Sifan Du, Tong Li, Yibin Zhang, Dennis Pham, Jason He

Financial Modeling Trading Project Report

1. Stock Selection Strategies

The main strategy of our group is based on event-driven strategies combined with current news and market changes as a reference for trading. Event-driven trading strategy is a trading strategy based on the event study method. Event Study is to study whether the stock price will fluctuate when a certain event occurs in the market, and whether it will produce abnormal returns. The investment theory of event-driven strategy includes four steps: the first step is to construct an investment theme from the perspectives of macroeconomics, policies, and deterministic events.

The second step is to grasp the driving factors such as economic development trends and corporate profitability, then determine the variables with long-term development prospects and strong operability. The third step is to determine the best investment portfolio through the theme industry allocation and individual stocks in the theme industry. The fourth step is to select the appropriate time point by tracking the strength and weakness of the driving factors of the investment theme to carry out the trading operation.

Thus, we apply this theory to our transactions, and due to the incomplete validity of the financial market, the occurrence and spread of events have an impact on the stock's expectations, also influence the market's pricing of stocks. At the beginning, we select the stocks that can be used for long-term operation and investment based on the 30 stocks given by the professor. Because the position adjustment time is once a week, we cannot respond to the changes in the market every day and every time. Hence, we want to trade in a long-term holding manner. We only adjust positions when major market events and individual stock events occur. After that according to the stocks already in our portfolio, we made some appropriate operations every week.

2. Portfolio Performance

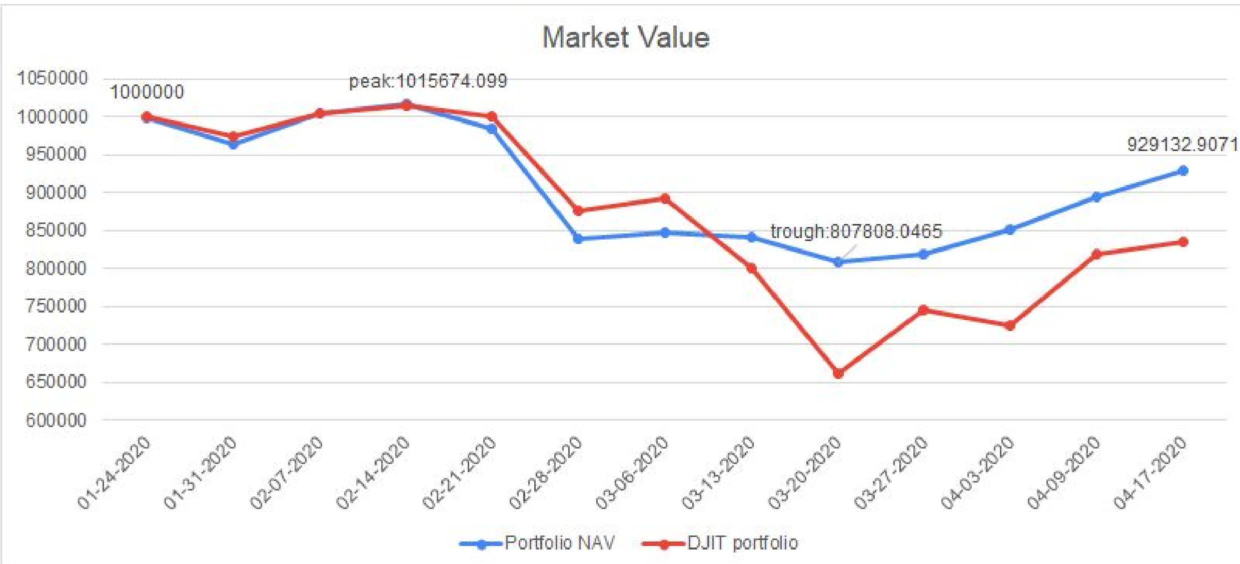
Portfolio transaction history(01/24/2020-04/17/2020)

