PEARCE FINANCIAL, LLC
755 GRAND BOULEVARD #B105-200
DESTIN, FL 32550
PEARCEFINANCIAL.COM
800-678-8030

August 12, 2008

"Trading The World"

RISK MANAGEMENT: HOW (NOT) TO BLOW UP LIKE A ROGUE TRADER OR MELTDOWN LIKE A HEDGE FUND

INTRODUCTION

In today's current investment era, terms like 'modern portfolio theory', 'diversification', and 'risk management' are thrown around by most professionals. But how is it that quite regularly over the last few decades there still seems to be spectacular hedge fund blow-ups, investment house collapses, and bank failures? Perhaps the professionals are not heeding their own advice? Worse yet, maybe the advice being doled out is flawed or incomplete to begin with. The possibility exists that the prevailing models of risk management are in error. This potential error could exist either in the application of the risk theory or even in the theory itself.

As new, complex, and impressive as many of today's risk models might be, there's one tiny detail that just does not seem to want to conform to these various models. It's called 'reality'! Theories may be nice but they can also be dangerous when they don't pan out in the real world of investing/trading in the capital markets. We want to identify what we believe is a potential pitfall that's leaving the financial industry vulnerable. Then we would like to propose a way to correct the problem. Our proposed solution is not infallible. However, we will still consider it a great achievement if this discussion inspires the investing, trading, and money management community to do some serious soul-searching and re-think how the subject of 'risk' is approached. New ideas need to be considered. New theories need to be formed. New solutions need to be proposed. But just like any other problem, the first step to fixing the problem is admitting that you have one!

Background Of Risk Management - The Old Days

Ancient man had no risk management. Everything was left to 'fate' and the whims of the gods. Because ancient man felt that he was merely a victim of circumstance he did not see a need to plan for the future. Therefore, he had no future. In his book Against The Gods: The Remarkable Story Of Risk (1), Peter Bernstein plots out the history of man's discovery of the law of probabilities and risk management. Suffice it to say, economic progress seems to run parallel with man's ability to discover, quantify, and manage risk. Risk and reward are two sides of the same coin. One is not present without the other. You cannot receive the reward unless you are willing to take the risk and you cannot expect to keep that reward unless you learn to mange that risk. It is imperative to master both subjects if you expect to be successful in any endeavor, especially the arena of investing/trading.

Modern Portfolio Theory: A Step In The Right Direction

In 1952, Harry M. Markowitz published his doctoral thesis. This thesis was the beginning of what is now known as Modern Portfolio Theory.(2) (Markowitz eventually went on to receive a Nobel Prize in 1990 for his work). The gist of Modern Portfolio Theory is the belief that the risk of an investment portfolio can be lowered, the volatility of the portfolio can be reduced, and the gains can be enhanced, all by diversifying the portfolio among several non-correlated assets. To most investors/traders, diversification is a 'no-brainer' idea. They probably just assume that's how its always been done. Just as long as you don't put all of your eggs in one basket, you should be fine…right?

The Correlation Factor

The critical component that makes this Modern Portfolio Theory work is the *non-correlation* or the *inverse correlation* among the investments in the portfolio. *Correlation* is simply the measure of degree to which different variables (investments) respond to the same factors.

A good example of *non-correlation* between two investments is the movement of the stock market with the movement of the commodity grain markets. Most of the time, these two very different asset classes have little influence on one another because the fundamental factors that influence them are quite different. Weather patterns can send the grain markets soaring or plummeting, but the stock market takes no account of the temperature or rainfall levels in the Midwest. Likewise, the price of corn is not determined by the earnings of the companies that make up the Dow Jones Industrial Average.

An example of *inverse correlation* between two different investments would be that of two different stocks that perform in an opposite manner under the same market conditions. Consider the stock price of an oil company such as Exxon Mobile and the stock price of an airline company such as American Airlines. In today's current environment of high oil prices, oil stocks have risen exponentially because profits are hitting new record highs. At the same time, many of the airline stocks are in a nosedive as that very same fundamental factor, record oil prices, has substantially reduced or even eliminated their profit margin. Since these two industries are on opposite sides of the supply/demand equation (one is an oil *producer (SUPPLY)*, the other is an oil *consumer (DEMAND)*) the effects of the marketplace fundamentals are opposite as well. According to Modern Portfolio Theory, you should have an ideally balanced portfolio if you owned equal amounts of stock in these two various industries.

