

# The Double Diagonal



*There's an adage in trading that says that the best guess on where a stock or index will be tomorrow is where it is right now. Of course, we've all had experiences as traders where that has not been the case, and those big moves stand out in our minds. But how often has a stock or index traded in a range, with relatively small percentage changes after a few weeks? More often than you might think. Since the beginning of 2002, the DJIA has changed 5% or more either up or down from one expiration to the next only 30% of the time. The more volatile NASDAQ 100 Index changed 7% or more either up or down from one expiration to the next only 24% of the time.*

Armed with this knowledge, one of the positions that can be used to take advantage of this market behavior is what option traders call the double diagonal. The double diagonal generates profits without having to guess the direction of the underlying stock or index within the range, has limited risk if the stock or index breaks out of the range, and gives you flexibility in managing the position.

The double diagonal is an option spread pioneered by thinkorswim, Inc., where we used it extensively as market makers before we founded the brokerage firm. It's an option spread that has a lot of great characteristics that are appealing to not only professional traders, but retail option traders as well. The double diagonal's key

aspects are defined risk and market neutrality. The maximum risk of a double diagonal spread is known before you do the trade, and it can profit whether the stock or index moves up or down, just as long as it doesn't move too much. But it also benefits from increases in implied volatility.

The double diagonal consists of short calls and puts in one expiration month, and long calls and puts in a future expiration month. For example, using SPY, the S&P 500 ETF (exchange traded fund), trading at 115.00, a double diagonal would be short the June 111 puts and short the June 119 calls, and long the July 109 puts and long the July 121 calls for a credit of .10. That means you're actually taking

money in to do this trade and can make money if the SPY stays within the range of the short strike prices, which in this example is up or down about 3.5%. That seems to be a reasonable expectation given the historical data.

One of the best places to look for double diagonals is stocks or indices where the implied volatility of the front month short options is slightly higher, the same, or slightly lower than the implied volatility of the long back month options. In this example, the implied volatility of the SPY June options was 14.9%, while the implied volatility of the July options was 14.7%.

### What's the rationale?

The rationale for this is that when the implied volatilities across the two expiration months are relatively close, the cost of the double diagonal is relatively cheap. There is a temptation to initiate double diagonals when the front month implied volatility is much higher than the back month, which can let you establish a double diagonal at a large credit. But the heightened implied volatility usually indicates a possibility of large price movement in one direction or the other. For example, you see this in drug or biotech stocks waiting for product approval from the FDA. Depending on the ruling, the stock could move up or down sharply. So, even though the higher front month implied makes the price of the double diagonals look very attractive, they can have certain dangers that are best left to veteran traders. In fact, when implied volatilities are much higher in one expiration month than another, it's a good sign that there is some upcoming news on the stock that could make the price of the stock change a great deal in a very short time.

This is another reason why we prefer index products for double diagonals. Indices have much less volatility than individual equities do. The built-in diversification of the index reduces the impact of higher volatility in any one of the component stocks.

### Delta should be flat

One of the things you should look for when you initiate a double diagonal is a flat delta for the position. Delta is a theoretical measure of how much money your position will make or lose if the stock or index moves 1.00. Positive deltas mean the position makes money if the index moves up. Negative deltas mean the position makes money if the index moves down. If you're speculating that the stock or index will remain in a range, you don't necessarily want to have directional

## F1) Order Entry Double Diagonal



Double Diagonal spreads should be executed with one order. Buying and selling the puts and calls separately exposes the trader to too much market risk until the entire position can be opened.

(delta) risk. A delta close to zero, which you can achieve with a double diagonal if the short strikes are roughly the same distance from the current index price, means the position won't be affected that much if the index moves up or down. The delta of this SPY double diagonal has a delta of about -2.50, which means that the position will lose \$2.50 if the SPY moves up 1.00. That is close enough to zero to consider the double diagonal to have a flat delta.

