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Be Dynamic In Your Asset Allocation

Overview

The Global Financial Crisis (GFC) has put global asset allocation back into focus. Some have blamed the downfall on asset allocation while others have blamed it on investment judgment. Some investors have altogether given up attempting to balance risk and return across asset classes and are now exploring purely risk-based approaches.

The PineBridge Asset Allocation Team believes that more success will be found by re-examining how theory has been applied (or misapplied among strategic asset allocators who perhaps mistakenly assume a constant risk/return relationship and constant correlations). The Team continues to use a dynamic intermediate-term approach to asset allocation, which proved itself during the GFC. This approach enables allocation based upon a fluid view of prospective risk versus return, while adhering to sound financial theory — extended Capital Asset Pricing Model (CAPM).

Global Asset Allocation: Under Fire And Under Pressure

The GFC has prompted investors to question the traditional notion of asset class diversification and to search for other approaches ranging from downside risk to strategic risk allocation and risk-parity [Fitzpatrick's], [Harlow], [Qian]. Investors were harshly reminded that diversification only works during "normal" times yet fails to protect in times of crisis, when correlations between risky assets migrate towards one (also known as perfect correlation). Under these circumstances, the only mitigating action is to de-risk, and thus allocate towards the "risk-free" assets.

The volatility index (VIX) represents the implied volatility of S&P 500 Index options and is generally referred to as the "fear index," as its value tends to increase dramatically when investors are looking to purchase insurance, or put options, on a portfolio. This indicator is one of the most widely monitored for evaluating the market's risk expectations. The VIX graph in **Figure 1** illustrates the severity of the fear gripping the world at the end of 2008. The spike during the end of 2008 was a stark illustration of the paralysis and fear that overtook the market.

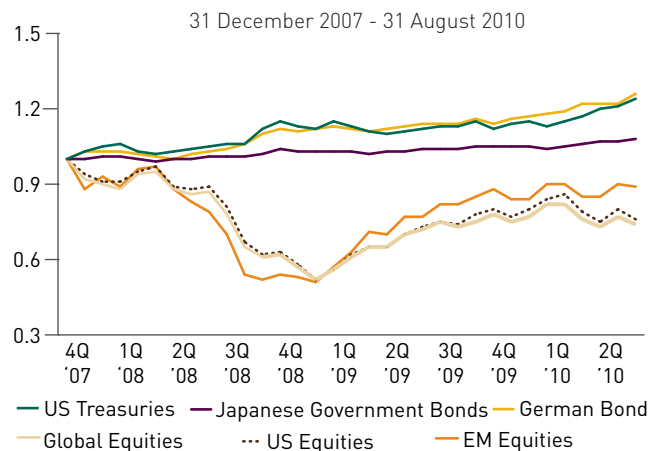
FIGURE 1 Volatility Index



Source: Bloomberg as of 29 November 2010.

There was virtually no place to hide at the time. Total assets under management of the 500 managers included in the Pensions & Investments/Watson Wyatt *Global 500 Ranking Report* [P&I-WW] totaled US \$53.4 trillion at the end of 2008, down 23.1% from the end of 2007. Similarly,

FIGURE 2 Cumulative Return by Asset Class



Source: Bloomberg as of 29 November 2010.

according to the OECD report, pension funds experienced average returns of -21.4% during this same period.

Risk-free was the place to be during the GFC, as shown in **Figure 2**. Having said that, historical money flow and investor return during that period indicate that few asset managers actually changed their exposure to risk-free assets. This should, once and for all, put to pasture the presumption that diversification alone is sufficient to manage risk in strategic asset allocation. Asset allocators may have become somewhat complacent, having lived through normal times for quite a while managing risk by diversifying into nearly all asset classes with modest under-weightings of those deemed unattractive. However, as the GFC has shown, diversifying a portfolio into overheated markets does not lower risk, but rather increases it.

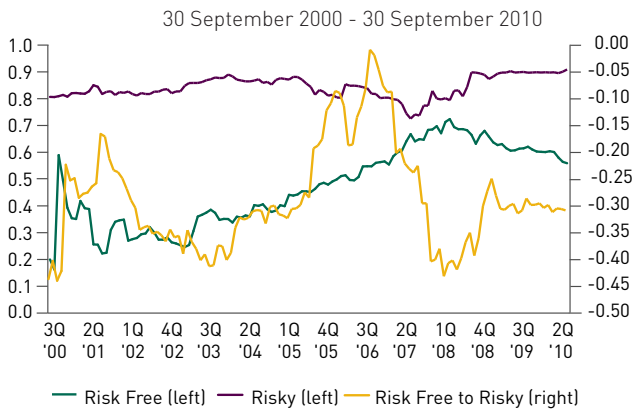
Capital Market Line Approach

The PineBridge Asset Allocation Team has implemented what is referred to as a prospective Capital Market Line approach (CML), which takes into account both valuation and risk and thus can guide investment decisions and suggest areas where concentration may prove beneficial. This approach is dynamic, as is prospective risk and return. While less diversified, the approach is more discerning having produced lower risk as well as higher return.

Clearly, when implementing asset allocation correlation needs to be factored in, as do risk and return. It is common knowledge that correlations spiked during the GFC. **Figure 3** highlights a crucial fact about correlations: correlations within risky assets, as well as those within risk-free assets, increased during the GFC period (July 2007 to end of 2008/start of 2009). Meanwhile, correlations across risk-free and risky assets actually fell.

Theoretical And Practical Approaches To Global Asset Allocation

FIGURE 3 Average 3-Year Rolling Correlation of Assets



Source: Bloomberg as of 29 November 2010.