So What's The Catch?

The problem arises when the *correlation* between the assets change. If only the correlation between different markets always stayed the same we would have a perfectly balanced Utopian-investment environment where everyday is a party and every night is a feast. But that's the rub: Correlations between various markets/investments *do* change!

Unfortunately, the market correlations can change quite abruptly and without warning. Therefore, to think that Modern Portfolio Theory is complete to stand on its own is not quite correct.

Going back to our example of the stock of the oil company and the stock of the airline company, what happens if the prevailing fundamental factor driving the market is no longer high oil prices but, instead, it's climbing interest rates? This could have an adverse effect on the share prices of all sorts of different companies as the cost of corporate borrowing goes up. Suddenly, the oil stocks and the airline stocks could find themselves in the same boat and sinking fast.

Another example of a sudden, major change in market correlation is what occurs during steep, sudden declines in the stock market. A stock market crash can create a liquidity crisis and take high-yield currencies, precious metals, agricultural markets, and all sorts of typically non-correlated assets down with it as investors suddenly dump everything to get into cash. Basically, when a market shock is severe enough, it will have a spill over effect and cause investments in several different asset classes or markets to succumb to sudden liquidation.

It is interesting that legendary investor George Soros also alluded to the problem of the current quantitative methods of measuring risk. He stated, "…They're generally constructed on the assumption of efficient market theory. That theory is in conflict with our firms theory of imperfect understanding and reflexivity. We think that those methods work 99 percent of the time, but they break down 1 percent of the time. We am more concerned with that 1 percent."(3)

About Volatility

According to Modern Portfolio Theory, one of the benefits of a diversified portfolio is lower volatility. Volatility, as used in Modern Portfolio Theory, is simply the measure of how much an investment fluctuates. These fluctuations are measured in standard deviations. Some believe that this implies that the lower volatility, the lower the risk in an investment portfolio/trading account. This may not necessarily be true.

Low volatility may not always mean that an investor is ideally positioned. Low volatility can have two different meanings: It can mean that the portfolio is well diversified across the right investments OR it could also mean that the portfolio is not taking enough risk! To confuse the matter even more, this implies that higher volatility can have two meanings as well: High volatility can mean that the portfolio is NOT well diversified across the right investments OR it could also mean that the portfolio is correctly positioned!

Measuring Volatility

Sharpe ratio

Another Nobel laureate William F. Sharpe created a ratio to measure risk-adjusted performance. The Sharpe ratio is calculated by subtracting the risk-free rate - such as that of T-bills - from the rate of return for a portfolio and dividing the result by the standard deviation of the portfolio returns. The formula for the Sharpe ratio is as follows:

$$= \frac{\bar{r}_p - r_f}{\sigma_p}$$

Where:

$\bar{r}_p$ = Expected porfolio return

r_f = Risk free rate

σ_p = Portfolio standard deviation

Many assume that the higher the Sharpe ratio, the better the risk-adjusted performance. However, this does not quite cut it. If the portfolio is higher in volatility the Sharpe ratio does not necessarily tell the investor/trader if that volatility is a good thing or bad thing because is does not distinguish between volatility on the positive side or volatility on the down side.

