But this is not true. If we do a good research and take the calculative actions then we can make a good amount of money through the stock market.

Within the stock market there are different markets such as equity market, derivative market, commodity market, currency market, etc. among these markets we will talk about the derivative market as it is the area of concern for us regarding this project. In derivative market we can earn a huge amount of money by risking a small chunk. There is a study which says that only 2% - 3% of the derivative market traders make money and other 97% traders lose money in this market. But if we look it the other way around then instead of thinking about losing if we think about the gain then the perspective will be changed. As this market is a zero-sum game where if someone is losing then other person is making the money that is if 97% people are losing the money then all that money is earned by those other 3% people in that market. This shows that the amount of money that one can make in this market.

But this is not that easy like we are discussing. For the gain in this market we have to do a thorough research about the stock and make the strategy accordingly to make the money in this market. Analysing the past data and taking the actions as per the strategy made through that can be profitable. But getting all the trades profitable is not possible. We have to make the strategy in such a way that we can make money most of the time and at the end if overall calculation is done then we should remain in profit.

We have discussed only one aspect about this market. The other aspect is the amount of money that we need to trade in this market. For example, if we are willing to trade a stock of price 500 in the market then the money required in the equity market will be Rs.500 to trade this stock but if we want

to trade the derivative of the same stock then we will need only Rs.10. This is the huge difference in the money required for the trading.

1.2 OBJECTIVES OF THE STUDY

- Collection of the data for the allotted companies.
- Organizing the data and perform certain calculations on that data to analyse it through certain methodology.
- After the analysis through the research, making the strategy for the trade.
- Testing the strategy through the model by calculating the profit at the back dates' trades.
- Making our own authentic strategy to trade for each stock.

1.3 NEED OF THE PROJECT

Now, we come to the next point which is at a dire need these days and that is the authentic and reliable research. Nowadays, there is a very shortage of a good reliable authentic research. Many of the researches that are available in the market are either biased or does not have a proper methodology. In this market everything depends on the strategy build on the research. If the research is biased or not correct then the whole strategy will get affected and instead of making profit, we will end up making losses. Hence, for being sure to make overall profit at the end of all trades we have to make sure that our research work and the analysis is correct and unbiased. For that we have to make our own research and then make the strategy accordingly.

1.4 PROJECT OVERVIEW

In the first chapter we have discussed where the project belongs to, what is its need and the objectives of the project. Later in the next chapter we have entered more into the details of the companies allotted for the project by the organization. Then we have discussed about the data and the calculations that has been done for the analysis purpose. After doing the research and analysing the data we have formed a raw strategy in the chapters post to that. Also, we have back tested that strategy for the historical data and analysed the profit.

CHAPTER 2

ALLOTED COMPANY'S BRIEF OVERVIEW

2.1 INDIAN OIL CORPORATION (IOC) LTD.

It is an oil and gas company owned by the Indian government. It's headquartered at New Delhi. It is among the Fortune India 500 companies also comes in the Fortune Global 500. It was established on June 30, 1959. It basically deals in Petroleum, Natural Gas and Petrochemicals.

2.2 MARICO

It is a leading FMCG company in India which provides its products in the area of beauty, health and wellness. It was founded on April 2, 1990 and it is headquartered at Mumbai. Its service area is all over world and few main product ranges comes under edible oil, skin care, hair nourishment, healthy food and grooming of male categories.

2.3 NCC

It is a Swedish construction company headquartered at Sweden. It was founded in the year of 1988. It is in the business of building and housing, roads, electrical, railways, irrigation, etc.

CHAPTER 3

DATA COLLECTION

3.1 TYPE OF DATA

There are two types of data was collected for each company. First was the data of the underlying asset and second was the options data of the derivative. These both data was collected for the last 10 years. The underlying asset's data gives us the opening, high, low, closing, last traded price, number of quantities traded and many other things for each working day in the last 10 years. Then the option data gives us the all the above discussed things for the derivatives.

3.2 SOURCE OF DATA

Both the above discussed data was collected from the NSE website. The underlying asset data was collected from the equity section of the NSE website and the option data was collected from the equity derivative data section. The path for the data is given below.

For the last 10 years data of the underlying the path would be: -

- Got to the NSE website (older version) -> Products - > Equities -> Security-wise price volume data.

For the options' data.

- Go to Equity Derivatives -> Historical Data -> Contract Wise Archives.

By using these paths, the data was collected for the past 10 years. Then that data was used for the analysis to make the strategy.

CHAPTER 4

DATA CALCULATION

4.1 HISTORICAL VOLATILITY (HV)

The historical volatility is the measure of the fluctuation of the stock over a time period. Through HV we look backward that is we look in the past. To calculate HV we use standard deviation method to measure the dispersion of the price of the underlying asset.

To calculate the HV first we have calculated the % change in the price from the previous day. This way we have calculated the change in the percentage of the prices for the whole data as compare to the previous date. After calculating the % change we have calculated the standard deviation. For calculating the standard deviation, we took 22 days as working days in a month. Then by applying the standard deviation formula in the Microsoft excel we have calculated the standard deviation for all the days from 23rd day onwards as first 22 days were needed for the calculation. Then we have calculated the HV by multiplying the calculated standard deviation by the square root of the working days in a year. After omitting all the holidays, we took 252 as the number of working days in a year. Then standard deviation for all the dates (starting from 23rd day of the data took under observation) was multiplied by the square root of 252. Then we got the HV of the stock. This HV is called as Annualized HV. Then the combo chart was plotted for the Annualized HV and the underlying price for all the stocks given. We also observed the HV and wrote inferences for the organization.

After calculating the HV we observed that there were some very high spikes in the HV graph. So, then we checked for the corporate actions taken by the companies and we observed that the spikes were formed when there was a bonus of the share given. Therefore, we have adjusted the price for that bonus given and again made the graph. After adjusting the price, we got the smooth graph.

