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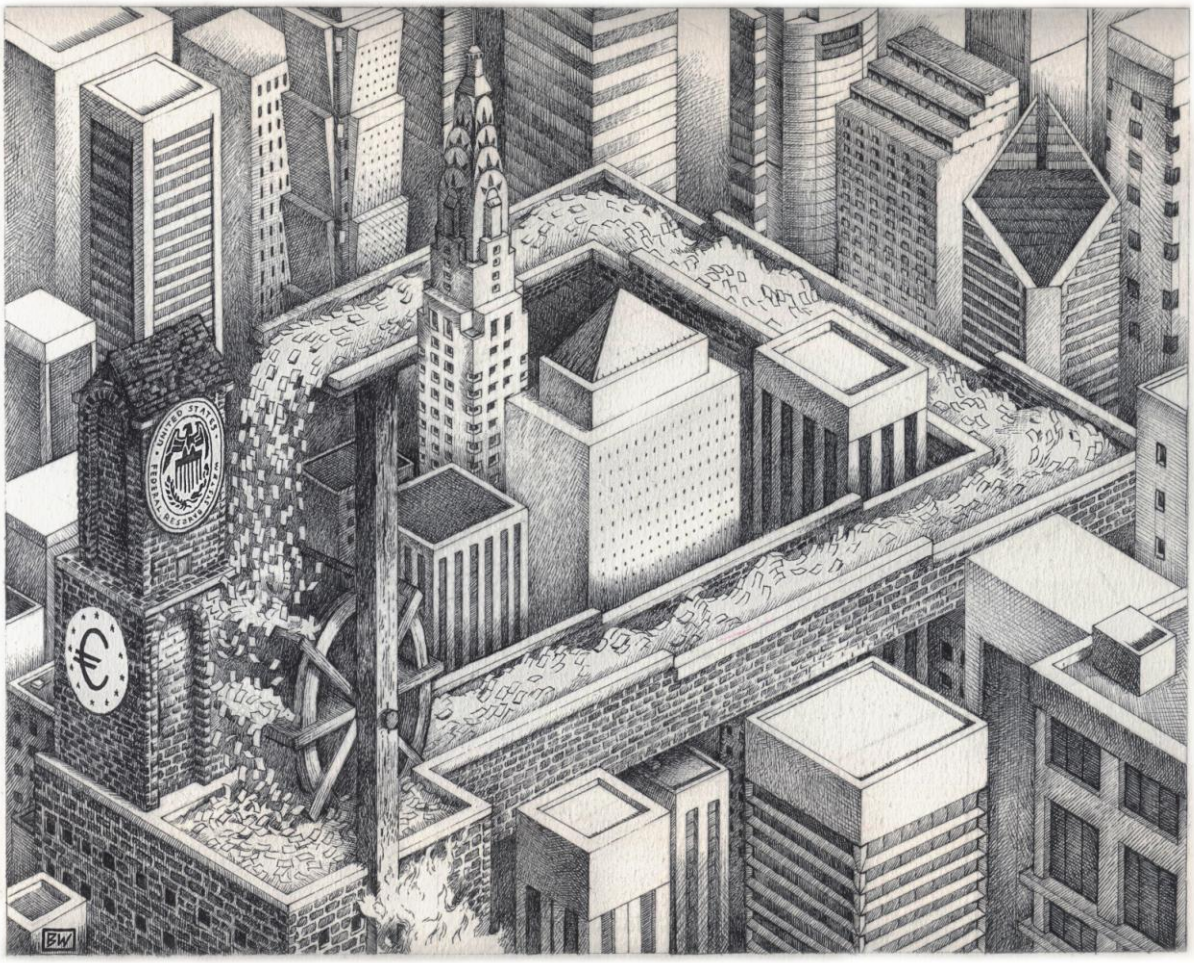
CAPITAL MANAGEMENT

Volatility of an Impossible Object

Risk, Fear, and Safety in Games of Perception



Note: The following research paper is an excerpt from the Third Quarter 2012 Letter to Investors for the Artemis Vega Fund LP published on September 30, 2012.

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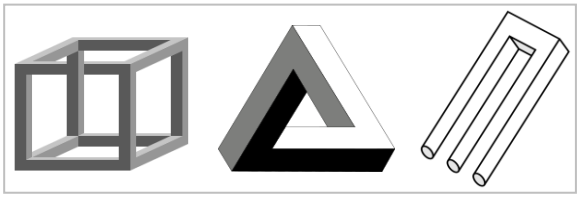


The global financial markets walk on the razors edge of empiricism and what you see is not what you think, and what you think may very well be impossible anyway. The ***impossible object*** in art is an illustration that highlights the limitations of human perception and is an appropriate construct for our modern capitalist dystopia. Famous examples include Necker's Cube, Penrose Triangle, Devil's Tuning Fork, and the artwork of M.C. Escher. The formal definition is "an optical illusion consisting of a two-dimensional figure which is instantly and subconsciously interpreted as representing a projection of three-dimensional space even when it is not geometrically possible" [(1)]. The fundamental characteristic of the impossible object is uncertainty of perception. Is it feasible for a real waterfall to flow into itself; or for a triangle to complete itself in both directions? The figures are subject to multiple forms of interpretation challenging whether our naïve perception is relevant to understanding the truth. The impossible object is of vast importance to mathematics, art, philosophy and as I will argue... modern pricing of risk.

Modern financial markets are a game of impossible objects. In a world where global central banks manipulate the cost of risk the mechanics of price discovery have disengaged from reality resulting in paradoxical expressions of value that should not exist according to efficient market theory. Fear and safety are now interchangeable in a speculative and high stakes game of perception. The efficient frontier is now contorted to such a degree that traditional empirical views are no longer relevant.

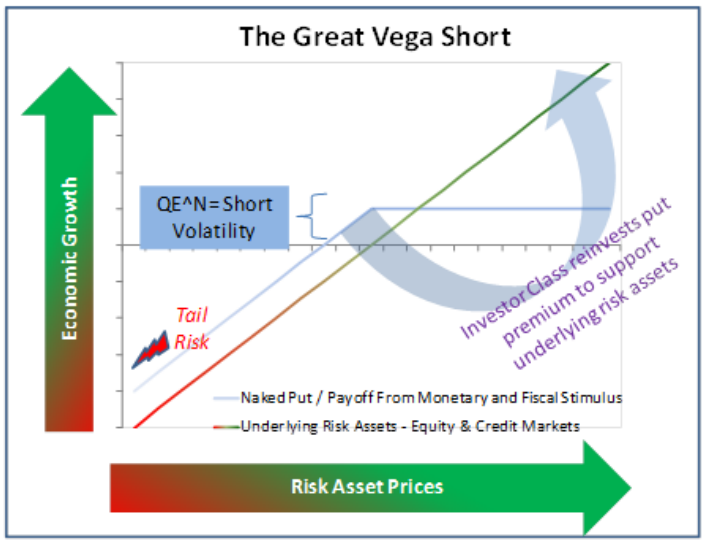
The volatility of an impossible object is your own changing perception.

Our cover illustration pays homage to M.C. Escher's 1961 masterpiece Waterfall and is intended to be an artistic abstraction of the self-reflexive mechanics of modern monetary theory. In a capitalist cityscape the aqueduct begins at the waterwheel of monetary expansion churning out a torrent of boundless fiat currency that streams through the dense metropolis. The river of money flows from the edge of the aqueduct into the waterfall of deflation and then over the waterwheel suspended in a never-ending cycle of monetary expansion and crisis. Beneath the city the fires of inflation burn threatening to one day consume the monetary mechanism. Is the reflexivity of flowing fiat currency the solution or the very source of the paradox? We don't know.

Likewise how certain are we that the elevated two-dimensional prices of risk assets and low spot volatility have anything to do with fundamental three-dimensional reality? In this brave new world volatility is an important dimension of risk because it can measure investor trust in the market depiction of the future economy. The problem is that the abstraction of the market has become an economic reality unto itself. You can no longer play by the old rules since those rules no longer apply. I know what you are thinking. You didn't get your MBA to be an amateur philosopher - your job is to make cold-hard decisions about real money - not read Plato. You are out of luck. For the next decade this market is going to reward philosophers over students of business. Why? Because the modern investor must hold several contradictory ideas in his or her head at the same time and none of them really make any sense according to business school case studies. Welcome to the impossible market where…

Knowledge is not what you know but certainty in what you do not
Volatility is cheap and expensive at the same time
Fear is a better reason to buy than fundamentals
Risk-free assets are risky
Common sense says do not trust your common sense

The Great Vega Short in the Impossible Market



Global central banking is the architect of the modern impossible object. On September 13th the Federal Reserve touched off a speculative frenzy in risk announcing QE3 in the form of *unlimited $40 billion monthly purchases of MBS*, low-rates until "at-least mid 2015", and the continuation of Operation Twist in an effort to stimulate job growth. Across the pond the ECB also agreed to fund unlimited purchases of Euro-zone debt to tame the sell-off in Spanish debt. Massive injections of monetary stimulus by the world's two largest central banks have reignited another round of international currency wars motivating central bank action from Japan to Turkey. In the face of a faltering global economy nearly all asset classes rallied during the quarter including domestic stocks (+**5.75%** SPX), international equity (**+6.08%** EFA), high yield bonds (**+1.93%** JNK), gold (**+10.83%** GLD), oil (**+7.25%** USO), corporate bonds (**+3.49%** LQD), and USTs (**+0.49%** IEF) as volatility fell (**-7.9%** VIX). It is the Goldilocks bull market of fear. The data is just bad enough for monetary authorities to keep printing but not so bad as to usher in the next deflationary collapse. If the Fed follows through on its promise to buy MBS indefinitely they will own the ***entire market in a decade*** [2]. In addition the Fed is already the world's largest holder of US treasury bonds and currently owns all but $650 billion of the bonds maturing from 10-30 years[3]. To appreciate the cumulative effects of this stimulus consider a research report released by the Federal Reserve in 2011 that concluded since 1984 a staggering 80% of the premium earned from domestic equity was achieved in the periods leading up to FOMC announcements[4]. How ironic.

As expressed in past letters, in the mind of this volatility trader the current paradigm of monetary stimulus may best be understood as the greatest leveraged volatility short in economic history *("The Great Vega Short" Artemis Q4 2010*). The monetary policy of asset purchases is analogous to continuously rolling "naked" put options on the global economy and reinvesting the premium to collateralize the system with the goal of short-term growth at the expense of long-term systemic risk. In the case of QE3 this policy action is quite *literally* a volatility short because the purchase of MBS is also a simultaneous sale of pre-payment optionality. The stimulus regime socializes "tail risk" to generate short-term prosperity.