The CML approach monitors cross asset correlations and operates two correlation matrices: one under a normal regime and the other under a stressed regime [for further details please refer to the latest quarterly CML publication on www.pinebridge.com]. When the CML has a normal shape, we favor the normal correlation matrix. Yet, when our CML foreshadows a de-risking (with an inverted shape as it did in 2007), we favor the stressed correlation matrix.

Another reminder from the GFC is that risk and the price that the market puts on it, is a key element of successful investing and the role of asset allocation is gaining prominence in the process. We believe that this indicates neither a swing back to short-term asset allocation nor an abandonment of traditional asset allocation approaches. Instead, we believe that the focus should be on taking advantage of the opportunities provided by market movements, both in terms of risk and return over a one- to three-year timeframe. Why? In our ten years of utilizing our prospective CML approach we have come to appreciate that even if our fundamental views are reasonably accurate, markets will not necessarily converge towards our CML in less than one year. Yet, they do over an intermediate term perspective, such as one to three years.

Theoretical Timeline

1952

- Harry Markowitz’s [Markowitz] seminal work on Modern Portfolio Theory (MPT) is the basis for virtually all portfolio work, whether within one asset class or across asset classes. MPT established the science of the risk-efficient portfolio and its curved characteristic, also known as the diversification effect of improving the reward-to-risk ratio.

1958

- Tobin’s Separation Theorem in 1958 proposed that investors could choose the optimal combination of risky securities and layer that performance based on appetite for risk by deciding whether to lend or borrow.

1964

- The Capital Asset Pricing Model [CAPM] established by William Sharpe was built on the MPT framework and Tobin’s thinking by showing how the market prices individual securities in relation to their asset class, also known as the index or the “optimal mix.”

1972

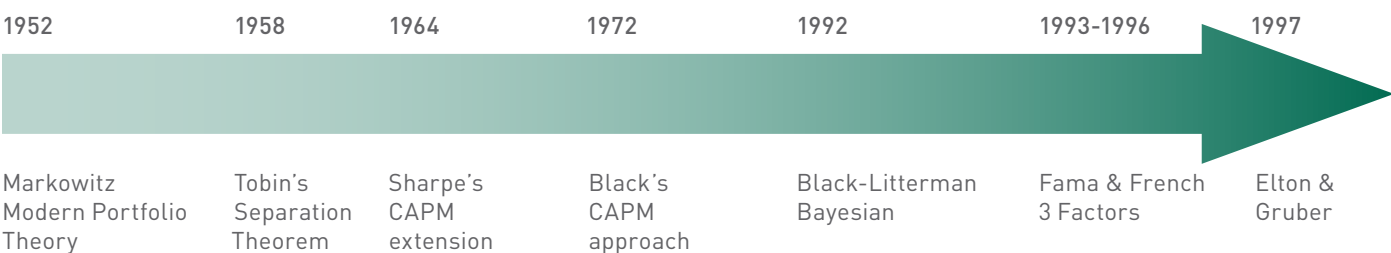
- Fischer Black developed a version of the CAPM where risk-free borrowing or lending is not assumed [CAPM Black].

1972 - On

- From then on, esteemed academics, including Litterman, Fama & French and Eton & Gruber expanded the MPT/CAPM theoretical framework.

Figure 4 highlights the major theoretical building blocks underlying global asset allocation.

FIGURE 4 Theoretical Evolution of Global Asset Allocation



Empirical Evolution

Static Allocation

As soon as the MPT foundations were laid, investment professionals applied MPT to their approach to asset allocation and allocated a static percentage of their portfolio to traditional asset classes.

Strategic Allocation

As practitioners embraced this process, CAPM guided them in their quest to implement optimum global portfolios based on long-term assumptions; hence strategic asset allocation. Strategic asset allocation was focused on creating an asset mix that provided the optimum balance between expected risk and return over a long-term investment horizon.

Tactical Allocation

Along with the advances in quantitative investments and portfolio optimization techniques, came tactical asset allocation approaches that serve to distribute investments across a set of asset classes according to a model-based risk and return methodology [Weigel]. The first Tactical Asset Allocation (TAA) approach can be attributed to Wells Fargo [Lee] in the late 1970s. After the market decline of 1973/74, this US stock/bond tactical tool was able to produce positive simulated returns during the 1973-76 recession. TAA approaches expanded from there and now cover a wide range of asset classes and techniques.

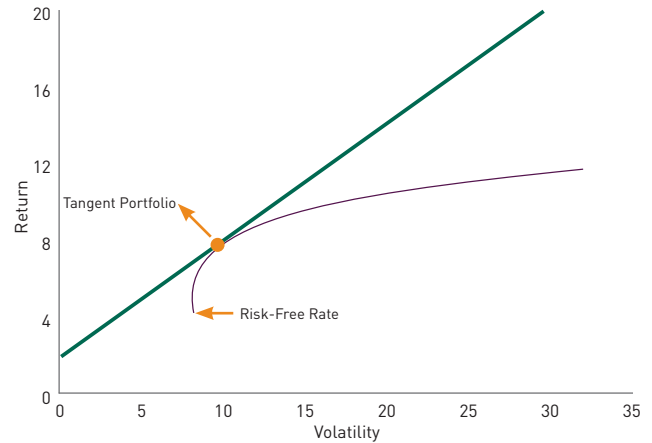
Figure 5 depicts the empirical evolution of global asset allocation portfolio construction and takes us to the beginning of the PineBridge CML approach.

Risk-Focused = Tangent Added

The CAPM Tangent Added theory, illustrated in Figure 6, is a special CAPM case in which leverage constraints are lifted. Asset managers, such as Mellon Capital, introduced this approach to allocation in 1989 [Mellon Research].