A Better Way To Measure Volatility

So how does an investor/trader judge whether or not the level of volatility is good or bad? Frank Sortino had the same question so he developed a ratio to help distinguish the good volatility from the bad volatility in the Sharpe ratio. His measurement is known as the Sortino ratio. It's calculated by subtracting the risk-free rate - such as that of T-bills - from the rate of return for a portfolio and then dividing the result by the downside deviation only rather than the entire standard deviation of the portfolio returns. So distinguishing between 'good' or 'bad' volatility is as simple as just measuring which side of the mean the standard deviation occurs. The formula for the Sortino ratio is as follows:

$$\textbf{Sortino Ratio} = \frac{< R > - R_f}{\sigma_d}$$

Where,

$< R >$ = Expected Return

R_f = The Risk Free Rate of Return

σ_d = Standard Deviation of Negative Asset Returns

Let's say we have stock ABC that produced an annual gain of 7%. It had a drawdown of 15% and a peak high of 15% during that same year. The difference between the peak high and the peak low (the deviation) for the year was 30%. If we also have stock XYZ that gained 12% for the year with a drawdown of 10% at some point and a peak high of 50%, we have a difference of 60% between the peak high and the peak low (the deviation). Stock XYZ was twice as volatile as the first. If someone were to look strictly at the amount of volatility they may assume that stock ABC is the better investment: the standard deviation of stock ABC was lower than stock XYZ. Also, stock ABC's Sharpe ratio of 0.23:1 was higher than stock XYZ's Sharpe ratio of 0.20:1. However, the volatility alone does not give you all the information you need to decide which investment is superior.

The investor needs to take a closer look at whether the volatility of the two stocks occurred 'above the mean' or 'below the mean'. In other words, did most of the volatility occur while the stock was at a profitable price level or while it was at an unprofitable price level? We believe that stock XYZ was actually the better investment for three reasons: 1.) It had a smaller drawdown than stock ABC 2.) The absolute return was higher than that on stock ABC and 3.) The stock XYZ had a higher Sortino ratio of 1.2:1. That's more than two and a half times greater than stock ABC's Sortino ratio of 0.46:1!

As far as risk measurement goes, an investor/trader will be better off focusing on the sub-standard deviation to determine what kind of risk the asset is to the portfolio. (The sub-standard deviation is simply the amount of volatility below the mean, also known as the 'drawdown' or how much the investment is in the red). Once you have identified an investment that has a positive expectancy, as well as a small enough of a sub-standard deviation to fall within the guidelines of your risk parameters, you can move forward.

Take The Next Step

Diversification across several investments is good, but it is not enough. Measuring the volatility of the assets in the portfolio is also good, but it's still not enough. You must also have set parameters for a portfolio's absolute exposure. Neither the Sharpe ratio nor the Sortino ratio tells you what the actual drawdown potential of an investment/trade really is. These ratios can only tell you what the biggest drawdown of the asset has been so far.

Writing 'naked' deep out-of-the-money options can look very appealing according to these standard volatility measurements. After all, you could theoretically collect option premiums for months or years with very little drawdown. Some hedge funds operate exclusively on this premise. And why shouldn't they? On paper, this strategy looks fine and dandy: the strategy could generate a high accuracy amount of trades, smooth and consistent returns, and a high Sharpe ratio. What more could an investor/trader ask for? But before you start raising money to open your new hedge fund so you can write those options and rake in the millions, stop and consider this: The accuracy figures, the volatility measurements, and the drawdown figures (to date) do not tell you what the actual underlying risk of the strategy is! They only address what has happened so far, not what could potentially happen in the future. (Many traders have been seduced by the Siren song of the high probability of winning trades made possible by uncovered option writing. Many of those same traders

now have the bitter experience of the infrequent, but grossly out-sized loss of a short option trade gone wrong. Several months and years worth of profits can be wiped out in just a day with this strategy. Professional trader Mark D. Cook shares his hair-raising option writing experience in the book Stock Market Wizards. (4) I highly suggest that anyone interested in writing options read this story before attempting this strategy!

After an investor/trader has located investments/trades with a positive mathematical expectancy and taken a measure of the sub-standard deviations to determine which assets are the best fit for his portfolio, he should now take one more step and calculate the 'meltdown level' of the entire portfolio/trading account. Consider this number to be the bottom line worst-case-scenario market exposure. This is not a very pleasant number to calculate, but it is quite necessary. As a matter of fact, we believe it's probably the most important calculation you will make for your portfolio. An investor's/trader's very survival could depend on it.