Despite higher asset prices experimental monetary policy seems to be doing very little to support the middle and lower class. Following QE2 GDP growth actually slowed down from +2.4% to +1.6% and unemployment adjusted for discouraged workers went from 22.5% to 22.7% according to shadow government statistics [5]. The middle and lower class do not own stocks and they cannot buy homes because they remain overleveraged. Raising bank profits has not helped the economy because credit cannot be extended to households that are in debt. For example less than 1% of all mortgages originated in the past 18 months went to borrowers with an impaired credit history, and 1 out of every 5 homes sold was purchased in an all cash deal by an investor rather than a live-in homeowner. Every $1 increase in equity prices raises consumer spending by just 3 to 5 cents so a 10% increase in stocks will add, at best, 45 basis points of GDP growth to the US economy [6]. In addition by keeping interest rates artificially low the Fed is creating a large funding gap for pension systems and other programs leading up to what could be a demographic time bomb. It is very hard to justify the risk to reward payoff of this monetary experiment. The defense of quantitative easing rests largely on an assessment of what would have happened to the economy absent its support. Nonetheless we should fear the law of unintended consequences because it takes a very small shift in perception to result in uncontrollable socio-economic change. We may get higher asset prices today but at the expense of inflation, class warfare, social unrest or something even worse tomorrow.

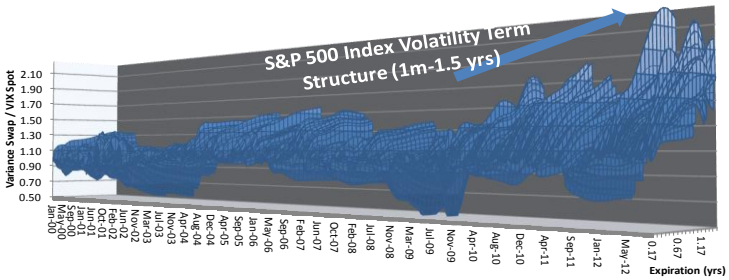
Right on the Button Square: The question the Fed and ECB must be prepared to answer is how "open" is "open-ended" stimulus? If need be are they willing to fully corner liquidity in UST bonds, MBS, and the bonds of the European periphery in an effort to maintain the façade of economic recovery? If you're going to talk-the-talk you had better be prepared to walk-the-walk. To this point I was shocked at the bravado of ECB Governing Council Member and Bank of Cyprus Governor Panicos Demetriades. When asked about the ECB's pledge of unlimited bond purchases he responded that the threat alone may mean no action is ever needed, ***"No one will speculate against the unlimited firepower of a central bank. A central bank has this wonderful ability that no other player in the market has when it says, 'I'm going to do whatever it takes,' and everyone believes that, in the end they may do nothing"*** [7]. That is just asking for trouble. Demetriades seems lost in his ivory tower. His is the same dangerous logic that resulted in the September 16th, 1992 Black Wednesday devaluation of the pound after the

UK withdrew from the European Exchange Rate Mechanism. Words are cheap and a demonstration of strength is only meaningful if everyone knows you are NOT at the limit of your ability. Think of a clumsy fighter throwing desperate but strong punches as he teeters on the brink of a knock-out. To this effect the ECB governing council should watch more hockey and quoting former Detroit Red Wings enforcer and Stanley Cup Champion Darren McCarty, ***"The important thing is that when you fight you have to be willing to take a punch. You're going to have to, and it's not about how many you give but about how many you can take and who's the best about learning to take a punch properly"*** He adds, ***"as long as he doesn't get you on the button square, then you'll be alright."*** (8)

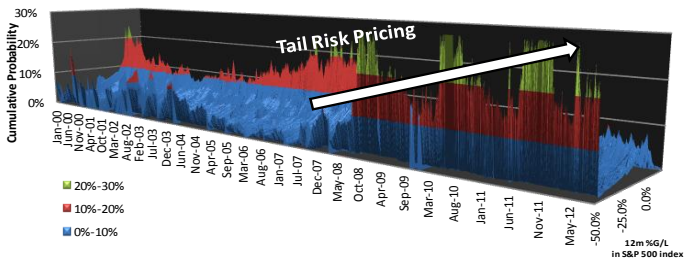
The reputation of being able to take a beating is more powerful than the threat of giving one. The ECB must realize that when bail-out enthusiasm wanes inevitably some anti-austerity political party or bond vigilantes will dare to punch the Euro right on the "button square". So despite all this bravado how many credible punches does the ECB have left to give before issues of Euro solvency come back into focus? Can the ECB walk-the-walk without the backing of true fiscal unity in Europe? Obviously Demetriades has never been in a proper fight and given fair comparison of wisdom and rhetoric perhaps Darren McCarty deserves a seat on the ECB Governing Council. Fortunately Bernanke is more modest than his counterparts in Europe and does not publicly challenge the "Gods of Risk" to a throw down. Bernanke states more humbly regarding the threat of accommodative policy, ***"Whether we have the credibility to persuade markets that we'll follow through is an empirical question… we will have created (by following through) a reserve of credibility that we can use in any subsequent episodes that occur".*** (9) His game theory comment does not convince me that monetary policy is the answer to full employment but at least he is not absurdly arrogant. Either way the fate of markets rests largely on the psychological fight between the credibility of global central banks to defend an optical illusion against the will of risk markets to test the fragile boundaries of human perception. We are now in the middle of a bull market in equities, commodities, bonds, and fear all at the same time. How can these conflicting visions of reality co-exist in the same multi-dimensional space? Welcome to the postmodern economy.

Games in the Impossible Market

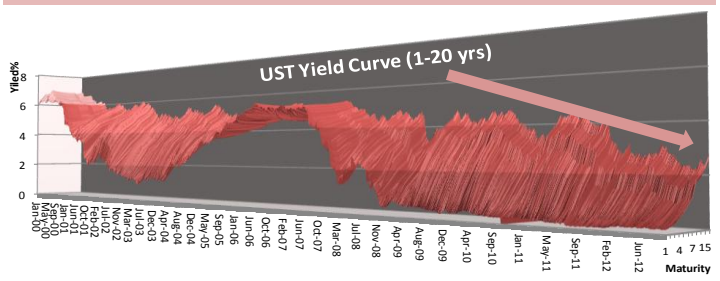
Bull Market in Volatility (Fear)



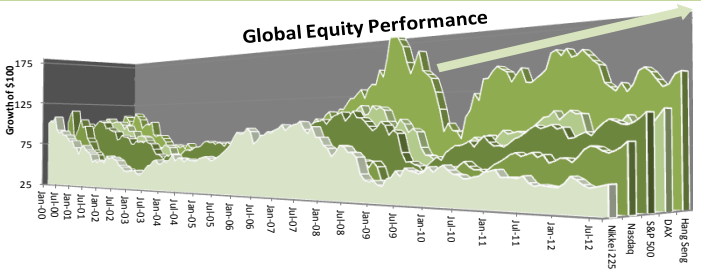
Bull Market in Tail Risk (Fear II)



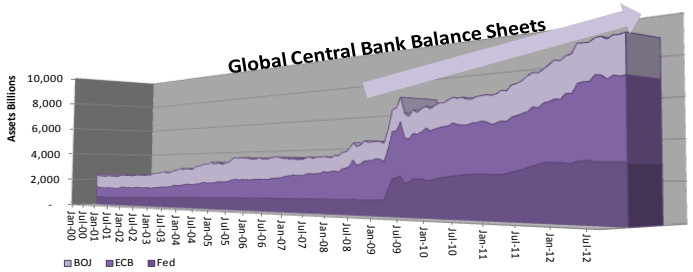
Bull-Market in UST Bonds (Safety)



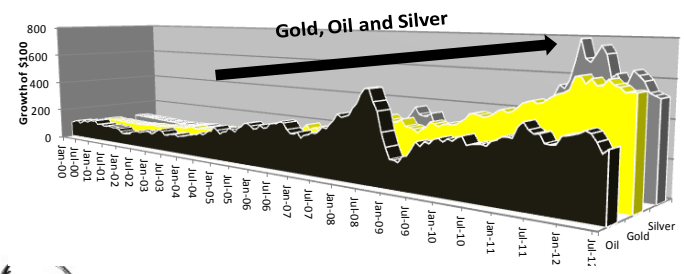
Bull Market in Global Equity (Risk)



Bull Market in Monetary Expansion (??)



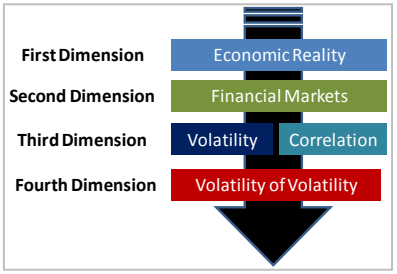
Bull Market in Commodities (Inflation)



The Postmodern Economy

"The simulacrum is never what hides the truth
it is the truth that hides that fact that there is none.
The simulacrum is true "
Ecclesiastes

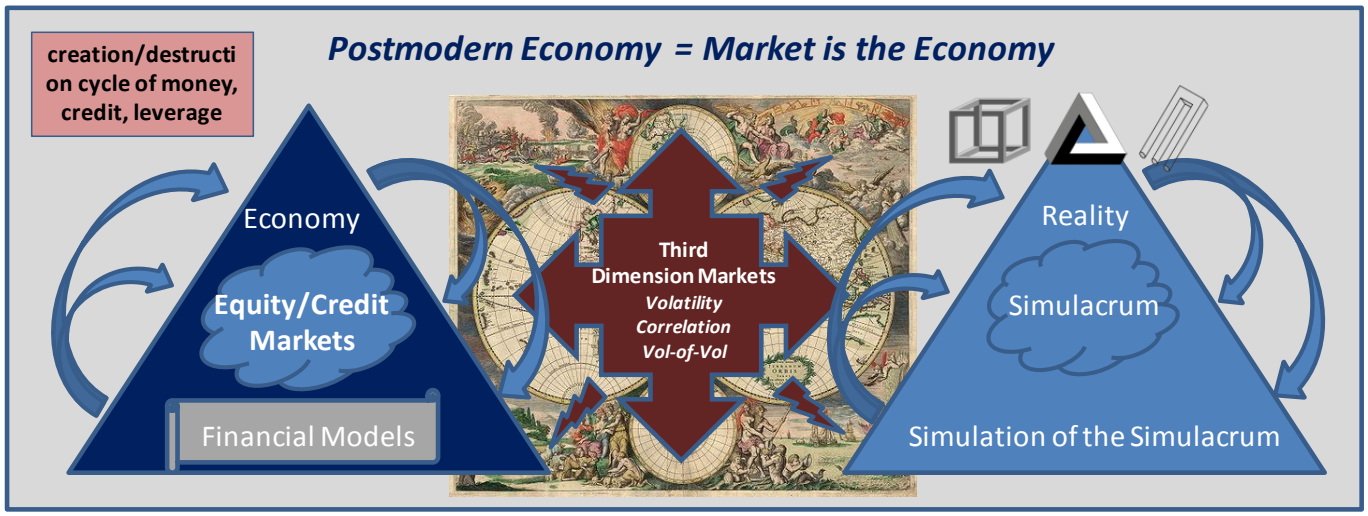
The perfectly efficient market is by nature random. When the market has too much influence over the economic reality it was designed to mimic, the flow of information becomes increasingly less efficient with powerful consequences. Information becomes trapped in a self-reflexive cycle whereby the market is a mirror unto itself. Lack of randomness ironically leads to chaos. I believe this is what George Soros refers to as "reflexivity". The impossible object is a visual example of reflexivity.



