

Flaw in Asset Allocation Policy

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EXECUTIVE SUMMARY

Many institutional investors over the last decade have not realized their return objectives. This failure has reignited criticisms of the Modern Portfolio Theory (MPT) and Mean-Variance Optimization (MVO) framework that investors have relied on to set their asset allocation policies. We believe the MPT framework, despite its shortcomings, is still a useful planning tool to optimally allocate investments among asset classes. In our view, the main cause of unrealized return expectations has been the adoption of a static target or policy asset allocation by institutional investors. A target or policy asset allocation by definition implies that the set of expectations used to derive the asset allocation mix does not change. We believe the inability of a static asset allocation mix to accept new information is the main cause of unrealized return expectations. In this paper, we will discuss shortcomings of a target policy allocation based on stale expectations. We believe an optimal portfolio should reflect the most recent changes in expectations, which can be expressed through a dynamic asset allocation program.

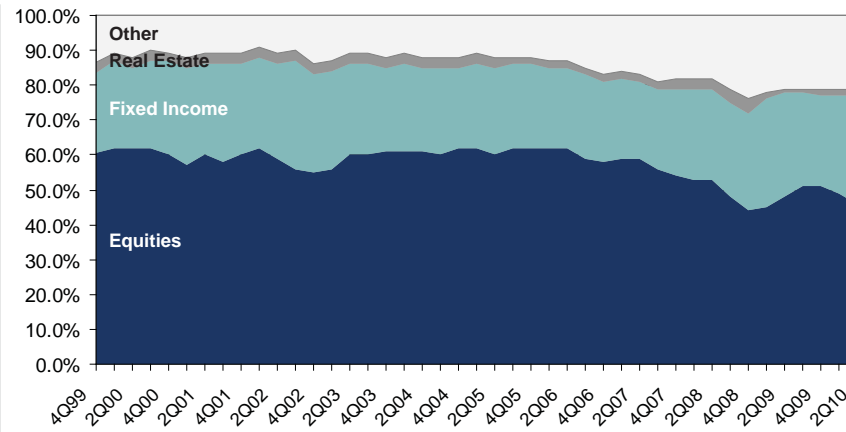
INSTITUTIONAL INVESTORS ADOPT STATIC ASSET ALLOCATION

Investors seem to be ignoring the most important decision involved in constructing an optimal portfolio. Brinson, Hood, and Beebower [1986] suggested that 93.6% of the average return variation in U.S. pension plan portfolios from 1974 to 1983 can be explained by asset allocation policy mixes¹. After some controversy over the research, Ibbotson and Kaplan [2000] confirmed that in fact asset allocation explains approximately 90% of the variability of portfolio returns over time². Even after decades of research confirming that asset allocation will be the overwhelming determinant of portfolio returns, investors continue to turn a blind eye to asset allocation decisions when market conditions change. In *Figure 1*, we plot the average asset allocation exposures of public, corporate, and endowment plans in the U.S. during the last decade. The data confirm that institutional investors do in fact adhere to a policy asset allocation mix. The decrease in equity exposure since late 2007 can be mostly explained by market movement.

1. Gary P. Brinson, L. Randolph Hood, and Gilbert L. Beebower, *Determinants of Portfolio Performance*, The Financial Analysts Journal, July/August 1986.
2. Roger G. Ibbotson and Paul D. Kaplan, *Does Asset Allocation Policy Explain 40%, 90%, or 100% of Performance?*, The Financial Analysts Journal, January/February 2000

Figure 1: Average United States Pension and Endowment Asset Allocation (4Q99–2Q10)