FIGURE 6

Efficient Frontier with Capital Market Line



Source: *Risk Parity: In the Spotlight After 50 Years*, Christopher A. Levell

PineBridge CML Approach

The CML was initially developed as a decision support tool for the Asset Allocation Team headed by PineBridge's Global Head of Asset Allocation and Structured Equities, Michael Kelly. The tool was initially intended for use in managing a pension portfolio [Kelly]. The CML quantifies key fundamental judgments per asset class and combines these with current pricing, resulting in annualized expected return forecasts over the next five years. These are compared with our views on asset class risk, as defined by volatility. Together, these asset class risk/return parameters form the CML slope, which illustrates the general risk return environment in the market. For example, in a "normal" environment one would expect to see a convex-shaped CML that slopes upward from left to right, as was the case in 2009 (Figure 7).

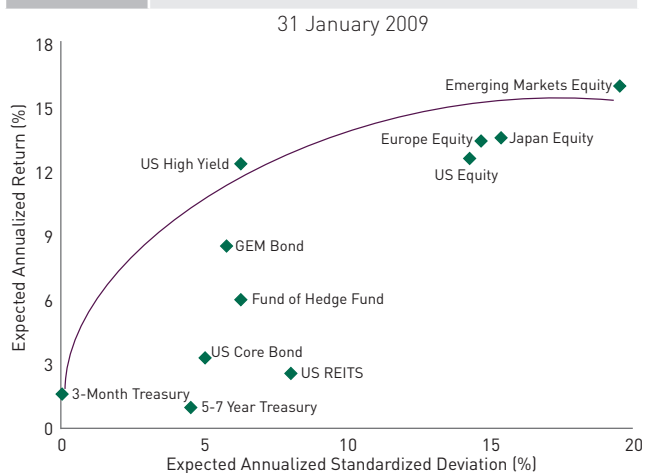
PineBridge has utilized this approach since 2000 and learned that if our judgments are reasonably accurate, asset classes usually converge most of the way towards fair value much sooner than the five-year forecasts upon which the CML is built. Usually, most of this convergence happens over one to three years. This matches up well with the preferred intermediate-term perspective in making asset allocation decisions.

FIGURE 5

Empirical Evolution of Global Asset Allocation



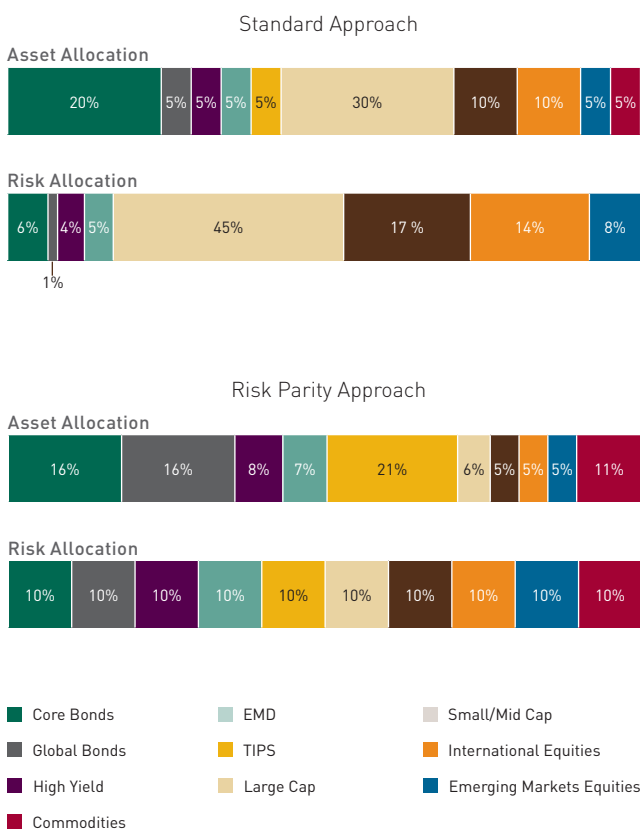
FIGURE 7 CML Slope in a "Normal" Environment



Risk Focused = Risk Parity

Following the GFC, investors resurrected risk focused approaches and in particular risk parity which focus solely on risk allocation. In contrast to a "standard" allocation, which allocates most of its risk budget to risky assets, a risk parity allocation parses an equal amount of risk to each asset class and results in a portfolio with a much lower allocation to risky assets. Also, risk parity generally involves leverage in order to reach a level of expected return in line with the return required by the investor.

FIGURE 8 Allocation of Risk in Standard Versus Risk Parity Approaches



The Fate Of The Approaches

Static Allocation is Dead!

Static asset allocation, which was novel in its time, followed the principle that asset classes diversify each other through MPT. The empirical evidence supports the view that this principle applies most, but not all, of the time. Therefore, the static allocation approach should be remembered for its historical value, but is clearly not appropriate today.

Strategic Allocation is Too Long-Term & Misaligned With Reality

Strategic asset allocation typically requires a 20-year timeframe to be validated or otherwise. This 20-year timeframe is not realistically implementable; any prevailing strategic allocations will be reviewed or altogether abandoned following the onset of a new crisis. The onset of a new crisis, such as during the 1973/76 recession and the 2008 GFC, usually forces investors to discard its prevailing strategic allocations and set new ones. In other words, there is a misalignment between the measurement period and the relevant time required for the strategic approach to have merit. The PineBridge CML approach has an intermediate term horizon (one to three years), which better aligns to the investors' measurement period.

Strategic allocation recognizes the need to set risk and return expectations, even though the strategic expectations are too long term. The CML approach relies on risk/return expectations but does so in a one to three year timeframe. These risk/return expectations are top-down judgments about the fundamentals that are believed to be the greatest influencers of the returns of each asset class over time (e.g. inflation, earnings growth). We believe that if we are fundamentally correct in our forecasts, then the market should recognize these fundamentals within the timeframe.