Deeper dimension markets like volatility, correlation, and volatility-of-volatility are important because they measure our confidence in the financial representation of economic reality. If financial markets are the mirror reflecting a vision of our economy third dimension markets measure the distortion in the reflection. If you are familiar with Plato's Allegory of the Cave volatility is best understood as our collective trust in the shadows on the wall. In the 1985 work "Simulacra and Simulation" French philosopher Jean Baudrillard recalls the Borges fable about the cartographers of a great Empire who drew a map of its territories so detailed it was as vast as the Empire itself. According to Baudrillard as the actual Empire collapses the inhabitants begin to live their lives within the abstraction believing the map to be real (his work inspired the classic film "The Matrix" and the book is prominently displayed in one scene). The map is accepted as truth and people ignorantly live within a mechanism of their own design and the reality of the Empire is forgotten [10]. This fable is a fitting allegory for our modern financial markets.

The market is no longer an expression of the economy… it is the economy

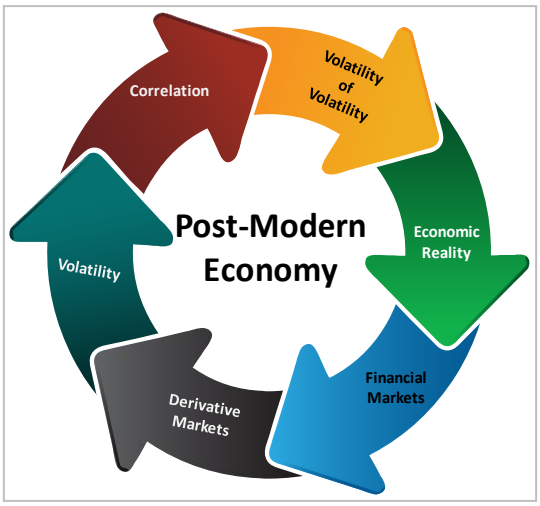
In the postmodern economy market expectations are more important to fundamental growth than the reality of supply and demand the market was designed to mimic. Our fiscal well being is now prisoner to financial and monetary engineering of our own design. Central banking strategy does not hide this fact with the goal of creating the optional illusion of economic prosperity through artificially higher asset prices to stimulate the real economy. In doing so they are exposing us all to hyper-reality or what Baudrillard called "the desert of real". In Fed speak this is what Bernanke calls the "wealth effect" and during his September 13th press conference he explained the concept: ***"if people feel that their financial situation is better because their 401k looks better or for whatever reason… they are more willing to go out and spend, and that's going to provide demand that firms need in order to be willing to hire and to invest."*** [11] In the postmodern financial system markets are a self-fulfilling projection unto themselves while trending toward inevitable disequilibrium. While it may be natural to conclude that the real economy is slave to the shadow banking system this is not a correct interpretation of the Baudrillard philosophy. The higher concept is that our economy ***is*** the shadow banking system… the Empire is gone and we are living ignorantly within the abstraction. The Fed must support the shadow banking oligarchy because without it the abstraction would fail.

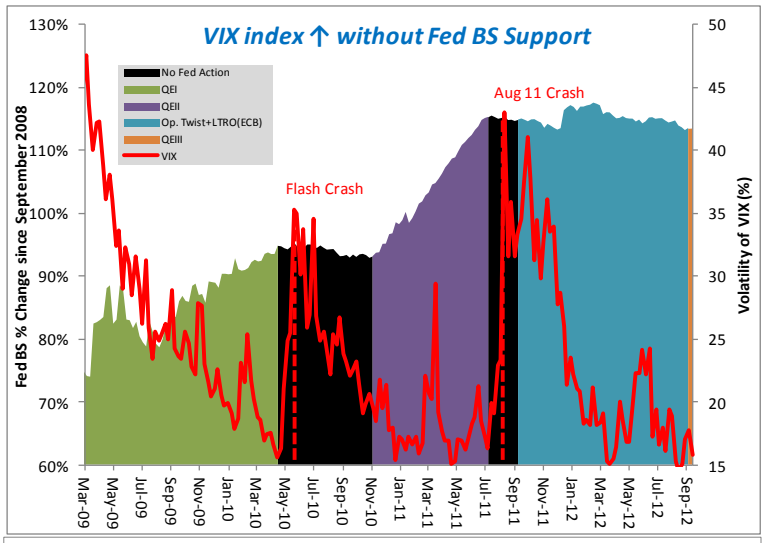


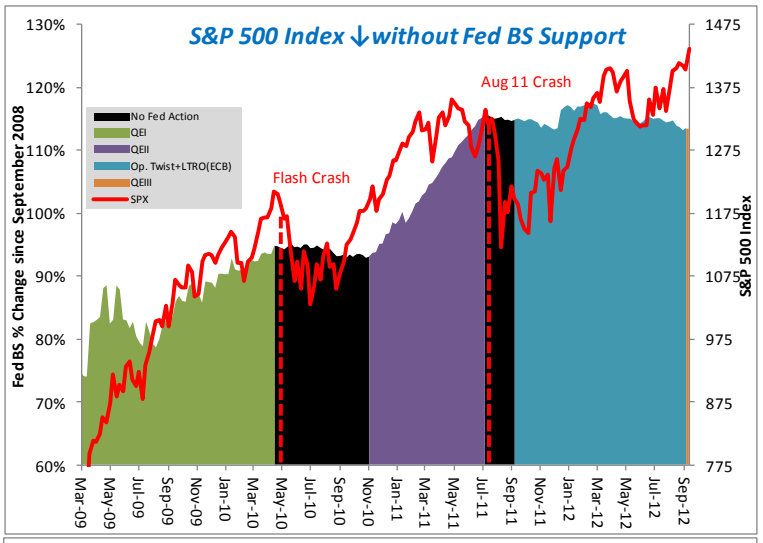
Third & Fourth Dimension Markets & Global Central Banking

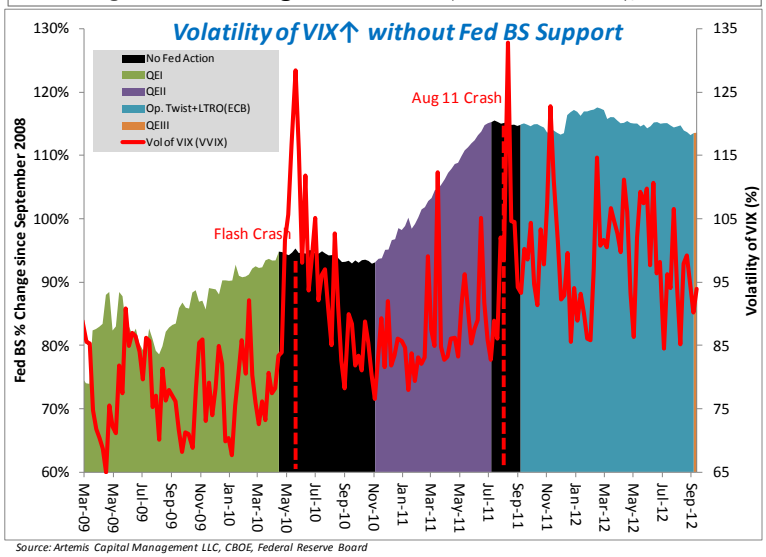
The price discovery mechanism of markets is held together by fragile psychology that is increasingly dependent on money creation to sustain itself rather than economic growth. When systems become abstractions upon themselves they contain less and less information, are less random, and hence more susceptible to extremes in either direction. This is a source of tremendous opportunity and shocking systemic risk.

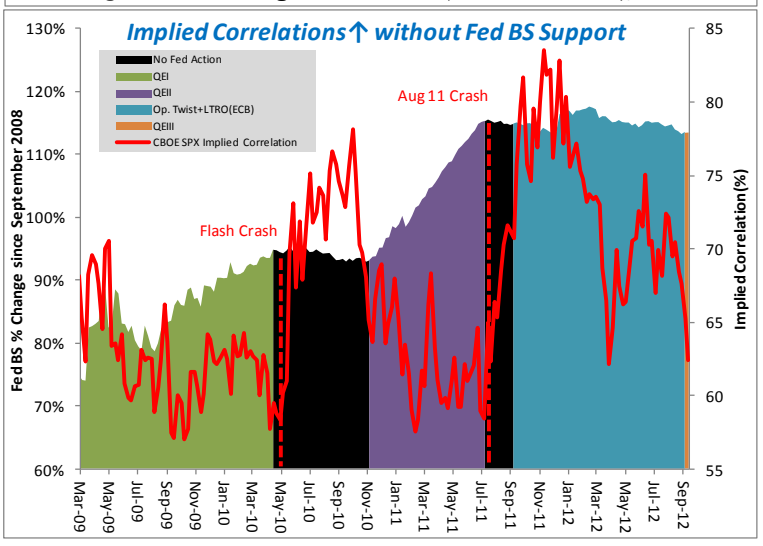
If this sounds esoteric look no further than to how volatility markets are dependent on the expansion of the Fed balance sheet for stability. Third and fourth dimension markets (like volatility and vol-of-vol) become increasingly unstable the minute global central banks (Fed and ECB) cease to provide monetary stimulus. As seen below the reflexive cycle described herein is not as much an obscure philosophy as it is a cold hard mathematical reality. Is the economy anything more than shadows on the wall of a cave? The fact that tail risk and volatility-of-volatility markets are historically expensive only shows that investors have never been more certain of their own uncertainty.











