MY DISTRIBUTION

* Input the date/o/h/l/c/v columns for any ticker
* The cells labeled returns will auto fill to a desired date
* Returns frequency is manually updated when I made the sheet, I had to play around with the different bin sizes (intervals) so I could make the graphs to see the data. If not it’s a really peaky distribution which wasn’t much help to look at.
* The middle of those tables is something that Excel had built in under the Data Analysis tab, summary statistics. Im sure theres a better way to calculate the same thing automatically if the spreadsheet changes but honestly I haven’t played with it to try yet.
* Probability column shows the percentage historical chance of whatever the range column in the same row verbally says. I put the words to better explain how the range data worked in terms of the intervals.
* Cumulative probability is the sum chance of the returns happening, so for the second row in that returns data table it would show the percentage chance of the return over (‘X days’) being the bin label value or less. Logically it also shows the percentage chance of the returns being greater (not greater than or equal to, im writing this out again so I remember it better lol) than the bin value of the same row. Both the probability and the cumulative probability tables auto update
* The data table next to it shows the average ‘x’ day return out of all the days. Avg positive and negative return/all days is filtering out all the opposite values and calculating the average of all the values. Its very important, using those numbers lets us understand:
  + If we are thinking a stock is going up from the fundamental business view from the PMI/NMI/UMCSI/BUILDING PERMITS/EuroZone GDP view/China GDP view, using the average return lets us understand what a reasonable upside movement over time is, standard deviation paints the picture of how accurate the probability is. These auto fill, and it shows the volatility of an asset. +/-1 standard deviation to the mean return of the asset over ‘x’ days, and lets us understand that the distribution of the asset is not a normal distribution. It is a pareto distribution, and that shows that the histogram has a higher peak than a normal distribution. This also shows that the distribution of the asset is wider than a normal distribution would be, and the kurtosis value essentially means how fat the tails of our actual distribution are. Kurtosis ‘fatness’ is showing that extreme returns are more likely than would be expected in a normal distribution. This logic is the same for if we think something is going to shit, just use the numbers to understand the RISK of the stock moving up against up, and the likelihood that
  + We get the frequency of returns within certain STD DEV. values from filtering the data that we put in for any asset for the values by filtering the returns column for the respective data table. Pretty easy math, can be applied lots of ways….. for the 1d returns of the data that I first sent you “theres a 70.59% chance buying at open and selling at close that the total return (not including slippage or commissions) will be between +0.9% and -0.86%”
  + Up days is the count total of days with returns greater than 0, same logic for the down and flat days. The count total of days divided by the total number of periods that have returns values gives us the total number of days in a percentage form to see how much each return seems to happen. Taking the frequency% value and multiplying it by [average return/all days] column value gives the value for long every green, short every red. So its showing the result of taking the average [positive/negative] return and multiplying it by the frequency of actually having a [positive/negative] day. I hope I explained that good enough, I had to rewrite that a couple times.
  + The actual odds book on the farthest right side is not fully auto updating, only the buying rows are. The second group of columns inside with the longer sentences update both the buy and sell rows. Pretty straight forward. That outside group on the far right is the one with the sell rows that don’t update right now. This is because I couldn’t figure out how to have the average returns go from positive to negative, ie showing the average positive return as the average loss when we have a short position on an asset, since that would be the expected ‘risk’. So everything in the outside row will auto fill, except the profit loss average returns values in the selling row.

More on distribution theory….

* The reason that we aren’t using normal distribution for stocks is because they do not fall under the same blanket rules that normal distributions do. Normal distributions are predominant in nature, if you take the average height of people, 68.2% of the time people with be within one standard deviation of the average height, 95.4% of people are within 2 standard deviations of the mean height either above or below, and 0.02% of the population is outside the 3 standard deviation. Most physical traits across the world fall into normal distribution rules. Stocks don’t, they create pareto distributions. All we do to create distribution statistics is

[ (close price – open price) / open price ]