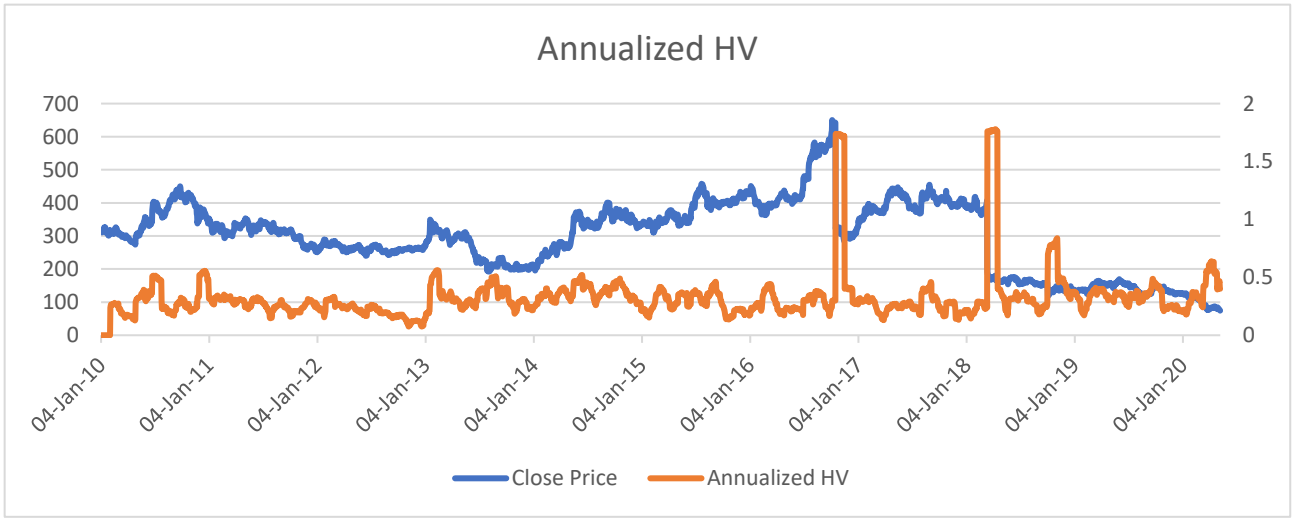


Fig 4.1.1. Annualized HV of IOC before price adjustment.

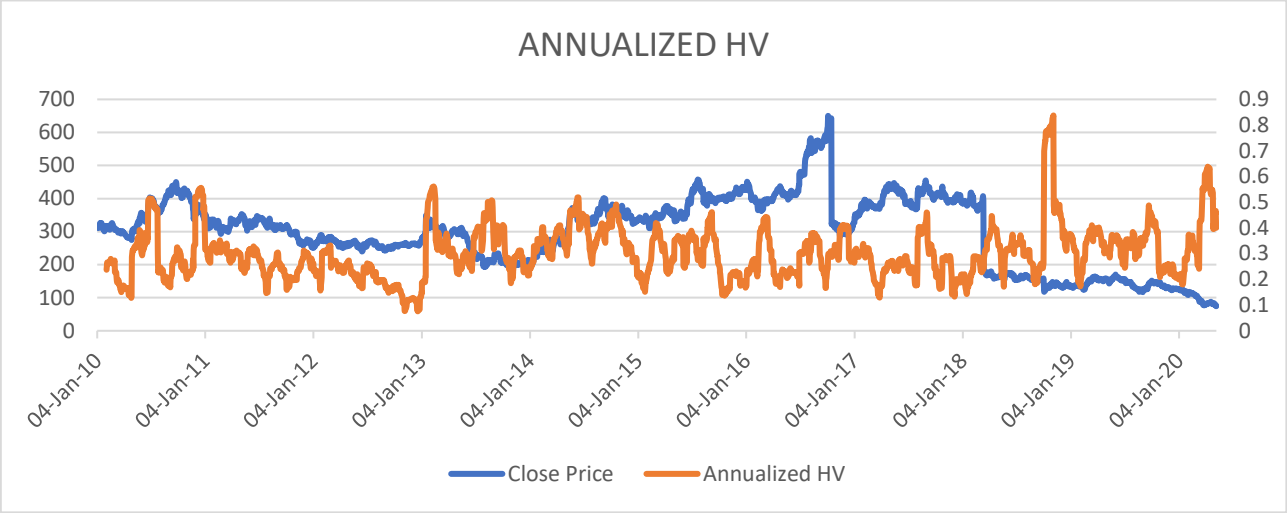


Fig 4.1.2. Annualized HV of IOC after price adjustment.

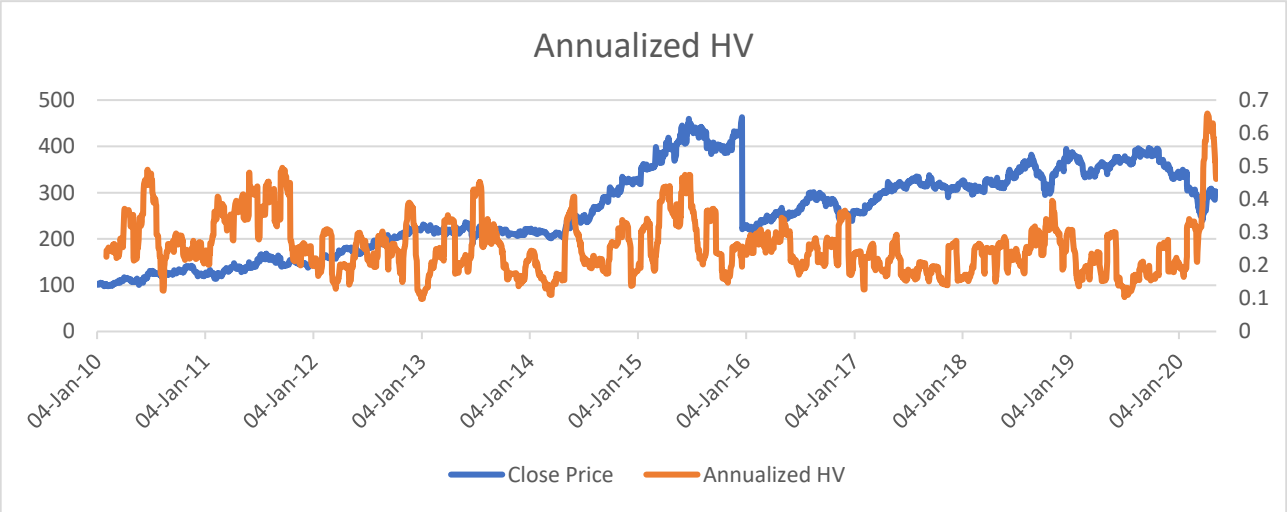


Fig 4.1.3. Annualized HV of MARICO before price adjustment.

