



Investment Risk and Benchmarks

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Executive Summary

- By thoroughly understanding the many facets of Investment Risk, investors are better informed for asset allocation decisions
- Other preferences and judgments are best when made explicit
- Since volatility is often misunderstood, it needs a thorough exploration
- The Board is encouraged to review and reconsider existing Benchmarks and use them to make more informed investment decisions



What is Risk ?

For a Public Pension, the ultimate risk is an inability to pay promised benefits

Teachers' Retirement System (TRS) Illinois	406,855 members	\$122,904 pension liability	40% funding ratio
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Investors Expect Compensation for Taking Risks Markets offer risk premia to induce investors to take those risks

- Equity or Economic Growth:
- Interest Rate:
- Credit:
- Inflation:
- Illiquidity:
- Currency or Foreign Exchange (FX):
- Tracking Error, or deviation from a Benchmark (more about Benchmarks later)
- NOTE: uncompensated risk means we are exposed to risks without any expected return:
 - Headline Risk, Reputation Risk, Cyber Security Risk, Fraud, etc.

These Risk Premia are not constant over time, but fluctuate as investor demand for taking those risks ebbs and flows (Fear and Greed)



Other “Risk Factors” have been identified as providing sources of return

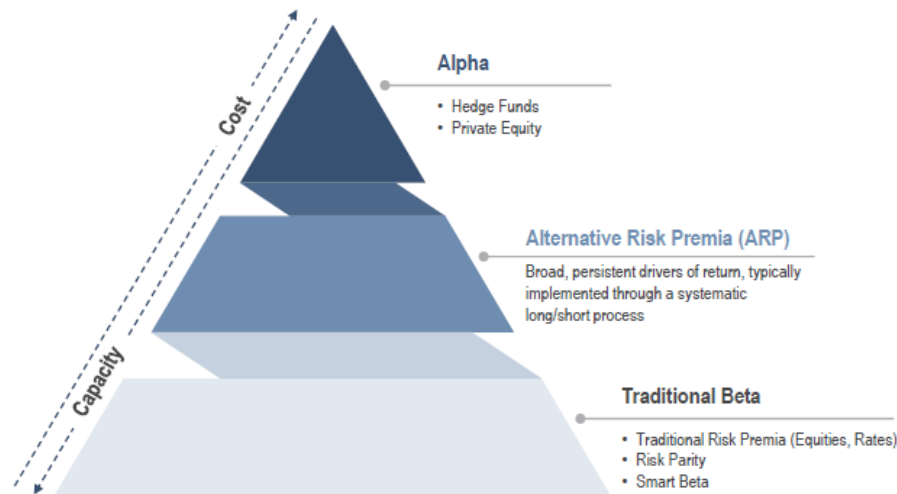
- Size (small, esp. stocks)
- Value (companies often have some type of distress)
- Momentum (a body in motion stays in motion, a body at rest stays at rest)
- Quality: some studies have shown a persistent return for higher accounting and business quality
- Carry: related to currencies and dividends (borrow in low rate invest in high rate)
- Fallen Angels: some investors are forced to sell non-investment grade bonds

When considering any investment, we need to ask which of these factors are in play, and are they priced adequately for us to assume these risks?



Risk Premia Strategies Seek Returns in All Market Environments

Alternative Risk Premia (ARP) strategies can complement traditional equity or fixed income portfolios, act as a lower fee hedge fund replacement or be a core alternatives solution



For illustrative and discussion purposes only. This material is intended as a broad overview of the Portfolio Managers' style, philosophy and process and is subject to change without notice. The use of tools cannot guarantee performance. Investing entails risks, including possible loss of principal. See Additional Disclosures at the end of this piece, which are an important part of this presentation.

