

Blue PAPER

Managing Risk in a More Volatile Investment World

IN BRIEF

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Living in a More Volatile Investment World

Financial markets have experienced a dramatic increase in volatility. We believe that this trend might continue in the current zero-rate environment.

Increase in Correlations over the Last Decade

Over the last decade, cross-asset correlations roughly doubled. Globalization of capital markets, global deleveraging and new risk-management techniques could have driven the secular increase of cross-asset correlations.

Risk Management Tools

In periods of high volatility and correlations, investors' portfolios could be exposed to a higher-than-expected risk. That's why we have developed a set of proprietary tools that aims at limiting portfolio's volatility and drawdown.



Michael Temple
Senior Vice President,
Director of Credit Research, US



Francesco Sandrini
Head of Multi Asset Stock Solutions

Key Insights

Over the last decade, the equity markets have experienced a dramatic increase in volatility. In the medium to long-term we believe that certain issues, such as Central Banks exit strategies, public debt deleveraging and the transformation of emerging economies could still lead to episodes of high volatility.

Today's other main source of uncertainty for investors is the increase in cross-asset correlations. In our opinion, there are many reasons behind this increase such as the globalization of financial markets, global deleveraging and the alignment in major Central Banks' policies.

The Euro Debt Crisis has also contributed to the break-up of some correlation dynamics. It is the case, for instance, of the correlation of the Italian and, more generally, euro peripheral countries' government bonds with the European equity market, due to the perception of sovereign risk.

This environment is particularly challenging for investors, as it results in periods of dramatic increases in their portfolio risk. In fact, even well diversified portfolios can incur in spikes in volatilities and higher than expected drawdowns during what we call the "risk-off" phases.

Our analysis shows that in 2008 the drawdown registered by a sample balance portfolio (50% US Aggregate Bond and 50% US Equity) has almost doubled the maximum drawdown signed in the previous 30 years. This surge in volatility and correlations has, therefore, resulted in shifting investor demands. In fact, while in the past the investors' target was mostly related to a benchmark, today, the investors' goal is to achieve a predefined target return while limiting the risk of downside.

To respond to our clients' needs, we have developed a proprietary methodology called "VaRIO." This tool provides a modern dynamic risk management system that sets the client's individual risk profile at the centre of all management decisions and helps limit the portfolio downside.

In addition, to facilitate Portfolio Managers in reviewing the portfolio risk allocation over time, we have developed an in-house tool named "Risk Budgeting System." This system is an integral part of our investment process and allows the optimal mix of portfolio strategies based on a quantitative assessment of their contribution to overall portfolio risk.

In conclusion, at Pioneer Investments, we believe that the increase in volatility and cross-asset class correlations experienced over the last years is a trend that might continue in the future. That's why, in our opinion, it's important to focus on a strong risk management discipline in order to deliver investment solutions and tools, which can help to navigate different and more challenging market environments.

Contributions

Michael Temple is Senior Vice President of Pioneer Investment Management, Inc., the US investment division of Pioneer Investments, and Director of Credit Research, US He is responsible for oversight of Pioneer Investments' US credit research department.

Francesco Sandrini is the Head of Multi Asset Stock Solutions at Pioneer Investments. He leads a group that is responsible for managing Balanced Funds or Solutions across the organization.

Other contributors:

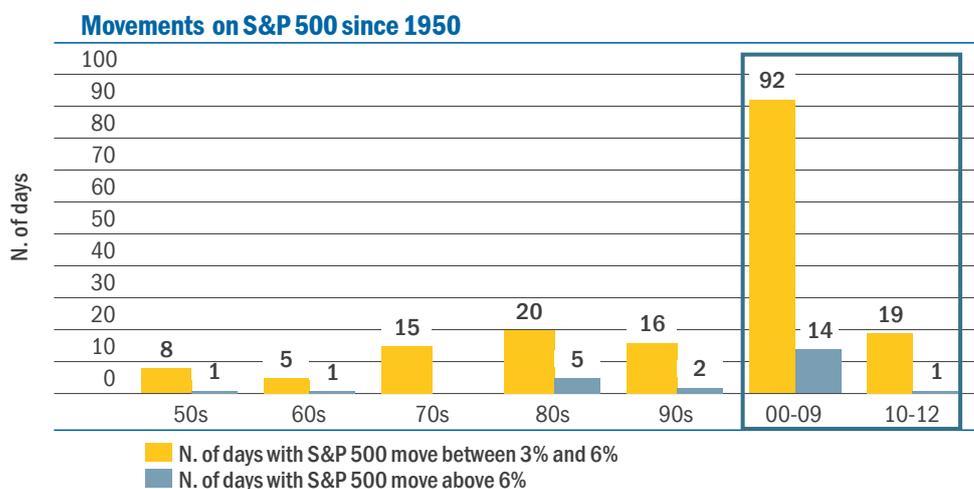
- Thomas Kruse, Head of Income & Risk Overlay Strategies
- Lorenzo Portelli, Senior Asset Allocation Analyst
- Laura Fiorot, Global Financial Communication Specialist

A paradigm shift in financial markets has taken place since 2008 into a more volatile investment environment that we believe will demand different ways of managing risk.

Living in a More Volatile Investment World

A paradigm shift in financial markets has taken place since 2008 into a more volatile investment environment that we believe will demand different ways of managing risk. In this paper we will examine the forces behind the evolution to this new paradigm and describe how investors might navigate this more volatile investment climate.

Over the last decade, the equity markets have experienced a dramatic increase in volatility; an analysis on the S&P 500 index shows how significant this increase has been. We have analyzed the number of days where the index daily move has been in the range 3-6% and the days where it has been above 6%. We found that in the decade from January 2000 to December 2009, there have been more volatile days than in the previous five decades combined. This trend looks set to continue as the number of large daily moves in the period 2010-2012 is equal or above those registered in any other decade from the 50s to the 90s.