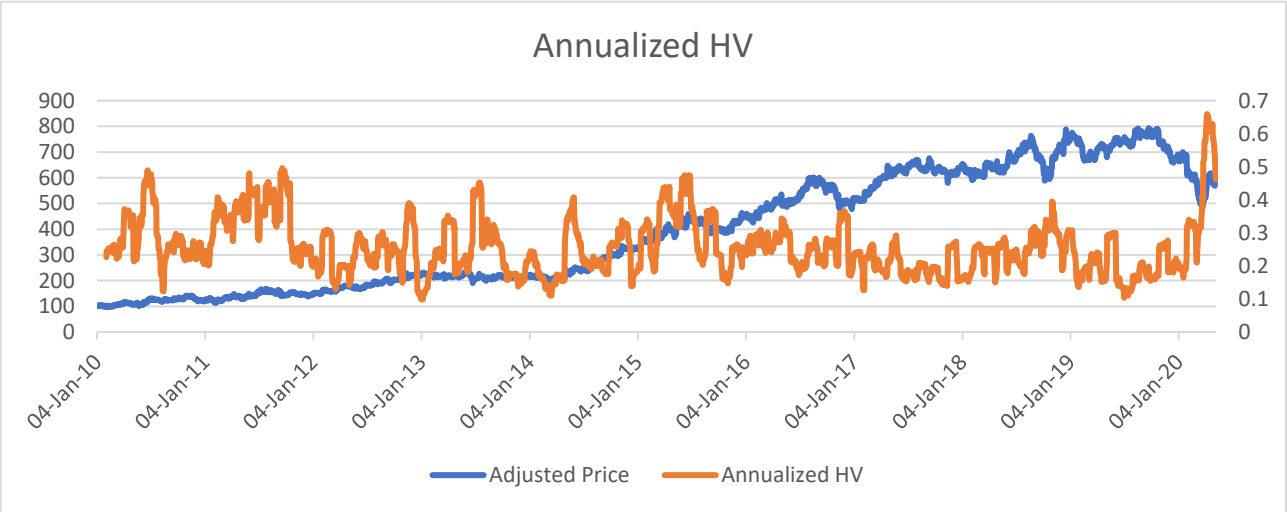


Fig 4.1.4. Annualized HV of MARICO after price adjustment.

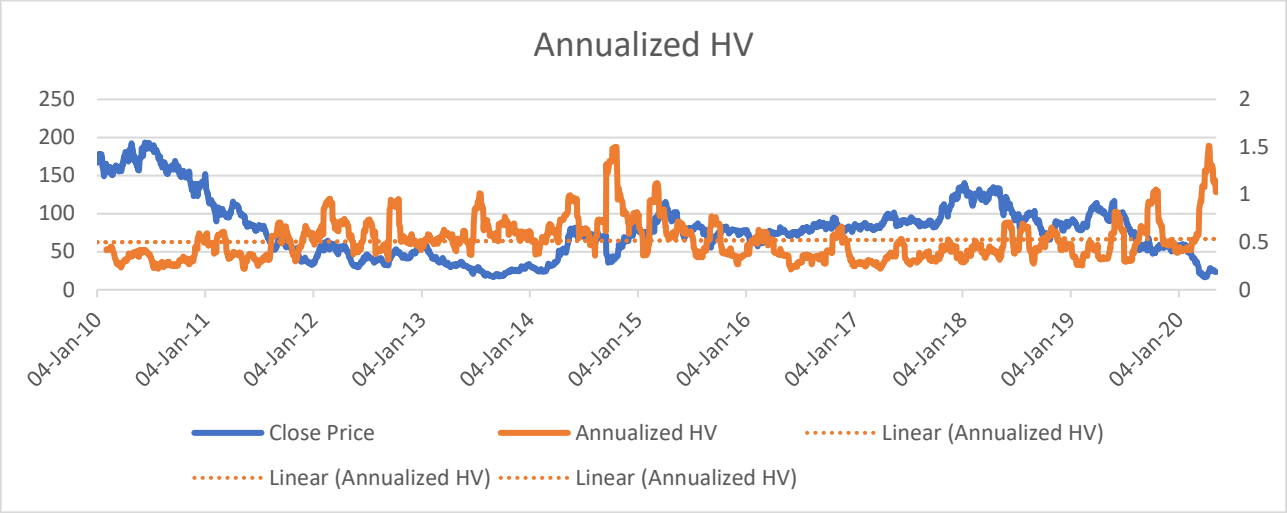
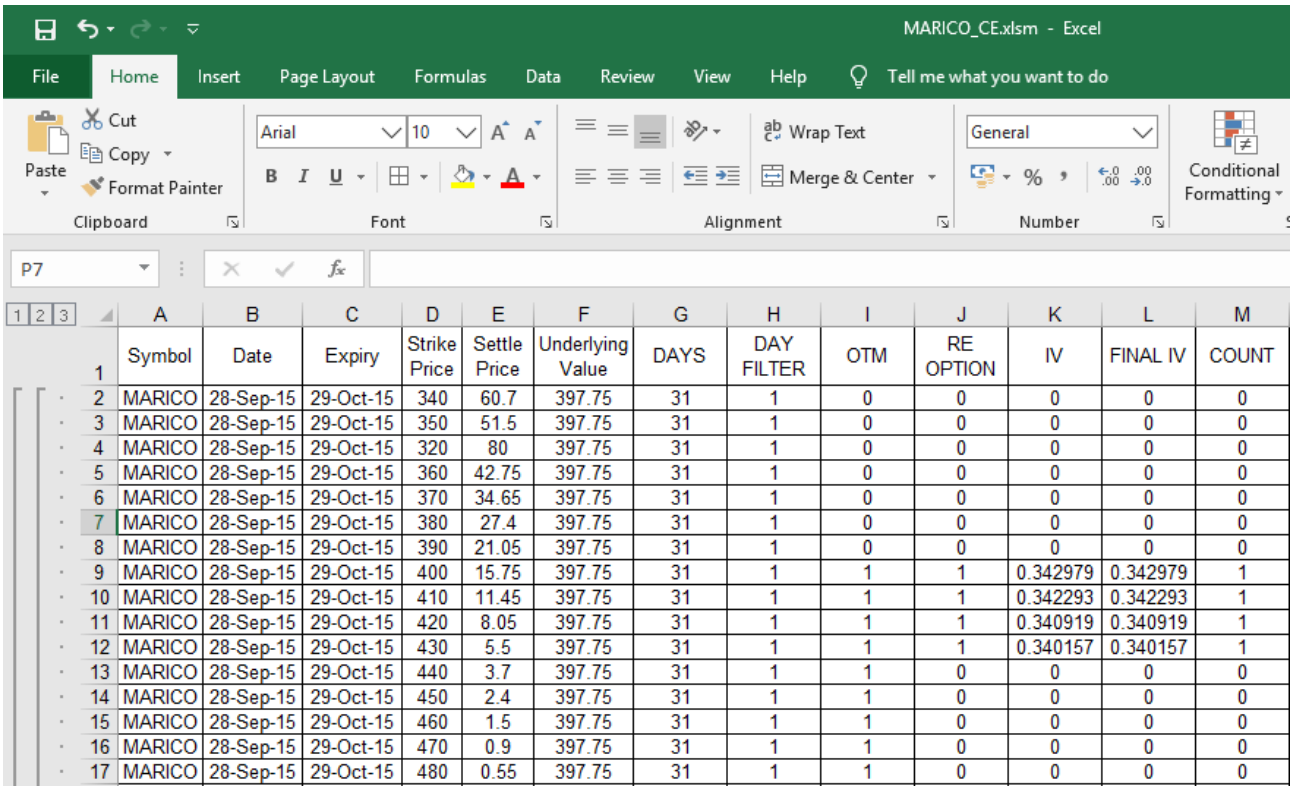


Fig 4.1.5. Annualized HV of NCC.