Data Source: BNY Mellon Asset Servicing



STALE EXPECTATIONS IMPLIED BY A STATIC ASSET ALLOCATION MIX

MVO and MPT, first introduced by Harry Markowitz in 1952, provide a framework for investors to construct an efficient frontier portfolio that achieves diversification benefits by holding assets or securities that are not perfectly correlated with each other. Since the introduction of the Markowitz mean-variance approach, many extensions have been developed, such as the Black-Litterman model optimization. For simplicity we focus on the original mean-variance approach in this paper. Institutional investors typically set a policy or target asset allocation mix based on the following formula:

$$Asset Allocation_t = f(Investor Risk Tolerance_t, Market Expectations_t).$$

Armed with this breakthrough in modern finance, investors began to set policy asset allocation. Unfortunately, in the past decade many investors have failed to realize their expectations or objectives by employing this framework. For institutions that have a contractual liability stream, not realizing their expectations can lead to a dire situation. Some institutional and retail investors without the burden of a liability stream may have to rein in the ambitious objectives. We believe the main culprit in the failure to realize return objectives is the *stale market expectations* used to arrive at the policy allocation. A “target” policy allocation by definition implies that the expectations used to arrive at the optimal mix will not change, regardless of the most recent information. Please see *Figure 2*. Policy asset allocation mixes fail to incorporate new information from the market. The stale expectations limit investors to implementing portfolios along *one efficient frontier*. We believe a dynamic allocation program that encompasses the most recent expectations is superior to the “set it and forget it” approach to asset allocation. A dynamic asset allocation process allows the investor to move the efficient frontier as new information becomes available. This is achieved by dynamically adjusting the expected returns, risk, or correlation expectations. Please see *Figure 3* where we alter the equity expected return and keep risk and correlation estimates constant.

Figure 2: Policy Asset Allocation Mixes Fail to Accept New Information from Market

Data Source: Mellon Capital

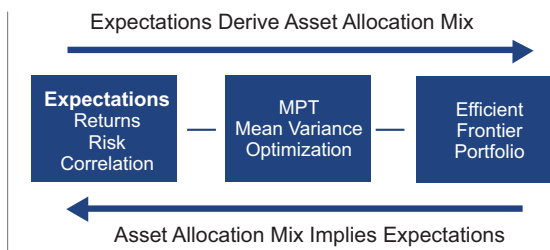
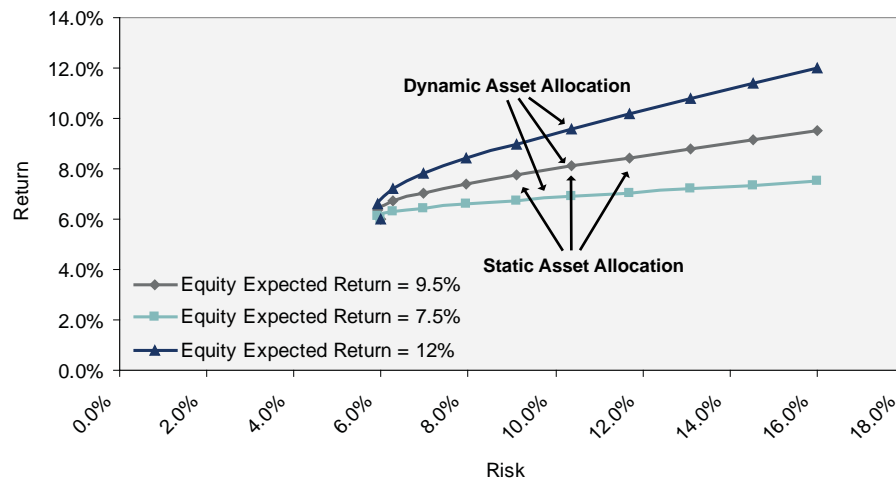


Figure 3: Illustration- Efficient Frontier: Dynamic and Static Asset Allocations

Data Source: Mellon Capital



According to *Figure 1*, we can assume that most investors adhere to the broadly used 60/40 (stocks/bonds) asset allocation mix. We can reverse engineer the implied expected return from a 60/40 asset allocation mix by making some assumptions. In order to solve for the implied expected returns, we need to define a return target. The most frequently quoted return target seems to be approximately 8% for defined benefit plans. For risk and correlation estimates, we use realized stock (S&P 500® Index) and bond (Barclays Aggregate Bond Index) returns from 1976 through 2010 as inputs. To achieve a solution through reverse optimization, we define the most common mean variance utility function as follows:

$$U = w^T \mu - \frac{\lambda w^T \Sigma w}{2}$$

In this case we use $\lambda = 2$ as the risk aversion parameter.

