
E(R) – A Key Driver in the Asset Allocation Process

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Objective

- **Determine Risk Premium, or Excess Return, Necessary to Achieve a Moderate Allocation (10%) to Both Small Cap and Emerging Market Equities**

~ Introduction ~

- **Asset Allocation Models largely a function of:**
 - Historic Volatility of Inputs
 - Historic Correlation of Inputs
 - Expected Returns
- **Small Cap & Emerging Markets**
 - High Volatility
 - Optimizers Require High Risk Thresholds and/or Substantial Risk Premiums

“We have two classes of forecasters: Those who don’t know – and those who don’t know they don’t know.”

~J.K. Galbraith

Framework & Assumptions

Premised on Mean Reversion Methodology Taking into Account:

Last Ten Years Historical Standard Deviations and Correlations of Returns.

Expected Returns Taking into Account Current Valuation Levels

Asset Classes Considered for Analysis / Minimum - Maximum Allocation:

Domestic Large Cap Equities (S&P 500) / 20-50%.

Domestic Mid-Cap Equities (Russell Mid-Cap) / 0-20%.

Domestic Small Cap Equities (Russell 2000) / 0-10%.

Domestic Fixed Income (Lehman Government / Credit Index) / 30-50%.

International Developed Markets Equities (MSCI EAFE) / 10-20%.

International Emerging Markets Equities (MSCI Emerging Markets) / 0-10%.

Framework & Assumptions

10 YR S.D.	S&P 500	MSCI EAFE	MSCI EM	Russell MidCap	Russell 2000	Leh Gov/Credit
	13.16	13.18	21.44	14.20	17.81	3.29

10 YR Correlations	S&P 500	MSCI EAFE	MSCI EM	Russell MidCap	Russell 2000	Leh Gov/Credit
S&P 500	1.000	0.820	0.718	0.897	0.740	-0.227
MSCI EAFE	0.820	1.000	0.787	0.817	0.726	-0.221
MSCI EM	0.718	0.787	1.000	0.762	0.725	-0.217
Russell MidCap	0.897	0.817	0.762	1.000	0.915	-0.195
Russell 2000	0.740	0.726	0.725	0.915	1.000	-0.181
Leh Gov/Credit	-0.227	-0.221	-0.217	-0.195	-0.181	1.000

10 YR Covariance	S&P 500	MSCI EAFE	MSCI EM	Russell MidCap	Russell 2000	Leh Gov/Credit
S&P 500	173.19	142.17	202.66	167.67	173.49	-9.82
MSCI EAFE	142.17	173.64	222.38	152.96	170.41	-9.56
MSCI EM	202.66	222.38	459.71	232.01	276.65	-15.30
Russell MidCap	167.67	152.96	232.01	201.67	231.45	-9.11
Russell 2000	173.49	170.41	276.65	231.45	317.11	-10.58
Leh Gov/Credit	-9.82	-9.57	-15.30	-9.11	-10.58	10.80

Past performance is not indicative of future results. Indices are gross of fees and are not available for direct investment.

Source of Historical Returns: Mellon Analytical Services

Data as of 3/31/08

Framework & Assumptions

$$\sigma_p^2 = w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2w_A w_B \rho_{AB} \sigma_A \sigma_B$$