The CML approach is dependent upon these fundamental drivers being right, but they display a less volatile range of reasonableness than the markets as a whole and are therefore easier to forecast. The PineBridge Asset Allocation Team also benefits from both top-down and bottom-up expertise. Of course, there is no claim that any approach is perfect, including the CML. As the CML is built on fundamental drivers, if these drivers are not correct, then the CML output will be flawed.

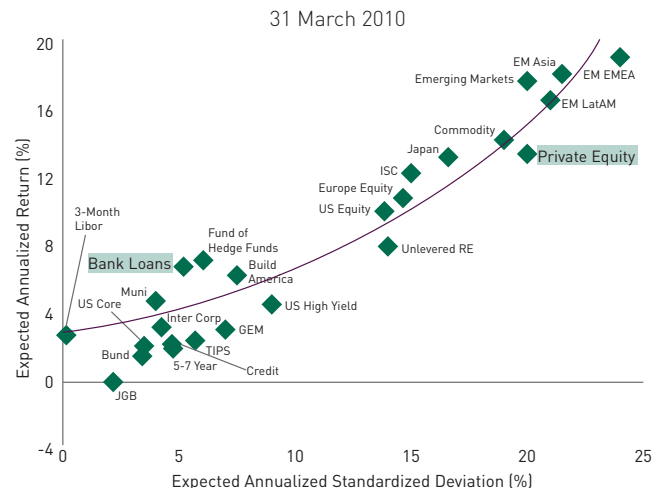
Tactical Asset Allocation is Short-Term & Too Statistically-Focused

Tactical Asset Allocation (TAA) is generally used to execute short term deviations from a strategic asset allocation, due to a deviation from fair value (or market mispricing), enabling investors to enhance returns and/or reduce risk over a short time period of less than one year. TAA identifies imbalances that may create short-term opportunities, mostly based on valuation or momentum anomalies that are widely followed by market participants [Wang]. We question the concept of a shorter-term fair value and believe markets normally require more than one year to meaningfully correct major realignments.

There is an ongoing debate about the added value of TAA and the approach has both supporters and detractors, but there is rather scant evidence to support its use as an effective tool. Putting aside this debate, one of the biggest drawbacks of TAA is that it is usually anchored to some strategic allocation and is therefore only allowed limited deviation from strategic positions. As the GFC demonstrated in times of crisis it is sometimes necessary to deviate significantly from a “standard” position. However, given the short timeframe that is typical of TAA, large deviations are either not appropriate or not possible.

In contrast, the CML approach has the flexibility to capture and implement more meaningful and stable shifts in risk and return expectations across an array of asset classes. As mentioned, the slope of an intermediate-term CML illustrates a more stable and slowly evolving risk/return profile of the capital markets. In most instances, the CML slopes upward from left to right, indicating a positive expected relationship between risk and return. However, at times the CML has become inverted, sloping downwards from left to right, indicating that risk-seeking capital markets were not adequately compensating investors for risk. The CML approach identifies tactically attractive or unattractive asset classes based on their relative position. The asset classes well above the line are attractive (over the intermediate term) and those beneath it are deemed unattractive. As the 2010 CML in **Figure 9** shows, private equity was deemed to be unattractive in 2010 given the large amount of dry powder, while the bank loans sector was deemed attractive.

FIGURE 9 CML and Asset Class Selection



Risk-Focused Approaches Can Be Useful But Not The Panacea

Historically, allocation approaches based on CAPM with Tangent Added have not been widespread because leverage is a key component. Lately risk-parity has received an enormous amount of attention since strategic and tactical asset allocation approaches delivered such poor average returns during the GFC. The risk parity approach is based on fixed income investments having a better Sharpe ratio. Consequently, leveraging up the fixed income portfolio component should provide a higher return with less risk, though the use of leverage requires caution. In fixed income, it means taking more risk to bond-specific fundamental metrics: real interest rates and inflation. We have just lived through an extended period of low interest rates and inflation and should be wary of how such risk parity will fare in a world where inflation and rates trend back up.

The sheer number of publications being released on the risk parity approach clearly indicates that it is re-emerging after a long bond bull market and poor equity performance. This is similar to, and likely hindsight driven by, the overweighting of equities during the late 1990s and the recent preference for uncorrelated assets during the early 2000s. The time line of asset allocation trends can be summarized as 1) Go Equity 2) Go Uncorrelated 3) Go Leverage.

- Go Equity was the period during which virtually all investors and plan sponsors increased their equity allocations. Academic and empirical articles strengthen the case that more equity equates to more return.
- Go Uncorrelated was the period during which virtually every market participant allocated heavily

to alternatives and elsewhere. Again, academic and empirical articles demonstrated convincingly that greater diversification equates to higher returns.

- Go Leverage could be a period during which investors move towards a risk parity type approach and use leverage to reach their required return.

For an asset allocation approach to be successful it must consider the reasons behind this timeline. CML integrates strategic and tactical approaches as well as risk parity. It does so by focusing on the next intermediate-term risk/return regime and identifying the asset classes with upside opportunities within the risk regime and within an intermediate timeframe.

CML In Action

Looking at the CML at three different points in time - 2007, 2009 and 2010 - demonstrates its ability to deliver successful asset allocation recommendations in different environments. The CML integrates today's market with fundamental metrics five-years out with an expectation that these metrics will converge one to three years out.