Every asset class can be assembled with one or more risk factors

eg: fixed income
 +Interest rates
 +plus credit spreads
 +plus currencies
 +plus illiquidity
 +long/short strategies



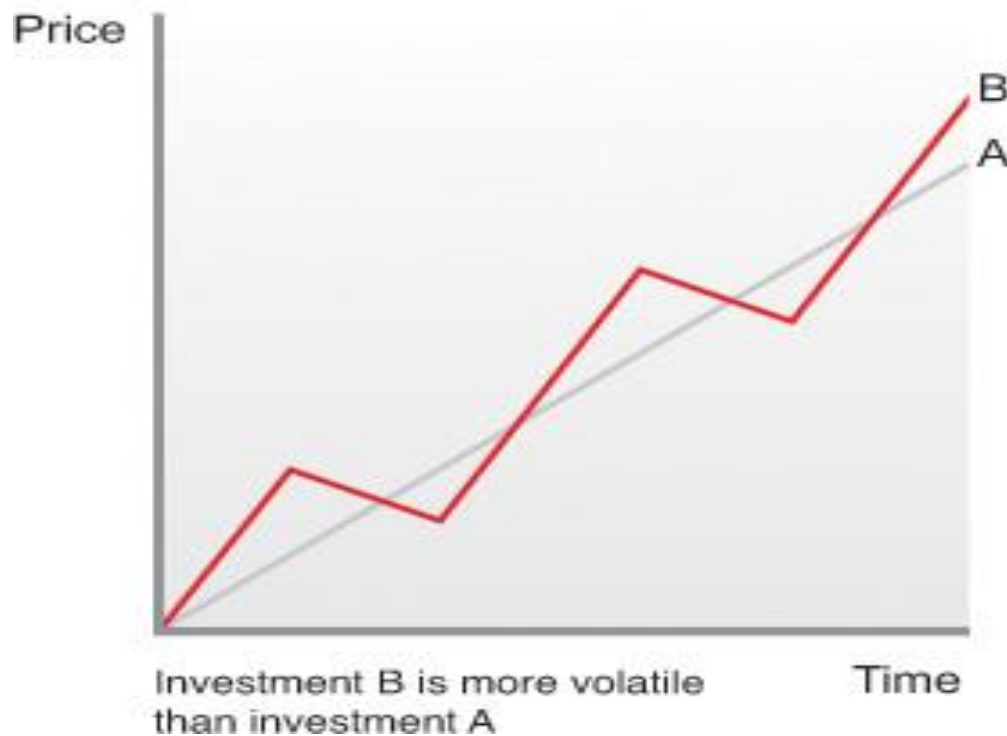
The Active vs. Passive Debate

- Asset allocation is the primary driver of investment returns
- Asset allocation outweighs manager selection as a return driver
- Passive exposure to Beta or asset class lowers tracking risk and fees
- Factor tilts can add incremental value (“Alternate Beta”)
- Active management (manager selection) adds risk, might add return
- “Pure alpha” or uncorrelated (low/no Beta) returns with low correlation benefit are the best diversifiers, aka absolute return

(Alpha is elusive, difficult to prove, and more difficult to sustain.)