Double diagonals give you a choice about how much distance you want between the long and short strikes. But you have to understand that the wider the spread between the long and short strikes, the greater the risk of the position and the higher the margin requirement. That's why if you're starting out with double diagonals, we suggest you look for options that have 1 point strikes, like the SPY, QQQQ (NASDAQ 100 Index Tracking ETF) or DIA (Dow Jones Industrial Average Diamonds Trust) options. That way, you can carefully define the maximum risk of the spread within \$100 increments, which is smaller than index options that have 5 or 10 points between the strikes.

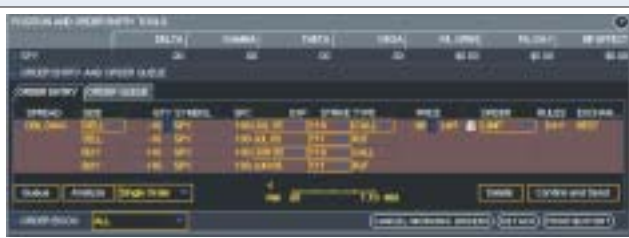
### Credit or debit

A double diagonal can be executed for a debit or credit, but we have had most success when I put them on for small debits or credits, that is, no more than a .15 debit or credit. The reason for this is that the smaller the cost of the trade, the less the risk, but it also avoids high front month volatility situations. The .10 credit for the SPY June 111/119 July 109/121 double diagonal is good because it offsets the total risk of the position and takes advantage of the inverted implied volatility between June and July.

The double diagonal should be executed as one order. Trying to execute a double diagonal leg by leg can expose you to significant market and execution risk. A few online brokers will allow you to enter double diagonals as one spread electronically. This is very helpful when trying to put on complex spreads such as these.

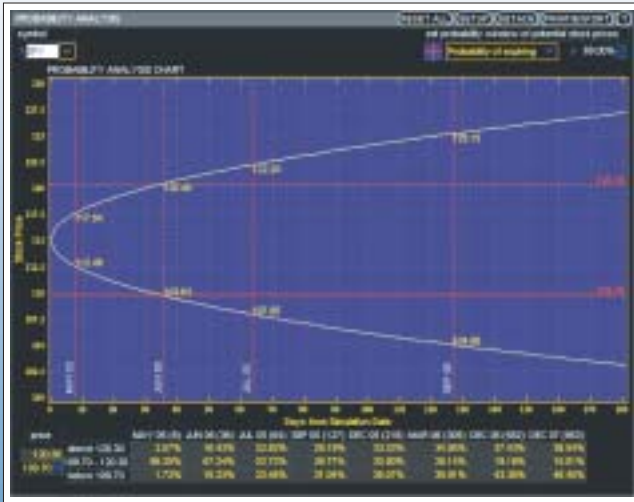
The maximum loss of a double diagonal occurs when the stock or index is either lower than the strike of the long put or higher than the strike of the long call at the expiration date of the long options. Because the index can either be below the put strike or above the call strike, and never both, the max loss is the difference between the short put and long put strikes or the short call and long call strikes plus any debit or minus any credit received for the position. In this example, the maximum risk of the SPY double diagonal is \$190, which is the difference between the strikes of \$200 minus the credit of \$10.

## F2) Order Entry Double Roll



Rolling means buying back the short front month calls and puts and selling the same strike calls and puts in the next expiration month. This generates a credit, which is the profit generated by the Double Diagonal.

### F3) Probability Analysis Double Roll



Tools to calculate the probability of an index staying within the Double Diagonal's profitability range are very useful for determining if a Double Diagonal should be opened or not. A probability of 45% to 55% that the index will remain between the Double Diagonal's short strikes is a good base value for this spread.

The amount of capital you need to put on a double diagonal is based on the maximum risk. The amount of your account's buying power used up by this SPY position is only \$190. The key to this is to find a broker that sets the margin requirement for a double diagonal on only 1-times the difference between the long and short strikes.

One of the advantages of the double diagonal is that there is the possibility to "roll" the short front month options forward and collect premium by doing so. The term "rolling" refers to buying back the short front month option and selling out the option with the same strike price in the next expiration month. For example, you can buy back the short June 111 puts and June 119 calls, and sell to open the July 111 puts and July 119 calls. Because the further dated options have more value than the near dated options, you will collect premium by doing so. How much you collect depends on where the stock is relative to the strike prices and the implied volatilities of the June and July options.