There was no corporate action taken by the NCC.

4.2 IMPLIED VOLATILITY (IV)

Implied volatility is the forecast of the market's likelihood of the price fluctuation in the future. Basically, it estimates the future change in the price based on certain factors. The calculation of IV is very different from the HV as we have done the calculations on the basis of the past price movement of the equity stock but in IV we have to predict the price by doing the calculations on the equity derivative's option prices for both call as well as put separately and then combine them for the final IV.



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Symbol	Date	Expiry	Strike Price	Settle Price	Underlying Value	DAYS	DAY FILTER	OTM	RE OPTION	IV	FINAL IV	COUNT
2	MARICO	28-Sep-15	29-Oct-15	340	60.7	397.75	31	1	0	0	0	0	0
3	MARICO	28-Sep-15	29-Oct-15	350	51.5	397.75	31	1	0	0	0	0	0
4	MARICO	28-Sep-15	29-Oct-15	320	80	397.75	31	1	0	0	0	0	0
5	MARICO	28-Sep-15	29-Oct-15	360	42.75	397.75	31	1	0	0	0	0	0
6	MARICO	28-Sep-15	29-Oct-15	370	34.65	397.75	31	1	0	0	0	0	0
7	MARICO	28-Sep-15	29-Oct-15	380	27.4	397.75	31	1	0	0	0	0	0
8	MARICO	28-Sep-15	29-Oct-15	390	21.05	397.75	31	1	0	0	0	0	0
9	MARICO	28-Sep-15	29-Oct-15	400	15.75	397.75	31	1	1	1	0.342979	0.342979	1
10	MARICO	28-Sep-15	29-Oct-15	410	11.45	397.75	31	1	1	1	0.342293	0.342293	1
11	MARICO	28-Sep-15	29-Oct-15	420	8.05	397.75	31	1	1	1	0.340919	0.340919	1
12	MARICO	28-Sep-15	29-Oct-15	430	5.5	397.75	31	1	1	1	0.340157	0.340157	1
13	MARICO	28-Sep-15	29-Oct-15	440	3.7	397.75	31	1	1	0	0	0	0
14	MARICO	28-Sep-15	29-Oct-15	450	2.4	397.75	31	1	1	0	0	0	0
15	MARICO	28-Sep-15	29-Oct-15	460	1.5	397.75	31	1	1	0	0	0	0
16	MARICO	28-Sep-15	29-Oct-15	470	0.9	397.75	31	1	1	0	0	0	0
17	MARICO	28-Sep-15	29-Oct-15	480	0.55	397.75	31	1	1	0	0	0	0

Fig 4.2.1. IV for MARICO CALL option.

For the calculation all the option prices data was collected and then number of days of the contract was calculated for each contract that has been traded for the last 10 years. Then only the options which are between the range of the 3 to 40 days of expirations were taken as in the last 3 days of the contract people don't trade because of the physical settlement and after 40 days it is very much uncertain to predict. After getting the desired result the separation of out-of-the-money options was done. In the OTM options we wanted the options which has moved more than 10% at the expiration. Then with the help of the implied volatility function we have calculated the IV of the options. One more thing was also calculated in the same excel which is the count i.e., the number of contracts in which we got the IV. The sample of that excel sheet is also shown in the Fig 4.2.1. It is the clipping of the excel and not the full excel.

Then for the final IV we have made a new excel and then calculated the final IV by adding the IV of call and put options for the same date and then divided that sum by the sum of the count that we have calculated for the same date for both the options. By doing this we got the final IV.

These calculations of HV and IV was done for the further help in observing and making strategies on the basis of that. What we are trying to do is to exploit the volatility by making trading strategies on the basis of the analysis and the observations made.

Earlier, the analysis was made as per the observations made on HV but as earlier stated that HV shows us past and not future so those decisions can't be made only on the basis of the past. There has to be some more parameters which can help us in taking the decisions. Therefore, IV has been introduced which gives us the future prediction of the stock's price movement. So, then HV was used in the conjunction with IV to get the more accurate predictions and through which the trader can take the trades as per the observations made from the IV-HV graph. For this the graph was plotted between the price of the stock and the difference between IV and HV.

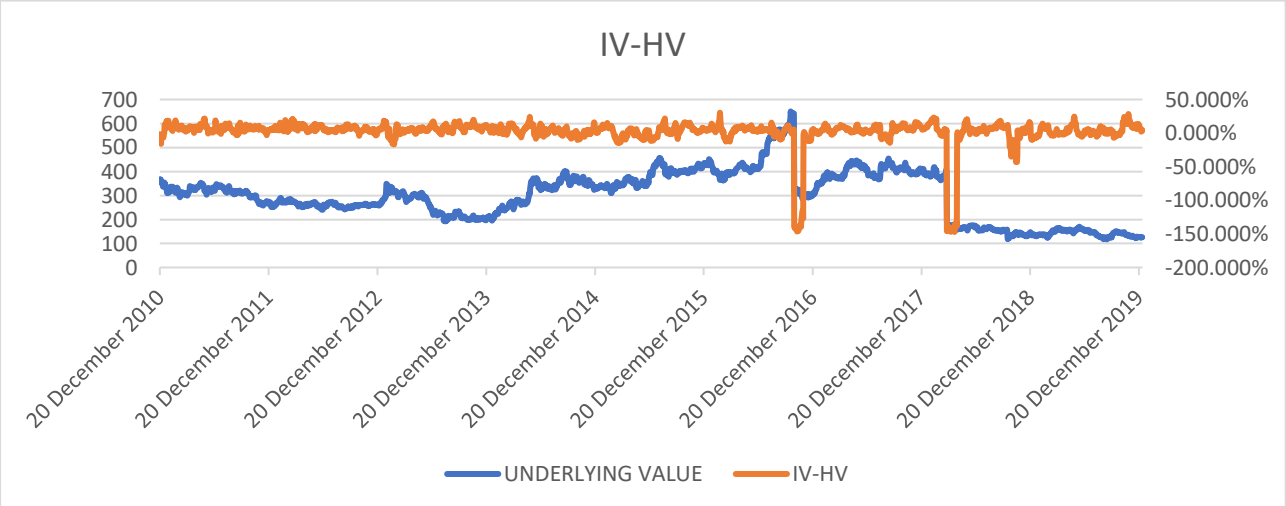


Fig 4.2.2. IV-HV graph for IOC.