What is volatility

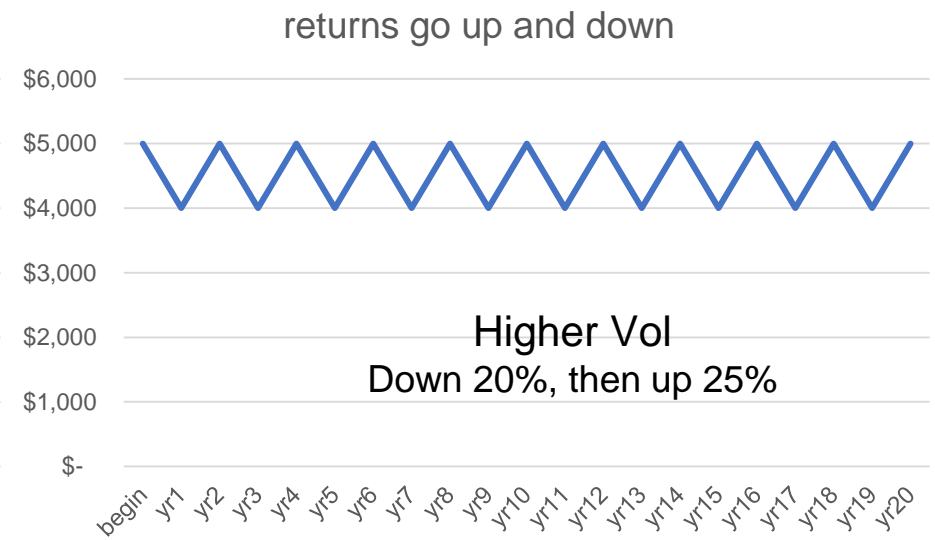
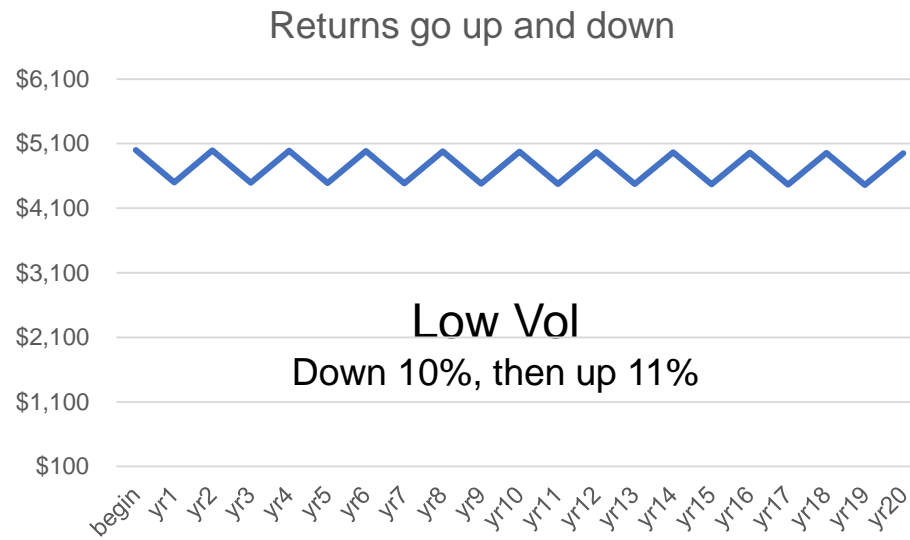


All else being equal, lower volatility is preferred to higher.

Investment B is preferred only if you can time the market.