* That formula will tell us how much the price has moved, and it can be over whatever period that is desired. By dividing the return by the open price will allow us to determine the direction of the movement.
* We have to choose the intervals to display the returns in, something that isn’t too generic so the data isn’t displayed nicely, but keeping the overall graph to 8 or so bins seems like more than enough in terms of spreading out the intervals to see data in a good way.
* Frequency tables are simply how many returns are within each interval range, the count is the number of occurences. Descriptive statistics is another excel built in table, makes things nice and quick for us. Calculates the mean return, standard deviation, kurtosis(how fat the distribution is in terms of width), the range between low and highest return, the max and min value, and the total number of days. Skewness is important too, its another sign of a non-normal distribution. Negative skew means that negative values are more extreme than positive ones. That’s intuitive in stocks, and in people. When shit loses value, especially stocks. There is not any stock that I have found that has more extreme and frequent upside returns, if there was there would be a significant reason to choose to bet on that stock. Basically means as a whole, you can expect the stock market to lose value more violently than it will gain value. For example, financial crisis in ’08, the stock market has never gained 40% in the same time period.
* The probability column beside descriptive statistics and range, is simply the frequency of returns within a certain range divided by the total count of values for a certain range of data. Cumulative probability is the sum total of probabilities so we can easily interpret the historical odds of returns being anywhere below or above a certain bin range. So instead of knowing the odds for returns being between say -0.5% and 0%, we can easily see the odds of returns being anywhere below 0%. Taking 100% - the cumulative probability we can understand the percentage chance of returns being anywhere above 0%.
* Perhaps the most useful conclusion that the cumulative probabilities show us is the percentage value of days that returns are within the range that we are looking to bet on. This prevents us from expecting wild returns in stocks that historically have never proved to be something that we can statistically expect to happen. Realistically, we can expect to see returns that land within 1 standard deviation of the mean return over any period. Ignoring any volatility fluctuations for right now, this sheet will be telling us a reasonable target to aim for in terms of profit, and understanding what the risk of the trade is. So what we are looking to do with this…
* Number of return periods(in days) / total days:
* Ex. “78% of the time AAPL has returns within +x% and -x%”, so we should be able to use the world view that we have achieved through the PMI/NMI/Uni of Michigan Consumer Sentiment Index/US Homebuilding Permits. PMI/NMI/UMCSI show us how businesses themselves are forecasting the future. Obviously the guys who are actually on the ground scheduling the future of the business on behalf of the business, will know more about the business and how the current macro economic situation is affecting their future business outlook. If the businesses themselves are bullish on the future, you can expect to see more inventories, hiring more, new deals, new business with new clients etc. This should have us in a position that we can differentiate between better and worse performing industries and sectors within the market. Within the top performing sectors or industries, there are individual stocks that will over perform and underperform the sector or industry. Same thing for the underperforming sectors or industries. To balance out market risk, and be able to compute way more data than we could ever manually input in the same amount of time, using the statically gathered future over and underperformers [from a macro lens] we want to ignore the dead money. Avoiding dead money is simply investing with the goal of being able to find the future over and under performers, which is just avoiding situations where we manage to find the future signicant movers with returns that are more significant than the SP500 market as a whole, and achieving less of a return than the market. For example, when the market dropped in ’08, and started coming back out in ’09 the energy sector did 100% in a very short time, which sounds good, but the market did 130% in the same time. That would not be a good trade, since we would have voluntarily taken more risk through saying that the energy sector would out perform the market as a whole. The goal of asset selection is to pick what risk we are willing to take, for a realistically expected return and over what time frame. The way we create the ‘reason’ for how we got to saying that an individual business in a specific sector will out perform both the sector and industry that it is in, and the sector/industry that we chose to invest in will be moving more than the market. If not, there is nothing wrong with just buying the market as a whole, or not participating. The key is not fighting the market, take what the market is telling you in terms of where the money is coming from, and where it is going. If consumer sentiment is up, that means that everyone is more willing to spend, and since every dollar spent is a dollar earned for someone else, prices increase because income and spending has increased. The homebuilding permits is an interesting number, interesting because you can see how much ‘wealth’ US consumers as a whole are holding in housing, but the more important way for me to understand it is the willingness of the US financial industry(the banks) to lend money. Since no one buys houses for cash, we can understand how willing the banks are to loan money out. If banks are more willing to lend, people are more willing to spend since willingness to lend means that the cost of business is down. Cost of business is simply the financing rate, since about 90% of spending in the world is credit. If you can get credit more easily, and for a cheaper total price people are once again more willing to spend it.
* GDP is not a number that we can trade off of when it is released, but we can see that the correlation between the market and GDP numbers are strong. The both of them are leading indicators to eachother, which can be kind of hard to understand but I can try to lay it out. Think of it as a self fulfilling prophecy:
* GDP pretty much has to go up, for the SP500 to increase in value. Heres the thing, as GDP is increasing the SP500 is pricing it in. By the time that the GDP number is released at the end of every quarter it is already priced into the market. It is more likely that GDP is reported as being up and the SP500 is down in the same quarter, and usually that is a result of expectations being too high in the market or an external shock(9/11, flash crash on the Great Britain Pound, etc). The only way that GDP can be reported up is for the quarter to have already happened, and new business either created or shrinking, which would have already affected the price. So what the market price is right now is an indication of where people who are way smarter than us are showing us what we should be expecting for future.
* Using the PMI/NMI/UMCSI/Building permits we can understand where GDP will be going. Does the GDP % seem too high? If so, could be a chance for profit taking in the market since expectations might be unreasonable. This is where understanding volatility is key. As we watch the future volatility number begin to climb, we can shorter the time period that we are looking to trade since the standard deviation(risk) that we took on when we took the position, is not the same risk that we wanted. The single most vital thing, we can literally trade daily everyday, because theres 6000+ assets that are listed on the NYSE, something has to have volatility. If volatility is down, we have to extend the time horizon in order to let the price move enough to actually make money, and take the position with a statistical idea of where its going and how mathematically likely, with an understanding of the fundamentals of why money is better suited in this sector than anywhere else.
* Firstly, this guide and the accompanying spread sheet does not go into how dividends affect our pricing model and hence the implied volatility outputs. For this reason, in order to get an accurate representation of implied volatility, you should choose options on underlying assets that do not pay dividends. Beyond this, maturity dates should represent the timeframe in which you wish to investigate the volatility. For example, an option with one month expiry will imply volatility levels determined by the market that are forward-looking by one month. This is why I significantly prefer my FVE volatility, its more accurate that historical volatility by a lot. And you don’t need to deal with the volatility smile and inefficiencies of longer dated options in implied volatility, which leads to a ton of options that are significantly misvalued further out. This entire paragraph is explaining the implied volatility sheet, the formula is the Black-Scholes formula. Its really complicated and its not perfect. Feel free to hide the sheet and ignore it. My formula is incredibly accurate on literally any time frame, daily/weekly/monthly/quarterly
* Below is an example of a volatility “smirk” that is common throughout equities and equity indices. Note that some assets, such as currencies, have more of a “smile” – that means the options that are deeper “out of the money” (to the right hand side on this graph) would have slightly higher implied volatilities much like the “into the money options”. In short, the smile is more symmetrical.