The following examples show the CML in December 2007, January 2009 and January 2010, along with the allocation of a portfolio managed by the Asset Allocation Team referred to as the PineBridge Managed Portfolio. This section shows how the CML is constructed. In particular, it shows how the fundamental metrics were estimated. It also gives a real life example of how the CML is applied through a managed portfolio and the resulting recommended allocations.

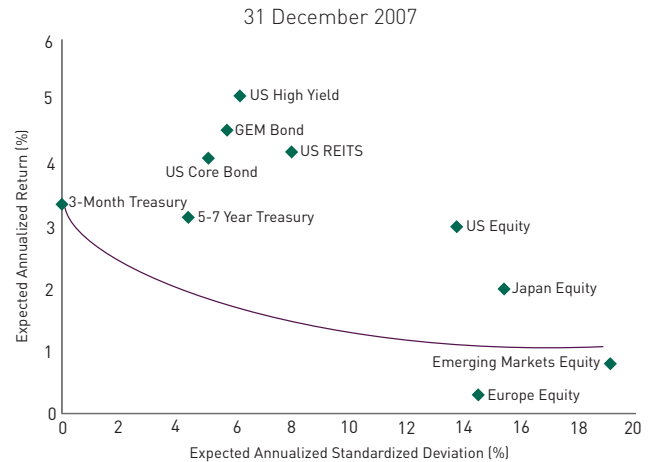
How Do We Arrive at the Risk/Return Numbers?

While it may seem extremely difficult to arrive at these numbers it is actually a relatively straightforward process, so long as five-year forward fundamental metrics are taken into account rather than extrapolating the recent past. For the sake of simplicity, we will look at US equity and fixed income. The CML equity model focuses on five-year forward Return On Equity (ROE), five-year Earnings Per Share (EPS) growth, and Price to Earnings (PE) and Payout estimates. The CML fixed income model focuses on five-year forward expectations for the risk-free yield curve, inflation, spreads and net defaults [Appendix].

Inverted CML: December 2007

In 2007, the inverted CML pointed to abnormal market conditions where risky assets such as equity and private

FIGURE 10 "Inverted" CML at 31 December 2007



equity were not expected to earn returns commensurate with their level of risk (volatility expectations). In this scenario, lower risk assets and even "riskless" assets were expected to earn more solid returns.

By integrating the various asset classes and by anchoring their expected risk/return in five-year fundamentals and combining them with current market pricing, the CML enabled us to de-risk our portfolios on time. In other words, we reduced our allocation to risky assets quite drastically in favor of low-risk assets; this was implemented across our set of Global Asset Allocation portfolios.

The Risk/Return Numbers

US Equity:

In December 2007, actual ROE stood at 17.5%, with retrospective experienced five-year average EPS growth at nearly 20% (remember, this is a five-year average), PE at 17, and Payout at 32%. These fundamental metrics diverged from long term averages, which is not to say that they could have been maintained going forward. However, we could not identify the economic and financial drivers necessary to maintain such solid growth at that time. Our five-year forward expectations were more subdued, particularly with five-year prospective ROE and EPS growth closer to their longer-term norms. When combined with the December 2007 price levels, any reasonable set of numbers, grounded with a knowledge of history and some modest appreciation of how things might be a little different, generated unattractive prospects for US equity. Our forecasts at the time generated an expected return of 3% for US equity.

Fixed Income:

In December 2007, three month Treasury Bill returns stood at 3.36%, five to seven year US Treasury yields were

3.45% and the US Aggregate Index (“US Agg”) spread was 1.2% (to duration equivalent Treasuries). At the time, we expected the Treasury yield curve to be steeper with an upward slope. We also expected a slightly lower spread at 1%, in line with “normal” spreads. These expectations generated an expected return of 4% for the US core bonds, with a level of risk in line with historical levels of about 5%.

Allocation Example

In December 2007, the PineBridge Managed Portfolio was allocated 48% to equities and 40% to bonds, down from an allocation of 76% in equities as of July 2007. The CML enabled us to de-risk our portfolios quite significantly and thus escape much of the abysmal 2008 returns generated across all risky assets.

Normal CML: January 2009

The 2009 “normal” CML displays a “standard” market environment, where risky assets such as equities were expected to earn returns commensurate with their risk (volatility expectations). At the short end of the risk spectrum, the less risky assets were expected to earn lower returns.

Once again, by integrating the various asset classes, anchoring their expected risk/return in five-year fundamentals and combining them with current market pricing, CML enabled us to re-risk our asset allocation portfolios. In other words, we increased our allocation to risky assets; this move was implemented across our set of Global Asset Allocation portfolios.

The Risk/Return Numbers

US Equity:

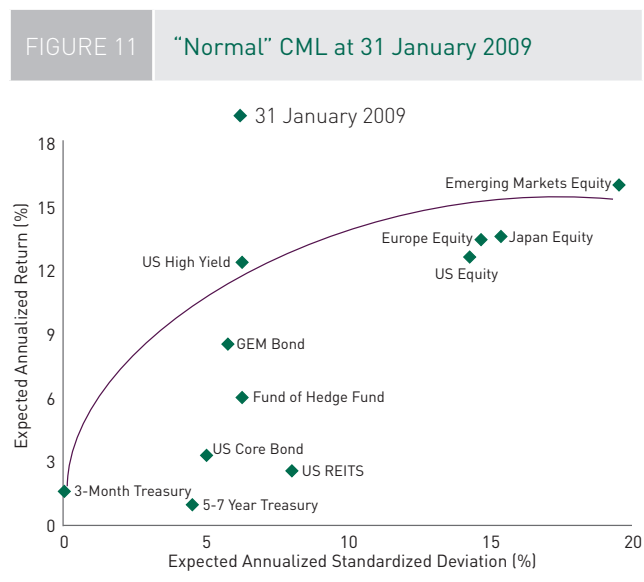
In January 2009, equity ROEs stood at 13.7%, five-year EPS growth was 11% (down from 20% in Dec 2007), PEs were 11.6 and Payouts were 35%. These fundamental metrics followed the massive 2008 downturn and were evaluated by the team, based on 30 years of historical data and the prospects of the comprehensive financial stimulus package in 2008 (the Feb 2009 package had not yet been unveiled). When we took into account five-year forward fundamental metrics, it seemed entirely plausible to forecast a forward PE of 15, an ROE of 14% and five-year EPS growth of 6%. When combined with the market levels in January 2009, the expected returns generated were about 13.5% for US equity.

