Group 6 - Report

Members:

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One-and-half-month return: **+10.2%,** *Rank: 2rd*

Trade 1: Hedging an equity portfolio using market index futures

1.1 Reason for setting up the portfolio:

First of all, we chose to begin with long position since it is the most simple and intuitive way for us as new traders. Viewing the recent highly drop of the US stock market, we thought that it was not the right time to do so.

We first took a look at the /ES future. As is shown in the first picture, the price of it was showing a rising trend and started fluctuating from September 20th. We kept tracking it and we thought that it seemed to be a bottom of the price (shown in the second picture) which is a good time for us to make our long position.

S&P mini 500 Index

1.2 Stocks and futures picking:

For the TSLA and AMD stock, we have more ways to get information to choose the right time make our long position.

As TSLA is the leader in new energy auto industry, we believe it has a bright future on auto market. Its current stock price may be a little higher than its suitable value, however, it deserves an overestimated value.

As AMD is one of the biggest manufactures and merchants of integrated circuits, it recently declared a new technology on their products. Addition to the expectation of shortage in Intel's supply on microchips, the market became quite optimistic about AMD, which rose its stock price up to 2 times just in two months. And then, after its short drop along with the index price, we held our long position on it, additionally according to a little technical analysis.

We noticed that, the volatility of /NQ price had high correlation with the stocks we targeted, so we had three futures contracts on short position. Meanwhile, we let the assets value of our portfolio be close to the value of futures contract.

This portfolio would made profit as the selected stocks performed better than the market level. This means when the market goes down, our short position on the futures would cover the loss on the stock price. And when the market goes up, our selected stocks would rise more than the Nasdaq Index. Thus, no matter the market goes up or down, we will hold the big chance to make profit.

1.3 Implementation of Hedging:

As referred above, we set up our portfolio with 500 shares of TSLA and 6000 shares of AMD. Then we calculated the number of futures contracts we needed to short on in order that we could make profit no matter the market went up and down. For the calculation of contracts number, we downloaded the daily close prices of each during the past two months. In order to get rid of the influence of the quarter reports, we chose the date from 03/29 to 09/29. Then, we figured out the correlation between each stock return and Nasdaq Index futures return. Based on that, we could decide the number of contracts we should hold.

The trade price of TSLA was 262.15 per share. The trade price of AMD was 27.35 per share. The trade price of NQ was 7284.75. We used the formula below to calculate the number of futures contracts:

$$\text{The beta } \beta_i = \frac{Cov(R_i, R_F)}{Var(R_F)}$$

$$\text{Number of futures} = \sum_{i=a,b,\dots} \beta_i \times \frac{V_i}{V_F}$$

	Trade price	quantity	delta	value	Stand deviation of daily return	beta	Future number
TSLA	262.15	500	500	131,075	0.0369755	1.593	1.433
AMD	27.35	6000	6000	164,100	0.0342133	1.505	1.695
/NQ	7284.75	-3	-60	-437,085	0.0082935	1	-3
Trading record and position contents							

1.4 What happened:

However, things never go perfectly. We encountered a severe drop of 8% in AMD stocks on 27th, Oct, just 3 days before its scheduled report of the 3rd quarter. Considering that there might be some unknown information had leaked, we felt like the unanticipated large drop seemed to give us a warning.

Thus, we unloaded all AMD shares and changed the assets into Intel's shares. As the result, it seemed we made a wise decision for that AMD's profit was under the market expectation and Intel's report was kind of pretty. So, we made a great deal of profit.

And for up to one and a half months, this portfolio contributed more than 100,000 profits. It not only covered the loss we suffered from many other trades, but also brought us to the first rank of the project.