$$\sigma_p = \sqrt{\sigma_p^2}$$

- Calculate Risk of Combining All Asset Classes in Portfolio with Formula Above

$$E(R_p) = w_A E(R_A) + (1 - w_A) E(R_B) = w_A E(R_A) + w_B E(R_B)$$

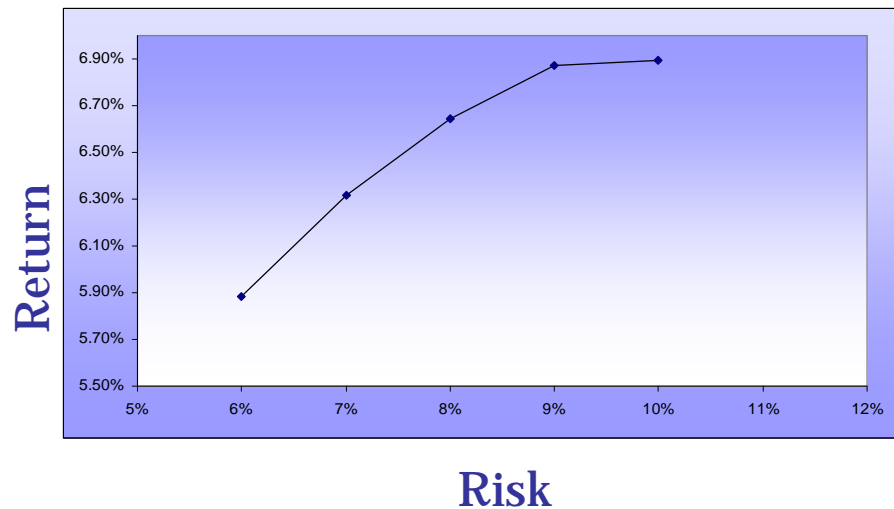
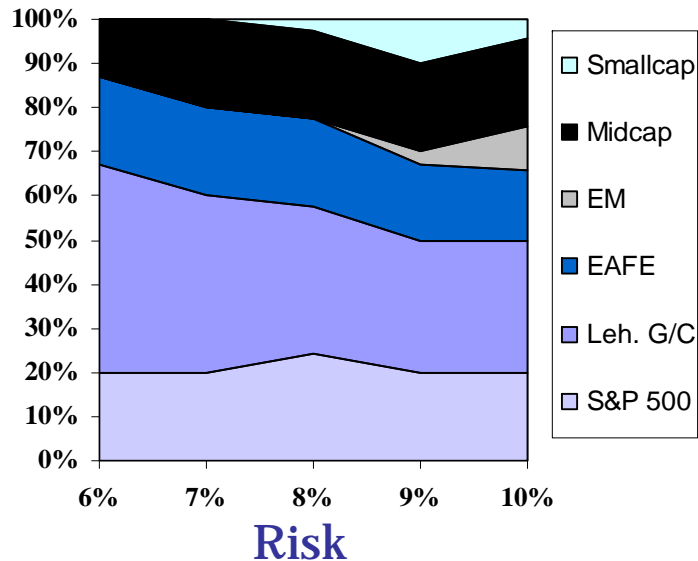
- Optimize Portfolio for Varying Levels of Risk
 - Portfolio is Optimal when Sharpe Ratio is Maximized

The term "optimize" reflects only the multiple portfolios that lie along the efficient frontier and no assumption should be made regarding the risk or return that would be experienced by any actual portfolio.

Current Model

	S&P 500	MSCI EAFE	MSCI EM	Russell MidCap	Russell 2000	Leh Gov/Credit
E (R)	7.65%	8.10%	8.78%	9.45%	8.55%	3.20%

Risk							Expected	
	S&P 500	Leh. G/C	EAFE	EM	Mid Cap	Small Cap	Return	Efficiency
6.00%	20.00%	47.01%	20.00%	0.00%	12.99%	0.00%	5.88%	0.4403
7.00%	20.00%	40.09%	20.00%	0.00%	19.91%	0.00%	6.31%	0.4392
8.00%	24.31%	33.17%	20.00%	0.00%	20.00%	2.52%	6.65%	0.4258
9.00%	20.00%	30.00%	17.27%	2.73%	20.00%	10.00%	6.87%	0.4037
10.00%	20.00%	30.00%	15.83%	10.00%	20.00%	4.17%	6.90%	0.3657



* Expected returns are after tax and represent a hypothetical scenario based upon management's current expectations and beliefs concerning trends and future developments and their potential effects. They are not guarantees of future performance. Actual results may differ materially from the illustration. Past performance is not indicative of future results. Indices are gross of fees and are not available for direct investment.

Historical Analysis

“If past history was all there was to the game, the richest people would be librarians.”