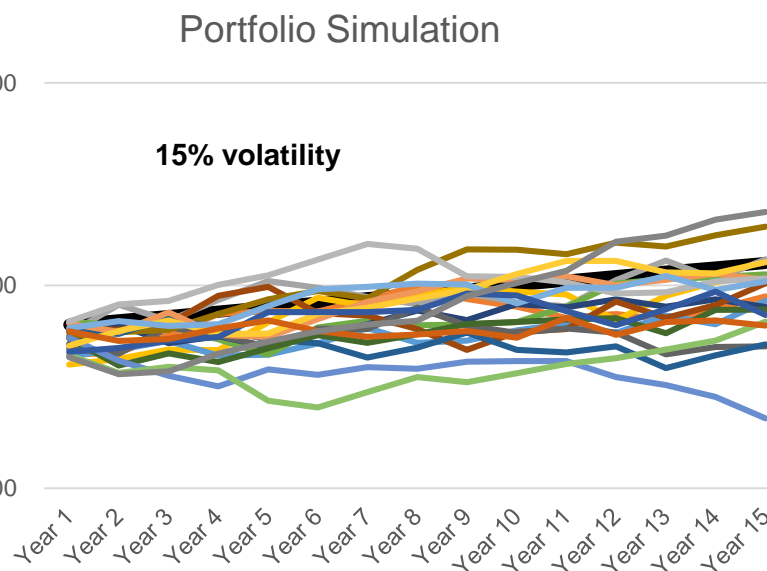
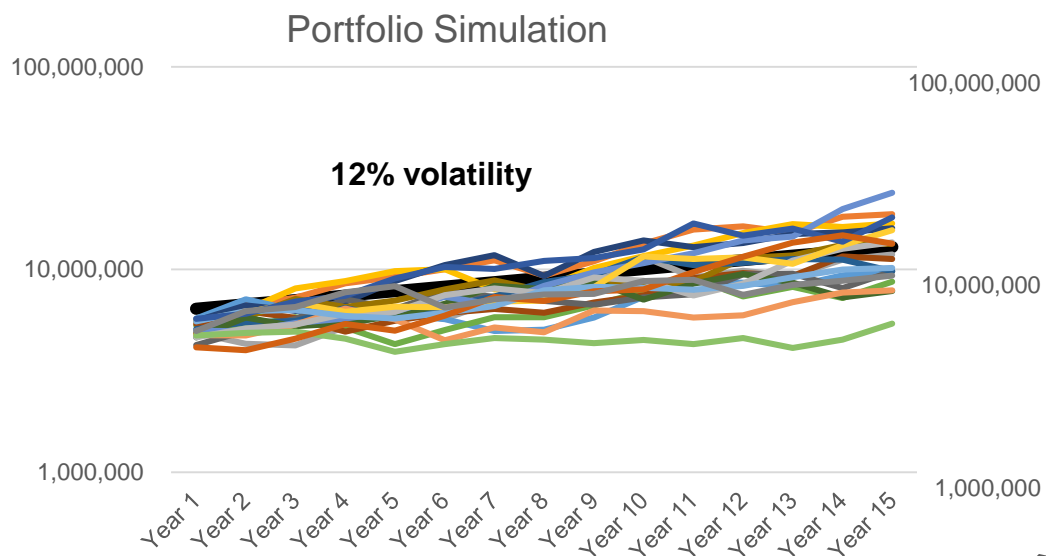
Who cares about volatility? They go down, but they come back up !





In Fact, Portfolio Returns are “path dependent”

- An investment down in one year, is not necessarily up the next
- The geometric mean return is always less than the arithmetic mean
 - eg: 7% expected return with 12% vol, geometric return is 6.28%
 - eg: 7% expected return with 15% vol, geometric return is 5.875%
- Lower volatility = narrower range of outcomes, both high and low



A series of random returns with specific mean and variance offers a wide range of outcomes



Portfolio Expected Return = weighted sum of its component parts.

Portfolio Volatility is NOT = weight sum of component parts.

Lower correlation → lower portfolio volatility → easier to compound money

Example 1:

60/40 portfolio of stocks/bonds, **correlation 1.0**

Equities: 6.6% return, Bonds: 2.4% return

Portfolio: 4.9%, with vol of **11.72%**, **2/3 of the time periods**

Between -7.2% and +16.6%

Example 2:

60/40 portfolio of stocks/bonds, **correlation 0.5**

Equities: 6.6% return, Bonds: 2.4% return

Portfolio: 4.9%, with vol of **10.7%**, **2/3 of the time periods**

Between -6.2% and +15.6%

Example 3:

60/40 portfolio of stocks/bonds, **correlation -0.1**

Equities: 6.6% return, Bonds: 2.4% return

Portfolio: 4.9%, with vol of **9.3%**, **2/3 of the time periods**

Between -5.6% and +14.2%



Low Correlation = Diversification

The “Free Lunch” of Asset Allocation

- Good Diversification Lowers Volatility without lowering returns
- Lower Vol narrows the range of possible outcomes
- Raising the minimum return reduces the greatest pension risk

Note: A Well Diversified Portfolio will always have some component that looks like it isn't working



Asset Allocation

- Strategic or Efficient Asset Allocation targets the expected rate of return with the lowest volatility
- The best mix of assets is determined by their expected returns, volatility, and cross correlations, balanced against the Plan tolerance for Risk



FCERA Asset Allocation at various points in time (which risk factors are in play?)