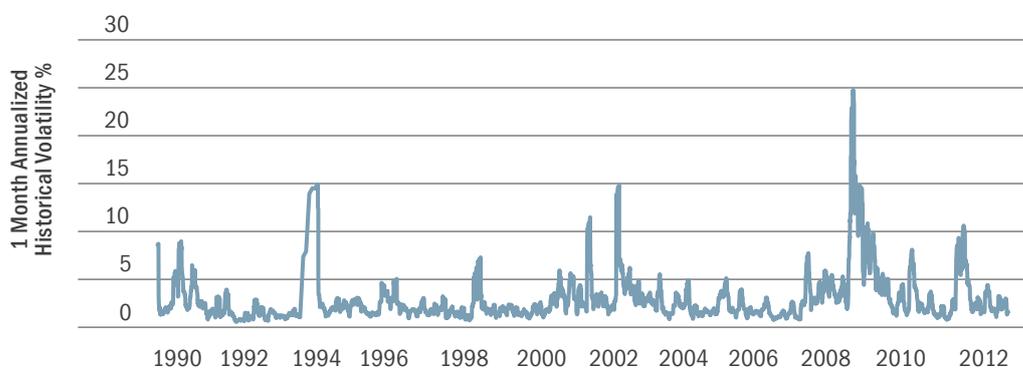


Key Points – Living in a More Volatile World

- A paradigm shift in financial markets has taken place since 2008 into a more volatile investment environment that should demand different ways of managing risk.
- We believe that today’s higher investment volatility is the consequence of attempts by Central Banks in the early 1980s to engineer a less volatile economic environment. The surge in volatility has been a common factor among different asset classes and we believe that might continue in the current zero-rate environment.
- Further volatility fertilizers could be related to some macro factors. In the long-term, the deleveraging phase, the structural rebalancing of the emerging markets economies and the effects of the Central Banks’ policies are certainly factors to watch. In the short-term, volatility episodes could be related to political gridlocks, geopolitical risk and weak economic conditions in Europe.

Equity markets were not the only ones affected by higher volatility over the last decade. During the 2008 Global Financial Crisis, extreme levels of volatility have also been registered in other asset classes such as in High Yield bonds.

High Yield Volatility

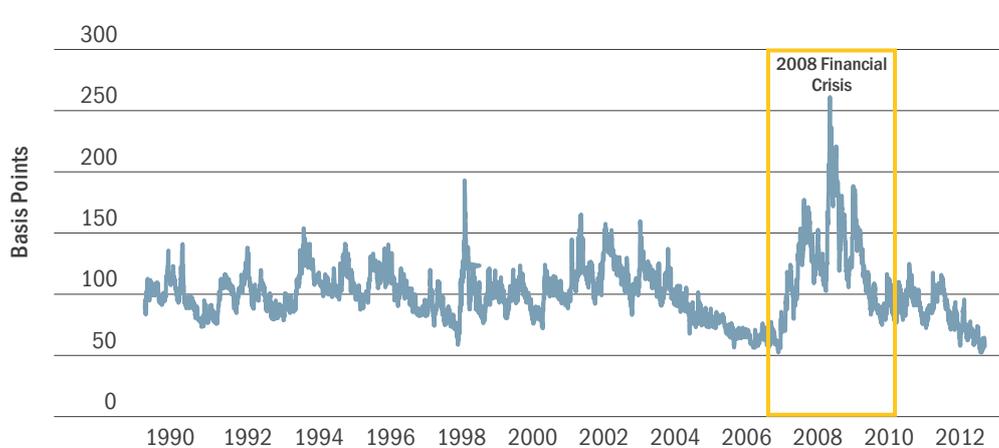


Source: Bloomberg. BofA High Yield Master II Index which measures the performance of below investment grade US bonds, data as of December 31, 2012.

Even the Treasury has signed unprecedented levels of volatility over the crisis.

It is interesting to notice that even the Treasury has signed unprecedented levels of volatility over the crisis, well above those registered in periods of rate hikes such as in 1994. This behavior could signal, that over the crisis, the dynamics of the Treasury have been less anchored by the Fed Funds rate and more linked to the market sentiment.

Treasuries Volatility



Source: Bloomberg. ML BofA Option Volatility MOVE Index, a yield curve weighted index of implied volatility on 1-month Treasury options and the weighted average of volatilities on 2-, 5-, 10-, and 30-year Treasuries, data as of December 31, 2012.

In our opinion, one of the key questions to be analyzed is how the last decade of surge in volatility has been related to the macroeconomic scenario and what could be the causes behind this increase in volatility.

In trying to answer this question, we have analyzed the equity market volatility in comparison with the US business cycles.

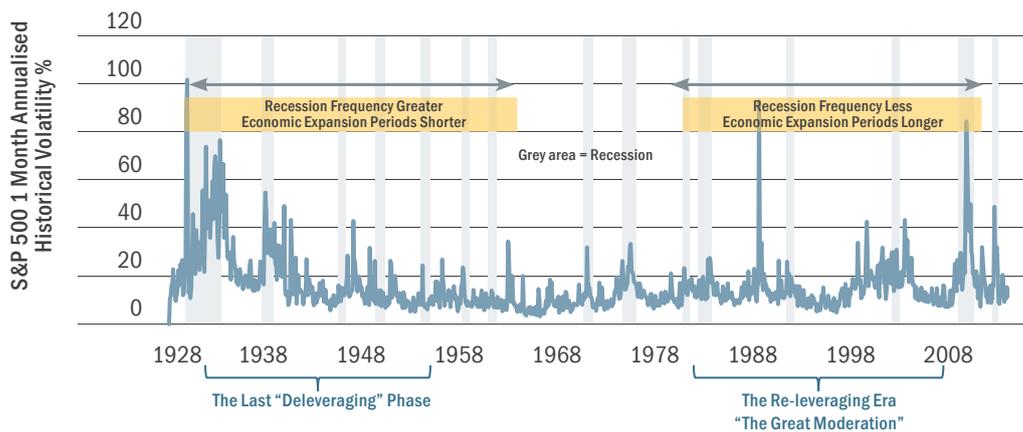
The following graph goes back to the 1930s, highlighting the deleveraging period after the great Depression and WWII and then the so called "Great Moderation" after 1982.

After the 80s, episodes of volatility spikes have been more independent from the business cycle.

We notice the greater frequency of recessions in the deleveraging phase after the big recession in 1929, when individuals, companies and the government were actively reducing their debt loads, vs. the relative calm in the re-leveraging phase from 1982 to 2008.