US Fixed Income:

At the same time, three-month Treasuries returned 0.23%, five- to seven-year US Treasuries offered 1.87% and US Core posted a spread of 2%; a Yield To Worst (YTW) of 4.27%. We expected the spread to compress to a standard level of 1%, with expectations for gradually higher rates as the financial stimulus took effect over time. Five-year Treasury expectations were 5.45%, based on an expected inflation rate of 2.5% versus the prevailing rate of 1.8%. These fundamental metrics resulted in a 3% expected return for US core, with a risk of 5%.

Allocation Example

In January 2009, the Portfolio was allocated 65% to equities and 35% to bonds, up from an allocation of 48% in equities, as of December 2007. The CML enabled us to re-risk our portfolios in time to participate in the recovery.

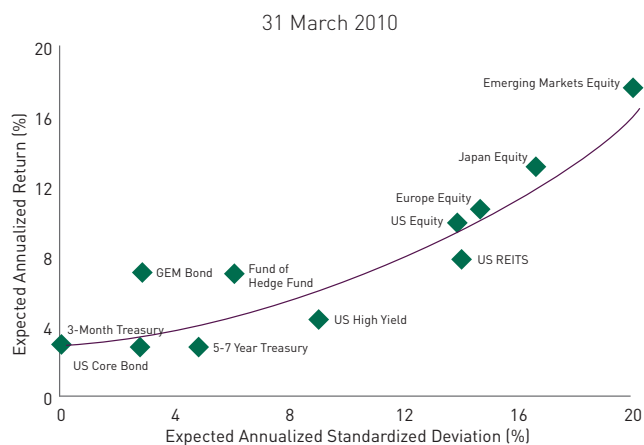


Concave CML: January 2010

At the beginning of 2010, the CML depicted a concave shape, upward and inward sloping from left to right. This shape points to a (1) “standard” market environment, where risky assets such as equities were expected to earn returns commensurate with their level of risk (volatility expectations) and (2) an environment where taking marginal risk is not rewarded until reaching a trigger-like level of risk.

By integrating various asset classes and by anchoring their expected risk/return based on five-year fundamentals combined with current market pricing, the CML enabled us to segment the asset class universe into the flat asset classes where marginal risk was not rewarded and into the exponential asset classes where marginal risk was substantially rewarded. This segmentation enabled us to position aggressively in equities and conservatively in fixed income.

FIGURE 12 “Concave” CML at 31 March 2010



The Risk/Return Numbers

US Equity:

In March 2010, actual ROE stood at 13%, five-year EPS growth was -2.1%, PE was at 18 and Payouts were 43%. These fundamental metrics were obviously distorted by the full effect of the GFC, which historical data was now incorporating. We believed that we should shift our attention to five-year forward fundamental metrics. We felt that, at this point, the global economy should have been pumped up by stimulus packages put in place by countries all over the world, and the fear of a prolonged global recession would have subsided somewhat. In this context, five-year forward ROE of 14.5%, five-year EPS growth just below 7% and forward PE at 16 appeared entirely reasonable. These metrics, when combined with the March 2010 market levels, generated an expected return of about 9.83% for US equity.

US Fixed Income:

In the fixed income world, three month Treasury Bills stood at 0.16%, the five- to seven-year US Treasury YTW was 2.55% and the US Agg was a 0.44% spread over the same maturity as Treasuries. Our forecast was calling for spreads to return to a 0.75% level, while 5 year Treasury Bills were forecasted to increase to 5.6% from 2.5%. In March 2010, 3 month Treasury Bills were sitting just above 0% and thus negative real rates were not sustainable. Over five years, inflation returns to norms and rates tend to increase. These metrics generated a return expectation of about 2% for US Agg with a volatility of 3.5%. At the time, Treasuries were subject to massive moves and we expected volatility on them to be higher than that of US Aggregate.

Allocation Example

In February 2010, the portfolio was allocated 79% to equities and 17% to bonds, up from an allocation of 65% to equities as of January 2009.

Conclusion

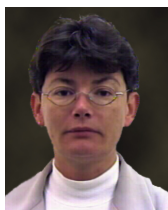
The recent market turmoil has clearly necessitated a re-evaluation of the role of asset allocation and the effectiveness of various methodologies. Investors have been questioning the standard asset allocation methods, such as strategic and tactical asset allocation, while seemingly gravitating towards risk-focused approaches at what we suspect will prove to be an inopportune time.

The PineBridge Asset Allocation Team believes that strategic allocation requires an unrealistically long timeframe, whereas tactical approaches too often disconnect with fundamentals and end with unstable technicals-focused signals. Purely risk-based approaches seem to be tied to history and today are skewed toward recent unusual market history. In our view, a dynamic and prospective approach based upon fundamental views of intermediate-term fundamentals offers the best prospects for success in balancing risk and return for abnormal, as well as normal times. By taking into account a few simple yet powerful forward-looking fundamental drivers, the CML can provide valuable insights into expected returns, while also enabling a calculated judgment on the risk side of the equation. The risk and correlation forecasts facilitated by CML are integrated with current market conditions to deliver a dynamic risk/return profile across asset classes as well as effectively positioning each asset class.