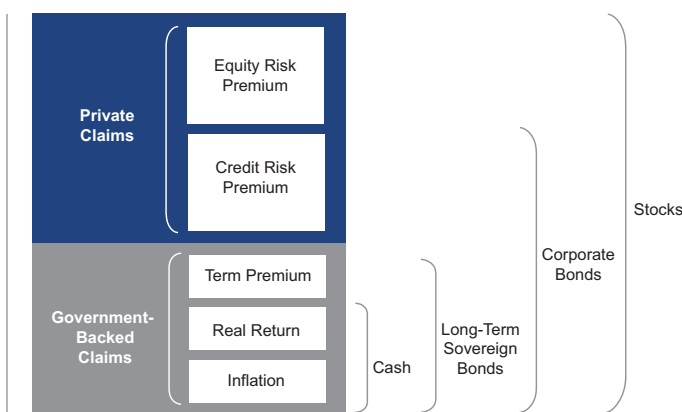
According to the previously mentioned assumptions, a 60/40 stock/bond allocation implies expected returns of 9.5% and 6% for stocks and bonds, respectively. The levels seem very reasonable, even close to our internal estimates. What we are more concerned with is that the implied expectations are static. We think this is an unrealistic assumption. Below we describe why expectations for asset class returns, risk, and correlation are not static as implied by a target asset allocation policy.

EXPECTED RETURNS ARE NOT STATIC

Expected returns in the Markowitz mean-variance process are the central inputs, and have the greatest effect on the optimal asset allocation. A change in the expectations can drastically alter the asset allocation mix. In *Figure 4*, we show a framework for deconstructing expected returns. This method is the foundation to our beliefs that expectations change with new information, and can be applied to any financial asset that has a claim to future cash flows.

Figure 4: Expected Return Building Blocks

Data Source: Mellon Capital



Expected inflation is embedded in nominal and real asset return expectations. Cash has historically achieved positive real returns above realized inflation. The positive real return of cash is the opportunity cost to defer consumption. Central banks conduct monetary policy by setting interest rates with the goal of adjusting consumption patterns in order to control inflation. The term premium is an element of the expected return that offers a premium as a result of the duration or length of the claims on the expected cash flows. The longer the duration or maturity of claims on future cash flow, the more the uncertainty. The market will offer a premium for those investors willing to exchange future uncertainty with today's cash receipts. Inflation + real return + term premium can, in our view, be interpreted as safe assets that have sovereign characteristics or claims on future tax receipts.

Moving to private-sector claims from government-backed claims requires additional return components such as credit and equity risk premiums. The credit risk premium compensates the buyer for bearing the risk related to the issuer's ability to pay back the debt, relative to sovereign debt. Equity represents the lowest claim on the capital structure of a private firm. Equities also offer a risk premium for participation in future growth. There are numerous ways to determine equity risk premiums. At Mellon Capital, we utilize a discounted cash flow model from forward-looking earnings expectations and the current price to derive an internal rate of return (IRR) on equity markets. The difference between the equity IRR and a representative long bond yield is our interpretation of the market's risk premium. Please see *Figure 5*. Historical realized asset class returns have confirmed our theoretical framework over the long run. Please see *Figure 6*.