|  |  |  |
| --- | --- | --- |
| Data Inputs: Spot Price | S | The current price of the underlying asset in the market |
| Strike Price | K | The price at which the holder of the option can buy (if it is a call option) or sell (if it is a put option) the underlying asset at upon exercise. |
| Risk-free rate | r | The risk-free rate of return. Usually taken as short term government bond yields |
| Time to maturity | T | The time (in years) until the option expires. In the spreadsheet this is calculated automatically from the number of days until expiry (see “Days”) |
| - | Expiry Date | The option’s date of expiry |
| - | Days | The number of days until expiry from today until the option expires. This is calculated automatically |

* Similarities between FVE and ImpVol:
* The initial FVE number and the Implied volatility, which should be auto populating when data is put into the sheet, get handled the exact opposite. FVE is initially shown as a daily volatility number, needs to be multiplied by the sqrt value to achieve further dated moves. Since the volatility score (the actual implied volatility score)that we have in this sheet is an annualized volatility number, we need to divide the Volatility(sigma) cell by the sqrt number to transform into shorter into the future expected moves. Implied volatility from the sheet also kind sucks because using a different strike price of the call option, which can be something as small as a different willingness to take on risk or whatever, will result in 2 people getting 2 different implied volatility measures. To me, that makes it not very useful. It also doesn’t mirror VIX movements very well, since the VIX is a weighted index, and the black-scholes formula only uses one option. Once again, if this doesn’t make sense, ignore it. FVE is the way to go.
* I guess its also useful to understand why we have the step of multiplying by the root number… so taking the volatility score and multiplying that score by sqrt(12) will give you a monthly volatility number. Multiplying volatility score by sqrt(52) would give a weekly volatility score, sqrt(4) will give quarterly volatility. Heres why the FVE is incredibly powerful….

The FVE score bounces between a pretty obvious channel, which if you create it and overlay it ontop of the VIX index, you can see loads of times where FVE is more responsive and does not get sucked into market inefficiencies. The taking the Volatility (sigma) cell value, which is the implied volatility for the future returns period that we chose, and dividing it with the square root to choose the time horizon we can return the actual percentage move from the mean. Implied volatility takes the mean return and tells us how much each asset is actually going to be moving in the next however many days. Taking the FVE score and multiplying the square root of the time horizon that we wanted starts to highlight things that are moving violently. Understanding the distribution of returns lets us say [ 78% chance of SP500 returning within 4.33% of its average return over the next 30 days. ]

May 19/19

With the PMI/NMI/UMCSI/Building Permits, use each score that are released monthly to determine whether the GDP of the USA is increasing or decreasing, and by how much. Use the PMI/NMI sheets to identify the best and worst performing sectors of the market. The amount of movement that we should be expecting should be in relation to 3 month moving averages of all of the GDP predictors. So if 3 of the 4 predictors are positive when this month’s reports are released in terms of their three month moving average, twelve months from reading those reports you should notice a period of modest growth across the market. So every month we should be continually updating previous forecasts for market price movements that we created several months back. For finding a position we need to take the entire sector, and calculate the standard deviation and mean return of every sector. Assuming we have already pieced together a world view of where we expect money to be flowing, and we understand reasonable expectations for returns and risk over any time frame, we can use the Price/Earnings Ratio to easily see what the market is paying as a premium to own the future earnings of any company. Generally, we can assume we wont know anything that the billions of people that interact with these companies every day already do, so don’t bet against it. If the market is telling you that they are willing to pay a premium to the sector compared to the market as a whole, and even more of a premium to the specific stock compared to the already ‘pricey’ sector, it means all of the analysts in the world who know way more than I do and everyone trading the stock that they are willing to buy and sell shares of this company at a premium because it is expected to be better. Low P/E Ratio doesn’t mean cheap, it means that no analysts would be willing to pay a premium for the future earnings of this company. So this means that we can look at the P/E ratio as where the market is expecting the brightest future, which should indicate that future share price will increase or decrease with it. A stock can stay at the same P/E ratio from 0$ per share all the way to infinity. So share price of XYZ is $100 Monday morning, and its trading at a P/E of 10. This is showing that the share price will be 10 times the expected earnings of the company. If Monday afternoon the XYZ company comes out and says that the $1 Earnings per share that they had anticipated is going to be missed, saying they will be targeting $0.90 Earnings per share in the following quarters, this would mean that the XYZ company maintaining the same P/E ratio of 10 would have the share price decrease from $100 to $90. 90 dollars per share/ 90 cents per share earnings is still a P/E ratio of 10. The same can happen if a stock increases earnings.