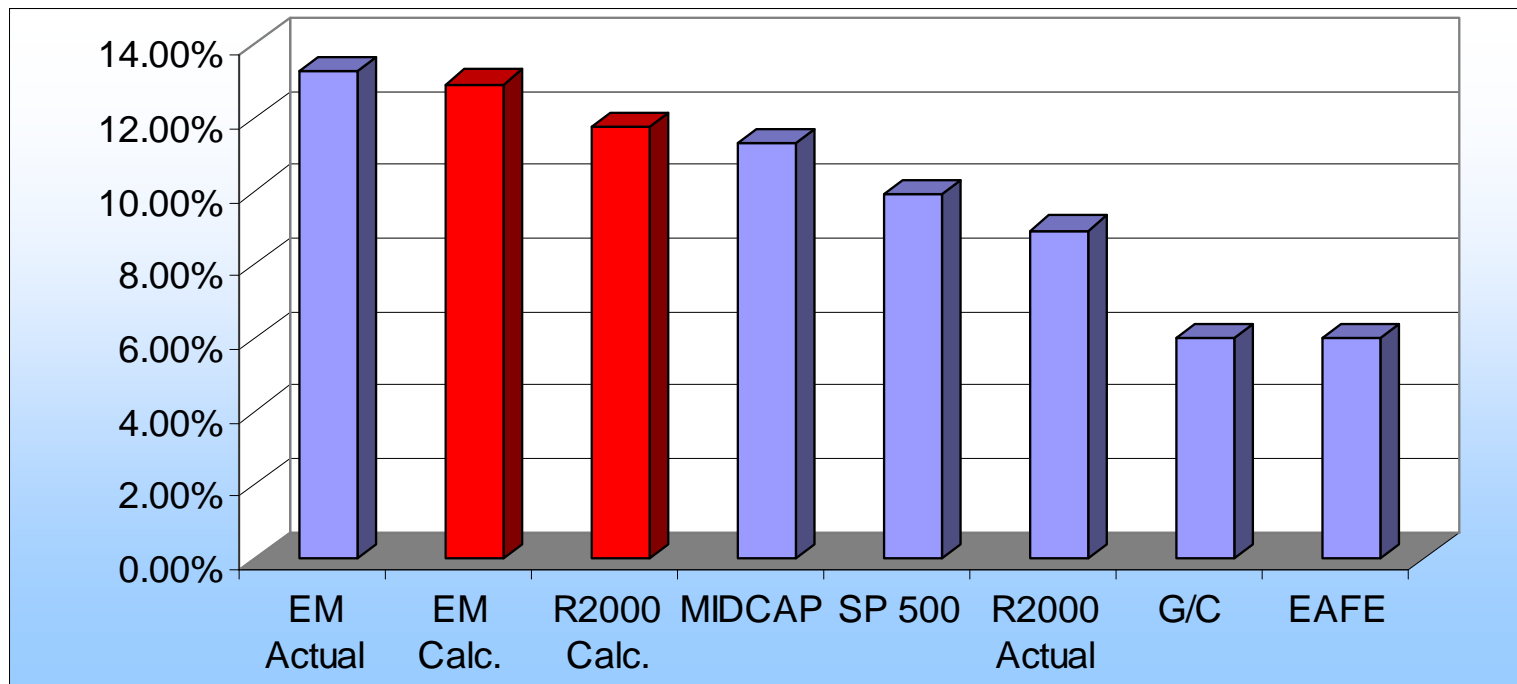
~Warren Buffett

Historical Analysis

- **Set Investor's Risk Tolerance Equal to 9.00%**
 - Risk Held Constant
- **Use Historic Returns for Each Asset Class**
 - Small Cap or Emerging Markets Become Variable
 - Determine Risk Premium, or Excess Return, Necessary to Achieve a Moderate Allocation (10%)

Historical Analysis: Annualized Returns (Past 20 Years)

<u>20 Years</u>	<u>Actual</u>	<u>Calculated</u>
MSCI EM	13.26%	12.90%
Russell MIDCAP	11.28%	
S&P 500	9.90%	
Russell 2000	8.93%	11.75%
MSCI EAFE	5.98%	
Lehman G/C	5.99%	