The 'meltdown level' of an entire portfolio/trading account is the amount of damage that the entire portfolio would sustain in the unlikely event that every single asset/investment in the portfolio declined at the same time. If you use stops or options as hedges, you would calculate the difference between the current price of the asset and the stop out price or the strike price of the option hedges to determine the maximum loss amount. If you don't use any stops you would then have to calculate the full intrinsic value of the stock/commodity/asset as the potential maximum loss amount. (And if you don't use stops or option hedges, then we will have to have a heat-to-heart talk about that subject later!) What about those 'naked' deep out-of-the-money options you wrote? What if you wrote uncovered stock puts and the market crashed? What size of a loss would you be exposed to on the options? After the potential maximum loss levels for each of the different trades/investments has been calculated, add them all together. This sum is the 'meltdown level' of the entire portfolio/trading account.

Purpose Of The 'Meltdown Level' Calculation

The purpose of finding the 'meltdown level' number is to give you a very sobering reality-check on the possible damage to your investment portfolio/trading account in the event that 'Financial Armageddon' breaks out. You need to calculate a "meltdown level" number that, if it were to be reached, would still allow your portfolio/trading account to survive. If this number is too large for your own psychological comfort or your financial sustainability, reduce the open exposure of the various investments/trades in the account until you have a number that you think you could survive if it were ever reached. However improbable it may seem, it's still possible that all the assets in the portfolio can go into a 'meltdown' at the same time. Have rules on how you will handle this scenario if it does occur. Do you have stop orders? Options to hedge the positions? What about lock limit conditions? Can the portfolio/trading account withstand such an extreme event?

Consider this "worst case scenario" plan to be like a life insurance policy for the investment portfolio/trading account. Although you may not like paying the premiums, it still protects you in the event of 'sudden death' in the markets. When things are going well there exists the temptation to get frustrated because your position size may not be nearly as large and aggressive as you would like it to be. You might feel like you're leaving a lot of money on the table. But don't be too upset when things are going along fine and you're not

collecting on your policy. It's actually good news because it means that your investment must not be getting killed! The benefits of this plan will only be seen when the markets become highly unfavorable. When everyone else is going "belly up" and you remain in the game you will then realize the wisdom in choosing this route.

Just How Important Is Risk Management?

Risk management is a very important part of trading. As a matter of fact, it can be argued that risk management is even more important than the actual investing/trading system that you use. In Jack Schwager's classic Market Wizards (5) book series, several top traders/money managers were interviewed. These are the guys who have produced stellar returns and consistent track records over the long haul. They are the crème de le crème of the investing/trading universe. What is interesting is that the methods that these different investors/traders use can vary quite a bit from one trader to another. Some traders use fundamental analysis exclusively, some use technical analysis exclusively, and still others use some sort of mix of both. Some trade long only, others go long or short. Some trade many markets, others focus on a select few or even one market only. There's also a wide array of different time horizons that they invest/trade on. Some of the Market Wizards are short-term swing traders while others will buy and hold for years. However, there is one thing that they all have in common: a rigorous, strictly followed risk management plan! Legendary commodity trader Richard Dennis, known best for the famous 'Turtles' experiment, said, "Discipline and risk size, those are things that if you talk about 'when do I get in and when do I get out' you don't see, but it is what makes what we taught fairly consistent."(6)

Risk management is what allows an investor/trader to survive long enough until they finally happen upon the opportunities that generate profits. To be successful in the markets you have to have three things: an investing/trading method with a positive mathematical expectancy, a proper risk management plan that will allow you to capitalize on market opportunities when you are right and minimize the damage to your portfolio/trading account when you are wrong, and the discipline to faithfully follow the trading and risk management plan.