Another point to notice is that periods of high volatility are associated with big recession phases such as in the 30s and in 2008. However, after the 80s, the globalization of financial markets have resulted in episodes of volatility spikes independent from the business cycle. This is the case, for example, of the black Monday in 1987, well visible in the graph.

Recessions, Shorter/Expansions Longer, in the Era of Re-leveraging



Source: Bloomberg. Data as of December 31, 2012.

We believe that today’s higher investment volatility is the consequence of attempts by Central Banks to engineer a less volatile economic environment.

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This environment has its roots in the early 1980s and has spanned over two decades. Dubbed “the Great Moderation,” the period commenced with the resetting of inflation expectations by Federal Reserve (“Fed”) Chairman Volker. This psychological watershed was backstopped by the globalization trend which helped defuse inflationary influences (as overseas capacity robbed firms of pricing power, acting as a “relief valve” for domestic price pressures).

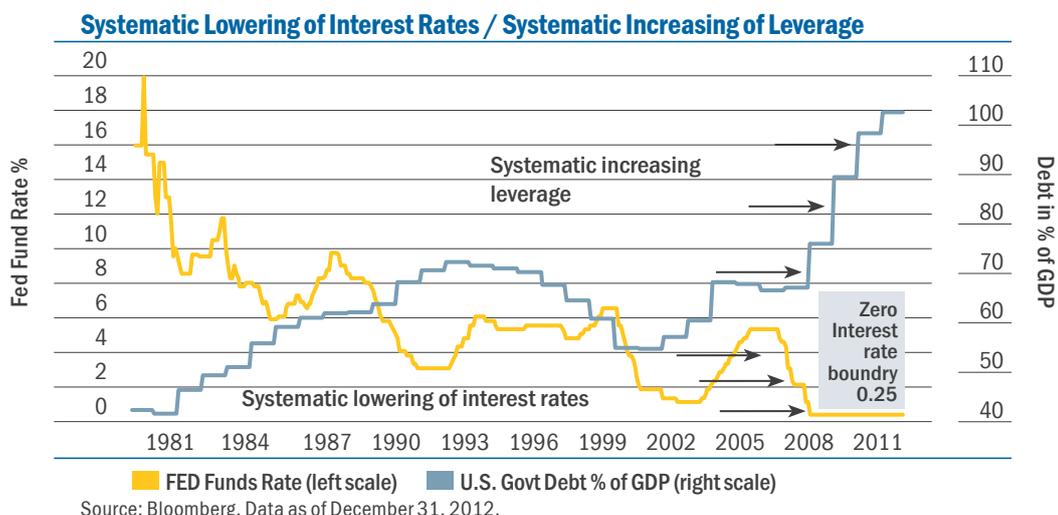
The decline in inflation and inflation volatility helped support a prolonged decline in interest rates.

The Great Moderation era led to excessive credit expansion and an underpricing of risk.

Improved corporate balance sheets, more transparent monetary policy, and new “risk-diversifying” financial instruments also lowered the perceived riskiness of investing in securities tied to economic growth. Unfortunately, the stable macroeconomic environment and strong Central Bank credibility created a false sense of security. Hyman Minsky dubbed this the “paradox of credibility.” The Great Moderation era led to excessive credit expansion and an underpricing of risk. Valuation bubbles and excess debt were the consequence, manifesting three times since the early 1990s in both the US equity and two real-estate busts.

To combat the economic aftereffects of burst bubbles, the Fed aggressively reduced interest rates. But because of increasing systematic leverage, rates had to be lowered further in each cycle, kept lower for longer, and raised less each time before the

economy tipped back into recession. In the graph below, you can see the increase in leverage and the path of lower highs and lower lows in interest rates. The story in Europe and Japan is similar.



In our opinion, the current deleveraging phase could be different from the 1930s-40s. Today, government debt balances are high, but corporate balance sheets are more sustainable and emerging markets have stronger growth.

What could be the effects of this excessive credit expansion over the next decade? Is it going to be similar to the 1930s-40s?

In our opinion, the current deleveraging phase could be different from the 1930s-40s deleveraging era, when there was a high frequency of recession periods. Today, conditions are different. In the 30s and 40s, a combination of high corporate leverage and high government leverage was a poisonous backdrop that caused more frequent recessions and periods of market instability.

Today, developed-world government debt balances are also extremely high, but at least we have more sustainable corporate balance sheets and other areas of global growth, such as the emerging markets, where government finances are in good shape.

However, the landscape remains rife with potential volatility for financial markets, independent from the business cycle. Below, we enumerate several of the more obvious factors. One could argue that a lot of these are embedded in the markets. However, it is clear that the fragility of the economic backdrops and the distortions created by Central Banks at the extremes of their monetary toolbox could magnify the effects of exogenous shocks.

The landscape remains rife with potential volatility for financial markets, independent from the business cycle.

Over the medium to long-term, the major factors that we believe could lead to episodes of volatility are:

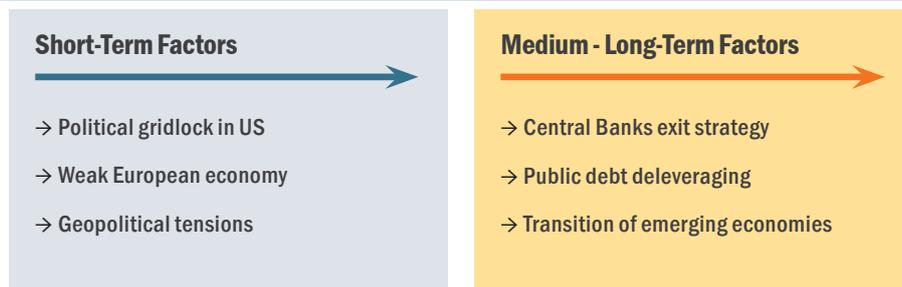
- Central Banks exit strategy. We are effectively at the zero interest rate boundary, where we have remained for almost four years. At this point, the only policies left are unconventional and at some point Central Banks should start their exit strategy, which effects on financial markets are quite difficult to foresee.
- Public debt deleveraging. Most developed economies should face a deleveraging phase. There could be various ways out from debt including financial repression, fiscal tightening, debt restructuring or even default which could have different effects on financial markets stability.