Source: Artemis Capital Management LLC, CBOE, Federal Reserve Board

Knowledge is not what you know but certainty in what you do not

"There are known knowns; there are things we know that we know. There are known unknowns; that is to say there are things that, we now know we don't know. But there are also unknown unknowns – there are things we do not know, we don't know."

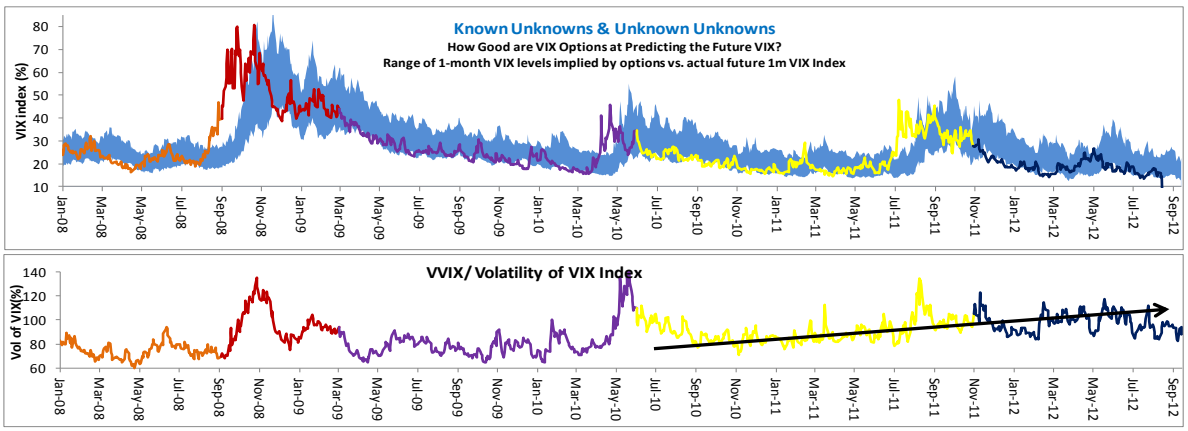
Donald Rumsfeld, United States Secretary of Defense

Modern volatility markets put a price on "unknown unknowns" and rarely has that price been higher. Volatility-of-volatility ("VOV" or "Vol-of-Vol") is a fourth dimension derivative that measures our confidence in the market as an accurate representation of the economy.

How certain are you that an M.C. Escher landscape could actually exist? That unsettling feeling you get when you look at the waterfall flow into itself… that is your own perceptual volatility-of-volatility.

It should not be a surprise that episodes of elevated vol-of-vol are associated with lower equity returns. For the S&P 500 index periods of high realized volatility-of-the-VIX underperform periods of low VOV by 13% annually (95th percentile compared to lowest 5th). A recent research paper by Baltyssen, Van Bekkum and Van Der Gruent found that individual stocks exhibiting high implied vol-of-vol underperform low vol-of-vol stocks by 10% a year [(12)].

Uncertainty is now very expensive. Vol-of-Vol premiums are rich in today's market despite a low-spot VIX. The chart below shows the predicted range of future VIX for a one-month variance swap constructed using VIX options. The VOV swap routinely anticipates the VIX rising from the teens into the mid-20s to low-30s. As you can see the VIX options have never been less accurate in their prediction with 40% of the observations falling underneath the range predicted by the VOV swap since November 2011. As of today 3-month VIX options are predicting a future range on the VIX between 16 and 30 with the VIX at 15.73.

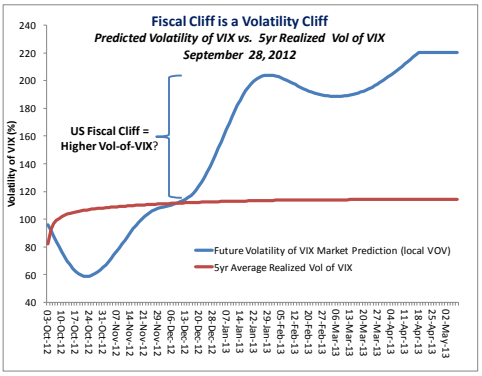


How Good are VIX options Predicting the Future VIX?

VIX Future Log-Contract Prediction Success/Failure %

Volatility Regime	Within Prediction Bound	Greater than Upper Bound	Less than Lower Bound
Total (2007 to Mar 2012)	71%	10%	18%
Bull Market (2006 to July 2007)	77%	23%	0%
Credit Crisis Onset (Aug 2007 to Aug 2008)	78%	8%	14%
Market Crash (Sep 2008 to Feb 2009)	63%	29%	8%
Recovery to Flash Crash (Mar 2009 to May 2010)	71%	7%	22%
Post-Flash Crash Steepening (May 2010 to Oct 2011)	74%	9%	17%
LTRO Steepening (Nov 2011 to Sep 2012)	59%	1%	40%

VOV curves provide a glimpse into the psychology of fear by making predictions about when the VIX is likely to explode or drop. Local VOV curves extracted from VIX-based derivatives anticipate a more violent VIX heading into the January 2013 US fiscal cliff showdown (compare the blue line expected VOV to the red line representing actual VOV since 2007). Volatility markets are only telling us what we already know - if the Congress doesn't act in time a list of things will occur that will be difficult for market's to digest. The Bush tax cuts will expire. The temporary payroll tax cut will end. Unemployment benefits will be severely curtailed. There will be more than $100 billion in automatic cuts to the Pentagon and domestic agencies. All on Jan. 1, 2013… so take a wild guess where predicted future volatility-of-volatility is highest?

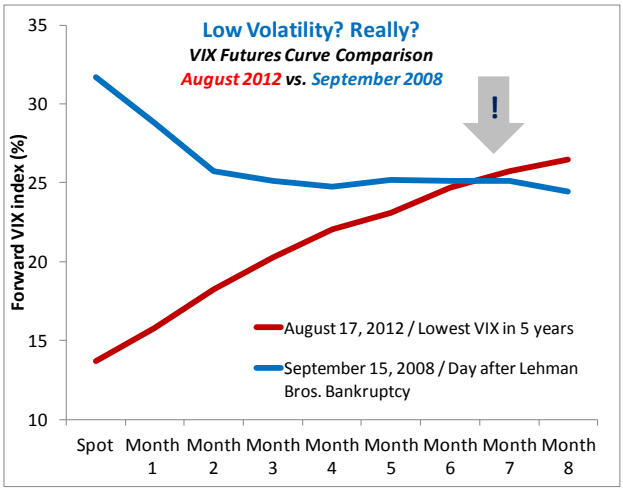


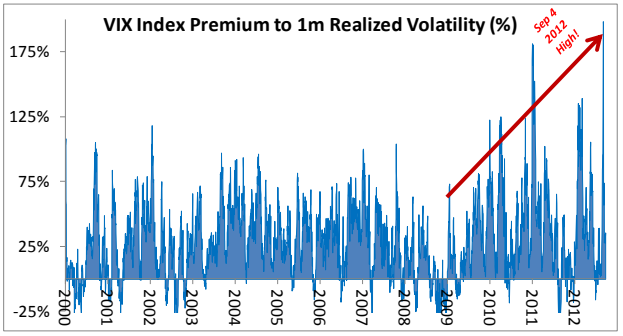
We don't know whether the US fiscal cliff will result in recession. We don't know what a collapse of the Euro would do to the global economy. We don't know whether China will experience a hard landing or whether Israel will start war with Iran… These are "known unknowns". The probability of each shock event is already priced into markets meaning their occurrence may still undermine returns but not as much as if they came out of the blue. What are the "unknown unknowns"? Ask a psychic… I have no idea (that is the point) but if someone put a gun to my head and forced me to guess I would answer vol-of-vol itself. The more traders use 'uncertainty' as a market timing indicator the more unstable and cross-correlated markets will become. If you extend that concept to high frequency market microstructure and take it to the logical extreme you may see the problem. ***Today everyone is afraid of the next 2008 but I am afraid of the next 1987 (in equity or bonds).***

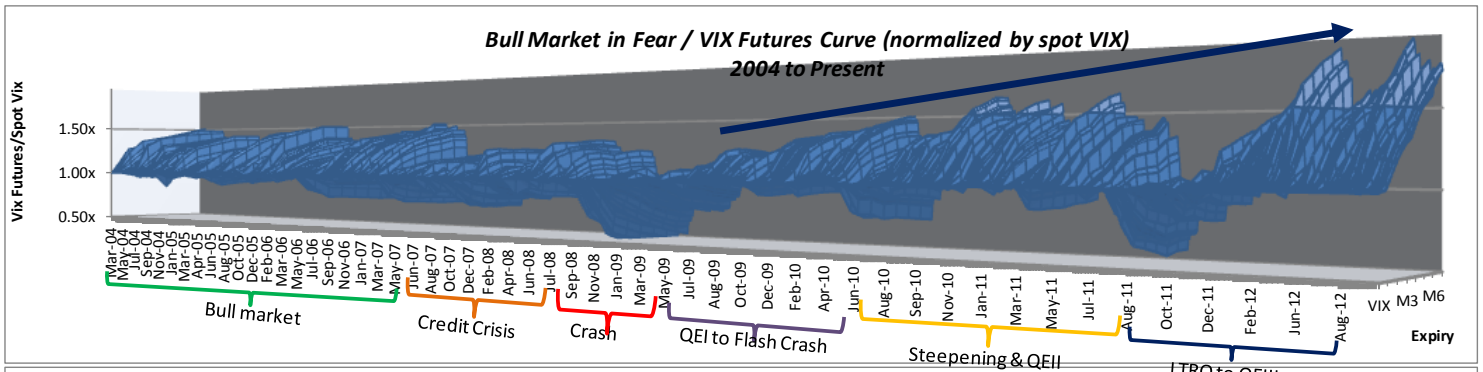
Volatility is cheap and expensive at the same time