FCERA Asset Allocations	2013	2014	Current	2020 Target	60/40 ACWI/ Global Agg
Domestic Equities	30.4%	21.4%	23.3%	25.0%	33%
International Equities	25.4%	18.4%	22.3%	24.0%	0.27
(Overall Equities)	55.8%	39.8%	45.6%	49.0%	60%
Fixed Income	26.7%	43.3%	28.4%	23.0%	40.0%
Hedge Funds	3.8%	3.8%	6.2%	6.0%	
Private Equity	5.0%	3.2%	6.5%	6.0%	
Private Credit		2.0%	5.4%	8.0%	
Real Estate	4.4%	3.8%	4.8%	5.0%	
Commodities	3.2%	2.6%	0.0%		
Infrastructure			3.1%	3.0%	
Cash	1.1%	1.5%	0.1%		
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Equities weight reduced in 2014

Fixed Income weight increased, with big credit tilt

Target Allocation adds equities and further cuts fixed income



Asset Allocation Matters!

Compare 5 passive allocations

Note that FCERA 5-year performance was 4.8%

Performance %	2013	2014	Current	2020 Target	60/40 ACWI/Global Agg
YTD 9/19	12.68%	11.26%	11.68%	12.35%	12.66%
1 year	3.31%	4.51%	3.34%	2.26%	4.54%
3 year	4.73%	6.46%	6.82%	8.38%	5.97%
5 year	5.82%	5.20%	5.57%	6.77%	3.55%

Lower equities exposure helped during Dec 2018 downturn, and would in future selloffs

Bonds and Stocks strong in 2019

A traditional 60/40 portfolio of global stocks and bonds has lagged

More conservative ie lower equities decision in 2014 has cost performance over time

Lower US equities weight has also affected long term returns



Benchmarks

For Any Asset Class

- Definition: A Point or Points of Reference Against Which Things Can Be Compared or Assessed
- Common or Standard compilations of assets whose characteristics and performance can be easily measured and replicated



Benchmarks

- Investment Policy → risk and return parameters for the Plan
 - Asset Allocation → series of benchmarks
 - Structure a diversified portfolio → balance risks and returns
 - Benchmarks → a passive but investable alternative
 - Asset Class Benchmarks → a gauge for decision making
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- Note: Markets are generally efficient, and passive is cheaper
 - Where markets are less efficient, consider active management

Imagine a portfolio that can be built and then passively managed against a series of benchmarks without ongoing intervention



Benchmarks

(Think nesting dolls)



Barclays Global
Aggregate Fixed Inc



Barclays US
Fixed



US Core
Bonds



US
Treasuries



Benchmarks (Equities can be dolls too!)



All Stocks



US Stocks



US Value



US Small Value



Clear and Simple Benchmarks allow for explicit and transparent tilts or weighting decisions

- e.g. Over/Underweight US, Europe, Japan
- e.g. Emerging Markets Tilt
- e.g. Value or Growth tilts
- e.g. Small cap stocks
- e.g. Low Volatility stocks
- e.g. High Yield Bonds
- e.g. Sector weights in bonds or stocks
- e.g. Credit Tilts in bonds



Sample Benchmark Nest

Equities: MSCI ACWI (All Country World Index)

- 23 developed markets, 26 EM countries
- 8820 constituents, so broadly representative
- Primarily Large Cap, but the IMI variant includes small caps
- Easily replicated, broadly representative of global equities
- Investable passively
- MSCI US: US-only subset of ACWI
- World ex-US (Hedged or un-Hedged?) : dev non-US
- ACWI EM: Emerging Markets

FCERA has not historically had an overall equities benchmark, which facilitates a conscious decision on geographic weightings