#### Rolling profits

Profits for the double diagonal come from the rolls, when you buy back the short front month options for almost nothing, say .10 or .20, and sell out the next month options at the same strike as the front month short options for more money, and generating a credit. That credit makes up the profit on the trade. The maximum profit of a double diagonal can only be estimated because the credit you receive for this roll depends on the implied volatilities of the options at the time in the future when you do the roll, which can't be known when you put on the original position.

But you can estimate the value of the roll by using an option analytical package that can calculate the values of options for future dates. What we do is estimate the value of the short June options and July options at the same strike a few days before June expiration. That

gives an indication of the net credit we might receive if we buy the short June options back and sell the same strike options in July.

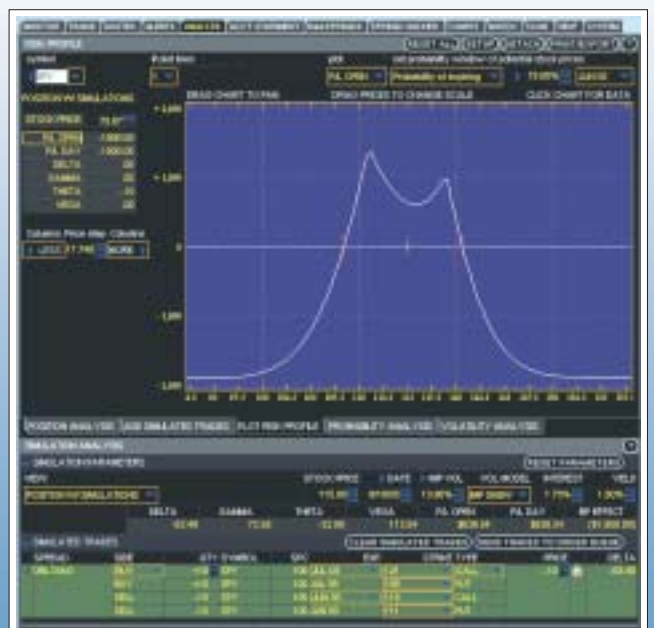
In the SPY, we would be looking to collect about \$1.20 in credit for rolling the short June 111 puts and 119 calls to July. That could vary higher or lower, depending on what the implied volatility of the July options is when we roll the short Junes. If volatility rises, that credit would increase because the options with more days to expiration (July) will be more sensitive to a change in implied volatility than the options with fewer days to expiration (June).

#### When to roll?

Typically, rolling the short front month options starts to happen in the last 10 days or so before expiration. That's when, ideally, the short front month options have the least value. Because the short front month options can be seen as a hedge against the long back month options of the double diagonal, it is wise to roll them when they have little or no hedging capacity left. Any time the short front month options are 0.00 bid, we look to roll them. That's because they can't go any lower and don't provide any hedge. But you could start to look to roll when the current value of the short option is less than 10% of the difference between the long and short strikes of the double diagonal. In the case of the June 111/119 July 109/121 double diagonal, the difference between the long and short strikes is 2.00. 10% of 2.00 is .20. So, when the short June 111 puts or 119 calls trade around .20, you could start to plan on rolling them.

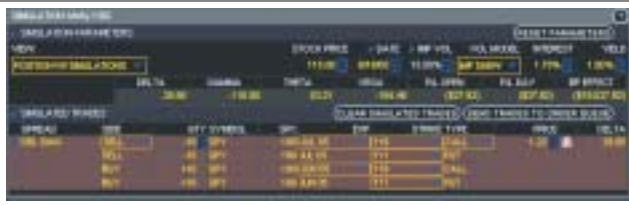
By rolling the short options to the next month, you are taking in more option premium. This does two things. First, it reduces the overall risk of the trade. By taking in the credit from the roll you offset the

### F4) Risk Profile Double Diagonal



The form of the Double Diagonal's profit/loss profile naturally shows its limited risk. The maximum loss is incurred when the index undergoes a large price swing. If the index stays between the strikes of the short calls and puts, profits are realized.