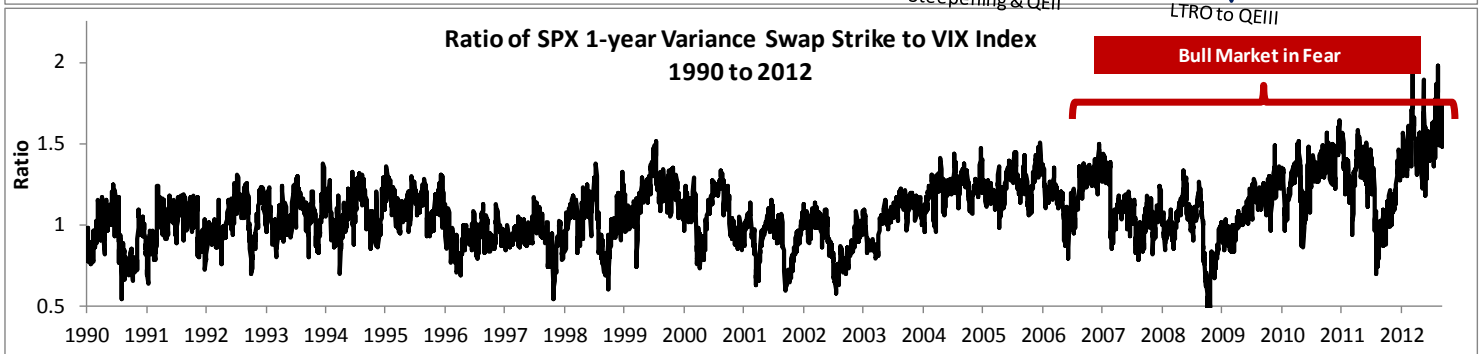
Today volatility is its own impossible object. ***Volatility markets are simultaneously calm on the surface and fearful underneath.*** Look at volatility one way and you see nothing but complacency with five year lows in the VIX index, but look at it from a slightly different angle you will see a furious ***bull market in fear***. On August 17th the VIX index fell to the lowest level since the summer of 2007 generating significant media attention. Every time the VIX falls into the low-teens you get the same clichéd range of "volatility is cheap" and "now is a good time to hedge" sound bites from the financial media.

Low spot-volatility does not mean cheap volatility. Volatility may be cosmetically low compared to historical averages but this ignores many important factors. For example, this past August it was more expensive to buy 1-year forward volatility with the VIX at 13.45 than it was one day after Lehman went bankrupt in September 2008 when the VIX was above 31. Think about that! Even though spot volatility was 18 points lower (-57%) the VIX futures on the back of the curve were priced higher in August than they were during the start of the financial crisis. If you had followed the advice of the media your "cheap" volatility hedge executed at the August 2012 low in vol would have already lost -12% of its value even as the VIX increased by +15%. To this point an internet stock was not cheap in 1999 just because it traded under $10. The absolute price is not relevant when looking at fundamental value. Volatility has fundamentals too and what matters is not the absolute price but the variance premium paid in relation to the expected movement of the underlying asset. To this effect, the VIX in the low-teens was also expensive on the basis of how it tracked actual movement in the S&P 500 index. The VIX recorded its highest premium to realized volatility in history in early September when it briefly traded at 200% compared to a historical average of 39%. You cannot expect to succeed hedging your portfolio by following simplistic heuristics based on the absolute price of the VIX index. You will get killed doing this. The smart hedger must utilize a relative value approach. Today this means buying less expensive volatility on the front of the curve and selling overpriced volatility on the back while dynamically hedging exposures.







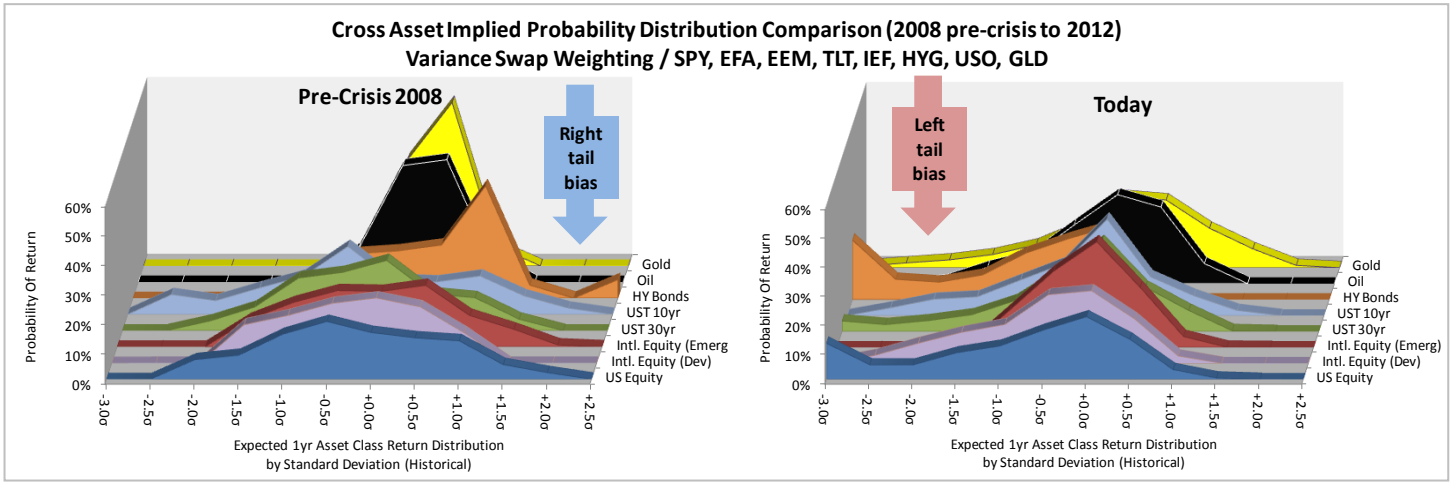


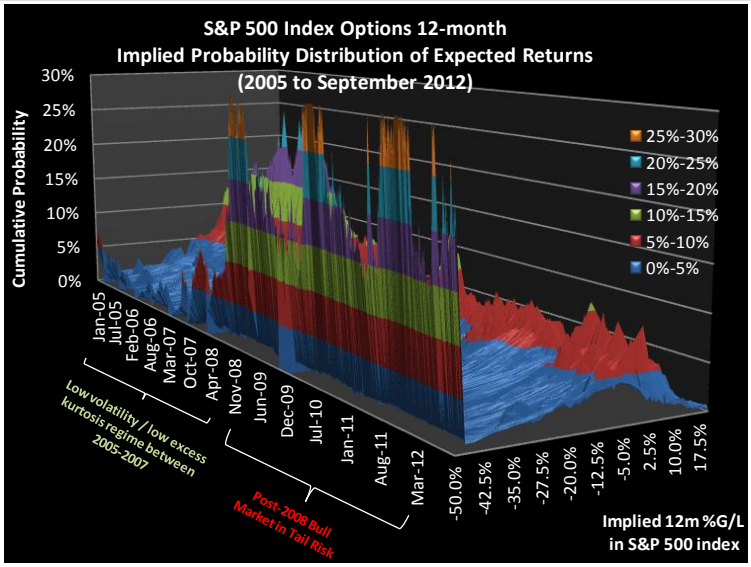
Fear is a better reason to buy than fundamentals

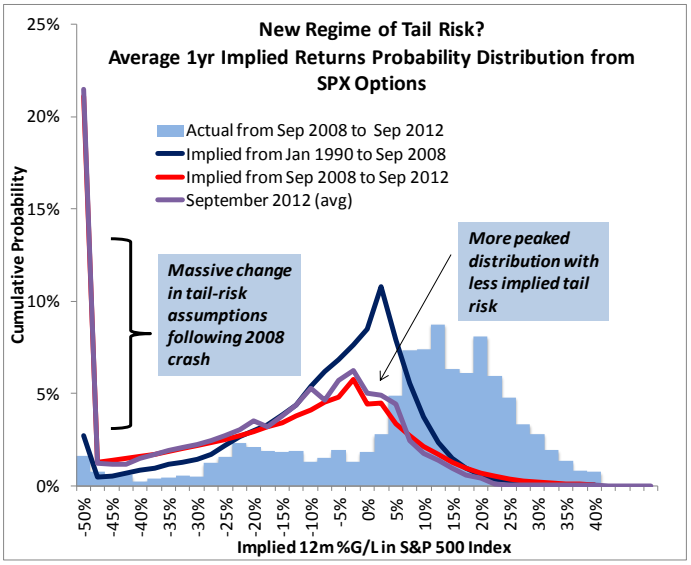
We are trapped in a binary market governed by the flip of a macroeconomic coin with deflation on one side (left tail) and government reflation on the other (right tail). It is easy to forget the coin has two sides. The more people fear the left tail of the probability distribution the more you should buy the right. The post-financial crash options market is marked by the transfer of risk premium from the center of the return distribution to the left tail in what I refer to as a 'bull market in fear' (see comparison below). The phenomenon is not unique to domestic equity and can be observed in many asset classes. Tail risk bets protecting against extreme declines in equity markets are still priced near multiple decade highs. In my last research letter I made the case that the fear of deflation was not misplaced but rather mispriced ("Volatility at World's End: Deflation, Hyperinflation, and the Alchemy of Risk"). Central bank intervention in markets has the effect of suppressing spot volatility but perception of risk is not destroyed and instead is shifted to the left tail of the distribution.

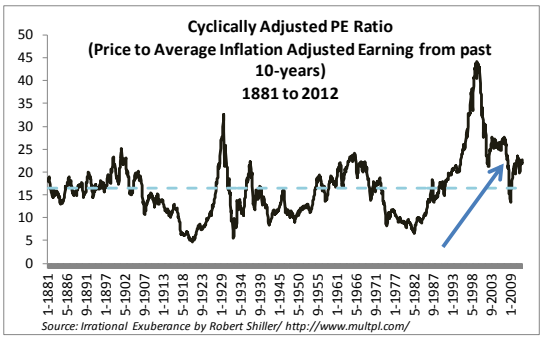
It is hard to have a bear market in a bull-market for fear

When everyone has already bought portfolio insurance doesn't that mean you kind of own portfolio insurance too? When you, your neighbor, the neighbor's dog, and the Federal Reserve are all hedging the market, it is very hard for that market to decline in an uncontrollable fashion. This is exactly where we are today with monetary expansion and very steep volatility curves. The worst crashes usually occur when investors are <u>not prepared</u> or <u>excessively leveraged</u>. Very rarely are you ambushed when you are totally ready for it. Widespread hedging provides an unseen floor to equity prices. In a hedged market the majority of investors are 1) not forced to sell in a decline or; 2) have the ability to buy on the dip. Even when markets are hedged self-reinforcing crashes often occur in phases with the first wave wiping out weak portfolio insurance defenses and the second wiping out portfolio equity (see September 2008). It may be counterintuitive but you shouldn't be afraid to climb the wall of worry when there is a mosh pit of hedged investors below you and below them a central bank financed mound of pillows stuffed with fiat currency. When the Fed is scared they expand their balance sheet to support the economy. When investors are scared they buy portfolio insurance putting a floor underneath stock prices. Ironically markets are at their very best when everyone is scared out of their minds.