Figure 5: Historical U.S. Equity Risk Premiums

Data Source: Mellon Capital

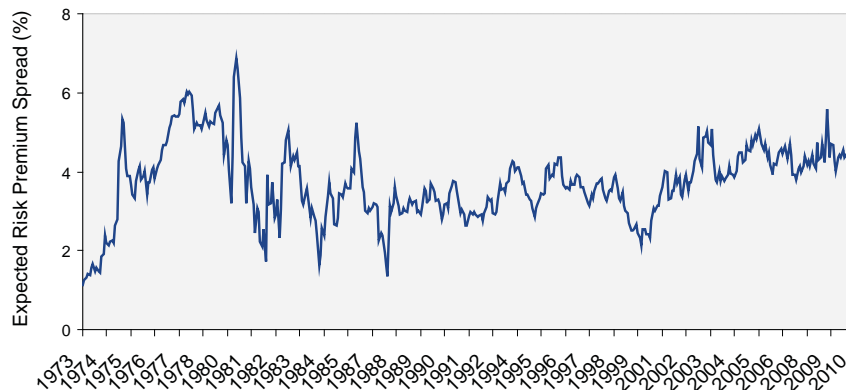
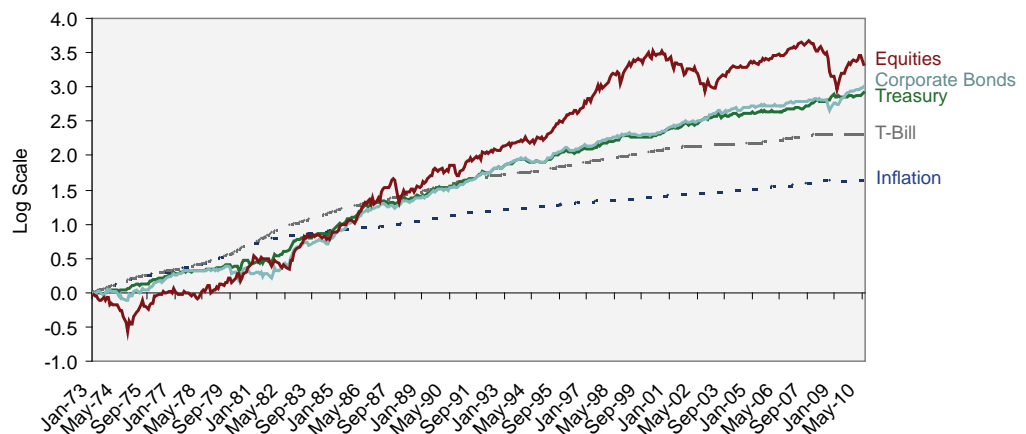


Figure 6: Realized Asset Class Returns (1973–2010)

Data Source: Thomson Reuters Datastream, Barclays



This framework for deconstructing expected returns allows investors to translate views on capital markets to expected return inputs for the MVO process. We believe changes in inflation and real returns, as well as term, credit, and risk premiums should be reflected through a dynamic asset allocation process that encompasses the most recent expectations.

Just how sensitive are the changes to expected returns in an MVO process? In *Figure 7*, we show the sensitivity of asset allocation mixes to a change in equity expected returns. The inputs are the same as in the previous reverse-optimization example. All other variables, including the utility function and risk-aversion level, are kept constant. A 5% change in equity expected return can shift the optimal asset allocation mix by more than 80%. For investors that adopt a static asset allocation policy, a 5% change in expected returns for any asset class may be difficult to justify. However, using our expected return framework, we have observed numerous instances of a 5% change to macro (inflation and GDP expectations) and valuation (credit and equity risk premiums) expectations over the last 30 years. Please see *Figure 8*, where we plot the forward twelve-month consensus forecast for inflation and GDP in the U.S. Furthermore, as shown in *Figure 5*, we have observed multiple periods of erratic fluctuations of 5% in expected equity risk premiums.