	Trade price	quantity	delta	value	Stand deviation of daily return	beta	Future number
TSLA	262.15	500	500	131,075	0.0369755	1.593	1.433
INTC	43.52	3500	3500	152,320	0.0173144	1.492	1.560
/NQ	7284.75	-3	-60	-437,085	0.0829352	1	-3

Modified trading record and position contents

TSLA

AMD

NASDAQ Futures	
INTC	

Daily close prices for each stock

1.5 what to improve:

(1) We could set up our portfolio more comprehensively and include more stocks in each kind of industry field. For example, we might choose one stock from each classified industry so that we could get a portfolio made up of 30 stocks. And more stocks meant less volatility and less risk.

(2) This trade strategy has a fatal shortcoming that if the selected stocks turn out to be weaker than the market, the hedging will lose efficiency and we will suffer loss. So it really challenges the manager's judgement on stock selection.

Trade 2: Options Straddle Strategy on JD

2.1 Reason for setting up the portfolio:

Here comes our second trade portfolio. It was 16th Nov., coming to be near the time for JD to publish its third quarter, which was due to 19th Nov. We observed that its stock price has consecutively dropped for almost half a year. Its daily return featured its high volatility in price.

We also calculated its $\beta = 1.815$ towards S&P500 Index, which indicated a high risk.

JD's stock price has dropped more than 50% just within 6 months

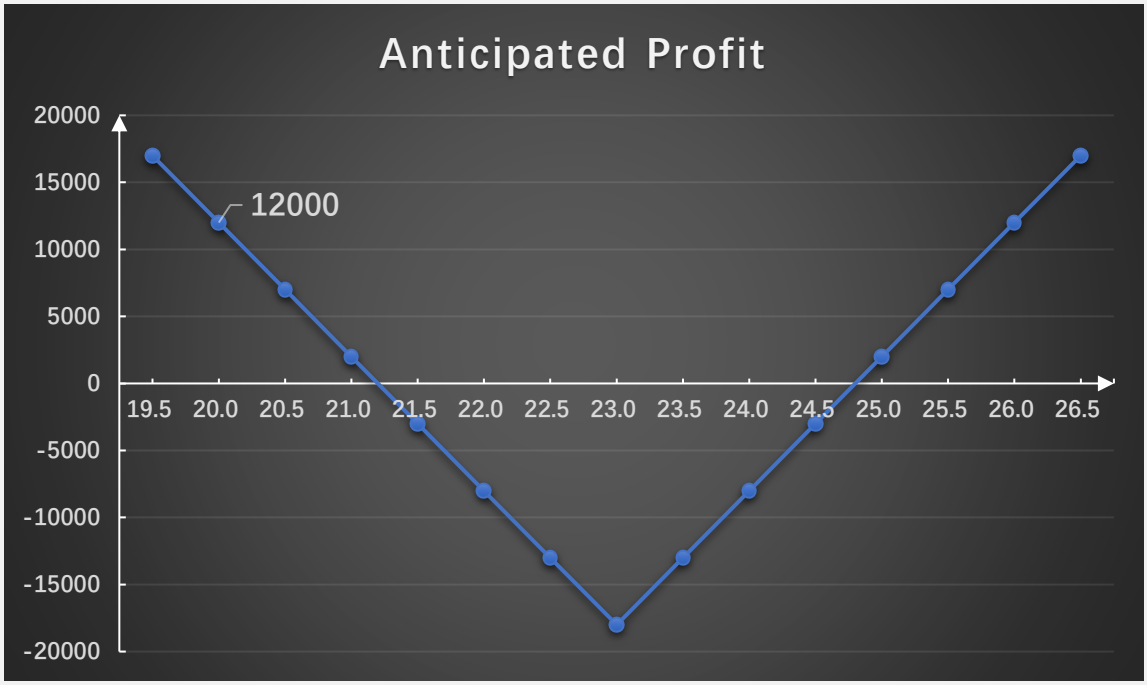
2.2 Implementation of Hedging:

Regardless of the scandal of JD's president, JD's long-term drop was mostly due to its awful data in the semiannual. So, there might be a surprise in JD's third quarter which was superior to market's expectation. In order to eliminate the risk of big loss due to the stock's volatility, and because of high uncertainty of this company, we decided to trade some options in a straddle combination.