Source of Historical Returns: Mellon Analytical Services

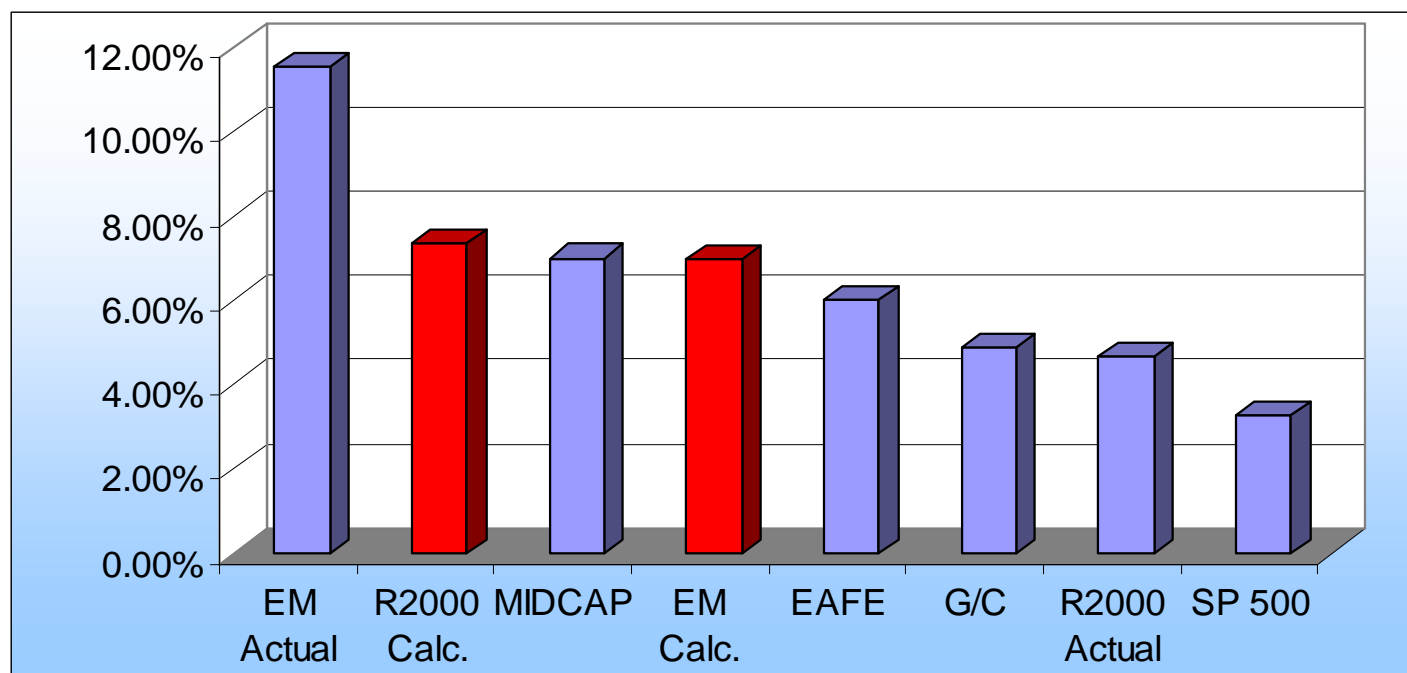
Past Performance is not Indicative of Future Results.

Indices are gross of fees and are not available for direct investment.