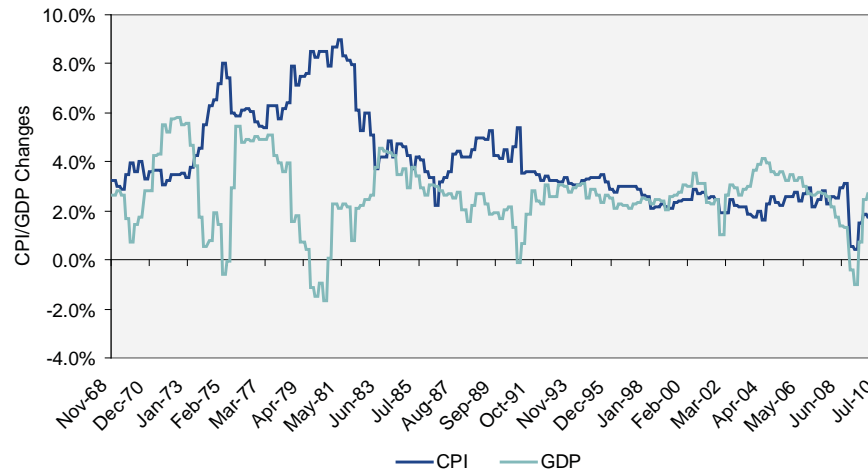
Figure 7: Illustration-Sensitivity of Optimal Asset Allocation Mix to Change in Equity Expected Returns

Data Source: Mellon Capital

Expected Returns		Asset Allocation	
Stocks	Bonds	Stocks	Bonds
6.50%	6.50%	16%	84%
7.50%	6.50%	36%	64%
8.50%	6.50%	56%	44%
9.50%	6.50%	60%	40%
10.50%	6.50%	95%	5%
11.50%	6.50%	100%	0%

Figure 8: 12 Months Forward Looking Consensus Expectations

Data Source: Thomson Reuters Datastream, Survey of Professional Forecasters, Consensus Economics



RISK AND CORRELATIONS ARE NOT STATIC

Risk and correlation estimates are foundations of the MPT and MVO. The Markowitz theory states that investors can minimize portfolio risk through diversification. Diversification benefits are achieved through securities or assets that do not move perfectly with each other. In a static asset allocation mix, the diversification benefits and the expected risk of the portfolio remain constant. We believe this notion of constant risk and correlation estimates implied by a policy asset allocation mix is the cause of unexpected risk and volatility in institutional portfolios.

Risk

Risk is defined as the standard deviation of the asset class returns by the MPT. Investors and academics have criticized the use of standard deviation as a measure of risk because of the implicit assumption of a normal distribution. Investors that adopt a policy or static asset allocation mix that assumes static risk estimates amplify this shortcoming. The static risk estimates used to derive the optimal asset allocation mix by definition assume a normal distribution, even when it is commonly recognized that certain asset classes do not have normal distributions. We believe policy asset allocation portfolios may be subjected to unexpected volatility as a result of the static expectations. In *Figure 9*, we show how changing stock risk estimates in a static 60/40 portfolio can elevate the overall total portfolio risk. Investors that assumed a 14% risk for stocks may be under the false assumption that the total portfolio risk was +/-9%, when in fact the actual stock risk was 24%, and one standard deviation on the total portfolio was +/-15%.

Figure 9: Illustration- Changing Stock Risk Estimates in Static Portfolio Can Elevate Risk

Data Source: Mellon Capital

Risk Estimate	Asset Allocation		Total Risk
	Stocks	Bonds	Portfolio
14.00%	60%	40%	9.16%
16.00%	60%	40%	10.35%
18.00%	60%	40%	11.52%
20.00%	60%	40%	12.71%
22.00%	60%	40%	13.88%
24.00%	60%	40%	15.06%

Figure 10: Illustration- Risk Sensitivity to Asset Allocation Mix in MVO Framework

Data Source: Mellon Capital

Risk Estimates		Asset Allocation	
Stocks	Bonds	Stocks	Bonds
14.00%	6.00%	98%	2%
16.00%	6.00%	76%	24%
18.00%	6.00%	60%	40%
20.00%	6.00%	48%	52%
22.00%	6.00%	40%	60%
24.00%	6.00%	33%	67%

We believe adopting a dynamic asset allocation process that encompasses the most recent changes in risk expectations can potentially mitigate the probability of fat-tail events in the portfolio. There are some common risk models, such as GARCH, that give investors a systematic framework for dynamically adjusting risk. In *Figure 10*, we plot just how sensitive risk can be to the asset allocation mix in the MVO framework. We continue with our previous example of holding all variables constant except for the risk estimate on stocks. Raising the risk estimate from 14% to 24% can alter the optimal asset allocation to stocks by nearly 70%. Shifting away from assets that exhibit increasing uncertainty or risk allows the overall portfolio to mitigate unexpected tail events. Return distributions for the portfolio are likely to look more normal (exhibit less kurtosis) with a dynamic risk process.