→ Long-term transition of emerging economies. As emerging economies are increasingly important in the world economic equilibrium, the question on whether these economies should be able to change their economic model from investment to demand-driven is extremely important.

Over the short-term, other volatility fertilizers could be:

- Political gridlock in US – Political infighting in the US Congress has been significant in the last months when the Congress had to face the “Fiscal Cliff” issue. The next issue is related to the debt ceiling which is due to come shortly and which may further test the American political system.
- Weak European economy – Last year, intervention by the ECB seems to have averted the worst case scenario of a euro break-up. However, the European economy remains weak and the structural reforms put in place over the last year need to be confirmed in the future to construct a stronger European economy. 2013 is an important year with political elections in Italy and Germany that could create some periods of uncertainty.
- Geopolitical tensions – The “Arab Spring” continues to roil the Mideast political landscape with new areas of tensions in Algeria and Mali. And in the background, growing concerns about Iran’s nuclear capability and the possibility of an armed response by Israel could keep tensions high affecting the price of oil – which has the potential for significant negative consequences to global GDP.

Volatility fertilizers could be:

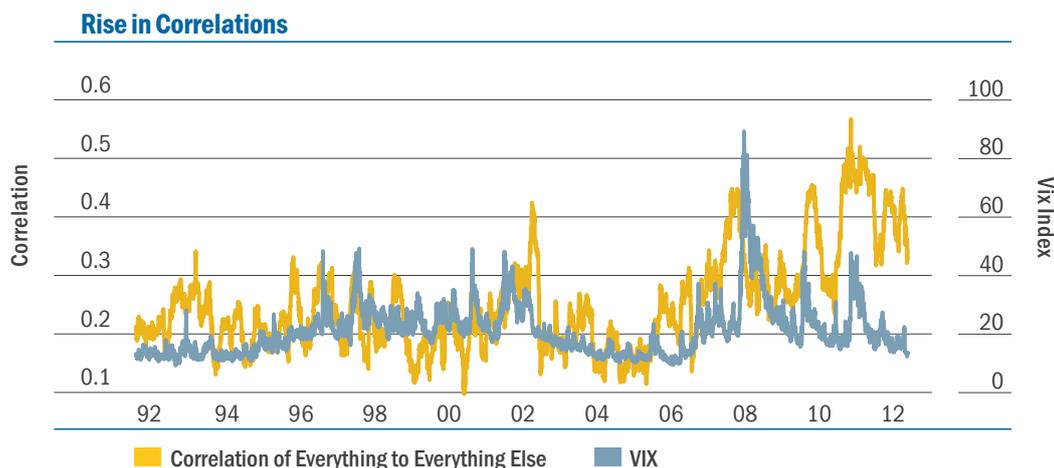


Source: Pioneer Investments. Data as of December 31, 2012.

Over the last decade, cross-asset correlations roughly doubled. Especially after the 2008 crisis, it seems that correlations have moved to a higher range than before.

Increase in Correlations over the Last Decade

Over the last decade, cross-asset correlations roughly doubled as we can see from the graph below which plots the evolution of an indicator of the average correlation among different asset classes and the volatility index VIX, over the last 20 years. What is interesting to notice is that volatility spikes tend to be associated with the rise in correlations, as, for instance, in 2008. However, over the last four years, it seems that correlations have moved to a higher range than before, even in the latest low volatility environment.



Source: Pioneer Investments, Bloomberg. Daily data from 30 December 1992 to 30 December 2012. The "Correlation of Everything to Everything Else" is calculated as the average magnitude of the cross-asset correlations, on a rolling return/change basis, between (1) S&P500, (2) Bonds Yields (average of USD government bonds 2 years and 10 years), (3) Yield Curve (USD government bonds 10 years-2 years), (4) Credit Spreads (Moody's BAA - USD government bond 10 years), 5 Dollar Index (DXY) & (6) Commodities (GSCI Spot).

One of the reasons behind this dramatic increase in correlations could be linked to the globalization of capital markets. With financial institutions able to trade on any market and asset classes worldwide, it happens that extreme movements in a specific region can spread across the globe.

Key Points – Increase in Correlations

- Over the last decade, cross-asset correlations roughly doubled. Globalization of capital markets, global deleveraging and new risk-management techniques could have driven the secular increase of cross-asset correlations.
- Traditional sources of diversification, such as commodities, are less effective nowadays. In fact, commodities have undergone a dramatic structural change and their correlations to other risky asset classes have risen sharply due to the development of the ETF industry.
- With the escalation of the Euro Debt Crisis, some correlations which had been stable over the previous years, broke up. It is the case, for example, of the correlation between the Italian government and the German government bonds, which have fallen dramatically over the crisis until becoming negative.

Globalization of capital markets and new risk-management techniques could have driven the secular increase of cross-asset correlations.

Another reason might be related to what we call the “risk on, risk off” market sentiment. High levels of correlation, especially when volatility is high, usually point to a common source of risk for asset prices. In times of high uncertainty, the prices of equities, risky bonds, oil, gold, and emerging market currencies are largely driven by a perceived systematic risk which impacts on investors behavior.

Global financial deleveraging, as a common source of recession in developed economies, might also be seen as a reason. Alignment in timing and size of global monetary responses by the major Central Banks could be behind the spectacular rise in cross correlations across most global financial markets since they could drive simultaneous increase or decrease of investors’ risk exposure across the different asset classes.