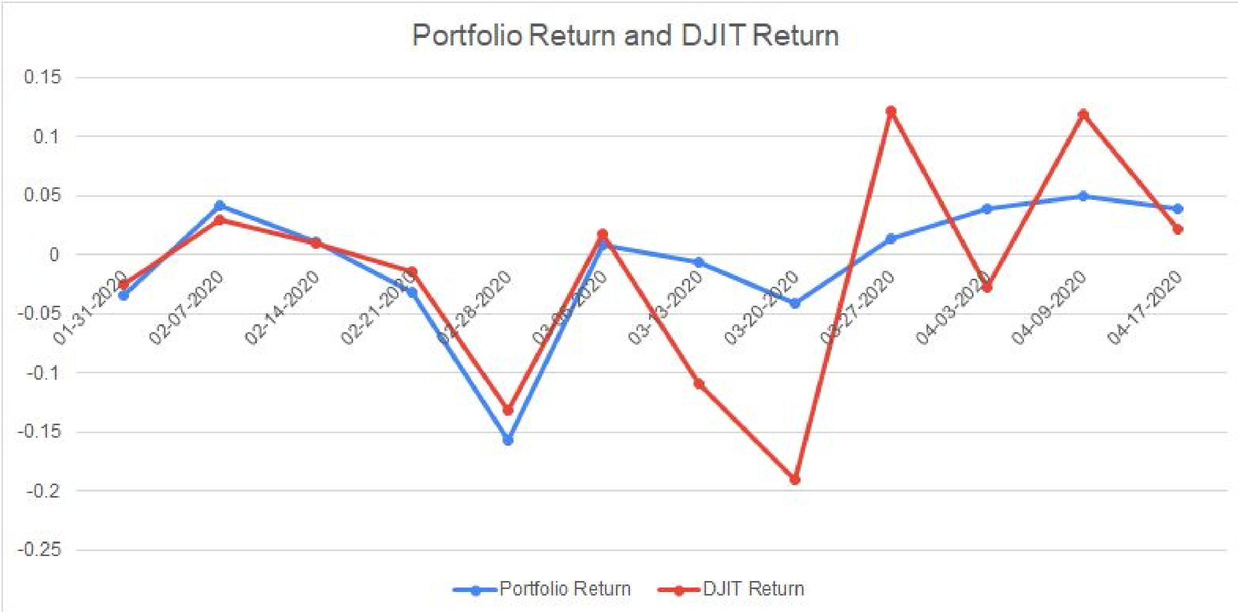
Transaction Table							
Date	Stock Symbol	Stock Name	Position	Shares	Price	Transaction Fees	Total Value
2020/1/24	AAPL	Apple Inc.	long	942	318.31	599.69604	299848.02
2020/1/24	BA	Boeing Co	long	1238	323.05	799.8718	399935.9
2020/1/24	INTC	Intel Corporation	long	4281	68.47	586.24014	293120.07
2020/1/31							
2020/2/7	MMM	3M	short	-1874	160.08	599.97984	-299989.92
2020/2/7	IBM	IBM	long	651	153.41	199.73982	99869.91
2020/2/14	MMM	3M	long	1874	161.01	603.46548	301732.74
2020/2/14	INTC	Intel Corporation	short	1500	67.27	201.81	100905
2020/2/21							
2020/2/28	AAPL	Apple Inc.	short	471	274.54	258.61668	129308.34
2020/2/28	BA	Boeing Co	short	1238	275.35	681.7666	340883.3
2020/2/28	INTC	Intel Corporation	short	2781	55.52	308.80224	154401.12
2020/2/28	IBM	IBM	short	651	130.09	169.37718	84688.59
2020/3/6							
2020/3/13							
2020/3/20	WMT	Walmart	long	1775	113.97	404.5935	202296.75
2020/3/20	VZ	Verizon	long	9800	51.8	1015.28	507640
2020/3/27							
2020/4/3							
2020/4/10							
2020/4/17							

Weekly Portfolio Performance(01/24/2020-04/17/2020)