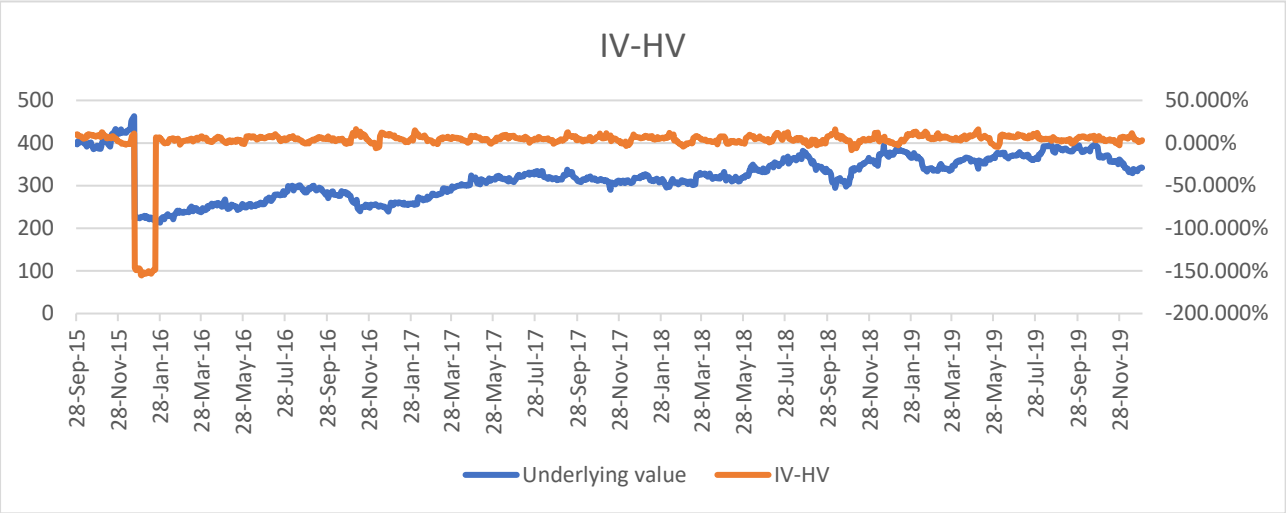


Fig 4.2.3. IV-HV graph for MARICO

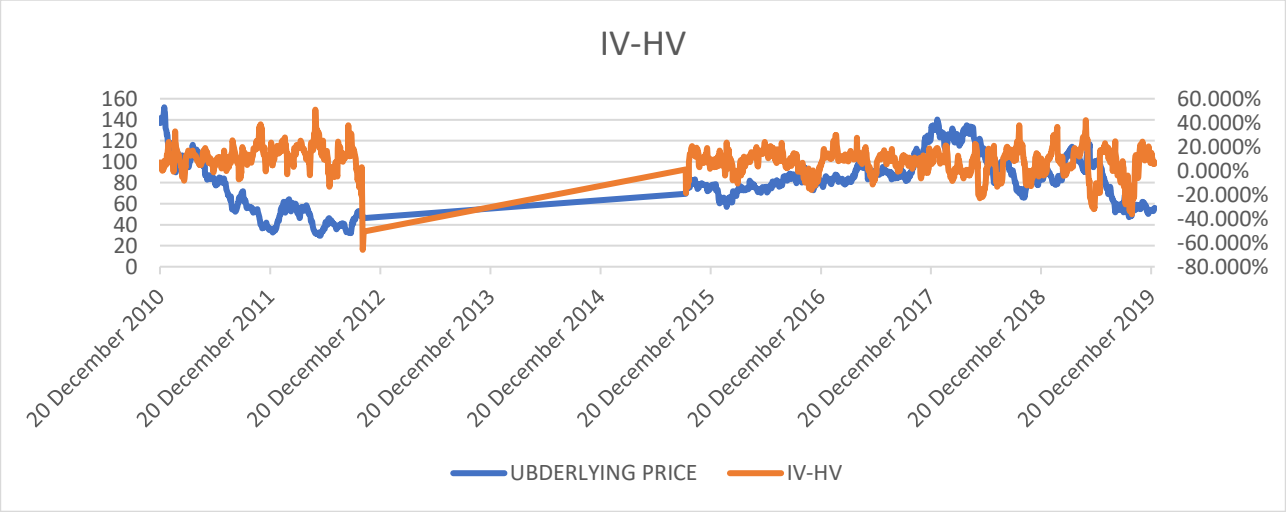


Fig 4.2.4. IV-HV graph for NCC

CHAPTER 5

OBSERVATIONS AND ANALYSIS

5.1 HISTORICAL VOLATILITY

5.1.1 OBSERVATIONS

While doing the calculations for the HV some observations has been made for each stock. Some points have been chosen and then the movement of the stock price with respect to the HV graph was observed. These observations are written down for each stock.

In IOC stock after doing the HV calculations observations are: -

- Whenever there is a sudden increase in the volatility graph the prices have fluctuated a lot.
- In January 2013 the HV was increasing slowly and the price was also increasing. From 16 January onwards HV started increasing very sharply which lead the increase in the price from 296 it went up to the 336 rupees. When volatility started falling the prices also started falling.
- From the start of October 2016, the HV start increasing and a sudden increase in the HV was observed on 18 October from 29.83% to 173.54%. at the same day prices fall from 642.3 to 321.7.
- Same thing happens in march 18 where HV increased from 23.88% to 176.13% on 15/03/2018. And the prices fall from 395.05 to 192.05.
- These high volatile markets can be used to make profit but it is difficult to say about the stock whether it will behave bullish/bearish. Only on the basis of HV.
- Shorting this stock for the long term would have been a better option as its prices fall from the last 10 years, even after some gains.

In MARICO stock the observations were: -

- In May 2010 the HV was increasing slowly. At the same time the prices started falling but when the HV suddenly started increasing in June 2010 the prices also boosted and from 107 on may starting went to 131 in July starting.
- From mid of December 2012 to mid of January 2013 the HV was not moving very much and the prices were also not moving.
- The HV was falling till 21 Dec, 2015 and suddenly increases to 179% from 19 %. On the same day the price was also fell from 463 to 221. Then the prices as well as HV stabilizes.
- On March 20, 2016 the HV started increasing and prices started falling. Then stabilizes in April,

- This stock would be good for investing as even a sudden downfall in the prices of stock, it again started gaining.

In NCC stock the observations were: -

- This stock is very volatile. Trading this stock can be highly rewarding if done correctly because it gives us a wide range of prices every time.
- As the HV curve increases the prices fell down.
- As the price of the stock fell continuously, shorting this stock for the long term would have been a better option.
- Both the line graphs moved inversely most of the time.
- The HV graph also shows that this stock might be a talk of the brokerage houses.