Probability-Based Investing/Trading

Investment decisions/trades should be made on probabilities. There seems to be unanimous agreement in the professional investing/trading community that this is the correct approach so we won't spend much time trying to build a case for it. The future is not known, but the probabilities of the future can be somewhat quantified. It only makes sense to take a calculated risk when a good risk/reward scenario is present and the probabilities of success on the investment/trade are favorable. Also, it is important that you seek out investments/trades with a positive mathematical expectancy. Although it may sound counter-intuitive, it's very possible to have an investment/trading system with high accuracy and still lose money. For more in-depth writing on this subject read Trade Your Way To Financial Freedom by Dr. Van K. Tharp. (7)

After an investment/trading decision is acted upon many investors/traders will then continue to use probabilities to mange the trade. It's perfectly fine to manage the trade according to probabilities. Let's say your investing/trading rules just gave you a signal to buy stock XYZ at $45 per share. Based on your research, you might know that 80% of the time that stock XYZ was purchased under similar conditions it led to a 15% gain but only 30% of the time did it lead to a gain of 20% or more. You might use this history to determine that you will take at least partial profits or at least tighten your stops once stock XYZ has gained at least 15% due to the fact that the probabilities of more gains are greatly diminished after this level is exceeded.

Possibility-Based Risk Management

While it may be perfectly acceptable to manage the trade according to probabilities we believe that an investor/trader should actually manage the risk on the investment/trade according to the possibilities instead of the probabilities. To do otherwise will eventually lead to a loss much greater than the investor/trader is prepared for. It is a mistake to think that something highly improbable is also the same as something impossible.

Your research on stock XYZ might have revealed that thirty-six of forty similar purchases of the stock at $45 per share usually never had to endure a drawdown of more than 10%. Perhaps there were three occasions when the stock declined as much as 20% but it eventually recovered. And don't forget about that one isolated incident when stock XYZ endured a 30% drawdown. Based on these figures, the probability of a drawdown exceeding 10% is low and the probability of a drawdown exceeding 20% seems highly remote. The investor/trader could be tricked into a false sense of security based on these numbers. He may buy a larger amount of shares than would be prudent because the probabilities of incurring a drawdown of over 20% are highly unlikely. But what if the stock does drop 25%? What if it hits a new drawdown record of 35% or more? What if it doesn't recover this time? It may not be probable for this to occur, but the fact that it's possible means that the investor/trader better have a plan in place to react to it and manage risk if it does happen.

If the market declined 35% the investor/trader who manages his position in XYZ stock based on possibilities should have done one of two things: 1.) He should have already liquidated the trade or been stopped out or 2.) He is holding a small enough position so that a continued decline will not cause him to exceed the maximum amount of equity risk that he has allocated for each investment/trade. This is what a 'reality-based' investor/trader would do.

By dangerous contrast, the investor/trader who continues to manage his position in XYZ stock based on probabilities is likely to continue to hold on to his full position because he just knows that it's not likely to stay this low…at least, he thinks he knows. If the investor/trader is really bold, he may even 'double-down' and increase his position in the hope that the 'inevitable' recovery will make back all his losses and give him a nice profit as his reward for staying the course. Apparently, nobody ever informed him of the old Wall Street saying that, "the markets can remain irrational longer than you can remain solvent". This scenario is exactly what happened in 2006 when Amaranth Advisors was holding a huge position in natural gas spreads. The natural gas market started to turn against them so they increased their position size, thinking that they were 'buying on the dip'. Unfortunately, the 'dip' turned into a waterfall decline that wiped out over two-thirds of their multi-billion

dollar hedge fund in a matter of a couple of weeks. During this big meltdown, Amaranth Advisors president Nick Maounis said, "We viewed the probability of market movements such as those that took place in September as highly remote…but sometimes, even the highly improbable happens". (8) That's certainly a hard way to learn such an important lesson: trades can be managed based according to probabilities, but trade risk better be managed according to possibilities. Besides, there's also the possibility that traders may be working off of an incorrect assumption of just what the probabilities are of an extreme market event actually are! (9) Perhaps a modern risk manager's mantra should be 'the improbable in inevitable'.

The Paradox Of Trading/Investing

There is a paradox that exists in investing/trading: You must first have faith to initiate an investment/trade, but then you must manage the trade risk with the expectation that every trade is wrong. It is the yin-yang, or balance, of fear and greed.