Portfolio Performance Summary

	Portfolio NAV	Transaction fee	Porfolio NAV without Transaction fee	Portfolio Return Before Costs	Portfolio Return After Costs	DJIT index	DJIT portfolio	DJIT return
01-24-2020	998014.192	1985.80798	1000000			28989.73	1000000	
01-31-2020	964372.6959	0	964372.6959	-3.4290%	-3.4290%	28256.03	974691.0371	-2.5635%
02-07-2020	1005309.85	799.71966	1006109.57	4.2368%	4.1573%	29102.51	1003890.343	2.9518%
02-14-2020	1015674.099	805.27548	1016479.374	1.1049%	1.0257%	29398.08	1014086.023	1.0105%
02-21-2020	983240.7759	0	983240.7759	-3.2454%	-3.2454%	28992.41	1000092.447	-1.3895%
02-28-2020	840033.8307	1418.5627	841452.3934	-15.5725%	-15.7412%	25409.36	876495.2278	-13.1916%
03-06-2020	847069.1048	0	847069.1048	0.8340%	0.8340%	25864.78	892204.9291	1.7765%
03-13-2020	842070.3912	0	842070.3912	-0.5919%	-0.5919%	23185.62	799787.373	-10.9350%
03-20-2020	807808.0465	1419.8735	809227.92	-3.9783%	-4.1539%	19173.98	661405.9531	-18.9978%
03-27-2020	818384.2467	0	818384.2467	1.3008%	1.3008%	21636.78	746360.1765	12.0840%
04-03-2020	851196.6168	0	851196.6168	3.9311%	3.9311%	21052.53	726206.4876	-2.7374%
04-09-2020	894244.197	0	894244.197	4.9336%	4.9336%	23719.37	818199.0657	11.9271%
04-17-2020	929132.9071	0	929132.9071	3.8273%	3.8273%	24242.49	836244.0768	2.1815%





2.1 Before-cost basis analysis

	Return	Excess return (T-bill)	Excess return (DJIA)
Mean	-0.5540%	-0.5690%	0.9363%
Stdv	0.056671836	0.056725651	0.070506238
t-ratio	-0.338659277	-0.347498141	0.459997634
significance	not	not	not

The return, excess return over T-bill and excess return over market are not significant.

Beta		
CAPM		
	market alpha	market beta
coefficient	-0.00526903	0.017311795
Std. Err.	-0.045004062	0.254022063
p-value	0.767092541	0.862915035
significance	not	not

Fama French				
	alpha	market beta	SMB beta	HML beta
coefficient	-0.008046235	-0.010069037	-0.157606201	-0.068135046
Std. Err.	0.020431896	0.471768124	0.364829328	0.50561102
p-value	0.704011376	0.983494628	0.677148989	0.896132098
significance	not	not	not	not

All the coefficient of CAPM and Fama-French are not significant

Sharp ratio	-0.100314072
Treynor measure	-0.328699648
M2 measure	0.000727232
appraisal ratio	-0.080435254

The ratio calculation are meaningless due to the total return is negative

	Return
best weekly return	4.9336%
worst weekly return	-15.5725%
number of winning week	7
number of losing week	5
maximum consequtive losing week	2

Our worst weekly return happened from 02/21/2020 to 02/28/2020, just matching the outbreak of coronavirus.

2.2 After-cost basis analysis

After we count the transaction fee in, the result is basically the same.

	Return	Excess return (T-bill)	Excess return (DJIA)
Mean	-0.5960%	-0.6110%	0.8943%
Stdv	0.057095084	0.05714884	0.070267408
t-ratio	-0.36158639	-0.370338587	0.440892036
significance	not	not	not

The return, excess return over T-bill and excess return over market are not significant.