So using the top performing sectors, we should be able to look at our past hypotheses and see where we are right now. We should be able to identify the individual companies that people are paying a premium to own, as in the future it is expected that their earnings increase. An increase or decrease in P/E ratio means that people way smarter than us working directly with the companies are reporting that people are paying more or less to earn the future earnings of a company. This is what warren buffet has been talking about forever, its fundamental investing. A cheap company is a company that people wouldn’t pay a premium to own, and inexpensive company has a share price being traded right now that is below what the earnings of the company are times the P/E ratio.

P/E 10 = [$100 stock price] / [$1.00 earnings per share]

Inexpensive company(Observed Stock Price) < [ [10 P/E] \* [$1.00 earnings per share] ]

Taking the best and worst performing stocks [in terms of what we expect in the future], theres a couple of ways to begin to understand what our risk : reward will be.

* Paring up the companies that are not correlated is the goal.
* Using the information that is given to us through the P/E ratio, we can understand the multiple of the earnings that the market is willing to pay to own a share of the company
* Finding companies with higher than sector average P/E shows us the companies in the sectors right now that the market is willing to pay extra to own. Betting that the companies in the sectors that people are willing to sell the share of the companies on a discount to the market as a whole, and specifically betting against the companies that are below the sector average, will allow us to only take on the specific risk of asset selection.
* By dividing the share price of the company that we are anticipating exceptional future growth in, by the share price of the company that we expect to have share price drop in the future gives us the spread of the trade that we are putting on. This spread that we just made is the profits that we are taking. Setting the profit target and the stop loss on the spread ratio itself. What the spread means is the change in share price on a day to day basis for our spread trade. By setting our desired stop loss and target profit on the spread, we can have a simple way of exiting a trade if somehow there is massively good news about the company that we are betting against and the price moves quickly against us, or if an unforeseen tragedy affects the price of our company that we are betting on coming up. If we hit the target of profit on the trade, double the positions of both the short and long to maintain the same spread ratio. This would cause the average price per share to be roughly 150% of the new stop loss value, causing us to be trading from a position where we have an infinite net risk return ratio on the trade. The infinite risk return is caused by us doubling down on a winner, once the winner has moved into a spot where simply moving the initially set stop loss and profit target to reflect where the spread value is at now. So if our stop loss on the spread was 7%, profit target is 21%, we hit the 21% profit on the spread we would move the spread stop loss to 7% below the price that was the initial target and the target profit up to 21% above the initial target price. Doubling up our positions in this case would move our average price per share up to 110.5% the original price that we bought the stock at, which is still 2.5% below where our stop loss is now. We can lose the second trade and still be net positive on the whole thing. Always trade with a 3 to 1 profit to loss. Always double up the winners. We are trading with net no risk. If we win the first time, and the second time after we have already doubled the position size, just let the position ride to wherever it takes us. If we get stopped out of the spread, ie our stop loss of 7% below where we moved our

[ target profit : stop loss ] gets triggered, means the spread went the opposite way that we wanted it to and we automatically trade out.