If It's That Simple…Why Isn't Everyone Doing It?

The Primary Motive

At his very basic nature, mankind has only two forces that motivate him: Pain or Pleasure. But when it comes to investing or trading, you should have only one primary motive: to make some green! Yes, there are people out there who invest/trade for other reasons such as excitement, prestige, a subconscious need for punishment, etc. But the 'healthy' reason that someone trades is simply to generate return on capital. Unfortunately, the incentive to produce profits can get out of balance. And when things are out of balance, those things come crashing down.

In the investing/trading world, the bottom line is how much money was made or lost. This makes obvious sense. But a meritocracy that rewards 'Alpha seekers' exclusively based on returns, without regard to the amount of risk used to attain those returns, is a breeding ground for financial catastrophes. This attitude of producing the highest absolute returns - no matter what the risk - may be partly to blame for all the rogue trader incidents that keep popping up. It encourages people to break the rules and take foolish risks in the hopes of getting lucky and hitting the 'big one' before they get caught. It has been reported that Jerome Kerviel, the trader who caused over $7 billion in losses for French bank Societe Generale, was actually ahead over $2 billion in profits before his ill-fated trades took it all back…and a whole lot more. (10) Every year, the Trader Daily Top 100 Traders List (11) shows the top earners in the trading industry. Surprisingly, a majority of them made their "killing" for the year on just one or two concentrated bets on a particular industry, sector, or even an individual market. There are also many who make the list one year and fall from grace the next. This poses a disturbing question: Is the only difference between a John Paulson and a Brian Hunter whether or not they were right on their massive bet? If the answer is 'yes' then you can be pretty confident that hedge fund blow-ups and bank failures will continue on a regular basis. It's just a matter of time until King Midas loses his touch

and some of his big bets turn sour. Without risk management these massive bets gone wrong could wipe out an entire firm. There is a saying that goes, "There are old traders, and there are bold traders, but there are no old, bold traders". The meaning is that those gun slingers who boldly take big risks and press their luck with large, over-leveraged trades will not last. Their number will eventually be called. (For those interested, read the stories on the Barings Bank collapse, Long Term Capital Management, Amaranth Advisors, etc. (12) These are real life accounts of how the use of high leverage and willingness to hold on to losers – or even 'double-down' when a trade moves adversely - finally caught up with the professionals). It's inevitable that you will have some investments/trades that are just dead wrong. All investors/traders will. But what separates the good investors/traders from the bad ones is how they manage the risk on the bad trades.

To survive long enough to accomplish your primary motive as an investor/trader, making a profit, you must exercise capital preservation. If profit incentive alone is the sole focus of trading it can easily turn into all-out greed and leave you vulnerable to a blow up that has the capability to wipe out all of your trading capital and take you out of the game permanently. This happens because the investors/traders are suddenly willing to take much more risk than is prudent in order to make as much profit as possible.

Unfortunately, cash incentives are not paid out to those who managed risk well. I've never heard of a trader who got a $1million bonus for not blowing up! But the rewards for good risk management are still there. They just manifest themselves in other ways such as: still having a job at the trading firm, still having capital left to risk, still being 'in the game', not having a black mark on your trading record in the form of a major trading catastrophe, etc. It's sad that such a large percentage of investors/traders still don't see it that way. They are not in this for the long haul. Their goal is to plunge into the markets and make the 'big killing' as quickly as they can even when it puts their own capital or someone else's in jeopardy. As the famous trader Ed Seykota once said, "Everybody gets what they want out of the market". (13) Since some of these guys are not in it for the long haul, rest assured: they will not last for the long haul!

What Can You Control?

The only thing that an investor/trader can control is his exposure in the markets. You can't control the markets themselves, but you absolutely can control how you will respond and interact with the markets. You need to remember that the markets are not like the house band down at the local bar. They do not take requests. As a matter of fact, if the market did play songs you would probably hear "You Can't Always Get What You Want" more often than you would like! Trying to control risk by controlling the market is a futile strategy. Sure, a large trader or hedge fund can attempt to corner the market and may even succeed at it for a short time. But over the long haul, the market is going to do what it wants to do anyways. Your task as an investor/speculator is to control your risk by monitoring and controlling your market exposure.