Beta		
CAPM		
	market alpha	market beta
coefficient	-0.005717613	-0.043835133
Std. Err.	0.017429511	0.256815816
p-value	0.749644978	0.867873956
significance	not	not

Fama French				
	alpha	market beta	SMB beta	HML beta
coefficient	-0.00861135	-0.005403526	-0.162666372	-0.074093308
Std. Err.	0.020511845	0.47832978	0.367826293	0.510588122
p-value	0.685662409	0.9912634	0.670029465	0.888210595
significance	not	not	not	not

All the coefficient of CAPM and Fama-French are not significant

Sharp ratio	-0.106907542
Treynor measure	0.139377745
M2 measure	0.000287884
appraisal ratio	-0.086705572

The ratio calculation are meaningless due to the total return is negative

	Return
best weekly return	4.9336%
worst weekly return	-15.7412%
number of winning week	7
number of losing week	5
maximum consequtive losing week	2

3. Stock Market Rewind

Overall, due to the covid-19 pandemic, we do not have a stock that has grown steadily and profitably in the whole trading period of nearly three months.

As we strictly followed our strategy, we still did well compared with the market. Next, is how we execute our strategy. First of all, because we are driven by real events, when there are no major events, we did not adjust positions frequently. We can divided the overall portfolio into three phases.

The first phase which starts from the beginning of this project until the middle of February, the whole market performed well. During this period, we targeted our stocks that were event-driven and have continuous upward momentum. As for Boeing company, we found that despite Boeing's own serious problems, its share price did not decrease significantly during those days. At the same time, we found that Boeing has adjusted its executives to fix their problems, and it is reasonable to believe that its stock price will rebound when it has already fallen at that time. If Boeing can handle its problems well, there may be a continuing upward momentum later. For these reasons, we allocated 30% for Boeing at the beginning. In fact, we have found from past experience that technology companies have performed well in almost any period of the market. For this reason, we couldn’t refuse to choose some technology stocks into our portfolio. In terms of Apple company, we found that Apple had always released new products or systems in the spring time in the past few years. If the new product is attractive enough, we believe it will push Apple’s stock up further. Therefore, we bought Apple shares in advance, hoping to make more profits. Another technology stock we had held is Intel. As we know, last year Intel released a 10-generation low-voltage version of the processor to counter AMD's processors. The mainstream notebook manufacturers on the market have also updated and released notebooks equipped with ten-generation Intel processors. This allows Intel to expand the product supply while retaining the original product line supply. At the same time, we were also expected to see Intel release the desktop version of the high-voltage ten-generation processor to increase market share. We can see for the whole first phase, our portfolio didi well.

The second phase began with the gradual spread of COVID-19 in the United States. At the beginning of this pandemic, we noticed that some of our stocks performed not well enough to hold for a longer time. Therefore, we decided to reduce some stocks, increased our holdings of other stocks to achieve diversification, and even shorted some stocks. As far as Intel is concerned, the previous performance did not meet our expectations, we decided to reduce some positions. In terms of IBM, we still believed that technology stocks will not be too affected by the pandemic, so we hold its shares. We also believed that pharmaceutical shares, especially companies like 3M which can produce personal equipment will have a big increase in this pandemic. Because of the time limit for adjusting positions, 3M stocks have skyrocketed. We decided to make short-term short orders to obtain the profit of price correction after the market overheated. However, the pandemic was unusual and the market turbulence exceeded most people's imagination, so we cleared most our positions at the beginning of the stock market crash. During this phase, we suffered our biggest loss.

Next is our third phase, as we follow an event-driven strategy, we should open a short position during this global disaster. But in the face of this unprecedented event, we cannot judge when the market has successfully bottom out. Facts show that after the market continued to fall crazily, there was also a short crazy rebound. We believe that blindly chasing short positions or open long positions may cause us to lose more. Therefore, we sold almost all the stocks within the two weeks of the overall decline in US stocks, which caused our previous earnings to turn into bubbles. Therefore, only when the market was relatively stable and the US government had introduced corresponding policies would we re-arrange our asset portfolio. Taking into account the whole country "stay-at-home" order, we noticed that some industries have made outstanding contributions during this special period. First of all, network operators provide a lot of support in all aspects of life, study and work for people.