Data as of 3/31/08

Historical Analysis: Annualized Returns (Past 10 Years)

10 Years	Actual	Calculated
MSCI EM	11.53%	6.95%
Russell MIDCAP	6.99%	
MSCI EAFE	5.99%	
Lehman G/C	4.88%	
Russell 2000	4.64%	7.35%
S&P 500	3.25%	



Source of Historical Returns: Mellon Analytical Services

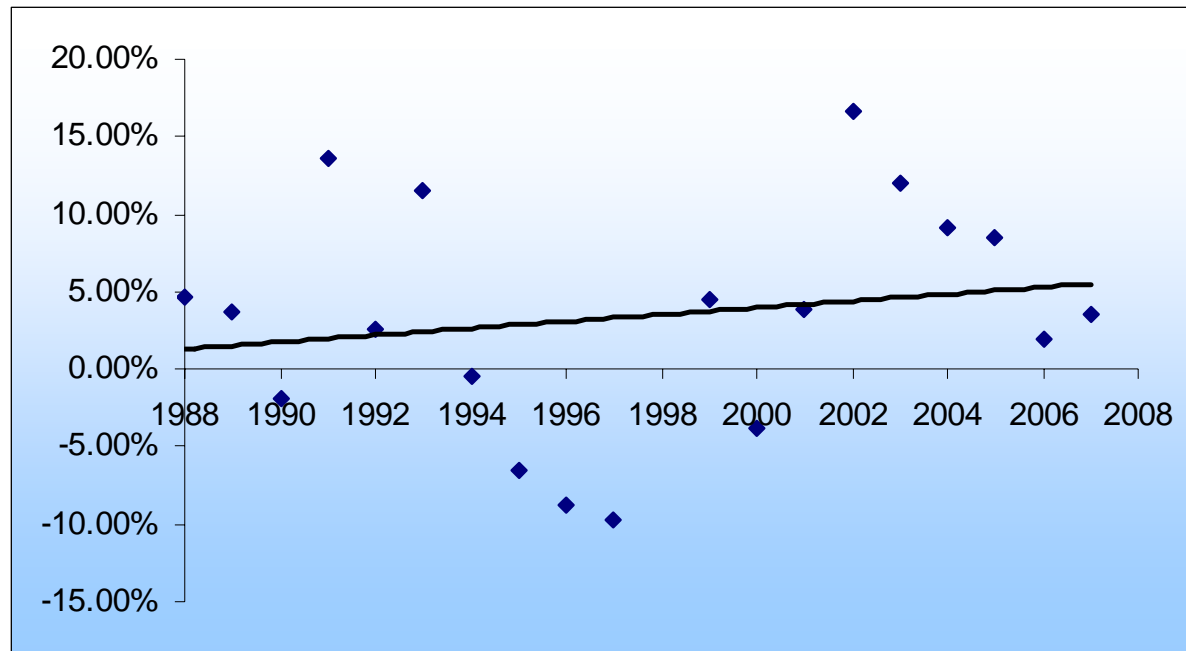
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Historical Analysis ~ Small Cap vs. Large Cap

Russell 2000 Calculated Return Spread Over S&P 500 (bps)



Source of
Historical
Returns:
Mellon
Analytical
Services

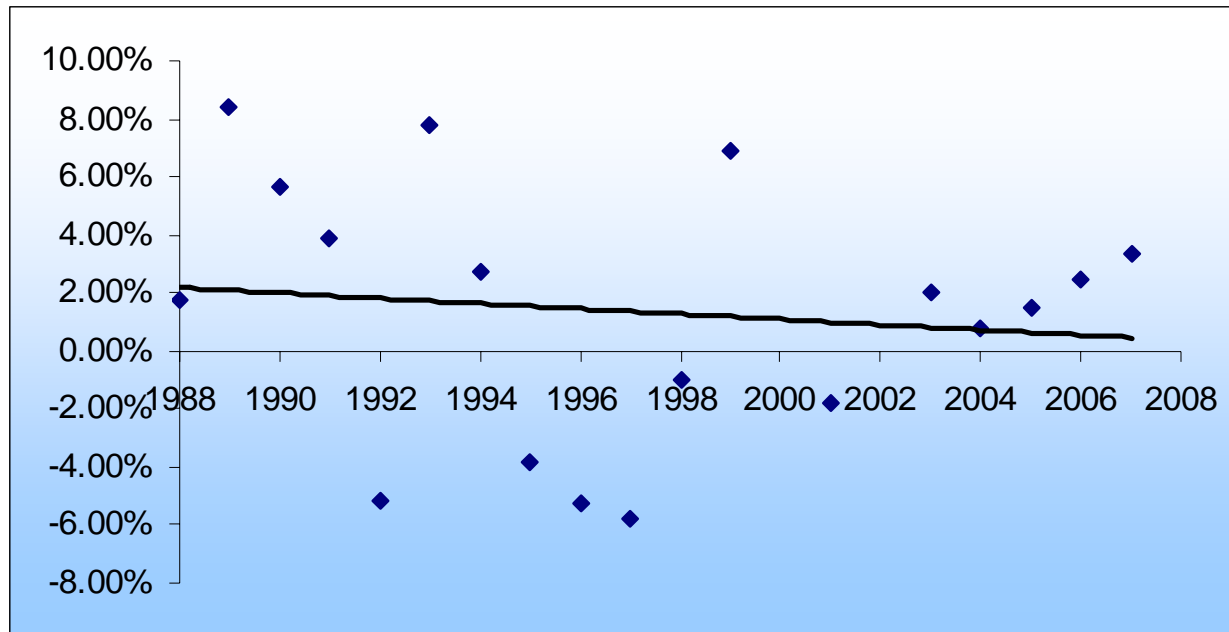
Past
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Indices are
gross of fees
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direct
investment.