We bought call options and put options in 100 contracts each other, underlying 10 thousand shares for both directions. And their strike prices are both 23 dollars, with the same maturity on 23rd Nov. The anticipated profit was shown below.

2.3 What happened:

The cost of each direction's option was up to 4.5% of the spot price, which meant only if JD's price went up or dropped more than 9%, compared to 23 dollars, could we make profit from this strategy. And the maximum loss of this trade could be up to 18,000 dollars if we waited for the options expired at price 23.



	number	Trade price	Strike	Spot price	Profit	Net profit
Call option	+100	1.02/share	23.00	19.510	-10,161.70	+13,498.33
Put option	+100	0.95/share	23.00		+25,660.03	

The results of the straddle strategy on JD

However, as the result, JD underwent a huge vibration after 19th Nov., and we successfully made profit from our option straddle:

We owned a big amount on this straddle

2.4 What to improve：

(1) Actually, the option straddle relies on the high vibration of the underlying stock price. This strategy usually works well during the timing of quarters' publishment. It is more like a speculation rather than a hedging strategy. However, considering time is also a precious capital, it is not bad to play as a speculator sometime.

(2) There is an obvious way to decrease the risk of this strategy. That is to buy the cheap option, which means to buy the call options with a higher strike price and put options with a lower strike price. By this means, we can control our costs within a smaller percentage.

Trade 3: Pair trading on stock hedging

3.1 The theory of portfolios:

Similar to the first strategy, we tried to hedge our long positions with short orders. What is different is that here we used a correlated stock as the hedging tool.

According to the CAPM:

$$\mathrm{E}(R_i) = R_f + \beta_i \times E(R_m - R_f)$$

Here, we set R_f as 0, thus we have:

$$\mathrm{E}(R_i) = \beta_i \times E(R_m)$$

This means we need to calculate the β_i so that we can figure out the proportion of each directions' position.

3.2 Implementation of portfolios:

We set several pairs: AZN and BMY, REGN and BLUE, INTC and NDVA. We have also considered about AMZN and FB, TSLA and GM, etc. Here is the table of our portfolio:

	Trade price	quantity	delta	value	beta	Net profit
AZN	39.40	+2,000	+2000	+78,800	1.66	-1780
BMY	51.22	-1,600	-1600	-81,952	1.37	+1728
A pair of medication companies						

	Trade price	quantity	delta	value	beta	Net profit
BLUE	132.92	+800	+800	+106,336	3.03	-11632
REGN	362.55	-500	-500	-181,275	1.57	6,630
A pair of biological companies						

	Trade price	quantity	delta	value	beta	Net profit
INTC	48.45	+2000	+2000	+96,900	1.02	-1280
NVDA	157.74	-400	-400	-63,096	1.87	-184
A pair of technical companies						

3.3 Feedbacks:

For the first pair, both these companies are medical and biological incorporations, and according to their highly similar trends in daily price, we held the same weight in their values. However, as the volatility of them were extremely large and seemed almost unpredictable, we unloaded them just after holding them a short time.

For the second pair, the BLUE underwent an extremely fluctuation which exceeded our expectation and caused our heavy loss. And we closed this portfolio to stop loss just in time.

While for the third pair, as this portfolio has just been set up for a few days, it turns out a moderate behavior.

3.4 What to improve:

(1) For the improvement, we might expand our portfolio into more pairs, and select their members more carefully. Meanwhile, the substitute for one of them should also be considered.

(2) Also, during the calculation of β_i, we improved our method:

	Trade price	quantity	delta	value	betas of daily return			beta
					In 3 months	In 6 months	In 1 year	
INTC	48.45	2000	2000	96,900	0.879251	0.987629	1.196082	1.02
NVDA	157.74	-400	-400	-63,096	1.905932	1.87736	1.82077	1.87

Modified method on calculating β_i