Correlation

MPT is a mathematical formulation of the concept of diversification, whereby holding multiple asset classes or securities that have a correlation of less than one can achieve lower risk than holding one individual security or asset class. Investors that apply static correlation estimates may fail to realize diversification benefits implied by these correlation estimates. Correlations across asset classes such as stocks and bonds are a function of the macro economic environment. In *Figure 11*, we plot the correlation between stocks and bonds relative to the changes in inflation. The negative correlation between stocks and bonds in the last 20 years may become a myth if we shift to a period of higher inflation. From 1968 to late 1970s, the U.S. went through an unprecedented period of inflation uncertainty. After the appointment of Federal Reserve chairman Paul Volcker, inflation was brought under control. Please see *Figure 12*, where we plot realized 10-year correlations between equities and fixed income.

Figure 11: Correlation Between Stocks and Bonds Relative to Inflation Changes (1/1979–1/2009)

Data Source: Thomson Reuters Datastream, Barclays Capital and Mellon Capital

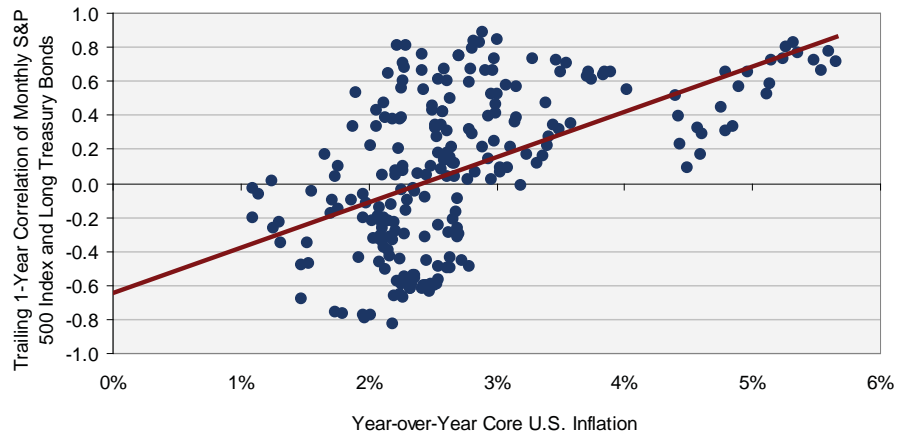
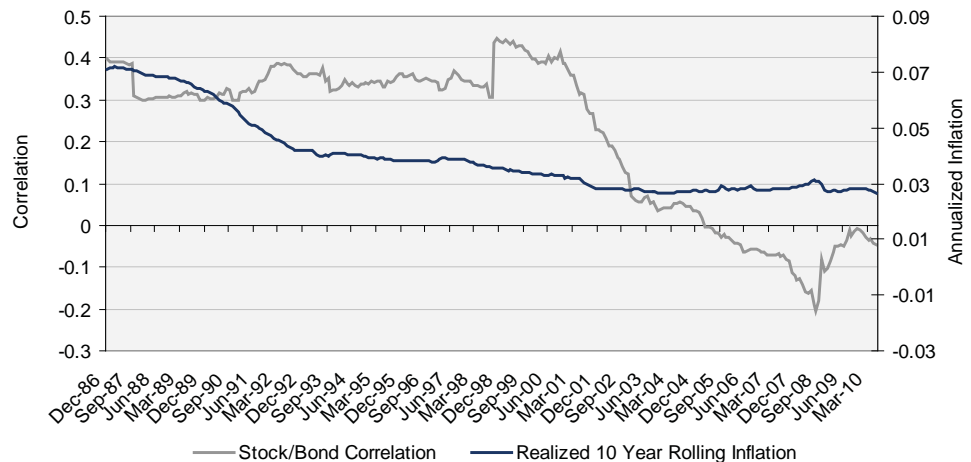


Figure 12: Stock/Bond Correlation vs. Realized Inflation

Data Source: Thomson Reuters Datastream



Furthermore, in a crisis, correlations converge and limit the expected benefits of diversification. After Lehman Brothers failed in 2008, nearly all risky assets declined in value. Historically reliable diversifiers such as commodities and REITS did provide benefits. *Figures 13, 14, and 15* show that inter- and intra-asset class correlations jumped higher following the Lehman failure.