5.1.2 ANALYSIS

After observing each stock's HV, analysis has been made as per the trading view for the stock.

For IOC the price fluctuation was very high whenever there was a sudden increase HV. Also, the price of the stock has fallen continuously over the years therefore if the stock was shorted for the long term then it would have given a great profit to the trader.

For MARICO there was not a strong relation among the HV and stock price. But the price of the stock has increased every time after a sudden downfall. Also, many times the inverse relation was observed therefore it can be said that the trader should have sold the stock when the HV was increasing and do the vice versa in the opposite situation.

For NCC the inverse relation has been observed between the HV and the stock price. This could have been used for benefit if the stock has been sold when HV was increasing and vice versa. Also, the price of the stock has fallen over the years therefore it would have been very rewarding if this stock was shorted for the long term.

5.2 IMPLIED VOLATILITY - HISTORICAL VOLATILITY

5.2.1 OBSERVATIONS

The observations made on the basis of IV-HV are made at the two extremes. For these observations the limit was decided for both the side. Above that limit the peak point was taken under observations. Through this at both, the higher and lower extremes the observations were made. The observations were on the basis of the price movement with respect to the IV-HV graph.

In IOC stock observations are: -

At higher extreme -

- The price shoots up from 288.1 to 349.3 within the same week after Jan14, 2013. The IV-HV was moving sideways for next 3 days while the prices were increasing and after 3 days the IV-HV fall suddenly and the price shoots from there on.
- Till May 15, 2014 the prices were moving sideways but on 16th the price shoots from 308.45 to 327.6 the very next day and increases from there on while the IV-HV was dropped from 24% to 10%.
- The IV-HV was moving sideways prior to Feb 7, 2018 and then suddenly fall on the next day which result into price fall from there on. IV-HV fall from 21% to 6% and the price fall from 404.75 to 385.6.
- Prior to May 17, 2019 the IV-HV was increasing slowly till this date and then fall suddenly at the same time the price started increasing after this date. The IV-HV fall by almost 50% and the price increased by almost 5%.

At lower extreme -

- On Dec 23, 2010 the IV-HV was peaked suddenly in the negative direction. As it starts moving towards the positive axis the prices started to fall which were moving sideways earlier.
- Prior to Feb 8, 2013 the price was falling but after this date there was a drop of around 3% in the price. The IV-HV was increasing till this date and keeps on increasing for the week and then dropped suddenly.
- For the last 1 month the IV-HV was moving away from the axis in the negative side and the price was increasing. After Nov 2, 2018 the IV-HV started increasing and moving towards the axis, at the same time the price fall for few days and then moved sideways. The price fall was not big enough.

In MARICO stock the observations were: -

At higher extreme -

- IV-HV was increasing slowly and the price was decreasing slowly. On Nov 9, 2016 the IV-HV peaked and the price for the next day increased a bit but then a fall in price was seen and then the price moved sideways.
- The price was reducing through the sideways movement but the IV-HV was increasing. IV-HV peaked Feb 3, 2017 and then fall slowly. After this the falling price started increasing with a sudden jump on the next to next day.

- The IV-HV was increasing slowly and the price was also reducing slowly but on Oct 9, 2018 IV-HV peaked which can be seen in a sharp fall in the price. After this the price started increasing slowly and IV-HV started moving towards the axis.
- With the increase in IV-HV the prices were falling and as the IV-HV peaked on May 6, 2019, the sudden fall in the price can be seen. Later on, the IV-HV falls and price increases.

At lower extreme -

- Before Dec 8, 2016 the price was increasing by sideways movement but suddenly the IV-HV moved away from the axis in the negative direction and then started coming towards the positive axis with this the price was reducing continuously through sideways movement.
- On Dec 8, 2017 the IV-HV fall by around 4% from yesterday. The price increased by approx. 2 rupees. But then the IV-HV started increasing and the price started falling.
- On Aug 31, 2018 the IV-HV saw a sudden fall from the previous day and then a sudden rise on the next day. On the next day the price fall suddenly and started falling in the sideways manner.
- As the IV-HV was falling the price was increasing, after June 4, 2019 the IV-HV started increasing very quickly but price fall in a sideways manner.

In NCC stock the observations were: -

At higher extreme -

- The price was falling slowly and the IV-HV was increasing which peaked on Nov 18, 2011 and then IV-HV falls slowly and the price falls slowly afterwards.
- The IV-HV was increasing slowly and the price was falling. IV-HV increment peaked on May 18, 2012 and then fall slowly. The price increases in the sideways direction.
- With the increase in IV-HV the price was also increasing and after Feb 8, 2017 IV-HV falls and the price also falls.
- The IV-HV was increasing slowly and the price was falling. IV-HV increment peaked on Oct 8, 2018 and then fall slowly. The price increases in the sideways direction.

At lower extreme -

- A sudden drop was seen on Sep 12, 2011 in IV-HV and the price fall. Then the IV-HV started increasing and the price moved along with and started increasing.
- A sudden drop was seen on Feb 14, 2012 in IV-HV and the price increased suddenly. Then the IV-HV started increasing and the price started falling.

- Before Nov 16, 2017 IV-HV was falling for past 2 days but the price was increasing and then along with the IV-HV increment the price also started increasing.
- As the IV-HV was falling the price was increasing and when after peaking on July 27, 2018 as the IV-HV started increasing the price started falling.

5.2.2 ANALYSIS

The IV-HV was used to get a clear view on the behaviour of the stock. With this the past record is clubbed with the future prediction. Different observations have been made at different extremes by different derivatives of the stock.

In the IOC equity derivative, the inverse relation has been observed between IV-HV and stock price at the higher extreme. At the lower extreme also the same relation was observed. This can be used to leverage our trading at the extremes for the equity derivative of IOC.

In MARICO the inverse relation between IV-HV and the stock price was observed at the higher extreme. At the lower extreme the relation cannot be established as it is not giving the clear view. Therefore, for a trader the higher extreme can be used for trading but not the lower extreme.

In NCC at the higher extreme the relation was mostly inverse but in one case it was not. At the lower extreme also, no clear relation can be established as some times it is inverse relation and some time it is direct.

On the basis of these analysis some strategies have been formed for trading and those strategies were also back tested. Strategies are discussed in the next chapter.

CHAPTER 6

STRATEGIES AND ITS BACKTESTING

6.1 VOLATILITY EXTREME BASED STRATEGY

On the basis of the observations made in the previous chapter at the extremes of IV-HV, a strategy was made and the rules were defined. On the basis of those rules the trade was taken and it was tested with the past data on the back-testing sheet.