* The reason we have target profits, and we don’t trade out, we put ourselves into a position where we have secured a net profit on the trade, and providing the odds are in our favour again and we are properly hedged we have changed the scenario to being no risk what so ever. We literally cannot lose money in that situation. If we find a high probability for the first trade and hit, regardless what the percentage value of the stop loss and target profit, if we have them spread out with 3:1 ( units of payoff : units of risk ) our new stop loss will be just over 2.5% above our average price per share. So if we lose the second time around, we will have still made 2.5% on the trade as a whole.
* We never ever ever double down on loses. As soon as our stop loss is hit, we exit. Period. We aren’t gambling, we’re using probability theory and math to find situations where the risk reward is in our favor. If we take those bets over and over we will inevitably make more money than the market would have made us, and we would take less risk to get there.
* Pairing up stocks between different sectors eliminates market risk, since we would expect that we would make money back on our bet against a certain company in equal amount to the amount that we would lose on the company that we are betting on. This causes us to lose net total profit, in exchange for eliminating risk. That is the goal, its how hedge funds are built and it’s the key. The goal is to hedge risk to such a degree that losing money is virtually impossible. By betting against poorly performing stocks in poorly performing sectors relative to the market and betting on the ones we are being shown are the winners, we eliminate market risk, and sector risk. Meaning we are choosing to isolate the risk of selecting the single wrong company, or that we misinterpreted somehow the PMI/NMI sheets for whos supposed to be moving. By making bets that are uncorrelated to each other, meaning the returns of the two companies are not generally the same, we can assume the net risk of the trade when we put it on is equal to the smallest return in the 1 standard deviation from the mean return. So if the bet to go up on AAPL has a standard deviation from the average return over 20d of 5% and WALMART has a standard deviation from the average return of 9% over 20d, we can assume the risk of the spread to be the worst value of the two and also that the correlation coefficient of the two assets multiplied by the spread risk is the likelihood of losing on both trades. If we bet on and against 2 companies in the same sector, the same logic applies, but we completely eliminate risk outside of risk of the 2 companies that we are betting on. Meaning that we can avoid being shocked by some random lawsuit affecting a sector as a whole, which eliminates all risk aside from the 2 companies that we chose moving in unanticipated ways. In the cross sector spread trade we take on a little bit more risk, but the spread can be significantly greater between the top performing stock in one sector to another. In the spread trade within the same sector, we eliminate sector risk that we take on in the cross sector trade by having a downside protection in the same sector as our upside bet. By eliminating that risk, we have also eliminated total market risk. What that means is when the market falls 40% in 2008, our trade doesn’t lose money because our bet against a company would win as much as our bet on a company to go up would lose.
* A strong pair for a spread trade when you chart the spread change in daily percentage terms, would show not choppy, increasing line to the right, showing how over a length of time the spread gap between the company we are betting on and the company we are betting against acts in a linear way in a consistent way. We don’t want a spread that is hopping all over the map , increasing consistently shows us that we are right in our logic of company A out performing company B , regardless of market conditions. The smoother the line, the less likely that our timing a trade causes us to get stopped out. If the spread graph is more choppy, the assets are more correlated and the probability of news that causes panic in the both of them and us getting stopped out is worse, but if we time is right we can trade the risk for greater reward. Regardless the trade, the same rules for 3:1 target profit:stop loss & moving up stop loss when our profit mark is hit apply to both of them.
* Fair Volatility (VIX) Estimate or FVE Model & Indicator is a function of:
* 1)      Realized Volatility
* 2)      Inverse Correlation
* 3)      Slope of Price Trend
* 4)      Relative Strength Index (RSI)
* 5)      Stochastic RSI
* 6)      Adjustment Weight of each Indicator
* 7)      Adjustment constant for best fit with VIX.
* Since we already have the realized volatility calculated…
* Next, we can combine the inverse correlation and slope of a price trend factors by using the Linear Regression Slope (LRS) indicator.  The LRS indicator moves above zero if the price trend over a specific time period is calculated to be rising and below zero if the price trend is calculated to be falling.  For inverse correlation, I subtract values from the FVE model when the LRS is positive and add values if the LRS is negative.  More specifically, however, instead of looking at the speed of a price trend, I believe looking at the acceleration of the price trend would be more optimal.  This can be accomplished by comparing the distance between the LRS indicator and its moving average.  Algorithmically, this is expressed by the following formula:
* **Negative of (Linear Regression Slope 11 day – simple 11-day moving average of the LRS (11)) \* Adjustment Weight**
* The current market since 2012 is that of a low volatility environment.  Therefore, given the current environment, as the S&P500 Index fluctuates above (for example) its 20-day moving average, we can expect with 50/50 probability that VIX would be around 13 (blue line).  When the S&P500 Index moves below its 20-day moving average, we can expect with 50/50 probability that VIX would be around 17 (cyan line).
* We can use moving averages to express whether VIX values are expected to be lower or higher, but the 22-day Relative Strength Index expresses this more efficiently and is easier to calculate.  Therefore, the following formula represents expected incremental changes to VIX dependent on the price trend of the S&P500 Index.
* **(100 – RSI(22))\*0.01 \* Adjustment Weight**
* The leading or wave factor tries to take into account the assumption that implied volatility level of options is a leading indicator to price volatility of the underlying instrument.  Even when the S&P500 Index is moving in a clear trend, intraday or daily prices moves up & down in wave form. VIX is not only affected by price trends but also is affected by intraday & day to day price behavior.  The Stochastic Relative Strength Index indicator moves quickly up & down with high sensitivity based on the intraday and day to day price behavior of the S&P500 Index.
* We should take caution that no price based technical indicator acts as a true leading indicator.  They are lagging indicators.  Using them would be like driving a car looking at the rear-view mirror.  However, the sensitivity of the Stochastic RSI indicator serves the purpose of anticipating possible changes to VIX quickly and in combination with other factors serves its purpose better.  The algorithm for this leading or wave factor is as follows.
* **((100 – Stochastic RSI)\*.01)\*Adjustment Weight**
* You probably have noticed the “Adjustment Weight” attached to the three factors described above.  Honestly, this Adjustment Weight is a blunt calculation to adjust the weighting of the various factors to the absolute value of volatility.  In other words, a 10% move in VIX when VIX is at 30 is twice the amount as when VIX is at 15.  Since the FVE model takes the base Volatility Factor and adds the various components of the Fear Factors, I needed to increase the value of those components as volatility rises.  The Adjustment Weight was calculated as follows:
* **1 + (75% of Realized Volatility / long-term average of VIX which is around 21.5)**
* The final component of the FVE model is the Adjustment Constant.  This Adjustment Constant was used as a value for best fit to the actual VIX values.  Yes, this is curve fitting, but if we take a look at the long-term, 6-month average of the difference between VIX and FVE model without this Adjustment Constant, we can see that the difference has been ranged from 2.0 – 7.0 most of the time.  I have used 3.2 since developing the FVE model since May 2010.  Furthermore, this Adjustment Constant is in of itself a good indicator to show structural changes to VIX.  For example, one of the reasons why the FVE model’s trading performance has been lackluster since October of 2012 could be that volatility has been aggressively sold since the ECB’s OTM policy announcement on September 6, 2012, when much of the fear of Euro’s collapse that was built into volatility markets quickly subsided.  With the Adjustment Constant untouched, FVE Model has perhaps been overvaluing VIX in recent months.  Nevertheless, this Adjustment Constant can be but should not be changed.
* <http://thirdeyemarketanalyst.blogspot.com/2013/08/fair-volatility-vix-estimate-model_20.html>