- Trend Line Begins Around 200 bps and Drifts Upward
- Small Cap Equities Need Excess Return of 3.00-4.00% to Justify a 10 % allocation

Historical Analysis~ Small Cap vs. Mid Cap

Russell 2000 Calculated Return Spread Over Russell Mid Cap (bps)



Source of
Historical
Returns:
Mellon
Analytical
Services

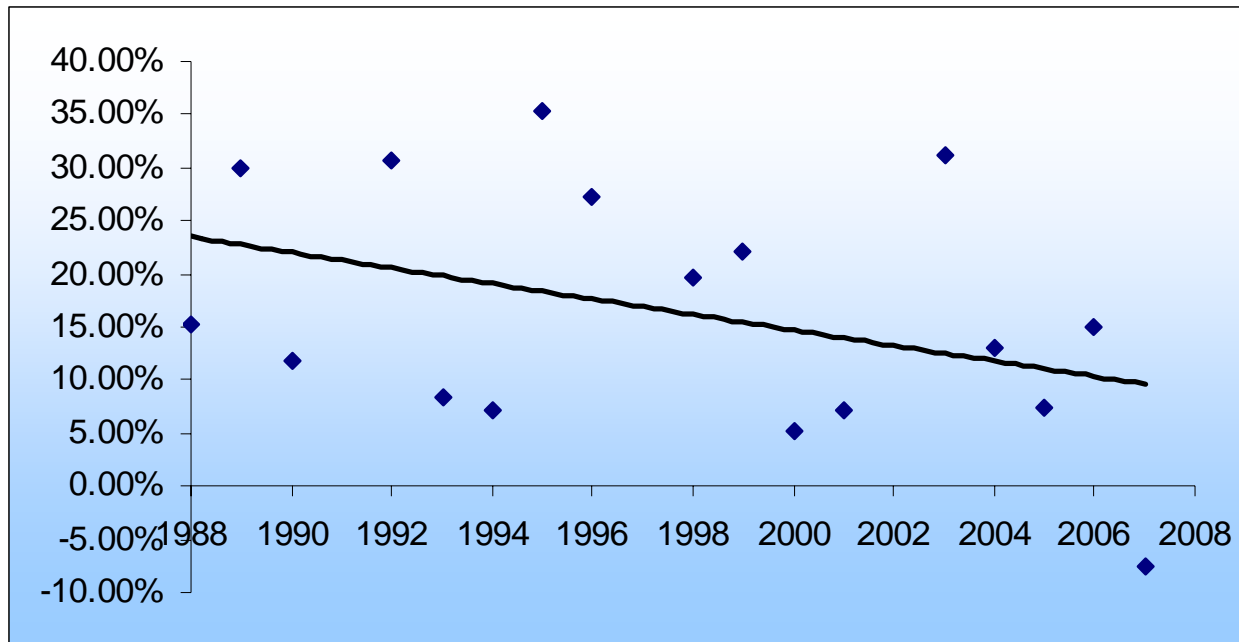
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- Trend Line Begins Around 200 bps and Drifts Downward
- Average 100-200 bps