Equity Benchmarks Implications

ACWI Benchmark geographic mix as of 9/30/2019

- US: 55.33%
- Developed Non-US: 33.37%
- EM: 11.31%

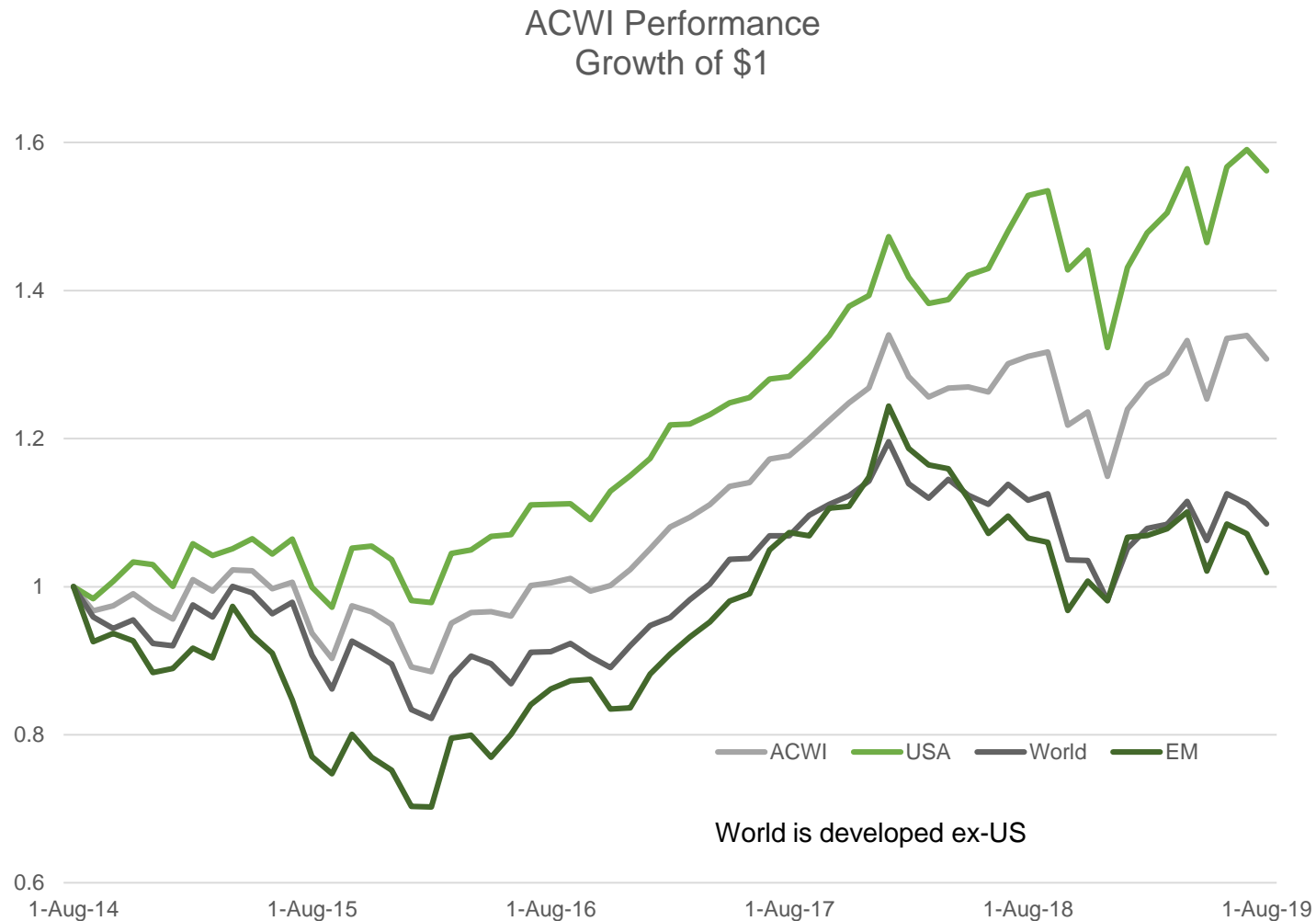
FCERA geographic mix as of 9/30/2019

- US: 50% (with Parametric overlay)
- Developed Non-US: 37%
- EM: 13%

For Example,
FCERA remains
underweight the
US relative to the
ACWI index

FCERA has been
consistently
overweight EM

*Since US stocks have materially outperformed, this
has cost performance historically. What will the
future hold?*



*The US has significantly outperformed (and has by far the richest valuations)
Note: past performance no guarantee of future results*