as it notes on that website, the FVE score doesn’t account for earnings dates, which the black-scholes model does. With the B-S implied volatility, you will notice that in the dates around the earnings, options will cost more. This is due to earnings generally being a time when stocks can move more violently up or down as a result of companies missing or beating earnings. Using the FVE model on the spread that we have between two assets will let us create a forcast for the spread trade in terms of how violently we can expect the spread difference to change. Since we should have a fairly strong idea on which companies are going to be beating and missing earnings pulled from our world view, we know where GDP is going, which are the good and bad sectors etc, it doesn’t affect us as much. We should be taking positions in companies that we expect to continue to beat or miss earnings, and the P/E ratio will tell us straight up which companies people are paying a premium to own the future earnings, or selling at a discount.

Hedging is the most important thing we can do. The easiest way to make money is not having to make back money that is lost. Kill losing trades fast, let winners run. This is why I wanted to build an algo, because that is the opposite of human nature and we can remove emotions completely from what we are doing.

\*\*attach Kelly criterion notes here\*\*

MARKOWITZ MEAN-VARIANCE ANALYSIS:

* Accounts for an integer [ i ] to the count of variable [ m ], for every risky asset in our desired portfolio. This means that the number of assets in our portfolio has to be an integer value, and it can be any positive whole number value.
* Analyses single period of returns, from historical data of any time frame.
* Uses average returns, as well as correlation of returns (doesn’t matter the return period window, so long as it’s the same for all assets. Since we will have multiple positions open with desirable odds over different time frames, compare the correlations and covariance of return over the most common return period for all assets. This will place less capital into shorter term trades and should let us get in early to positions, and we can later add or cut the position at a smaller capital loss and take on less portfolio risk)
* The count [ m ] -vector of optimal weighting of assets in a portfolio, which indicates the optimal fraction of portfolio wealth in each asset. The math looks like:
  + - W = (w1, …, wM) and wi = 1
* [ w ] is a variable representing ‘weight’, everything between the parentheses is simply showing that we will be able to calculate optimal weighting for every spread trade that we have identified as a possibility.
* Calculating expected portfolio return is simple, using the solver function to maximize the sharpe ratio of the portfolio. Sharpe ratio is the expected returns of the portfolio minus the risk free rate (which is easily found online, looking for the return of investing in US treasuries), all that divided by the portfolio’s standard deviation. The highest possible sharpe ratio we can attain means that we have found the maximally efficient allocation of cash, since we are able to create the best risk:return mathematically.

WHATS THE GOAL WITH MARKOWITZ MEAN-VARIANCE PORTFOLIO OPTIMIZATION?

* We begin to look at the Markowitz mean-variance optimizations AFTER we have identified and created a basket full of ideas of possible spread trade combinations, based on the direction and magnitude of the US markets and the winners and losers within the markets. The only way that we initiate a position on a trade (taking a trade idea into actually placing a bet in the market, moving the trade into “active” from our watchlist) is IF/WHEN we have a trade with low or negative correlation to all our other bets is:
  + - A) plugging the spread trade (long price/short price) into the distribution sheet will let us see what reasonable expectations for spread price change are over 1,5,20,40,60,120,200d return periods.
    - B) given the FVE (fair implied volatility calculation) and historical average returns over a period, we can see when trade ideas in our watch list have favorable expected risk:return ratios. When we have a trade idea that is showing to have expected returns exceeding the expected risk by 3 times or more, AND the addition of the spread trade to our already active portfolio of trades is able to improve our risk:return ratio, AND every return period from the distribution sheet less than the time frame that we are betting on (say we have over 3:1 risk:reward on 20d window, the 1d volume weighted average price must be above the 5d volume weighted average price, and the 5d volume weighted average price must be crossing or above the 20d VWAP).

HOW COULD YOU MAKE AN OPTIMALLY WEIGHTED PORTFOLIO EVEN BETTER?

* Only once we can manage to create portfolio’s consistently that add and remove spread trades from our watch list as they become properly timed, and through adding the trade we are able to achieve a better sharpe ratio for the portfolio, then we can begin to add leverage to the account. The most important thing with leverage, the only benefit to leveraging an account is multiplying the expected returns of the portfolio by the multiple of leverage on the account. So if we could get 100% returns, on a 4 times leveraged account would be 400%. The important part, is that just aiming for the highest return is not the goal. We need the highest sharpe ratio first, as it shows that we are being justified with the amount of returns that we expect for the amount of risk we are taking. The higher the sharpe ratio, the more comfortable we can get with adding a little bit of leverage. Adding leverage will let us increase the amount of capital that we have in our trading account, and can give us the option to diversify into other possible spread trades to get lower portfolio standard deviation as well as the option to simply increase the position sizes that we already had. This is super super important. If we are taking 20% portfolio risk leveraged 5 times, and not holding a portfolio that has expected returns SIGNIFICANTLY exceeding that, we are literally fucked.
* We can also begin to use constraints, as in the dollar amount of capital we are willing to commit to a trade as a maximum, wether we always need to be invested or if we can sit on some cash etc. This second bullet point of the reply is most likely one of the last steps for the algo, kind of like the cherry on top.