Figure 13: Inter- and Intra-Asset Class Correlations Jumped Higher During Lehman Failure

Data Source: Bloomberg and Mellon Capital

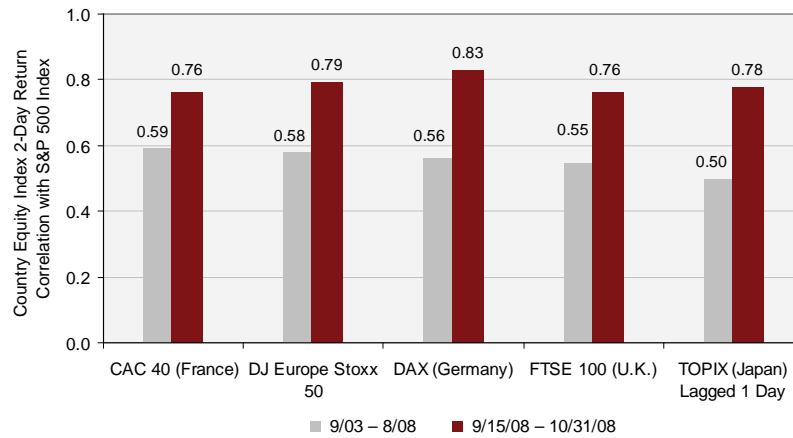


Figure 14: Inter- and Intra-Asset Class Correlations Jumped Higher During Lehman Failure

Data Source: Bloomberg and Mellon Capital

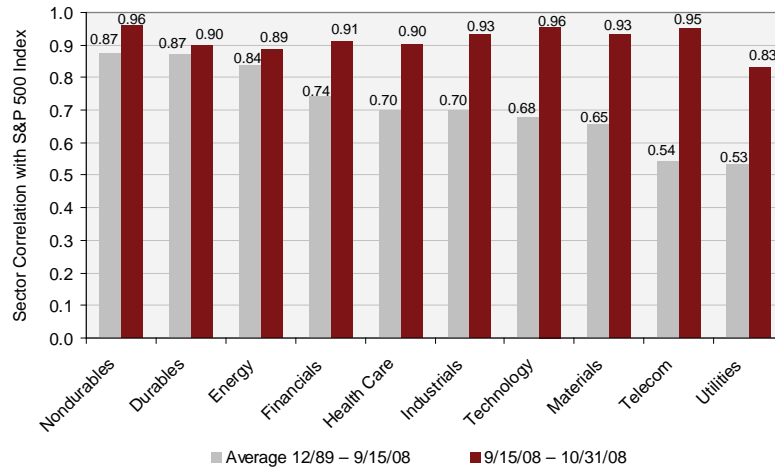
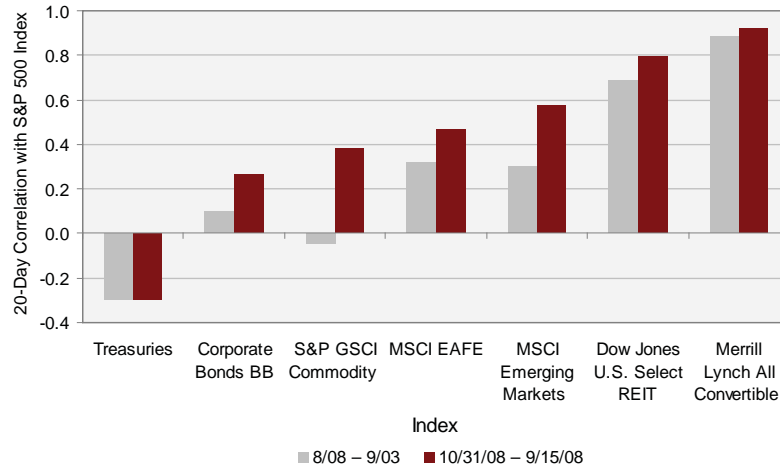