## F5) Simulation Analysis



Traders can estimate the expected credit of a roll into the next expiration month with the help of option analysis software.

potential loss if the stock or index moves outside the profitable range of the double diagonal. Second, if you roll cheap options to ones with more value, they have more capacity to hedge the long options. The reason for this is that they will drop in value if the stock or index moves away from their strike. When the long option loses money because of an adverse move in the index, the short option has to help offset that loss. It can only do that if it has some value.

### All of the sudden it becomes a bird!

Once you do that roll, the resulting position is an iron condor. In this case, the SPY June 111/119 July 109/121 double diagonal would turn into the July 109/111/119/121 iron condor. Iron condors are established for credits. If WE can do the roll for 1.20 credit, that combines with the original credit of .10 to total 1.30 credit for the resulting iron condor. Given the max risk of the position is \$190, a potential profit of \$130 is a good risk/reward ratio.

The object is to have the SPY close in between 109.70 and 120.30 at July expiration. If that happens, both short options will be worthless. Assessing the likelihood of that happening involves the current SPY price, time, and volatility. Now, some brokers have free tools that let you calculate probabilities right on their trading platforms, so you should be able to access this information easily.

But if you don't have the tools in front of you, you can do a relatively simple calculation to calculate an estimated range of stock or index prices at some point in the future.

As a rule of thumb, 38% of the time the stock or index will be between +/- .50 standard deviations. 50% of the time the stock or index will be between +/- .67 standard deviations. 68% of the time the stock or index will be between +/- 1 standard deviation. 95% of the time the stock or index will be between +/- 2 standard deviations. 99% of the time the stock or index will be between +/- 3 standard deviations.

If you want to estimate the range that would cover .5, .67, 1, 2 or 3 standard deviations, all you have to do is determine a number for future volatility of the stock or index and plug it into this simple formula:

**1 standard deviation =  
stock price \* volatility \* square root of days to expiration/365.**

To get to .5, .67, 2 or 3 standard deviations, all you have to do is multiply the result of that calculation by .5, .67, 2 or 3.

The reason you have to multiply the stock and volatility by the

square root of days to expiration divided by 365 is that implied and historical volatilities are annual numbers. The calculation converts the annual number into one that matches the time frame you're trading in.

Let's take an example. With SPY trading at 115.00, and July expiration 88 days away, and a volatility of 14.7%, what is the 1 standard deviation range for the SPY at July expiration?

$$115.00 * .147 * \text{square root } (88/365) = 8.30$$

That means that theoretically, 68% of the time, the SPY will be between up and down 8.30, or 106.70 and 123.30 by July expiration. Looking a bit further, we can multiply that 1 standard deviation number or 8.30 by .67 to calculate that 50% of the time the SPY will be between up and down 5.56, or 109.44 and 120.56. The 50% numbers are just wider than the break even points for the 109/111/119/121 iron condor that's left after the roll of the double diagonal. You can use that to estimate that there is about a 50% chance of making money on that trade.

Now, the probability numbers assume that stock and index percentage changes are normally distributed, and that your estimate of future volatility is accurate. But even if those parameters are not absolutely correct, the probability analysis can give you an indication of the likelihood of whether the trade might be successful or not.

### Bottom line

Will double diagonals give you large returns? Not necessarily. But remember that you won't get a large return without correspondingly high risk. However, the double diagonal does meet a lot of other criteria on a trading wish list: defined-risk, limited capital requirements, good risk/reward ratios with attractive probabilities of success, and the ability to generate moderate profits when there is no clear directional trend in the stock or index. When you come across a range-bound stock or index, don't ignore it and look for something with more directional potential. Consider applying the double diagonal to it and make a market neutral trade – you might be pleasantly surprised.

## Thomas Preston

Prior to joining thinkorswim as Managing Partner and Director of Quantitative Strategies, Mr. Preston held senior positions with financial technology companies and proprietary option trading firms. He holds multiple advanced degrees, including an M.B.A in Finance and Statistics from the University of Chicago.

