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Wilshire Consulting

Employees' Retirement Fund of the City of Dallas
Asset Allocation Modeling Update

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INPUT

Capital Market Assumptions (as of December 31, 2017)

Asset Class	10-Year Expected Compound Return	10-Year Expected Risk	Cash Yield
Equity/Growth Assets			
Domestic Equity	6.25%	17.00%	2.00%
International Equity	6.45%	18.75%	2.75%
Global Equity	6.45%	17.15%	2.35%
Global Low Volatility Equity	6.45%	13.50%	2.36%
Private Equity	8.75%	28.00%	0.00%
Fixed Income - Risk Reduction and Mitigation			
Core Fixed Income	3.55%	5.15%	3.55%
High Yield Fixed Income	4.95%	10.00%	8.15%
Credit Opportunities	5.75%	10.33%	4.05%
Inflation Hedging Assets			
REITs	5.40%	17.00%	3.95%
Private Real Estate	5.65%	12.00%	3.40%
MLPs	9.60%	17.00%	7.65%

- Wilshire's asset class return, risk and correlation assumptions are developed on 10-year forward looking expected rates of return and historical risk and correlation, adjusted to incorporate recent trends
- Return expectations represent a passive investment in the asset class (beta). They do not reflect value added from active management (alpha).

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ASSET ASSUMPTION METHODOLOGY

- Master Limited Partnerships
  - Predominately a yield-returning asset class
  - Utilize both the current yield and potential for yield increases in the future to formulate a return assumption
    - » MLP Index yield of 7.64%
    - » Current inflation of 1.95%
    - » = MLP Expected Return of 9.6%

- High Yield and Opportunistic Credit
  - Utilizes a high yield bond model to forecast returns, which accounts for credit yield spreads, defaults, recoveries & appreciation/depreciation of principal
  - Model Inputs:
  - Initial yield spread of 3.64%, widening to historical average of 6%
  - Annual default rate of 4.1% over the forecast period
  - A 40% recovery rate
    - » Wilshire forecasts 4.95% return for high yield bonds
    - » Wilshire forecasts 4.55% return for emerging market debt
  - Opportunistic Credit modeling includes a component of Distressed/Mezzanine Debt which is expected to return 6.95%

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OPTIMIZATION

PORTFOLIO MODELING

			HIGH YIELD ALLOCATION CHANGES					MLP ALLOCATION CHANGES		COMBINATION ALLOCATION CHANGES
Asset Class	Current Policy	Actual Weight ex Cash	High Yield 10%/Add 2.5% to Opp Credit	High Yield 10%/Add 2.5% to Global Equity	High Yield 5%/Add 7.5% to Global Equity	High Yield 10%/Add 2.5% to Core Fixed	High Yield 5%/Add 7.5% to Core Fixed	MLP Reduced to 5%/Add 5% to Global Equity	MLP Reduced to 5%/Add 5% to Core Fixed	High Yield 10%/ Opp Credit 5%/MLP 5%/Add 5% to Global Equity
Domestic Equity	15.00%	15.43%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%
International Equity	15.00%	16.42%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%
Global Equity	5.00%	5.22%	5.00%	7.50%	12.50%	5.00%	5.00%	10.00%	5.00%	10.00%
Global Low Volatility Equity	10.00%	10.65%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
Private Equity	5.00%	5.95%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Total Growth Assets	***50.00%***	***53.66%***	***50.00%***	***52.50%***	***57.50%***	***50.00%***	***50.00%***	***55.00%***	***50.00%***	***55.00%***
Core Fixed Income	15.00%	13.09%	15.00%	15.00%	15.00%	17.50%	22.50%	15.00%	20.00%	15.00%
High Yield Fixed Income	12.50%	12.28%	10.00%	10.00%	5.00%	10.00%	5.00%	12.50%	12.50%	10.00%
Credit Opportunities	2.50%	2.52%	5.00%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	5.00%
Total Fixed Income	***30.00%***	***27.89%***	***30.00%***	***27.50%***	***22.50%***	***30.00%***	***30.00%***	***30.00%***	***35.00%***	***30.00%***
REITs	5.00%	4.45%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Private Real Estate	5.00%	6.23%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
MLPs	10.00%	7.77%	10.00%	10.00%	10.00%	10.00%	10.00%	5.00%	5.00%	5.00%
Total Inflation Hedging Assets	***20.00%***	***18.45%***	***20.00%***	***20.00%***	***20.00%***	***20.00%***	***20.00%***	***15.00%***	***15.00%***	***15.00%***
Total Assets	***100.00%***	***100.00%***	***100.00%***	***100.00%***	***100.00%***	***100.00%***	***100.00%***	***100.00%***	***100.00%***	***100.00%***
Expected (Median) Return (%)	**6.59**	**6.59**	**6.61**	**6.63**	**6.69**	**6.56**	**6.50**	**6.40**	**6.29**	**6.42**
Standard Deviation of Return (%)	**11.35**	**11.76**	**11.37**	**11.59**	**12.09**	**11.22**	**10.99**	**11.68**	**10.96**	**11.70**
Cash Yield (%)	**3.85**	**3.68**	**3.75**	**3.71**	**3.42**	**3.74**	**3.51**	**3.59**	**3.54**	**3.48**
+/(-) in Expected Return (bps)			**2**	**4**	**10**	**(3)**	**(9)**	**(19)**	**(30)**	**(17)**
+/(-) in Standard Deviation of Return (bps)			**2**	**24**	**74**	**(13)**	**(36)**	**33**	**(39)**	**35**
+/(-) in Cash Yield (bps)			**(10)**	**(14)**	**(43)**	**(11)**	**(34)**	**(26)**	**(31)**	**(37)**
Sharpe Ratio	**0.43**	**0.41**	**0.43**	**0.42**	**0.41**	**0.43**	**0.43**	**0.40**	**0.41**	**0.40**