6.1.1 RULES, STRATEGY AND IT'S PAY-OUT FOR IOC

Extremes: -

- IV-HV Higher Extreme > 9%
- IV-HV Lower Extreme < -11%
- IV Lower Extreme < 29%
- IV Higher Extreme > 45%
- IV Midway = 37%

Rules: - When IV-HV is at higher extreme.

1. SHORT the options all the time with 77.78% of success rate.
2. Above higher extreme of IV strongly SHORT the options.

Strategy: -

DATE	IV	HV	SPOT PRICE	CALL	PUT	EXP SPOT	EXP CALL	EXP PUT	CH%	IV EXTREME	ACTION
19 May 2011	45.930%	24.377%	317.45	8	8	307.75	0.8	8	-3.056%	HIGHER	SELL
14 February 2012	49.610%	30.288%	273.95	7.8	9.8	283.55	2	0.05	3.504%	HIGHER	SELL
09 March 2012	48.430%	27.260%	275.9	12.25	15.25	254	0.05	23.55	-7.938%	HIGHER	SELL
06 November 2013	40.195%	20.436%	216.15	11	9.5	200.1	0.05	13.2	-7.425%	HIGHER	SELL
11 August 2015	48.600%	26.770%	418.65	16.6	16.7	409.85	0.05	10	-2.102%	HIGHER	SELL
12 February 2016	53.370%	23.002%	364.55	13.7	14.8	364.1	4	0.05	-0.123%	HIGHER	SELL
30 January 2018	45.003%	21.627%	416.25	8.6	29.75	363.2	0.05	56.2	-12.745%	HIGHER	SELL
22 May 2018	38.092%	17.083%	160.5	4.2	3.5	174.1	13.7	0.05	8.474%	MIDWAY	SELL
17 May 2019	55.852%	31.301%	149.6	6.1	6.05	161.95	11.95	0.05	8.255%	HIGHER	SELL

Rules: - When IV-HV is at lower extreme.

1. At higher or near to higher extreme of IV, SHORT the options.
2. At lower or very close to lower extreme of IV SHORT the options.
3. At above the lower extreme of IV LONG the options**.**

Strategy: -

DATE	IV	HV	SPOT PRICE	CALL	PUT	EXP SPOT	EXP CALL	EXP PUT	CH%	IV EXTREME	ACTION
13 February 2013	39.160%	56.039%	320.2	10.2	9.45	292.7	0.05	15.75	-8.588%	HIGHER	SELL
05 March 2015	26.660%	41.315%	348.7	8.85	8.15	349.55	0.05	0.65	0.244%	LOWER	SELL
16 March 2016	29.730%	42.439%	388.6	8.9	9.05	393.6	4.5	0.05	1.287%	NEAR TO LOWER	SELL
28 October 2016	27.044%	173.660%	323.5	11	6.25	293.95	0.05	27.5	-9.134%	LOWER	SELL
07 December 2016	29.052%	40.884%	303.6	7.35	9.3	322.95	15.5	0.1	6.374%	NEAR TO LOWER	SELL
05 September 2017	31.506%	45.892%	431.85	15.05	11.25	397.4	0.05	32.3	-7.977%	ABOVE LOWER	BUY
10 April 2018	30.573%	177.691%	179.3	4.15	4.2	161.15	0.05	21.25	-10.123%	ABOVE LOWER	BUY
17 October 2018	43.186%	77.972%	132.3	3.25	3.25	140.1	7.2	0.05	5.896%	HIGHER	SELL
05 November 2018	40.910%	83.756%	140.3	5.6	4.95	134.85	0.05	5.05	-3.885%	HIGHER	SELL

Strategy's Pay-out: -

Profit at Higher Extreme	**₹**	**3,44,287**
Profit at Lower Extreme	**₹**	**4,76,019**
Total Profit	**₹**	**8,20,306**

6.1.2 RULES, STRATEGY AND IT'S PAY-OUT FOR MARICO

Extremes: -

- IV-HV Higher Extreme > 11%
- IV-HV Lower Extreme < -1%
- IV Higher Extreme > 29%
- IV Lower Extreme < 23%

Rules: - When IV-HV is at higher extreme.

1. SHORT options all the time when IV-HV is at higher extreme with 83.33% of success rate.

Rules: - When IV-HV is at lower extreme.

1. When IV is at lower extreme within 1% of that lower extreme LONG the options.
2. SHORT the options if IV is not within 1% range of lower extreme.

Strategy: - On the basis of these rules the actions were taken in the similar manner as shown in the IOC strategy table.

Strategy's Pay-out: -

Profit at Higher Extreme	**₹**	**4,55,975**
Profit at Lower Extreme	**₹**	**1,63,167**
Total Profit	**₹**	**6,19,142**

6.1.3 RULES, STRATEGY AND IT'S PAY-OUT FOR NCC

Extremes: -

- IV-HV Higher Extreme > 52%
- IV-HV Lower Extreme < 11%
- IV Higher Extreme > 60%
- IV Lower Extreme < 45%

Rules: - When IV-HV is at higher extreme.

1. SHORT all the time with a 91.67% of success.

Rules: - When IV-HV is at lower extreme.

1. SHORT all the time with a 90% of the success rate.

Strategy: - On the basis of these rules the actions were taken in the similar manner as shown in the IOC strategy table.

Strategy's Pay-out: -

Profit at Higher Extreme	**₹**	**9,32,830**
Profit at Lower Extreme	**₹**	**4,74,629**

Total Profit	**₹**	**14,07,459**

6.2 STRADDLE + STRANGLE STRATEGY

This strategy was based on the assumption that price will move in the sideways direction i.e., it will not change till the expiry.

At-the-money options are those in which the strike price is same to that of the underlying price of the stock and the out-of-the-money options are those in which the strike price is more than the underlying price for call option and the strike price is less than the underlying price for put options.

This strategy was suggested by the company and I have to test it with the past year data. From here onwards the strategies were tested only on one stock as it is very time consuming and in internship it would not be possible to test the strategies for all the stocks.

Therefore, the stock chosen was MARICO.

Rules: -

1. Buy ATM (at-the-money) options and sell OTM (out-of-the-money) options.
2. Amount received from option selling should be greater than amount paid for option buying.

Strategy's Pay-out: -

Strategy's Maximum Profit	**₹**	**1,41,913**
Strategy's Maximum Loss	**₹**	**-75,122**
Total Strategic Profit	**₹**	**7,04,687**
Total Strategic Loss	**₹**	**-3,18,126**
Total Profit	**₹**	**3,86,561**

At the end an overall profit of **₹** 3,86,561 was made from the initial investment of **₹** 3,85,000. The initial investment is calculated by adding the margin required for the first trade and the maximum amount lost in subsequent trades.