Potential Board Considerations For Equities

- Establish Overall equities benchmark: common or custom
- Revisit Sub Asset Class benchmarks
- Set geographic weightings, relative to benchmark
- Consider various factor tilts to add Alternate Beta
- Revisit Active Manager lineup against passive alternatives



Sample Fixed Income Benchmarks

- e.g. Barclays US Aggregate Bonds
 - US only, 100%
 - Core Focused (high quality)
 - Does not include High Yield, TIPS, STRIPs, Agency CMO's
- e.g. Barclays Global Agg Bonds
 - Combines US, Euro, Asian, Canadian
 - US 40%, Japan 16%
- e.g. Barclays Multiverse
 - Similar to Global Agg, but includes high yield

Benchmark performance since asset allocation change in 2014





FCERA Fixed Income vs. Benchmarks (27.2% of the Total Portfolio, plus Private Credit at 6%)

*Any fixed income benchmark can be customized as well, eg 90% Barc Agg, 10% bank loans
This does add complexity*

	Global Agg (Hedged)	FCERA	US Agg
US %	40%	78%	100%
Sovereign (Govt)	57%	25%	39%
High Yield	0	19%	0
Emerging Markets	0	14%	0
TIPS	0	14%	0
US \$	100%	69%	100%
Bank Loans	0%	16%	0%
Investment Grade	100%	52%	100%
5 year performance	2.0%	3.0%	3.1%

FCERA used the US Agg until 2014

A Global Agg benchmark with a big credit tilt has equaled the US Agg



Potential Board Considerations for Fixed Income

- Revisit Fixed Income Benchmark
- Consider Sub index weightings
- Make tilts intentional: toward or away from sectors: (pyramid)
- Currency Hedging: “return free risk” aka uncompensated risk
- Risk Mitigation: UST, Core Bonds, Risk Parity, hedging, contingent capital (upon equities drawdown or yield spreads widening)
- Consider Private Credit as a component of Fixed Income overall, but with greater exposure to illiquidity and riskier credits



Final Takeaways

- The key Pension Risk is failing to make promised payments
- Volatility increases that risk, and should be consciously managed
- Asset Allocation is the most vital Board activity for managing risk
- Thoughtful benchmark selection makes portfolio management easier
- Passive investing is the default because it is cheaper
- Most active managers underperform, so passive is better
- Most Boards struggle to add value through manager selection

The Investment Process is like driving down an unfamiliar country road at night, with the lights off, but you must keep going regardless.



Appendix I

Investment Officer Recommendations

1. Create overall Equities benchmark, either MSCI ACWI or ACWI IMI, choose weights
 1. US Equities: MSCI US
 2. Developed non-US: MSCI Dev non-US
 3. EM: MSCI EM
2. Consider Hedging non-US equities, but not EM (too expensive)
3. Evaluate new factor tilts, such as growth or low vol in addition to value
4. Revisit Mondrian for EM and consider hiring 1 or more replacements
5. Restore Artisan International weight
6. Revisit Fixed Income benchmark and existing credit (lower quality) tilt
7. Gain understanding of risk parity as a way to tilt exposures and limit risk
8. Begin thinking about a more straight forward approach to private credit
9. *As an aside, limiting individual mandates to 3% or less reduces manager selection risk*



Appendix II

To be effective, a benchmark should meet most, if not all, of the following criteria:

- Unambiguous and transparent – The names and weights of securities that constitute a benchmark should be clearly defined
- Investable – The benchmark should contain securities that an investor can purchase in the market or easily replicate
- Priced daily – The benchmark's return should be calculated regularly
- Availability of historical data – Past returns of the benchmark should be available in order to gauge historical returns
- Low turnover – There should not be high turnover in the securities in the index because it can be difficult to base portfolio allocation on an index whose makeup is constantly changing
- Specified in advance – The benchmark should be constructed prior to the start of evaluation
- Published risk characteristics – The benchmark provider should regularly publish detailed risk metrics of the benchmark so the investment manager can compare the actively managed portfolio risks with the passive benchmark risks