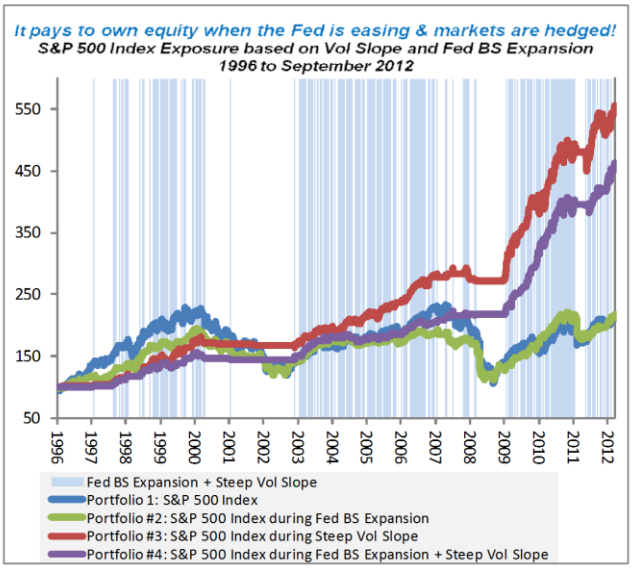


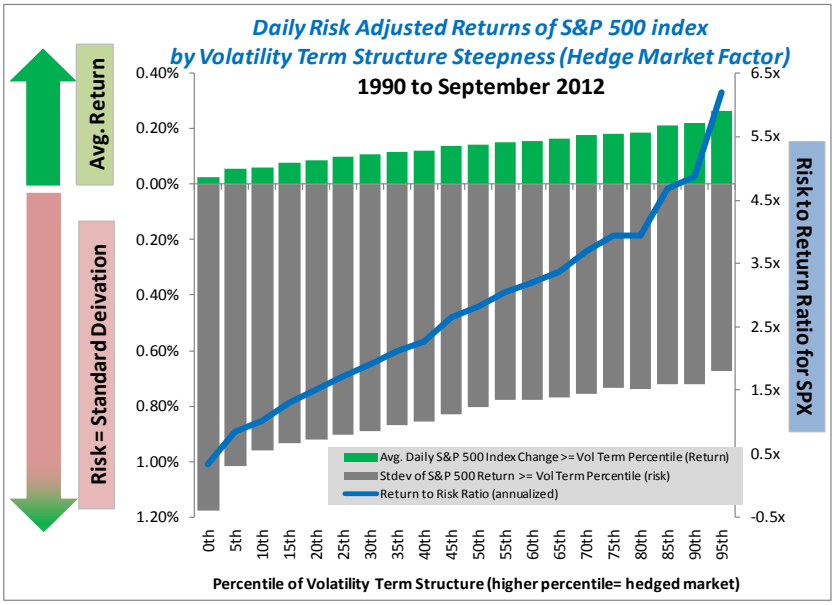
Fear over Fundamentals: Fear is a better reason than fundamentals to own stocks right now. The cyclically adjusted price-to-earnings ratio of the S&P 500 index is higher today at 22.86 than it was in July of 2008 and 6+ points over its historical average. Equities are expensive… but given the high degree of investor hedging and the Fed back-stop they can get even more expensive. During weeks with a steeper than average volatility term structure (1-year variance swap strike to VIX ratio) combined with central bank balance sheet expansion the S&P 500 index has increased **+0.61%** on average with a 66% chance of a gain since 1996. This compares favorably to the average weekly return of **+0.09%** and 55% chance of gain over that same holding period. To this point a simple tactical allocation strategy that switches between the S&P 500 index and cash based on a steep volatility term structure and simultaneous Fed balance sheet expansion would have outperformed a majority of hedge funds since 1996. The "tactical fear" strategy would have earned a **+9.9%** annual return with a 1.29x return to risk ratio compared to **+4.83%** annually with 0.25x ratio for the S&P 500 index (see below). Look to monetize further potential upside in domestic equity through the purchase of call options which minimize exposure to the left tail and take advantage of the lower than normal volatility on the right. If the volatility term structure starts flattening pull back your equity exposure ***quickly***. It pays to face your fears. If the Fed follows through on an idea of targeting nominal GDP they may as well just start targeting equity PE ratios as well. Fear will be the only "fundamental" we have left.

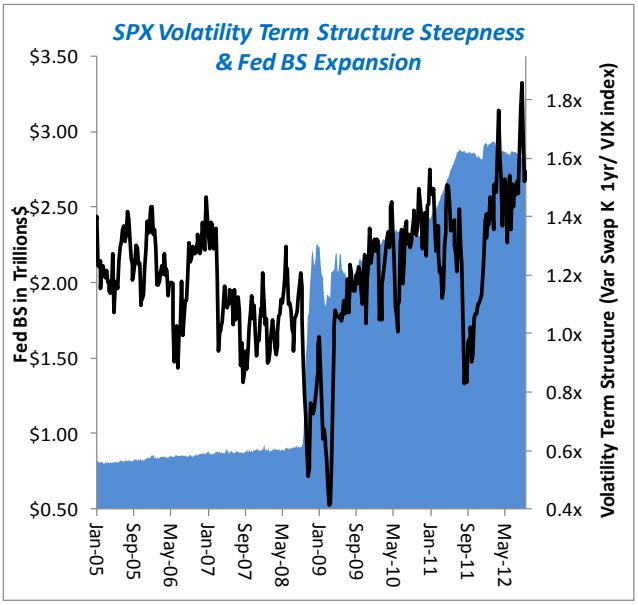
Strategic Allocation to S&P 500 Index based on Volatility Term Structure (Slope) and Fed Balance Sheet Expansion

S&P 500 Index Weekly Returns 1996 to September 2012

	Portfolio #1	Portfolio #2	Portfolio #3	Portfolio #4
Index	S&P 500 Index	S&P 500 Index	S&P 500 Index	S&P 500 Index
Condition #1	n.a.	Fed BS +	n.a.	Fed BS +
Condition #2	n.a.	n.a.	Volatility Slope >= 50th Percentile	Volatility Slope >= 50th Percentile
Returns by Investment Period				
Average Weekly Return	0.09%	0.17%	0.37%	0.61%
Weekly Sigma	2.52%	2.59%	1.78%	1.75%
Weekly Downside Sigma	1.95%	2.12%	1.16%	1.09%
Weekly Win %	54.85%	56.89%	60.48%	66.14%
Recommended Allocation	5.10%	9.48%	25.35%	38.61%
Portfolio Results				
Annualized Return	4.83%	4.91%	11.16%	9.90%
Peak to Trough Decline	-60%	-48%	-10%	-7%
Return to Drawdown	0.08x	0.10x	1.09x	1.44x
Return to Risk	0.25x	0.34x	1.08x	1.29x
Gain to Pain	0.33x	1.23x	0.31x	1.17x





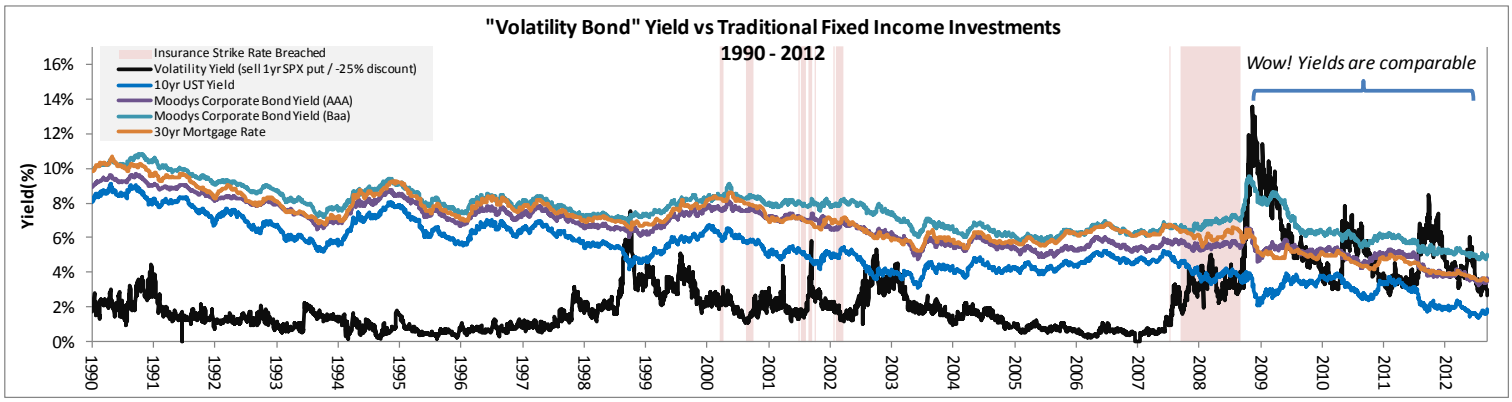


Risk-free assets are risky

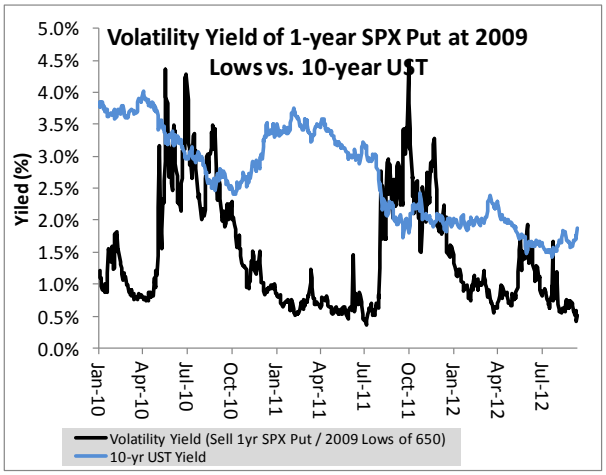
We all know shorting volatility is dangerous. We learned our lessons from the financial crisis. We all meticulously read "The Black Swan" and then watched the scary movie adaption of the book starring Natalie Portman. We all know that this method produces a steady stream of smooth returns making people think you are a genius until the inevitable disaster forces you to pawn off your Nobel Prize. We all know that shorting volatility will cause you to go insane with a twisted psycho-sexual obsession to master the art of ballet. It's picking up pennies in front of a convexity steamroller. Don't do it. Ever!! Worst of all … If you ever …ever… short volatility… Nassim Taleb will personally insult you and hurt your feelings [(13)].