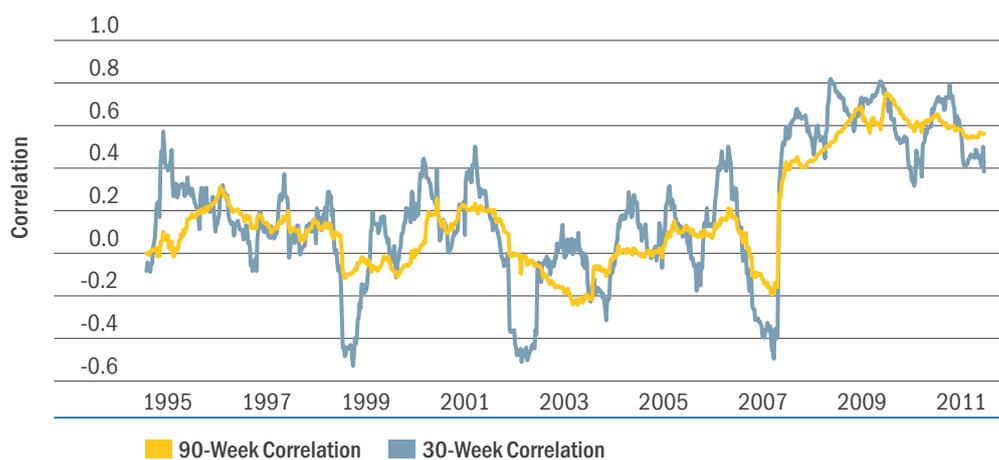
In addition we advocate an increased usage of algorithmic trading and risk management tools, which could also explain such sharp increases in global cross assets correlations. In fact, similar risk management tools or algorithms for trading could drive different investors to act at the same time and in the same direction in the markets. It happens, for instance, when similar risk management tools call for a reduction of risk and, therefore, trigger a simultaneous sell-off in different risky asset classes.

Commodities have undergone a dramatic structural change and their correlations to other risky asset classes have risen sharply.

Last but not least, the great success of instruments such as ETFs might also have played a role, at least for some instruments such as commodities.

In fact, over the last decade, commodities have undergone a dramatic structural change. The proliferation of commodity-linked exchange-traded instruments (ETFs and futures) has transformed this asset class. They are no longer simply used to mitigate price risk for crops and raw materials, but have “morphed” into complex financial instruments that are open to trading. A consequence of this transition has been the substantial increase in volatility, as well as a rise in correlation with other risk asset classes.

Correlation between Thom/Reuters Jeffries Commodities Index and S&P 500 Index

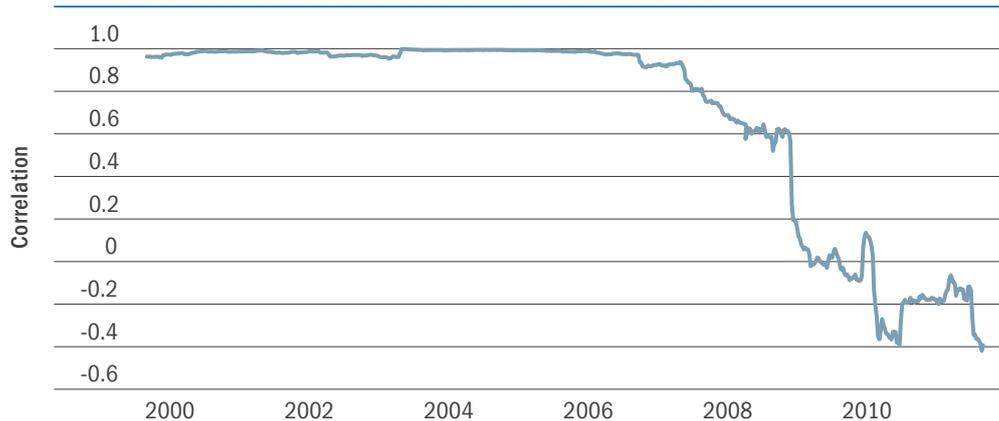


Source: Bloomberg, data as of December 31, 2012.

So far, we have analyzed the surge in correlations among risky asset classes. Another important effect to be noticed is the break-up of correlation dynamics when a certain asset class risk perception changes. This is the case, for instance, of the correlation between the Italian government and the German government bonds.

With the escalation of the Euro Debt Crisis the correlation between the Italian government and the German government bonds has fallen dramatically until becoming negative.

Correlation between Italian and German Government Bonds



Source: Bloomberg, data on 1-year rolling correlation on JPMorgan GBI Italy and German Index. Data as of December 31, 2012.

As far as both German and Italian government bonds were perceived as “safe” assets, their correlation has been close to 1. However, with the escalation of the Euro Debt Crisis this correlation has fallen dramatically until becoming negative.

Peripheral countries government bonds’ correlation with equity markets increased as a consequence of the crisis.

At the same time, the Italian and, more generally, peripheral countries government bonds’ correlation with equity markets increased as a consequence of the crisis. When the crisis was deepening both peripheral governments’ bonds and equity markets were trading on the downside. On the contrary, when the ECB measures put in place to solve the crisis became effective in reducing spreads in countries such as Spain, Italy, Ireland, Portugal and Greece, stock exchanges were celebrating, usually delivering positive returns. The “credit nature” of the peripheral sovereign spreads has become overriding and, therefore, their correlation with equities resembled much closer that of corporate bonds, indeed.

Correlation between Italian 10 years Government Bonds and EuroStoxx Index



Source: Bloomberg, data on 1 year rolling correlation on JPMorgan GBI Italy and Euro Stoxx Index, as of December 31, 2012.

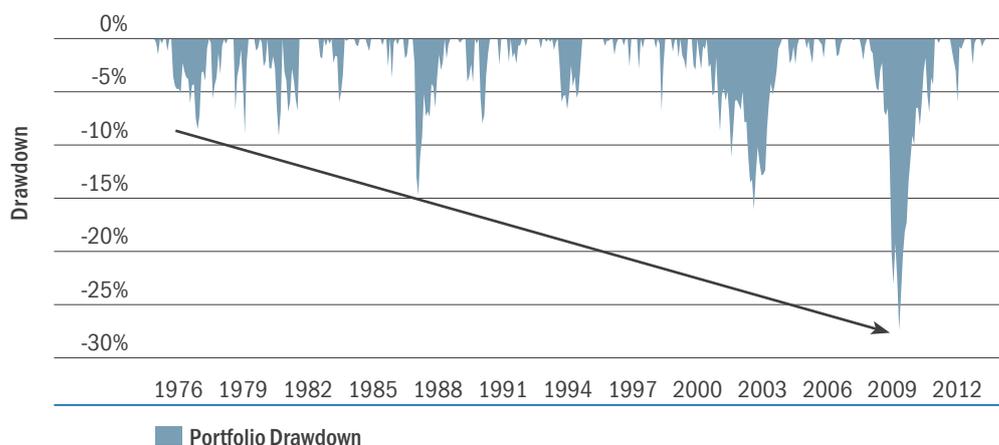
Whether these correlations could remain or revert back to previous levels is quite difficult to say, since many factors are involved. The market perception of sovereign risk, the evolution of the regulatory framework and the Central Banks’ policies are among the key factors that need to be monitored in trying to foresee these correlation evolutions.