PineBridge has found success with this intermediate-term perspective; a perspective characterized as one in which prices will converge in that direction in that timeframe so long as your fundamental view is reasonably accurate. Our CML approach has achieved this consistently over a one to three year period. Fundamental drivers are grounded in sound financial theory and reasonable fundamental forecasts, which boost confidence in the CML's signals. Ultimately, the CML approach enables its users to plan and execute global allocation decisions with greater conviction and success ■

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Ms. Azema-Barac is the Head of the Investment Strategies Research & Development group for PineBridge Investments. She joined the firm in 2001 through the acquisition of American General Investment Management by AIG. Ms. Azema-Barac has been working in the area of quantitative investment strategies since 1994 covering equity investments as well as fixed income, derivatives, currencies etc. She has worked in a quantitative capacity at AGIM, US West Investment, Citibank, and Warburg. Ms. Azema-Barac received a Diplôme d'Ingénieur des Grandes Écoles in Artificial Intelligence and Robotics from Toulouse, France. She received her Ph.D. in Artificial Intelligence and Distributed Systems from University College London. Ms. Azema-Barac is also a CFA Charterholder.

With Contributions By**Michael J. Kelly, CFA***Managing Director, Global Head of Asset Allocation and Structured Equities*

Mr. Kelly is responsible for the development and management of PineBridge's our structured equity products worldwide, including institutional pension fund advisory and retail orientated asset allocation vehicles. His team manages lifestyle and asset allocation strategies, principal protection strategies and global tactical asset allocation. Mr. Kelly serves as one of five permanent members of the firm's Global Asset Allocation Committee. Mr. Kelly received an MBA from the Wharton Graduate School of Business.

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Ms. Emmert acts as an interface between internal investment professionals and clients to provide value-added materials for external use. Ms. Emmert has previously been a Senior Research/Market Analyst in PineBridge Investments' Business Strategy group in addition to serving in a variety of research and strategy-related roles relating to PineBridge Investments' International Retirement business. Ms. Emmert graduated from New York University with a Bachelor's degree in International Relations.

Appendix: CML Models [Quarterly]

Equity - US

The equity expected return model decomposes equity returns along three major components:

1. The income component captures the normalized dividend at today's price.
2. The growth component captures the growth of this normalized dividend income.
3. The re-pricing component captures the impact from today's price relative to the normalized income stream to our forecast of the equilibrium price to normalized earnings.

All three components are driven by our fundamental forecasts over the next five-years. Our fundamental forecasts, which relate to corporate financial variables, are driven by our views on the long term structural qualities of the economy, corporate profitability and market participants' valuation.

They are influenced less by the present point in the business cycle but rather longer-term structural factors, such as competitiveness, government regulation and taxation and changes in market structure.

We use these forecasts to estimate a "normalized" income stream and given today's price, we compute a discount rate. This discount rate is the expected return.

The equity expected volatility model analyzes historical volatility as well as volatility regimes, to establish our conviction for forecasting future volatility.

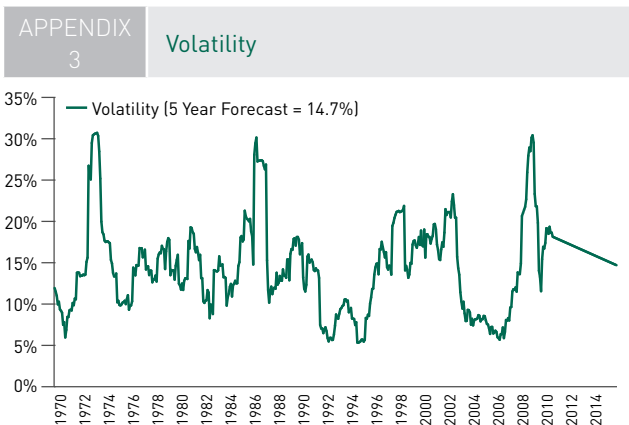
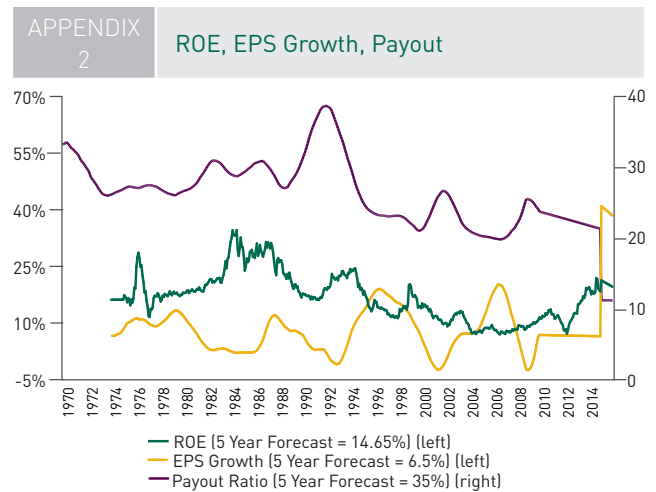
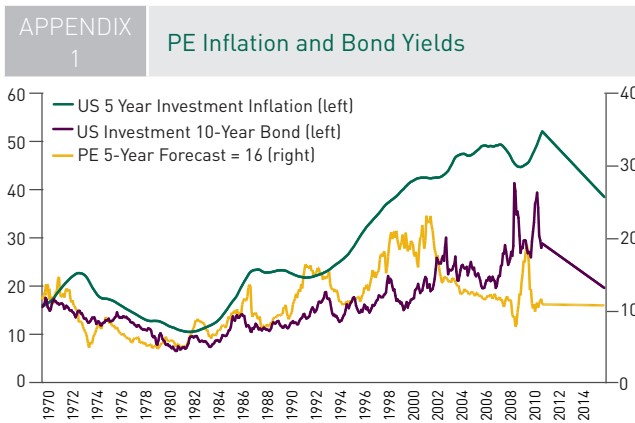
Appendix A: US Equity Inputs