As the largest operator in the United States, Verizon has reason to believe that it will play a huge role during the virus pandemic. After the U.S. stock market stopped falling wildly, we reopened our position to go long on Verizon. In a four-week period, Verizon showed steady growth, from 51.8 to 58.46, close to a 13% increase. Another relative industry is the whole sale or supermarket industry like Walmart. Because people can only stay at home most of the time, which greatly promotes the development of the supermarket industry. Therefore, according to the relative events of COVID-19, our strategy also achieved good returns in the third phase.

4. Strategy Improvement

For our trading portfolio it consisted of 1/24/2020 – 4/17/2020. In the first week, the economy was doing relatively well, and we took a long position in Apple Inc, Boeing, and Intel. At the end of the week we were down 3.3% of our portfolio. After the second week on 2/7/2020 we added a long position of IBM and a short position of MMM into our portfolio and our portfolio was up 4.2%.

Now during the week of 2/14/2020, news of Covid-19 as a large pandemic started to circulate around the world. At this point the stocks have not taken a dramatic decline yet, but people started to worry. We continue to hold our position the same as the previous week and still had small profit gains.

The following week was 2/21/2020, and the whole economy took a huge downward trend. The pandemic has started to infect people in the United States. The stock exchanges experienced two halts in the same week which was unprecedented and extremely rare as the last halt was during the 2008 recession. From our last week's position our portfolio took a huge loss for two weeks. In our analysis these two weeks were crucial times that we should have adjusted our strategy. Our initial strategy called for an aggressive long position and we did not adapt our strategy for extreme events. Initially we underestimated the pandemic and took our largest loss of 15%.

As the trading time frame continued on 3/6/2020, we started to think that the economy was going to go down but was worried that it might not be for too long hence we closed all of our positions besides for Apple. As Apple has always performed well we decided to keep it as potentially a large rebound would occur. The following week we invested in addition to Apple, Walmart and Verizon as these companies were bound to do well during the pandemic as these two companies are extremely important to everyone's daily lives. For the next three weeks we had returns of 1%, 4%, and 5% on the same portfolio positions.

For these weeks we have learned that we should take an adapting strategy to trade our positions. Because these weeks are when the $2 trillion stimulus package and potential cure news leaked roamed in the news. With all of this great news the market was bound to increase due to the optimistic view. Even though we were profiting these last three weeks, we should have taken a more aggressive approach in choosing to take long positions in the stocks that previously decreased the most during the pandemic as those stocks would most likely have the largest returns. All in all, we have learned that our strategy needs to be more adaptable to news related events for better trading strategies.

5. Further Strategy Revisited and Risk Analysis(Covid-19)

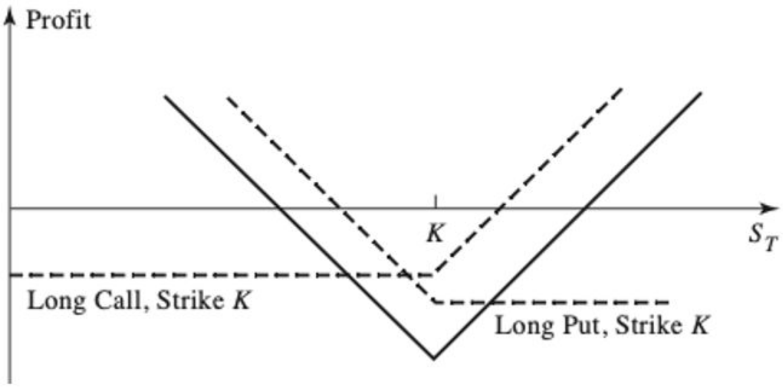
The topic we have been discussing during the whole trading period is how the coronavirus crisis will impact the financial market and how we should minimize our risk under this irregular and extreme market situation.

We come up with three possible alternative solutions to reduce our trading risk under the situation of high systematic risk and market volatility. They are our further considerations and may go beyond the scope and limitation of this trading project.