DEFINITIONS:

VWAP – VOLUME WEIGHTED AVERAGE PRICE

FVE – FAIR VOLATILITY ESTIMATE

COV – COVARIANCE

VAR – VARIANCE

MEAN – AVERAGE PRICE, ANY RETURN WINDOW

STANDARD DEVIATION – ESSENTIALLY RISK, HOW MUCH AN ASSETS’S PRICE DEVIATES FROM THE AVERAGE PRICE

P/E RATIO – PRICE TO EARNINGS RATIO, STOCK PRICE DIVIDED BY THE EARNINGS PER SHARE OF THE COMPANY, SHOWS THE PREMIUM THAT EVERYONE IN THE MARKET IS PAYING TO BUY AND SELL FOR, RELATIVE TO MARKET AVERAGE AND THE SECTOR AVERAGE. PREMIUM WILL BE PAID TO BE ABLE TO OWN A CERTAIN COMPANIES FUTURE EARNINGS IF THEY ARE GOING TO BE HOT. PEOPLE WILL SELL COMPANIES AT A DISOUNT TO THE SECTOR IF THE FUTURE EARNINGS ARE ANTICIPATED TO BE SHIT.

PMI – PURCHASING MANAGERS INDEX

NMI – NON-MANUFACTURING INDEX

UMCSI – UNIVERSITY OF MICHIGAN CONSUMER SENTIMENT INDEX

BP’S – US HOUSING SECTOR NEW BUILDING PERMITS, THIS IS MORE DEEP THAN IT SEEMS. THIS HIGHLIGHTS THE US FINANCIAL SECTOR’S WILLINGNESS TO LOAN MONEY. IT ALSO IS A GOOD METRIC TO UNDERSTAND WHAT THE LONGER TERM FUTURE CONFIDENCE OF THE US CONSUMER IS, AS BUYING A HOUSE INVOLVES A MORTGAGE. THIS IS A LEADING INDICATOR AS WELL, AND IS A BEAUTIFUL CHART LEADING UP TO THE ’08 FINANCIAL CRASH, WITH THE SAME 12 MONTH LAG FROM PUBLICATION DATE OF REPORT UNTIL THE MARKET GENERALLY REFLECTS THE CHANGE.

WHICH WAY IS THE MARKET GOING AND HOW AGGRESSIVELY?