Risk Management Tools for Portfolio's Construction

In periods of high volatility and correlations increase, a balanced portfolio can be exposed to extreme drawdowns.

The surge in volatility and correlations have resulted in changing risk dynamics in investors portfolios. In periods of high volatility and correlations increase, a balanced portfolio can be exposed to a much higher loss (drawdown) than what was estimated at the time the portfolio was set up. Over the last 35 years, the magnitude of the drawdown registered by a US balanced portfolio (in the graph below) has constantly increased throughout the different crisis. For example, in 2008, the drawdown registered by this portfolio has almost doubled the maximum drawdown signed in the past 30 years.

Drawdown evolution of a portfolio 50% US Aggregate Bond and 50% US Equity



Source: Bloomberg, Pioneer Investments. Portfolio of 50% US Aggregate Bond (BoA Merrill Lynch US Corporate & Government Bond Index TR in Local Currency) and 50% US Equity (S&P 500 TR in local currency). Calculation on monthly data, with monthly rebalancing. Data as of December 31, 2012.

Recently, the investors demand has shifted from traditional balanced portfolio solutions to investment solutions aiming at achieving a predefined target return, but, at the same time, limiting the maximum loss in case of adverse scenario.

Key Points – Risk Management Tools

- In periods of high volatility and correlations increase, a balanced portfolio can be exposed to extreme drawdowns. Therefore, while in the past the investors target was mostly related to a predefined benchmark, today, the investors' goal is to achieve a predefined target return while limiting the risk of downside.
- At Pioneer Investments we have developed a set of proprietary risk tools with the aim of delivering effective solutions for investors to limit the portfolio downside and capture the upside potential.
- Our dynamic risk management methodology named "VaRIO" provides a modern dynamic risk management system which may help in reducing a portfolio's volatility and drawdown.

We believe that a possible solution in the current difficult market situation is to focus on optimizing risk adjusted returns with a strong risk management discipline.

Our “VaRIO” methodology provides a modern dynamic risk management system which may help in reducing a portfolio’s volatility and drawdown.

The aim of VaRIO is not just to limit risks but also to optimize opportunities.

Therefore, while in the past the investors’ target was generally related to a predefined benchmark (relative value approach), today, the investors’ goal is to achieve a predefined target return while limiting the risk of downside (asymmetric approach).

VaRIO: Pioneer Investments Dynamic VaR Management System

We believe that a possible solution to the current difficult market situation is to focus on optimizing risk adjusted returns with a strong risk management discipline and, therefore, providing an asymmetric relationship between risk and return.

The key criteria that we set in our investment solutions to achieve an asymmetric risk/return profile are:

- Upside potential: the investment solution should aim at maximizing the probability that the client’s target return will be met or exceeded;
- Downside protection: the investment solution should aim at limiting losses according to the risk budget an investor is able to afford;
- Moderate volatility of the overall portfolio within different market environments.

At Pioneer Investments, we have developed a proprietary methodology, called “VaRIO,” that provides a modern dynamic risk management system.

VaRIO is essentially a risk overlay system that aims at delivering an asymmetric profile which may help in reducing a portfolio’s volatility and drawdown.

Within the VaRIO methodology a client’s individual risk profile is always central to all management decisions. In fact, the starting point for a portfolio applying the VaRIO methodology is the investors individual risk budget transformed in a certain maximum Value-at-Risk (Client Max VaR). At the beginning of each quarter, the VaR that the Portfolio Managers can risk is set by VaRIO as a portion of the Client Max VaR plus part of historic profits.

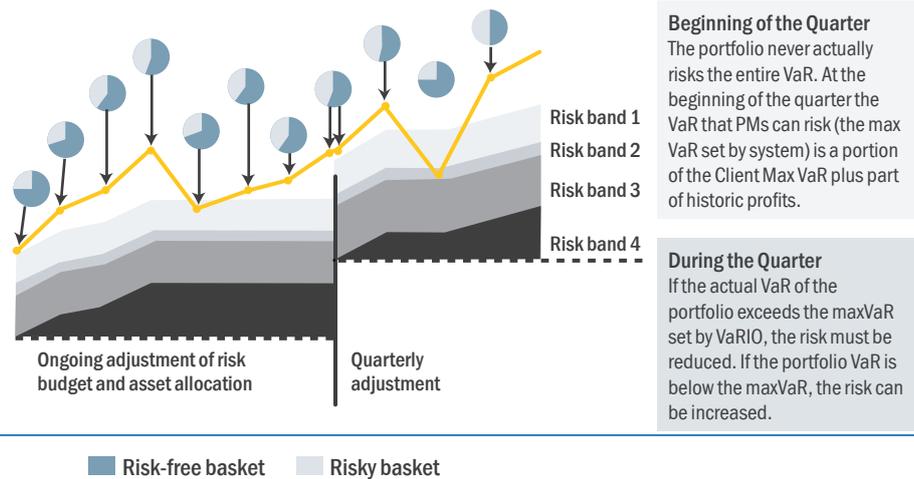
This means that on a quarterly basis, the readjustment set by the system lock part of the profits previously achieved without any need for expensive insurance structures. According to VaRIO, every day we calculate a maximum daily VaR which is the central driver of the investment strategy. In fact, if the whole strategy exceeds this daily VaR, the Portfolio Manager would be forced to switch to a more conservative strategy.

To ensure that the risk reduction is gradual and the Portfolio Managers maintain the investment freedom required to optimize the alpha opportunities, VaRIO sets different levels of stop-loss (Risk Bands) which activates a reduction of VaR and, therefore, an adjustment of the portfolio risk allocation. These risk bands may vary over time considering the performance achieved over the quarter. In addition, the risk bands are recalibrated each quarter, and the portfolio is realigned accordingly.