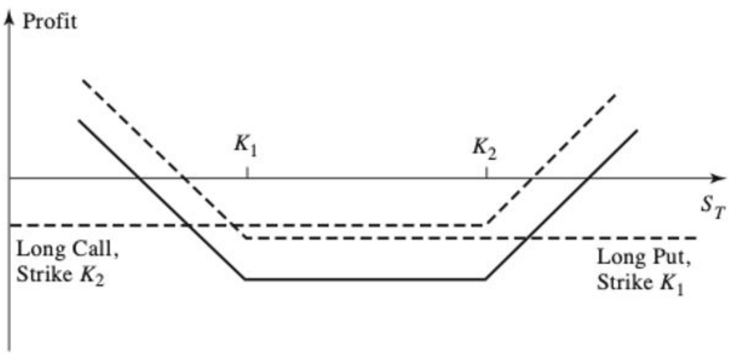
a. Non-directional Investing

When we only invest in the equity market, our profits are dependent only on the returns of assets in our portfolio. Given the current over volatile market situation, investors become very irrational, which makes the stock market irregular and returns hard to predict. We don't know what will trigger the boom in the financial market and when it will happen. However, we witnessed 4 trading curbs in 10 days. In March, there are 7 days with slides in the stock market and also 9 days with skyrocket. Those sudden falls and rises came in an unpredictable sequence which will be harmful for directional investors. Thus, we want to look for some alternative strategies.

We can add options into our portfolio to construct a straddle combination of option or a strangle combination of option. Those strategies are different from traditional trading strategies. The profits of those strategies will be determined by the volatility of the underlying assets.



Straddle



Strangle

We usd straddle combination strategy to illustrate our profit interval. We can find that it is constructed by longing both a Call option and Put option at the same strike price.

Range of stock price	*Payoff from call*	*Payoff from put*	*Total payoff*
$S_T \leqslant K$	0	$K - S_T$	$K - S_T$
$S_T > K$	$S_T - K$	0	$S_T - K$

From the range of the combination payoff, we can find that if the stock price is lower enough to make K-St-C-P greater than zero, we can make profits and if the stock price is higher enough to make St-k-C-P greater than zero, we can also make profits. By doing this, we can find that we actually want the underlying asset price to be volatile, which is the current situation market.

The strangle combination is quite similar to the straddle combination, the only difference is that the Call and Put option don’t have the same strike price. Therefore, we don’t go into too much detail for this one.

b. Equity-market Neutral Strategy

The principle behind the equity-market-neutral strategy is that our gains will be more closely linked to the difference between the best and worst performers than the overall market performance and less susceptible to the market volatility.

We can use the strategy that can help us leverage the differences in stock price by being both long and short among stocks in the same sector, industry, nation or market cap. By focusing on the sector and not the market as a whole, we can place emphasis on movement within a category. Consequently, a loss on a short position can be quickly hedged by a gain on a long one. The trick is to identify the standout and the underperforming stocks.

c. Speculation opportunity on exchange market

Except for the two above, we find some possible speculation opportunities on the foreign exchange market.

This is the USD/CNY exchange rate trajectory from 01/01/2020 to 04/21/2020. Before the burst of the coronavirus crisis in North America, the exchange rate hit the bottom. We expect that the coronavirus will have a very large impact on the economics of the United States which may cause the decrease of USD price at least in the short-term.

But why does the price of USD increase in the short-term? We think it is because of lagging effects in the market. During the coronavirus crisis, most of the real economy will stop running, which will make those debtors hard to find extra money and pay off their debts. Banks will also spot the risk and will release less liquidity into the market than usual. Those liquidity problems become the most urgent problems for most of the corporations. Thus, domestic USD becomes in high demand. Investors look at the foreign USD market and buy USD from overseas sources to pay their debts. It explains why the exchange rate is going up recently. At the proper time, we can short USD. It must fail back in the future, which will become our speculation opportunities.