Historical Analysis ~ EM vs. EAFE

MSCI EM Calculated E(R) Spread over MSCI EAFE (bps)



Source of
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Returns:
Mellon
Analytical
Services

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- Trend Line Begins Around 2400 bps and Drifts downward
- Over Recent Years Much Closer to 900-1500 bps

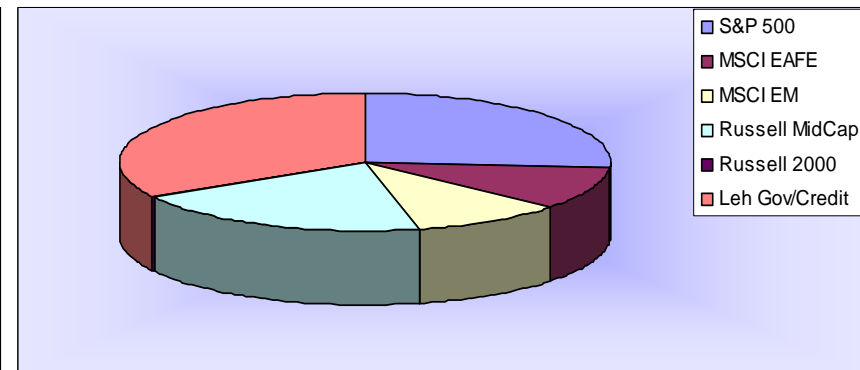
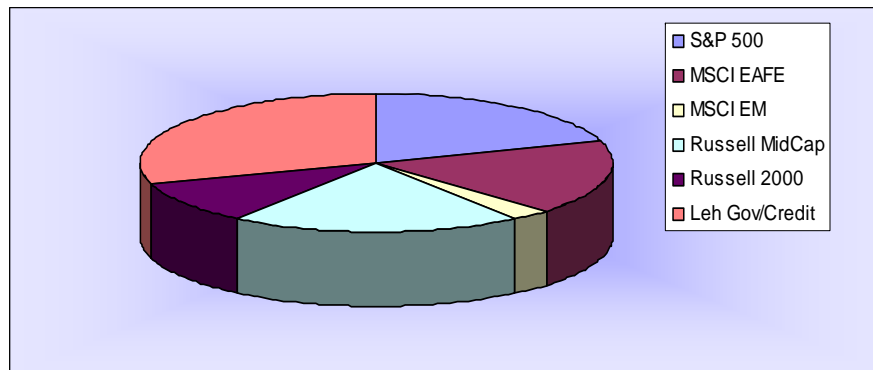
Applied Relationships

9% Risk	Asset Allocation	E (R)
S&P 500	20.00%	7.65%
MSCI EAFE	17.27%	8.10%
MSCI EM	2.73%	8.78%
Russell MidCap	20.00%	9.45%
Russell 2000	10.00%	8.45%
Leh Gov/Credit	30.00%	3.20%

9% Risk	Asset Allocation	E (R)
S&P 500	26.41%	7.65%
MSCI EAFE	10.00%	8.10%
MSCI EM	10.00%	13.15%
Russell MidCap	20.00%	9.45%
Russell 2000	0.19%	8.55%
Leh Gov/Credit	33.40%	3.20%

• Small Cap Equities only require excess return of 80 bps over Large Cap Equities

• Emerging Market Equities require excess return of ~500 bps over International Developed Market Equities