Figure 15: Inter- and Intra-Asset Class Correlations Jumped Higher During Lehman Failure

Data Source: Thomson Reuters Datastream and Mellon Capital



The changes in correlations across and within asset classes can alter the portfolio risk and the optimal asset allocation mix. In *Figure 16*, we plot the changes in overall portfolio risk by applying different correlation estimates. In *Figure 17*, we plot how sensitive diversification benefits can be to an optimal portfolio asset allocation mix. A static correlation estimate can over- or underestimate the diversification benefit across and within asset classes. We believe dynamic asset allocation program that assimilates changes to correlation estimates allows for better risk control. Under- or overestimation of correlation estimates can lead to nonefficient-frontier portfolios that incorrectly determine the optimal asset allocation and total portfolio risk.

Figure 16: Correlation and Risk

Data Source: Mellon Capital

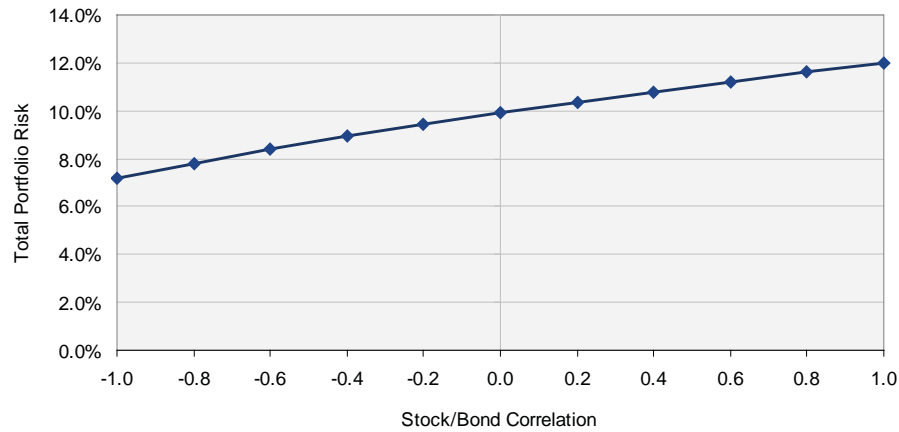


Figure 17: Illustration-Sensitivity of Diversification Benefits in an Optimal Portfolio Asset Allocation Mix

Data Source: Mellon Capital

S/B Correlation	Asset Allocation	
	Stocks	Bonds
-0.40	68%	32%
-0.20	70%	30%
0.00	72%	28%
0.20	78%	22%
0.40	80%	20%

DYNAMIC ASSET ALLOCATION

A dynamic asset allocation process may resolve some shortcomings of the strategic asset allocation portfolio. Most importantly, the dynamic asset allocation process allows a portfolio to reflect new information and adapt to a more optimal mix. Institutional investors would be unlikely to adopt a dynamic asset allocation overnight, for multiple reasons. The sheer size of institutional portfolios, internal resource constraints, and the board approval process may represent significant hurdles. Over the years investors have continually allocated capital to tactical asset allocation strategies that, combined with their policy or target asset allocation, can closely mirror a dynamic asset allocation.

CONCLUSION

The concept of a policy or strategic asset allocation is flawed. In our view, the MPT and MVO framework that investors employ to arrive at the optimal allocation is based on expectations. Expectations change as a result of new information from the marketplace. A policy asset allocation's inability to accept new information can lead to unrealized return expectations, inefficient portfolios, unexpected volatility, and tail risks. We believe a dynamic asset allocation program that adjusts expectations by incorporating new information allows for a higher probability of achieving return expectations and better risk control.

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