Conclusion

In our modern era we seem to know a lot about risk management and portfolio theory. Unfortunately, not all of it is correct. But the good news is that there are methods that we can employ to better measure and manage our risk. There has to be a paradigm shift where risk managers recognize that risk is an ever changing and evolving challenge. Risk is not stationary. It cannot be locked in a box. It constantly changes shapes and sizes. When market correlations change, traders/investors need to have a strategy in place to change with it. The portfolio managers need to know what they will do ahead of time. Have a defense plan already set in place to handle a market meltdown on the scale of a Financial Armageddon. These occasional, but inevitable, surprise shocks in the financial markets will occur. Although it will leave financial casualties, it does not have to result in your financial fatality. Traders/investors can survive if they have an exact detailed plan for the improbable already in place. To be forewarned is to be forearmed.

Too often, investment/trade selection and the overall risk management of the investment/trade are both based on probabilities. So when the improbable does happen, the result is financial disaster. It doesn't have to be so. The heart of our thesis is this: investments/trades should be based on probabilities, but the actual risk management of those very same investments/trades should be based on possibilities. You don't need complex mathematical formulas or a degree in quantitative physics to accomplish this task, just a good handle on common sense will do. But as Benjamin Franklin once said, "Good sense is a thing all need, few have, and none think they lack". (14)

References

1.) Peter L. Bernstein, *Against The Gods: The Remarkable Story Of Risk*. Canada: John Wiley & Sons, Inc., 1996.
2.) http://nobelprize.org/nobel_prizes/economics/laureates/1990/markowitz-autobio.html
3.) George Soros, *Soros On Soros*. New York: John Wiley & Sons, Inc., 1995.
4.) Jack Schwager, *Stock Market Wizards.* New York: HarperBusiness, 2001, 95-126.
5.) Jack Schwager, *Market Wizards.* New York: HarperBusiness, 1989.
Jack Schwager, *The New Market Wizards.* New York: HarperBusiness, 1992.
Jack Schwager, *Stock Market Wizards.* New York: HarperBusiness, 2001.

6.) "Richard Dennis: Seeding the Managed Futures Industry", *Allbusiness.com, 2007-10-01*.

7.) Van Tharp, *Trade Your Way To Financial Freedom*. New York: McGraw-Hill, 1999.

8.) "Betting on the Weather and Taking an Ice-Cold Bath", *NY Times, 2006-09-29*.

9.) Nassim Taleb, *Fooled By Randomness*. Canada: Texere, 2001.

10.) "Rogue Trader Began Year in Profit", *BBC News, 2008-01-30*.

11.) *Trader Daily*, (April/May 2008).
12.) Roger Lowenstein, *When Genius Failed.* New York: Random House, 2000.
13.) Jack Schwager, *Market Wizards.* New York: Harper Business, 1989, 172.
14.) Benjamin Franklin, *Poor Richard's Almanack*, June 1746.

Disclaimer: There is risk of loss in all commodity trading. The data contained are believed to be reliable, but have not been independently verified by Pearce Financial. Accordingly, such data cannot be guaranteed as to reliability, accuracy, or completeness, and as such are subject to change without notice. Pearce Financial will **not** be responsible for any indirect, compensatory, or consequential damages, including loss of profits which may result from reliance on this data. Pearce Financial and/or its Principals and employees may or may not follow strictly any or all of the trading strategies **or** recommendations contained herein. Past performance is not indicative of future results

Any research, analysis and/or information contained herein were drawn from sources believed to be reliable; however, Pearce does not guarantee its accuracy or completeness. Any opinions expressed reflect the opinions of the authors. This information is subject to change without notice and should not be acted upon without prior due diligence. This document is not an offer of solicitation for the purchase of sale of any commodity. Information mentioned herein may or may not be suitable for all investors. Futures' trading involves varying degrees or risk and investors should be aware of the potential for large loss before investing.