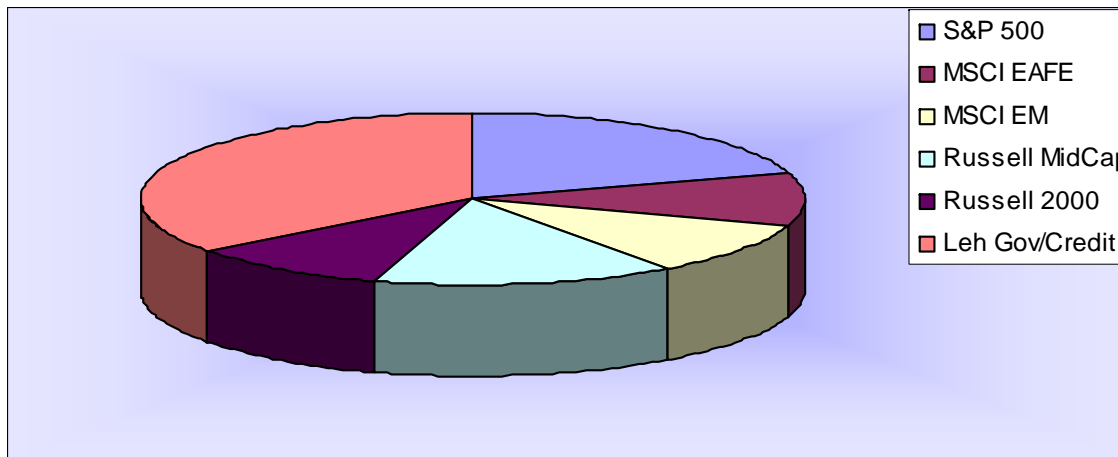
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Applied Relationships

9% Risk	Asset Allocation	E (R)
S&P 500	20.00%	7.65%
MSCI EAFE	10.00%	8.10%
MSCI EM	10.00%	13.35%
Russell MidCap	14.68%	9.45%
Russell 2000	10.00%	10.45%
Leh Gov/Credit	35.32%	3.20%

- Efficient Portfolio that Contains Maximum Allocations for both MSCI EM and Russell 2000

- With Independently Calculated E(R)'s EM (9.38% allocation) & Small Cap (0.18% allocation)



- EAFE and S&P 500 Now at Their Minimum Allocation
- Reduction in Mid Cap
- Increase in Fixed Income

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Conclusions

- Small Cap has Required Historically a Risk Premium of 200-400 bps on average over Large Cap and 100-200 bps on average over Mid Cap.
- EM has Required Historically a Risk Premium of 900-1500 bps on average over EAFE.
- Given 9% Risk Tolerance, 10% Allocation to Small Cap Equities Not Optimal Over Past 10 or 20 Years
- Although EM has Historically had Higher Volatility, Moderate Allocations are Justified

* Conclusions are not intended to constitute investment advice and are provided for educational purposes only.

Index Information

- **The Lehman Brothers U.S. Government/Credit Index** includes Treasuries, Government-Related issues (i.e., agency, sovereign, supranational, and local authority debt) and U.S.D. investment grade Corporates. It is designed to measure the non-securitized component of the U.S. Aggregate Index.
- **The MSCI® EAFE Index** is a free float-adjusted market capitalization index that measures developed market equity performance, excluding the U.S. and Canada.
- **The MSCI® Emerging Markets Index** is a free float-adjusted market capitalization index that is designed to measure equity market performance of emerging markets.
- **The Russell 2000® Index** is a float-adjusted index that measures the performance of the small-cap segment of the U.S. equity market.
- **The Russell Mid-Cap® Index** is a float-adjusted index that measures the performance of the mid-cap segment of the U.S. equity market.
- **The S&P 500** is a capitalization-weighted index of 500 of the largest U.S. stocks and is generally representative of the performance of larger companies in the U.S.

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Kyle P. West

ACADEMIC:

Wabash College, B.A.

EXPERIENCE:

Investment Experience: 3 years

Mr. West is responsible for the client service functions for Duff & Phelps Taxable and Nuclear Decommissioning Trust (“NDT”) accounts. These functions include coordinating the timely and accurate production of client reports and responding to all data requests submitted by clients, new business prospects and consultants. Prior to joining Duff & Phelps in 2005, Mr. West was a student at Wabash College where he received a B.A. in Mathematics.

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Member, CFA Society of Chicago