- Examined the impact of three asset allocation shifts
  - Reducing High Yield
  - Reducing MLP's
  - Combination of reducing High Yield and MLP's

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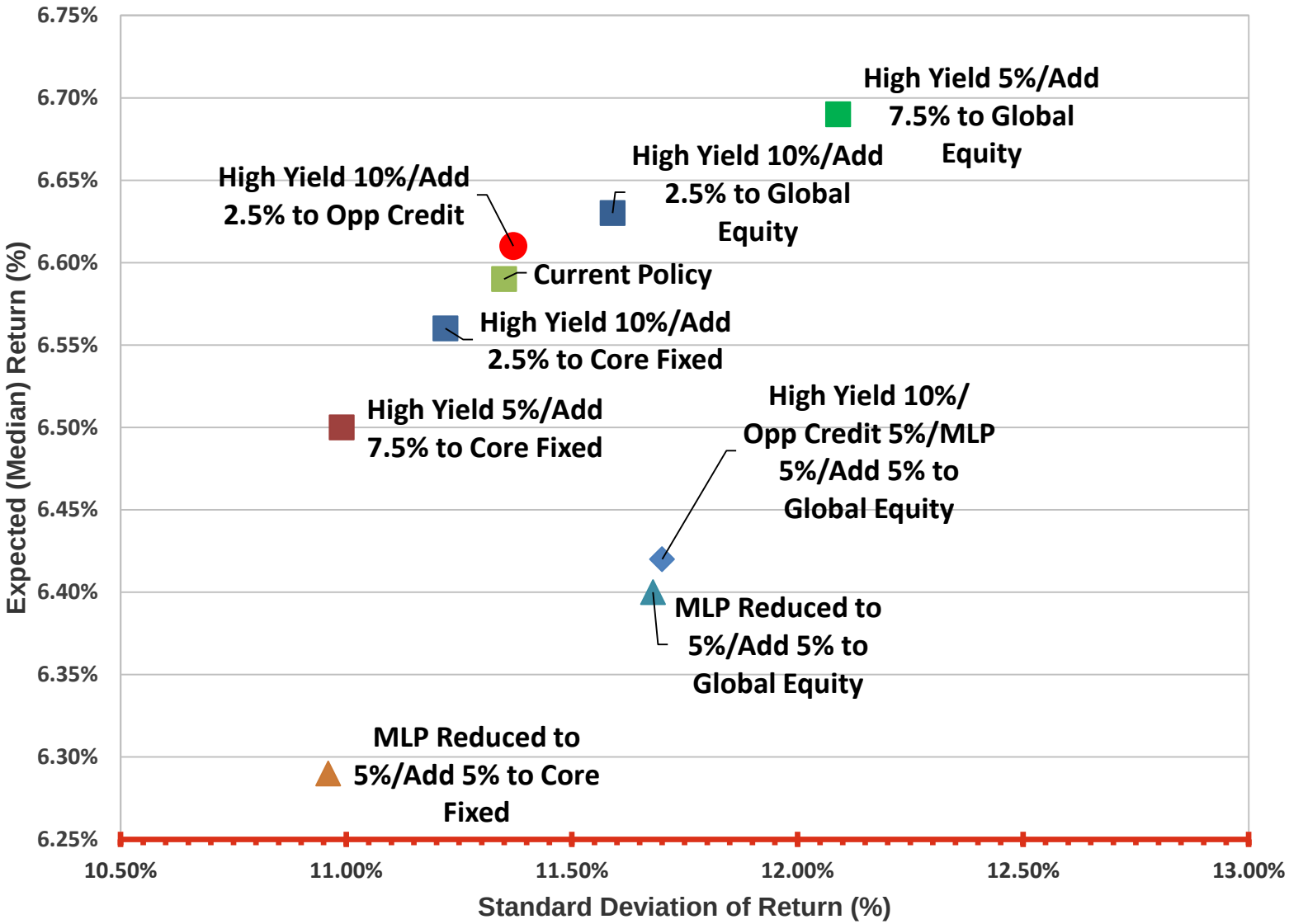
OPTIMIZATION
Risk-Return Trade-Off



- Total Fund impact from reducing High Yield depends on where assets are re-allocated
  - Add to Global Equity increases return and risk
  - Add to Core Fixed decreases return and risk
- Total Fund impact from reducing MLPs is a meaningful reduction in expected return

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