Knowing these facts I would like to pose a question… which is riskier right now? Shorting a collateralized far out-of-the-money S&P 500 index put or buying a "risk-free" US treasury bond? In the "bull market for fear" and "bubble in safety" the paradox is that these two vastly different investments have shockingly similar risk to return profiles (albeit to different risk factors). This goes against everything you have ever been taught in business school or on a CFA exam. In fact I will attempt to make a semi-compelling argument that the collateralized far-OTM put sale offers… gasp… a better risk to return profile than a long-dated UST. For the record I don't recommend either.

First off measuring the risk to reward of a volatility short position is often a complex endeavor involving greeks like gammas, vegas, volgas, and vanna whites [(14)]. Let's just simplify that entire process and "pretend" a put option is an alternative form of a bond. As an investor in this hypothetical "volatility bond" you receive an annualized "volatility yield" represented by the premium of the option divided by the capital commitment required to fund the obligation. In return for this yield you assume the risk of "default", essentially meaning an obligation to buy the S&P 500 index at a pre-defined discount to current market value (say -25% or -50%). Now you will collateralize that option by setting aside the dollar amount of monies over the specified term needed to cover that purchase commitment. That collateral is equivalent to the "face value" of the bond and the "yield" is the option premium divided by that collateral and annualized. If the default event is a $100 stock falling to the -50% strike price in one year you would set aside $50 for the term of the commitment to cover mark-to-mark losses on the short option position. If you receive $2.5 in premium for selling the put option your yield is 5% (against a face value of $50). We looked at several different types of hypothetical "volatility bonds". The first requires you to purchase the S&P 500 Index at a -25% discount to the current price for the duration of a year. The second obligates you to buy the S&P 500 index near the March 6, 2009 lows (650 strike price or -55% lower) for the duration of a year. We also obtained bank pricing on a 10-year over-the-counter put option at the 2009 low of 666. We can then compare these "volatility yields" to traditional fixed income yields. No complex greeks required.



For the first time in history the volatility bond yield is consistently competitive with the yield on a wide variety of traditional fixed income investments (see above). What does it say when the market will compensate you more in annualized yield for the obligation to buy the S&P 500 index at the 2009 devil's bottom of 666 (1.90% annualized yield for 10-year OTC put) than it will to own a government bond (1.87% yield for 10-year UST) of equivalent maturity? Consider that the 1-year volatility bond with a -25% SPX purchase commitment currently yields 2.69% annually or 82 basis point over the 10-year UST. In periods of equity market duress the spread can go much higher hitting 454 basis points over the 10yr UST this past May. I know what you are thinking… what about the risks?



Yield to Risk / UST Bond vs. "Volatility Bond" (Collateralized Short Put on S&P 500 index)

Investment			Stress Test #1			Stress Test #2			Stress Test #3			Stress Test #4		
Volatility Bond / Short SPX Put + Collateral			**SPX ↓ -9%**			**SPX ↓ -14%**			**SPX ↓ -25%**			**SPX ↓ -50%**		
	Yield	Maturity	Est. MTM Loss	Historic Prob. %	Risk to Reward	Est. MTM Loss	Historic Prob. %	Risk to Reward	Est. MTM Loss	Historic Prob. %	Risk to Reward	Est. MTM Loss	Historic Prob. %	Risk to Reward
SPX Put (Strike @-25%)	2.69%	1 year	-2%	68%	1.373x	-4%	39%	0.616x	-11%	13%	0.242x	-33%	2%	0.081x
SPX Put (Strike @2009 lows)	0.51%	1 year	-0.4%	68%	1.319x	-0.9%	39%	0.588x	-3%	13%	0.176x	-15%	2%	0.034x
US Treasury Bond			**UST Rates ↑ 100bps**			**UST Rate ↑ 200bps**			**UST Rate ↑ 325bps**			**UST Rate ↑ 600bps**		
	Yield	Maturity	Est. MTM Loss	Historic Prob. %	Risk to Reward	Est. MTM Loss	Historic Prob. %	Risk to Reward	Est. MTM Loss	Historic Prob. %	Risk to Reward	Est. MTM Loss	Historic Prob. %	Risk to Reward
US Treasury Bond / 10-year	1.87%	10 years	-9%	68%	0.214x	-17%	39%	0.113x	-25%	13%	0.074x	-41%	2%	0.045x
US Treasury Bond /30-year	3.09%	30 years	-18%	68%	0.176x	-31%	39%	0.099x	-44%	13%	0.070x	-62%	2%	0.050x

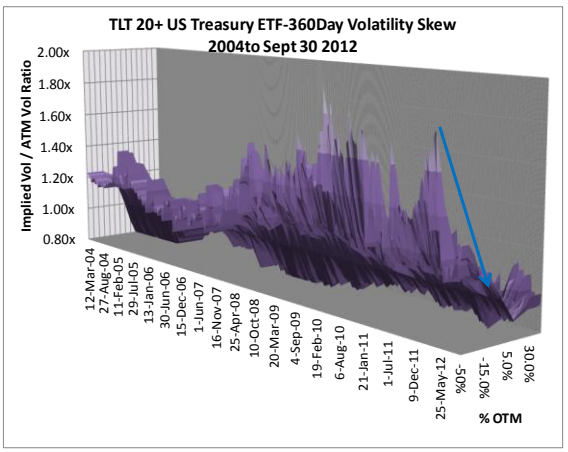
Note: All data as of September 14, 2012. Estimated unrealized loss on position given stress test scenario. Historic probability data based on period of 1960 - 2012 for the UST bonds and 1950 to 2012 for the S&P 500 index.
Option pricing based on estimated local volatility shifts, however actual shifts may differ from estimates during a real crash depending. All stress tests are assumed to occur close to the purchase period of the instrument. Unrealized losses may differ closer to maturity.

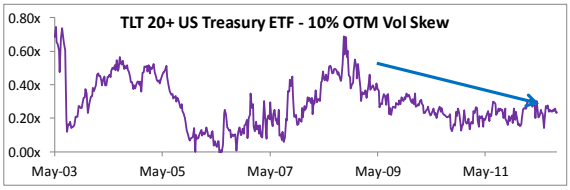
The volatility bond and the UST bond have opposite risks factors as the first is exposed to deflation (stocks crashing) and the second inflation (higher interest rates). For the purposes of this analysis we assume a neutral macro-economic view. As a baseline for comparison our stress test uses historical bond and equity prices over multiple decades to match the equivalent probability of each stress event. It may *feel* as if a 325 basis point increase in rates is extraordinary but it is easy to forget that the historical probability of that occurring is much greater (13%) than that of a 2008 style crash in equities (2%). Of course this is backward looking. Ultimately the true *future* probability estimate is always left to the best judgment of the investor.

Mark-to-Market Risk: Fair comparison of risk includes analysis of potential unrealized losses for both investments when exposed to adverse market conditions as modeled by the stress tests above. The volatility bond will experience a mark-to-market loss if stocks decline and vol rises, however if the short put option remains out-of-the-money by maturity those losses will not be realized and the investor will keep the full premium. In a similar manner the UST bond will have negative price swings if rates increase but could still make all payments on time. The investor holding either instrument to maturity may be none the wiser if he received his principal back in full and never looked at mark-to-market prices (a retired broker once told me this was how client reporting of fixed income worked at his firm back in the rising rate environment of the 1970s). Important to note that both positions have convex return profiles and prices will not change linearly given shifts in volatility or rates.

Default Risk: I think it is funny when academics claim that the US government will never default because it can just print money to pay off its debt obligations. ***That is the logical equivalent of saying my house will never be burglarized because if someone tried to break in I could just light it on fire.*** For the UST bond inflation and currency devaluation are alternative forms of default. For the volatility bond the definition of default is not as complex. If the short put ended in-the-money at maturity the investor would be obligated to own the discounted SPX at the higher strike rate resulting in a loss on posted collateral. This "default" scenario may not be a bad thing if the investor doesn't mind owning stocks at a -50% or -25% discount from today but it still counts for our purposes. Hence the volatility bond has much higher risk here. One unique attribute of the volatility bond is that it is a contractual obligation to ignore behavioral bias and purchase stocks only during periods of deep discounted value.

When the "bull market in fear" meets a "bubble in safety" a collateralized short volatility position and "risk-free' UST bond have shockingly similar risk-to-reward payoffs. Of course you would rather own the UST bond in deflation or the volatility bond in inflation but we are assuming a risk-neutral world. To this effect both investments suffer comparable losses to their worst case scenarios. Without endorsing either investment, when evaluated on a pure risk-to-reward framework the volatility bond (with embedded short optionality) is superior to UST bonds at current prices. What kind of world do we live in where the risk-return pay-off of short selling equity volatility is equal or better to that of a supposedly "risk-free" government bond? The UST bond market is one of the most liquid markets in the world where investors look to first for preservation of capital during periods of crisis. Now the market for safety has an efficient frontier on par with the penny in front of the steamroller trade? If you don't find that scary then you're not paying attention. It used to be that you would post margin against your tail risk options using risk-free UST bonds. Now those risk-free assets are the source of the tail-risk. ***When risk-free is risky maybe it is time to buy volatility on safety itself (see right diagram).***





Common sense says do not trust your common sense

Aesop's Fables (numbered 40 in the Perry Index)

Mathematician and the Artist[15]

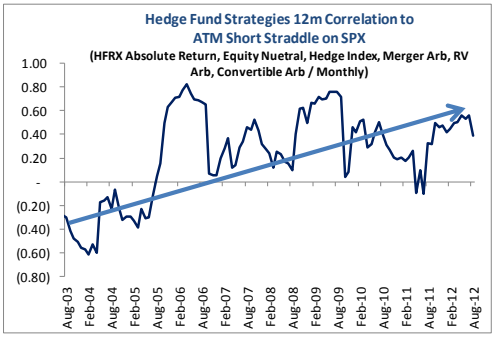
The mathematician crosses paths with an artist on a crowded village street. The mathematician is meticulously dressed in the finest business-casual attire of the day while the artist is unshaven and haggard as if he just woke up from bed. "Excuse me! I must ask you something" the artist says with urgency. "What do you want? My time is valuable" replies the mathematician. "I am an artist; I create alternate realities that do not yet exist to explore the human condition". The mathematician laughs, "My job is to model reality as it is, not invent new ones" He points to the busy street, "the movement of the people, the animals, the weather, the geometry of the buildings... it can all be modeled perfectly through numbers. Imaginary worlds and alternate realities are the work of children …mathematics allows for no hypocrisy and no vagueness"[16] The artist smiles**,** "well my hypocrisy knows no bounds."[17] The mathematician adds, "You are a fool! What type of artist are you anyway? Painter, sculptor?" "Cut!" screams the artist. Time stops… wheels stop turning, crowds freeze in their paths, the sun goes black leaving the world in darkness. "I'm a Hollywood film director and you somehow walked past security onto our soundstage and right into our shot! Would you mind moving along so we can get the extras back in place?"