6.3 JADE LIZARD STRATEGY

This strategy was based on being bullish about the market. In it OTM options were sold and call side was covered by buying a call option

Rules: -

1. Sell OTM options and cover call by buying call option.
2. Amount received from put option selling should account for more than 60% of the net money received in that strategic trade.

Strategy's Pay-out: - In this strategy the initial investment was ₹ 2,93,000.

Strategy's Maximum Profit	**₹**	**28,593**
Strategy's Maximum Loss	**₹**	**-20,186**
Total Strategic Profit	**₹**	**2,91,753**
Total Strategic Loss	**₹**	**-1,22,252**
Total Profit	**₹**	**1,69,501**

This JADE Lizard strategy was also suggested by the mentor to back-test it. After this I was asked to generate an idea for the trading strategy and make some rules for that. After some brainstorming I made a strategy on the basis of theory that was taught earlier and then analysed the data for that and made some rules for trading with that strategy. That strategy is discussed in the next section.

CHAPTER 7

RECOMMENDATION OR SUGGESTION

7.1 COVERED STRADDLE STRATEGY

This is the strategy that was suggested by me at the end of the internship for the trading purpose. The name was given by me on the basis of what I was trying to do with this strategy. The thought behind making this strategy was to be in a profit all the time and don't lose money although I knew that this safe approach towards trading will limit my profit but it is better to earn a limited profit continuously than making huge profit in one trade and lose it in the subsequent trades.

For making my own strategy I have analysed all the strategies that were taught in the modules. After analysing those I found that short straddle would be a good way to make money if the market or the underlying price remains in a particular zone at the expiry. One more thing that I have observed is that most of the time the market moves sideways. To encash that opportunity, I thought SHORT STRADDLE should always be used for the trading in derivatives market but when market crosses the breakeven of our straddle then all the hard-earned money can be lost in a single trade. The same can be seen in the Fig 7.1. So, to counter this situation I have tried a new strategy in which we will cover the straddle by buying the options. For example, I will sell Call at 100 and then at the same time to cover that I will buy Call at 110. The same thing will be done in Put option also as I will sell Put at 90 and at the same time buy put at 80. This strategy can be better understood by the Fig 7.2. that graph was made by a hypothetical example.

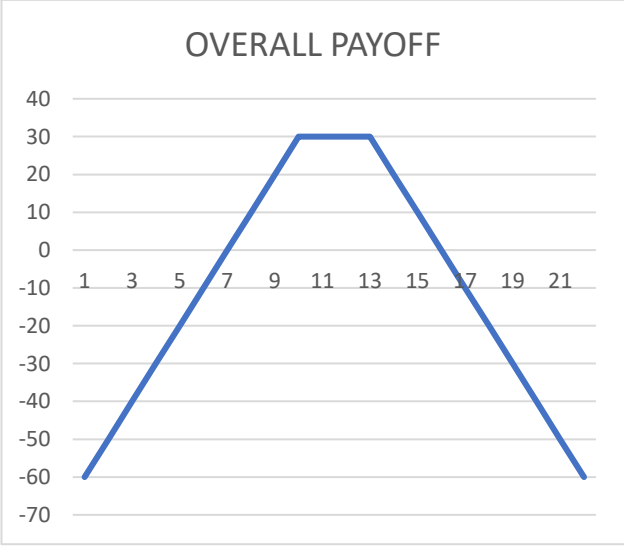


Fig 7.1.1 Straddle Strategy

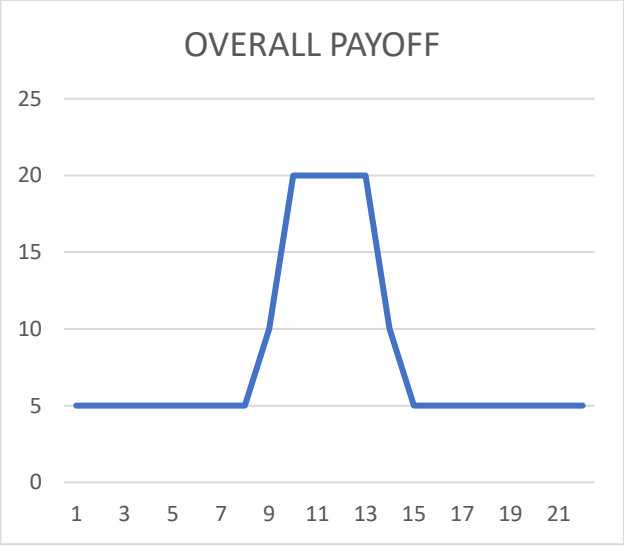


Fig 7.1.2 Covered Straddle Strategy

I tested this covered straddle strategy on a hypothetical situation and I found that I will always remain in profit if I cover the SHORT STRADDLE. Therefore, I have suggested this strategy for MARICO stock's derivative trading.

Rules: -

1. The premium we are paying should be in the range of 24% to 35% of the total premium we are receiving by selling multiple options i.e., sum of entry of options buying should be 24% to 35% of sum entry of options selling.
2. Sell OTM options near to ATM and Buy the OTM options next to the sold options.

Strategy's Pay-out: - In this strategy the initial investment was ₹ 3,77,526.

Strategy's Maximum Profit	**₹**	**45,149**
Strategy's Maximum Loss	**₹**	**-90,816**
Total Strategic Profit	**₹**	**7,35,799**
Total Strategic Loss	**₹**	**-2,18,370**
Total Profit	**₹**	**5,17,429**

7.2 COMPARISON OF ALL STRATEGIES

Comparison of all the strategies' is shown in the table below: -

STRATEGY	*INITIAL INVESTMENT*	*OVERALL PROFIT*	*RETURN ON INVESTMENT (ROI)*
Straddle + Strangle	**₹ 3,85,000**	**₹ 3,86,561**	**0.41%**
Jade Lizard	**₹ 2,93,000**	**₹ 1,69,501**	**-42.15%**
Covered Straddle	**₹ 3,77,526**	**₹ 5,17,429**	**37.06%**

This return is from the last 5-year data. As it can be seen the safe strategy that was suggested by me was giving a return of 37% and the other two strategies have not given this much return. Hence, my suggested strategy is more profitable than the other strategies and I suggest this strategy for trading in the MARICO's derivative.

PART C

LEARNINGS

During this internship I got the opportunity to learn many things like: -

1. Meaning of HV and IV in actual market terms and process of calculating IV and HV.
2. Building different forms of trading strategies. Their rules formations and back-testing.
3. Fetching the authentic data and analysing it.
4. Research tabulation methods.
5. Concept building for the trading strategies and making rules for it. Then making own strategy on the basis of that concept and back-testing it.

REFRENCES

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