However, the aim of VaRIO is not just to limit risks but also to optimize opportunities. For this reason, positive achievements in the portfolio performance are partially increasing the daily VaR budget.

This systematic approach, which is decreasing the daily VaR budget in case of a deteriorating portfolio performance and increasing the VaR budget in case of a positive performance contribution, delivers an asymmetric risk return profile where possible drawdowns are limited.

VaRIO at Work



Source: Pioneer Investments. For illustrative purposes only.

To manage the risk allocation within the portfolio and help Portfolio Managers in reviewing this allocation over time in order to maximize opportunities, we have developed an in-house tool named “Risk Budgeting System.”

Risk Budgeting: Focusing on the Various Sources of Risk

To manage the risk allocation within the portfolio and help Portfolio Managers in reviewing this allocation over time in order to maximize opportunities, we have developed an in-house tool named “Risk Budgeting System.”

Through this system, each underlying strategy/asset class in a portfolio is separately identified, allowing the Portfolio Manager to distinguish between the various sources of risk.

The system offers a very high level of transparency, aiming to be aware at all times, the risk inherent in the investment strategies and to avoid unrewarded risk where possible by a series of analysis which include:

- Strategies potential diversification analyzed in order to assess the risk contribution of the strategy for the overall Portfolio;
- Strategies risk factor analysis to assess if they have unwanted risk related to specific factors (i.e. oil shock);
- Ex-ante assessment of the expected correlation between strategies;
- Short-term correlation analysis between asset classes to identify possible changes in correlation;
- Assessment of quality of diversification through qualitative analysis of scenarios adversely affecting the strategies/portfolio performance (stress test).

The risk budgeting system also facilitates trade simulation in order to value the potential risk exposure effect in the portfolio of a new strategy. This system is an integral part of the investment process and allows the optimal mix of portfolio strategies based on a quantitative assessment of their contribution to overall portfolio risk. Additionally, risk budgeting system is also a source of performance attribution.

This tool is highly valuable for Portfolio Managers to select the strategies to be cut in case of an activation of a VaR reduction and those where the risk can be increased to optimize market opportunities.

The portfolio manager might decide not to use the full daily VaR available, especially during “risk-off” phases where correlations and volatilities tend to rise.

Further risk reduction might be achieved through derivatives strategies.

Risk Mitigation: Risk Utilization Rate

The risk management systematic itself is managing that the VaR of the fund is always in line with the maximum daily VaR and setting the maximum daily VaR in order to limit potential loss and increase the opportunities to capture market upside. However, the Portfolio Manager retain full discretion on how much VaR to use within the limit set by VaRIO. This means that the Portfolio Managers might decide not to use the full daily VaR available if he/she perceives the market environment to be too risky. The decision on how much of the VaR to be used depends on what we call the “Risk Utilization Rate.”

For the calculation of the optimal risk utilization rate, we take into consideration our proprietary “Risk-on/Risk-off indicator” (see box in the next page).

This means that in a market environment where the investors’ behavior is very risk averse (i.e. a “risk-off environment”) we would not use the full daily VaR for the portfolio construction but only a fraction.

In fact, in a “risk-off” scenario we could expect higher correlation on risky assets and higher volatility that might result in a higher portfolio risk. That’s why we prefer to take a more conservative allocation and to limit our daily VaR.

One way that we can aim to follow to reduce the risk is through derivative strategies. Especially within the equity part with its high volatility, it makes sense to implement an additional derivative overlay with the target to create, specifically on this asset class, an asymmetric risk return profile and to limit the negative drawdown on the performance contribution of the equity part.

VaRIO at work in a real client portfolio

The VaRIO concept and the Risk Budgeting framework were first developed in 2005. At the beginning of 2007, this concept was implemented for institutional investment solutions in Europe.

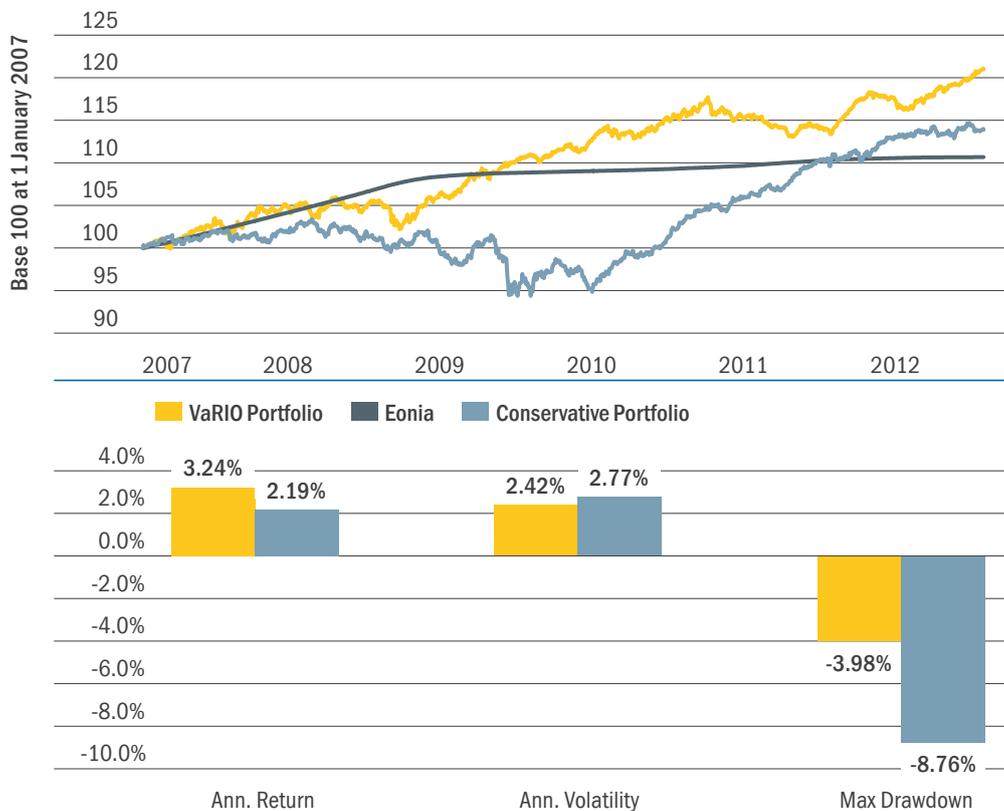
With six years of track record, we can now evaluate the effectiveness of these tools in managing the portfolio drawdown. To do that we have analyzed the performance of a real client portfolio managed within the VaRIO methodology – we can call this the “VaRIO Portfolio”. This portfolio has a mandate of an absolute return target above the EONIA rate and a 4% maximum VaR budget (with monthly VaR at 99% probability level, indicating that statistically the monthly loss of the portfolio should not exceed 4% with a 99% probability). The investment universe for this portfolio refers to the international developed equity and bond markets. The allocation to emerging markets equity and to non-investment grade corporate bonds are both limited to 5%. The base currency for the portfolio is the Euro.