A woodcut from Spain (dated 1489) depicting the Mathematician in business casual attire and Hollywood soundstage from the famous Aesop's Fable (Perry Index #40)

Mathematics is the language of god… but art is the highest form of mathematics.
Never forget investing is an art

Common Sense in the Pursuit of Alpha

Hedge fund marketing conferences are sort of like late-night infomercials except far less entertaining. If you ever have the poor fortune of attending one you will notice that everyone is always talking about "alpha". As much as everyone talks about it not a lot of funds are actually finding it as the HFRX Global Hedge Fund Index is up only **+2.76%** way behind the **+14.56%** performance for the S&P 500 index through September. In these highly crowded and correlated markets the asset selection component is negated and alpha becomes increasingly driven by rising and falling volatility and liquidity. When this happens many classic hedge fund strategies converge to simple synthetic volatility trades. You can see this by the high correlation of monthly returns for a range of hedge fund strategies vs. the monthly return of rolling an ATM short straddle on the S&P 500 index. In a highly correlated world alpha generation is often a closeted volatility short. There is also the problem of hedge funds crowding into the same trades. I remember at some emerging manager conference where a woman said that her definition of "*emerging*" was a fund with *only* $1 billion and anything less was not worth consideration. That's a little like saying you heard the cupcakes are really good at your neighborhood bakery but you won't shop there until it is listed on the NASDAQ. Today 49% of hedge fund assets are controlled by the top 3% of the largest institutions. If everyone is chasing the same investments a lot of that "alpha" begins to look like "beta" with leverage or liquidity premium. This is why many of the largest managers are actually giving money back to investors. You do not "think different" because you own AAPL stock.



To this effect I recently met with an institutional investor who told me that high cross-asset correlations between investments were hurting their performance. They were interested in volatility strategies as a potential solution and my return profile was intriguing to them. During my presentation they asked what "box does your core strategy fit into?" I told them it didn't cleanly fit into any of the hedge fund strategy "boxes" they routinely index. My response was not well received and I was told verbatim that I had a "marketing problem" if my fund couldn't "fit into a box". I understood right then and there why they had diversification issues. I look at things very differently…. that marketing problem is a competitive edge.

Despite the great lip service paid to the pursuit of "alpha" I think many institutions are not compensated to take risks to find it and therefore are perfectly happy with "beta" wrapped in pretty bow. This is one reason why the biggest funds get a majority of the assets despite strong academic evidence that emerging funds outperform. Institutional investors prefer to play it safe so they can keep their jobs. I don't blame them given their incentive structure as it is the path of least resistance. Common sense says you don't get fired by investing in the establishment. Common sense also says you'll *never* lose money investing in a UST bond.

Do not blindly assume old fables are genuine or true
What may be common sense today could be very dangerous tomorrow

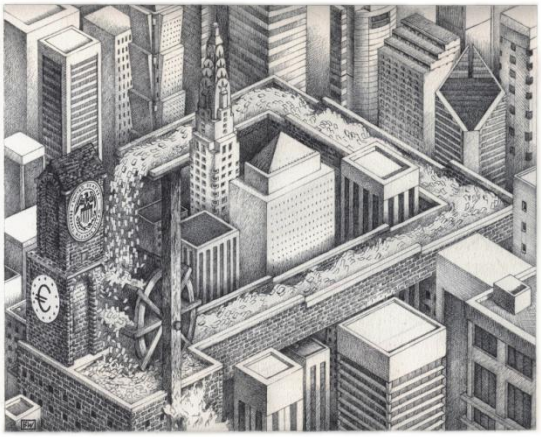
Definition of COMMON SENSE
: sound and prudent judgment based on a simple perception of the situation or facts
Merriam-Webster

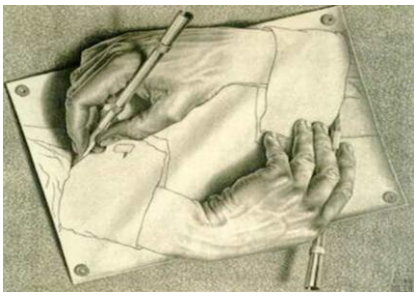
What is the common sense of an MC Escher painting? There is none – that is the point.

When the market is an impossible object the price of risk can change radically as perception shifts. Hence what may be sound judgment one minute may be completely foolish the next. If two contradictory ideas can exist simultaneously then there is no such thing as "simple perception" anymore. How is it possible for safety to be risky and for otherwise calm markets to be rich in fear?

Paradox is now fundamental. The investor who can adapt to shifting perspectives will endure the volatility of an impossible object. Common sense says do not trust your common sense anymore. Don't live in a box or walk a flight of stairs that leads back from whence you came. We cannot assume that the paradigm of the last three decades of lower interest rates and debt expansion will be relevant going forward nor can we find shelter in the consensus rules formed around that standard.

Today's market is the most infinitely complex impossible object ever imagined and for the investor to thrive in it he or she must think creatively and be adaptable to the changing modes of acuity. You must be able to imagine different realistic states of the world and think as both the mathematician and the artist. ***Ironically he or she who plays it safe may be assuming the greatest risk of all.***





Vive la vérité

Vive la volatilité

Artemis Vega Fund, L.P.

Christopher R. Cole, CFA
Managing Partner and Portfolio Manager
Artemis Capital Management, L.L.C.

The General Partner has hired Unkar Systems, Inc. as NAV Calculation Agent and the reported rates of return are produced by Unkar for Artemis Vega Fund LP. Actual investor performance may differ depending on the timing of cash flows and fee structure. Past performance not indicative of future returns.

Artwork

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"Plato's Allegory of the Cave" istockphoto.com
"Aesop woodcut Spain 1489" Public Domain/ please note this does not depict the mathmatician but instead Aesop himself surrounded by event from his stories.
"Waterfall" by M.C. Escher / 1961 Lithograph / Fair Use Copyright Law
"Drawing Hands" by M.C. Escher / 1948 Lithograph / Fair Use Copyright Law
"Liberty Leading the People" by Eugène Delacroix 1830 / public domain

Notes & Data

- *Unless otherwise noted all % differences are taken on a logarithmic basis. Price changes an volatility measurements are calculated according to the following formula % Change = LN (Current Price / Previous Price)*
- *Security price data from Bloomberg and Yahoo Finance*
- *Options data from Market Data Express with calculations executed by Artemis Capital Management LLC*
- *Central bank balance sheet data obtained directly from the Federal Reserve, Bank of England, Bank of Japan, European Central Bank, and the Bank of International Settlements*

Footnotes & Citations

1. *Definition of "Impossible Object" / Wikipedia / http://en.wikipedia.org/wiki/Impossible_object*
2. *"The Scary Math Behind The Mechanics of QE3, and why Bernanke's Hands May be Tied" ZeroHedge September 7, 2012 / statistics from Michael Schumacher of UBS September 2012*
3. *"Breakfast with David" by David Rosenberg / Gluskin Sheff Research September 14, 2012*
4. *"The Pre-FOMC Announcement Drift" by David O. Lucca & Emanuel Moench / Federal Reserve Board of New York Staff Reports/ Staff Report no. 512 / September 2011 and revised June 2012*
5. *Shadow Government Statistics/ John Williams / www.shadowstats.com*
6. *"Fed seeks 'wealth effect' so we'll feel like spending" Associated Press / September 16, 2012*
7. *"ECB Policy Maker Says Bank May Not Spend a Cent on Bonds" by Jeff Black and Stelios Orphanides / Bloomberg September 13, 2012*
8. *Spence, Ron (2003), Darren McCarty: Enforcing by Committee, Hockey Enforcers, retrieved April 12, 2007.*
9. *"Transcript of Chairman Bernanke's Press Conference" US Federal Reserve / September 13, 2012*
10. *"Simulacra and Simulation" by Jean Baudrillard / University of Michigan / 1994*
11. *"Transcript of Chairman Bernanke's Press Conference" US Federal Reserve / September 13, 2012*
    Statistic courtesy of Joseph Gagnon or the Peterson Institute for International Economics
12. *"Unknown Unknowns: Vol-of-Vol and the Cross Section of Stock Returns" Guido Baltussen, Sjoerd Van Bekkum and Bart Van Der Grient / Erasmus School of Economics & Robeco Quantitative Strategies/ July 30, 2012*
13. *"The Black Swan: the impact of the highly improbable" by Nassim Nicholas Taleb / Random House 2007*
    Note: I am not certain if Nassim Taleb will personally insult every person that shorts volatility but it is a tail risk.
14. *Vanna is the sensitivity of an option delta with respect to change in volatility/ Vanna White is the hostess of the popular game show "Wheel of Fortune" and is not involved in any known option pricing framework.*
15. *Aesop's fables are a collection of stories credited to Aesop who was a slave and story-teller that lived in Greece between 620 and 560 BC. The story of the "Mathematician and Artist" is NOT one of Aesop's fables as evidenced by the fact that there were no Hollywood directors in Ancient Greece. Had Aesop been around today I am certain he would approve of this fable so I took the creative liberty of attributing it to him. The actual #40 fable in the Perry Index refers to the story of "The Astrologer who Fell into a Well".*
16. *Quote attributable to Marie-Henri Beyle better known as Stendhal.*
17. *Quote attributable to Doc Holiday (played by Val Kilmer) in the 1993 film Tombstone directed by George Cosmatos and written by Kevin Jarre*