* Use the PMI to identify which of the 16 sectors are trending positive and negative. A smart idea is to let a growth / contraction trend confirm itself for 3 months in order to be sure that something is changing. The total number (PMI report score for the month) should be treated in the same 3 score ‘moving average’. Typically after seeing 3 months in a trend, 9 months following the release of the 3rd report we should see everything released in the report reflected in the price of the market (when its trading. That’s the goal with leading indicators, we want to use the business cycle to help us get into positions with odds in our favor 9 months before we hear about how crazy a price move has been over the last year. When a news story is published, it is recapping what has already happened, we don’t want to be dealing with that. By the time its in the news, the majority of money has already been made on the stock.)
* NMI is the same as the PMI, except it is for the 18 service sectors in the United States. Same time lag, same 3 month ‘moving-average’ as the PMI.
* UMCSI is simply how the US consumer feels about the future prospects of their spending and future earning. Same 3 month ‘moving-average’ and subsequent 9 month lag to the respected change in the market.
* Bp’s are really important as an additional insight into the health of the US financial sector, this is important because people have a lot of their networth invested in their houses, as well as the vast majority of spending in the US is from the consumer, and CREDIT RUNS THE WORLD.
* Taking the (PMI + NMI + UMCSI + BP’S) % change over the 3 month moving-average give us a pretty good idea of where the next 9 months are going in the market. More aggressive moves are reflected in the market.
* Locate the winner’s and the losers from the PMI and NMI reports, find the top trending sectors in both directions. Find the average P/E ratio for all of the sectors identified, paying a premium for stocks in a sector that the market is already paying a premium to own is highlighting the companies that people are willing to overpay as the future earnings are expected to be the best. The same is true in reverse, companies with a lower P/E than the market average and lower than the worst sector’s average P/E are being willingly sold at a discount relative to everything in the market. Bet on the winners, bet against the losers. Pay the premium to own companies that have strong future earnings, its well more worth it to pay more to own Google for example than it is to buy Bing because it’s ‘cheaper’.
* The amount that consumer spending in the US contributes to US Real GDP in % terms is insane, it’s over 60%. Since US GDP is still the world’s largest, that means US consumer’s run the world. Period. They spend less, everyone hurts. Let’s talk credit. My spending is someone elses earning, and that person’s spending is another person’s income, and that continues forever. When the cost to borrow money and spend more than I earn is cheap, people are more likely to spend, and when that person spends another person earns more, etc. Then businesses start hiring more people because they forecast more spending in the future meaning whatever their business does (cyclical stocks, which means consumer discretionary spending. Things that when you’re shit broke you don’t buy, but you’d treat yourself to when times are good) will have to adjust. And this goes both ways. This happens in a short cycle where the amount of debt builds up to a point where people can’t afford to pay it back, because businesses stopped hiring and people stopped spending as much. Because spending is any payment, which is a combo of cash that you own and credit which is a promise to pay. Eventually, when people spend more than they earn, they have to spend less than they earn to pay it back. See the cycle? You can have credit anywhere, any time. Bar tabs are credit. Well CEO’s don’t get squeezed as bad as the guys at the bottom of the barrel, since spending doesn’t generally ever exceed income for them in their personal lives. Look at any economy anywhere, and you can see that cycle. And there’s a nice longer cycle that happens after about 7-10 of those mini crashes. That’s when the countries debt itself can’t be paid back then the country as a whole is in the same spot the people getting pay day loans are in. not good. Germany had it happen to them before the 2nd world war, japan went through it back a couple years. There’s more examples but it’s not a good situation. The US is due by the way, you heard it here first lol we are in trouble with any more quantitative easing. There’s no real set level for the UMCSI, but tracking where it is trending gives a pretty good idea of how much confidence the consumers have in the future spending. The more aggressive moves mean consumer money from people, you have to think about the scale from retail sales to business revenue and try to picture how much ‘money’ is going in or isn’t. This can have a pretty good % change picture of how much money each person who doesn’t have a clue how to trade is going to be throwing extra cash on popular stocks, and we should have entered a position if we were going to well before they actually start throwing cash in.
* Another really important thing, if at any point the P/E ratio of a company in our trade watchlist (long) or in an active long trade position, we must exit the position, including the short half of the spread immediately. The only exception is if the company raises its expected future P/E ratio. This should be pretty obvious, if a company says it expects future earning to be lower than they currently are, and we want the share price to go up we are going to be homeless very quickly. This will make us very wealthy on the other hand if we wanted the stock to go down, and if we were already short the stock hold the position. If we are long an asset, we want the future earnings to be higher than the current earnings. So the P/E ratio goes up, for the stocks with the highest valued future earnings to be reflected in the stock price, higher future earnings means stock price is going up. The premium that people are willing to buy the stock for, regardless how insane it might look, is what the price is being traded at. Don’t argue with the market, the US consumer will eat you up. Low P/E doesn’t mean all the time that the future earnings are for sure horrible, but it does show that the market has places where money would better be put to use (in terms of wanting something to go up a lot). Low P/E in relative terms to another asset, or to a sector, or to the market itself does mean that the price will fall, and combining low and falling P/E assets with high and climbing P/E assets gives us a pretty good chance to collect the spread between the asset prices. Hence the name of the spread trade. We can reduce risk by assuming if the market as whole just plummets, the combination of the short asset price dropping as much as the long asset price (determined by correlation). Since the difference between the close prices might drop by say $15 per share, to both the long asset and the short asset, the ratio that we get from the ( long stock price / short stock price ) shouldn’t be affected as bad and we won’t lose all the money we would have if we weren’t hedged with the short position.
* Tldr;
* We are buying/selling the future expected earnings of companies
* Buy better future earnings
* Sell worse future earnings
* market’s earning more, price goes up
* market’s earning less, price goes down
* correlation shows how similar the past of anything behaves
* the stock price you see on a chart right now, like literally pull up any chart, has been in process to get to there for a while. We have all the tools to ‘detective’ look-back and paint a picture of how something behaves, what’s normal and therefore what can be reasonably expected.
* Our job is to use all 4 leading indicators to have the chart we are looking at right now, laid out 12 months ago, so we made money all the way up to here.
* Pay the premium the market is willing to pay, we aren’t smarter than them. If something seems irrational, like the tech bubble IPO P/E ratios realize there are several million shares being transacted at that price. You are irrational if you argue the P/E ratio, you’re arguing millions of people, trying to say you know something they don’t. Consider also that the majority of trades that happen, are the banks………….. read that until it sticks. The dumbasses on the news saying this companies P/E is dropping so it’s cheap are lying. The stock never does well following that. Ever
* Combine historical average returns, and standard deviations with the FVE to account for current market conditions to understand reasonable expectation for risk and reward.
* No point exiting a trade when we are up, so long as the 3-1 rule was followed. Move the P/L up to reflect the current stock price, using the same boundaries. Don’t adjust the stop loss or profit with the FVE score combined, use the original stop loss and target profit gap. We mathematically cannot net lose on the trade at this point when we double the position size, so why not. Only double the position size once.
* Enter a spread trade when the long asset is showing promise. We are assuming that we have identified a time horizon on the created hypothetical spread trade that shows nice odds over a certain time period. A smart time to enter the spread trade is when the same time period for the long asset is showing favorable odds on its own. If the Long asset is showing odds greater than 3-1, the short asset is showing odds greater than 3-1 and the spread is showing odds greater than 3-1 on expected returns over the same time period enter the trade and we are golden.
* Create scenarios where all spread bets are not correlated to each other. Ill make an optimal portfolio weighting spreadsheet, that will determine how much each pairs trade get in terms of portfolio wealth. We can optimize to maximize portfolio sharpe ratio. We win.