For illustrative purposes, we have compared the results achieved by the VaRIO Portfolio with the ones of a (buy and hold) “Conservative Portfolio” composed of 25% international equity and 75% global aggregate bond.

The conclusions are that the VaRIO Portfolio appears to have achieved positive returns every year since 2007, except in 2011 when the portfolio delivered slightly negative returns. What is most interesting is that the VaRIO Portfolio has registered a volatility

similar to the volatility of the Conservative Portfolio, but the maximum drawdown has been much smaller (roughly -4% maximum loss vs an almost -9% of the Conservative Portfolio) and the overall performance has been greater, delivering annually 100 basis points above the Conservative Portfolio and 170 basis points above EONIA.

VaRIO Portfolio vs a Conservative Portfolio



Source: Pioneer Investments analysis on Bloomberg data. The VaRIO Portfolio refers to a real institutional client portfolio with max VaR 4%. The Conservative Portfolio refers to an hypothetical portfolio with allocation at 1 January 2007 equal to 25% of MSCI World TR Index in Euro and 75% of Barclays Global Aggregate Bond TR Index Hedged in Euro. The performance for the VaRIO Portfolio are net of fees, while the performance of the Conservative Portfolio are gross of fees. Analysis on daily data starting from 1 January 2007 to 31 December 2012. For illustrative purposes only.

Conclusions

At Pioneer Investments, we believe that the increase in volatility and cross-asset class correlations experienced over the last years is a trend that might continue in the future. The implications are that investors’ portfolios could be exposed to a higher-than-expected risk. That’s why, in our opinion, it’s important to focus on a strong risk management discipline in order to deliver investment solutions that could help to navigate different market environments.

We have developed a proprietary methodology called “VaRIO,” that provides a modern dynamic risk management system. VaRIO is essentially a risk overlay system that aims at delivering an asymmetric profile. This methodology allows us to offer to our clients investment solutions that aims at limiting portfolio’s volatility and drawdown.

Pioneer Investments Risk Indicator objective is to identify the inversion point where risk diversification works (Risk-On) compared to the periods of strong risk aversion (Risk-Off) where correlations tend to increase and the portfolio risk surges.

“Risk-On”/“Risk-Off” Indicator

The past five years have been dominated by high volatility and large swings in financial markets. The appeal of using market sentiment analysis has been growing as financial risk moved from being specific to being more and more systemic.

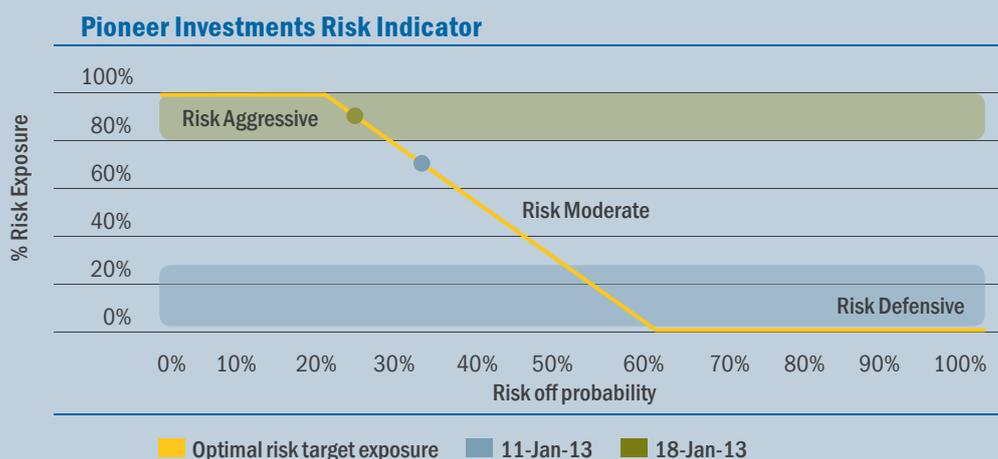
Launched in November 2011, the Pioneer Investments Risk Indicator objective is to identify the inversion point where risk diversification works (Risk-On phase) compared to the periods of strong risk aversion (Risk-Off phase) where correlations tend to increase and the portfolio risk surges.

The basic idea is to combine volatility considerations with internal tactical indicators in order to cope with all the characteristics of risk premia. The starting point is to detect a common trend for a basket of risk-off related asset classes (so called “Safe Haven” ones).

The economic assumption is that when risk sentiment is very bad Safe Haven assets have a remarkably strong common trend due to the “panic selling” of risky assets and the “fly to quality” behavior toward the Safe Haven.

Then we combine the common trend signal with the set of our internal tactical indicators which consider the risk premium of different markets and investors: equity risk premium, credit risk premium, commodity risk premium, FX risk premium and technical analysis. Each indicator has a dynamic weight: a higher one is attributed to the indicators that have a higher power in explaining the future short term moves of equities.

As all the indicators are built in house quantitatively, the Risk Indicator allows for calculating the probability to belong in the risk-on, risk-off, risk neutral regime on a daily basis. According to these probabilities, an optimal risk exposure is calculated and becomes the input for portfolio managers in order to calibrate the usage of their daily VaR limit.



Source: Pioneer Investments. For illustrative purposes only.

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