Date	Current Price	Current Income	+ DPS Growth	5-year Repricing	=	Expected Return	Volatility	Targeted Price-to-Book	Targeted ROE
	1266.63	2.34%	6.50%	1.38%		10.72%	14.70%	2.12	13.28%

Fundamental Inputs	Normal	Current	Historical Averages			
			5 Year	10 Year	20 Year	Since Inception
PE	16.00	14.94	17.43	19.26	20.81	18.77
Payout Ratio	35.00%	39.48	35.95	37.30	43.05	45.73
5-year EPS Growth	6.50%	6.85%	9.96%	6.84%	8.09%	7.84%
ROE	14.65%	15.53%	14.71%	14.57%	15.52%	15.11%
Volatility	14.70%	18.14%	14.93%	14.43%	13.59%	14.39%

Year	ROE	Book per share	Earnings per share	EPS Growth Rate	Dividends per share	Payout Ratio	Adj Clean Surplus
2008		503.78	58.02		29.84	51%	
2009	15.53%	548.32	78.24		23.18	30%	-1.92%
2010	16.73%	616.22	91.74		23.84	26%	0.00%
2011	14.65%	674.90	90.28	6.50%	31.60	35%	0.00%
2012	14.25%	737.40	96.14	6.50%	33.65	35%	0.00%
2013	13.89%	803.96	102.39	6.50%	35.84	35%	0.00%
2014	13.56%	874.84	109.05	6.50%	38.17	35%	0.00%
2015	13.28%	950.33	116.14	6.50%	40.65	35%	0.00%
				DPS Growth:	6.50%		

Appendix A: US Equity Inputs (continued)



Fixed Income - US

The fixed income expected-return model decomposes fixed income returns into three major components:

1. Return from income
2. Return from price movement (both risk-free curve-related and spread-related), and
3. Negative component from net default loss

First, we construct a risk-free real yield curve for each currency, then we add an inflation expectation on top of monetary variables. This serves as the common risk-free curve across all fixed income assets. For each individual asset class we may add a spread component where appropriate. This number uses history as a guideline and then we refine it using our judgment. This forecasted yield serves as the basis for our model.

We use these forecasts to quantify our fundamental views into an expected return.

- The return from income component is computed as the current yield, or carry, of the modeled fixed income index. Note that this changes over the horizon of our model with forecasted interest rates.
- The return from price movement relates to the change in prevailing yields, with an increase in yields implying negative price returns and a decrease in yields implying positive price returns.
- The net default loss is derived from our default rate and recovery rate expectations. This is a fundamental view of historical trends and how they are changing, but is not meant to be a short term prediction, but a long term “normalized” number.

We are modeling fixed income indices and thus assume that time to maturity and quality stays constant throughout our investment horizon.

Fixed Income Inputs

	Market Data as of: 31 December 2010				Forward Looking Expectations			Calculations		Expected	
	Maturity	YTW	Spread	Treasury Yield	Spread	Treasury Yield	Net De-fault	Avg Income	Avg Capital Gain/Loss	Return	Volatility
US T-BILL	0.25	0.12%				4.10%				2.02%	0.15%
EUR T-BILL	0.25	0.31%				2.70%				1.45%	0.15%
YEN T-BILL	0.25	0.12%				0.95%				0.52%	0.15%
SOVEREIGNS (5-7Y)											
US	6.09	2.40%				5.05%		3.46%	-2.17%	1.30%	4.70%
BUND INDEX	8.16	2.03%				3.11%		2.46%	-1.05%	1.41%	3.42%
JGB INDEX	8.20	0.77%				2.30%		1.38%	-1.68%	-0.30%	2.17%
TIPS (US)	8.49	0.83%		2.91%		2.10%				1.15%	4.55%
MUNICIPAL BONDS											
BUILD AMERICA	28.78	6.35%	113.64%	3.30%	95.00%	4.85%	-0.25%	6.44%	-1.50%	4.94%	4.85%
BUILD AMERICA	28.78	6.35%	148.48%	4.28%	113.42%	5.84%	-0.25%	6.15%	1.81%	7.95%	7.60%
US AGGREGATE	7.08	2.97%	0.42%	2.55%	0.68%	5.74%	-0.05%	4.08%	-2.68%	1.40%	3.50%
INTER CORP	5.22	3.39%	1.32%	2.07%	1.25%	6.29%	-0.15%	4.55%	-2.05%	2.50%	3.80%
LONG CREDIT	24.18	5.80%	1.76%	4.04%	1.45%	6.59%	-0.15%	6.11%	-1.45%	4.66%	7.60%
US HIGH YIELD	6.98	7.51%	4.99%	2.52%	5.20%	10.26%	-3.00%	8.61%	-5.28%	3.33%	6.60%
EM SOVEREIGN	13.23	5.89%	2.43%	3.47%	2.20%	7.31%	-0.28%	6.46%	-2.18%	4.28%	6.50%
EM CORPORATE	8.35	5.94%	3.06%	2.88%	2.90%	7.98%	-0.30%	6.75%	-2.25%	4.50%	5.00%
EM LOCAL	6.57	6.69%	4.28%	2.41%	2.23%	7.29%	-0.20%	6.93%	-0.54%	6.39%	3.30%

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