Callan

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Mendocino County Employees' Retirement Association

Real Assets Education and Manager Structure

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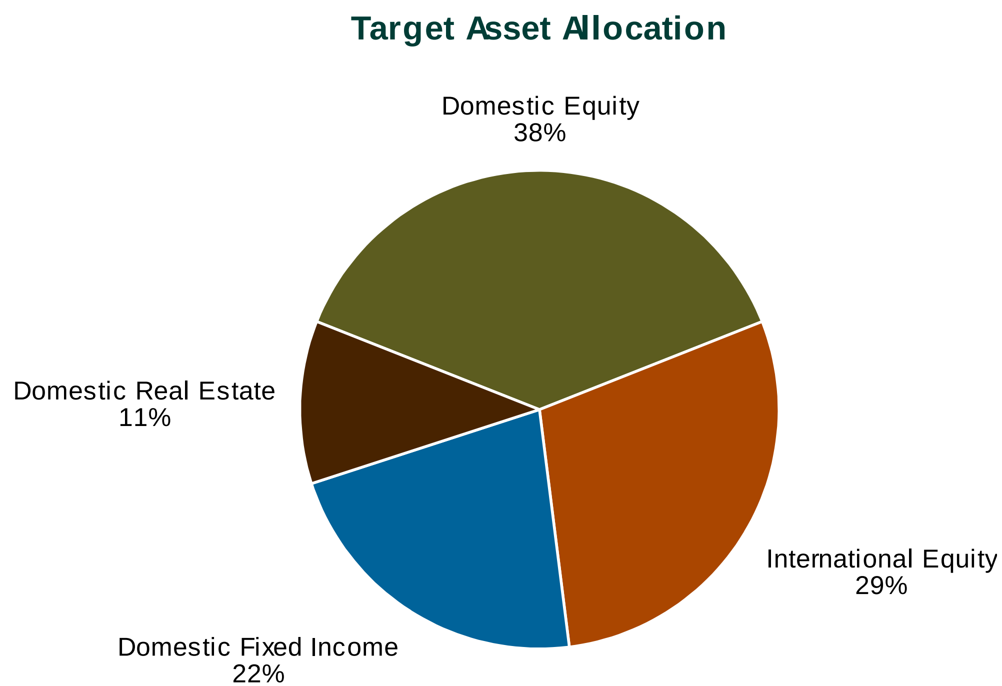
Agenda

- Current MCERA Real Estate Portfolio
- Real Assets Education
- Alternative MCERA Real Assets Structures

MCERA Current Target Asset Allocation



- 57% allocated to Stocks (growth)
- 22% allocated to Bonds (defensive)
- 11% allocated to Real Assets (inflation)
- Callan's expected 10- year geometric rate of return for the total portfolio is 6.4%
- Total fund assets = $519.5 million (3/31/2018)

Current MCERA Real Asset Structure

Total Fund Assets = $519.5 million at 3/31/2018

Style	Target Allocation (%, Real Estate)	Target Allocation (%, Total Assets)	Target Allocation ($, mm) as of 03/31/18	Actual Allocation ($, mm) as of 03/31/18
Private				
Core Open-Ended Real Estate				
RREEF America II Fund	50.0%	5.5%	$28.0	$26.87
Barings Core Property Fund	50.0%	5.5%	$28.0	$25.91
Total	100.0%	11.0%	$56.0	$52.78

- Mendocino currently has exposure to 2 core open-ended funds, plus the MCERA building in Ukiah (valued at $1,150,000)
- The Real Estate Portfolio is benchmarked to the NCREIF NFI-ODCE Equal-Weight Net index
- Real estate is the sole “real asset” in the Mendocino investment portfolio
- The plan conducted an asset allocation and liability study in 2016; the allocation to real estate was increased from 9% to 11% of the total portfolio
- The plan also conducted a review of the real estate manager structure in 2016; the plan eliminated an exposure to publicly-traded REITs and divided the target real estate exposure between two core funds

Real Assets Overview

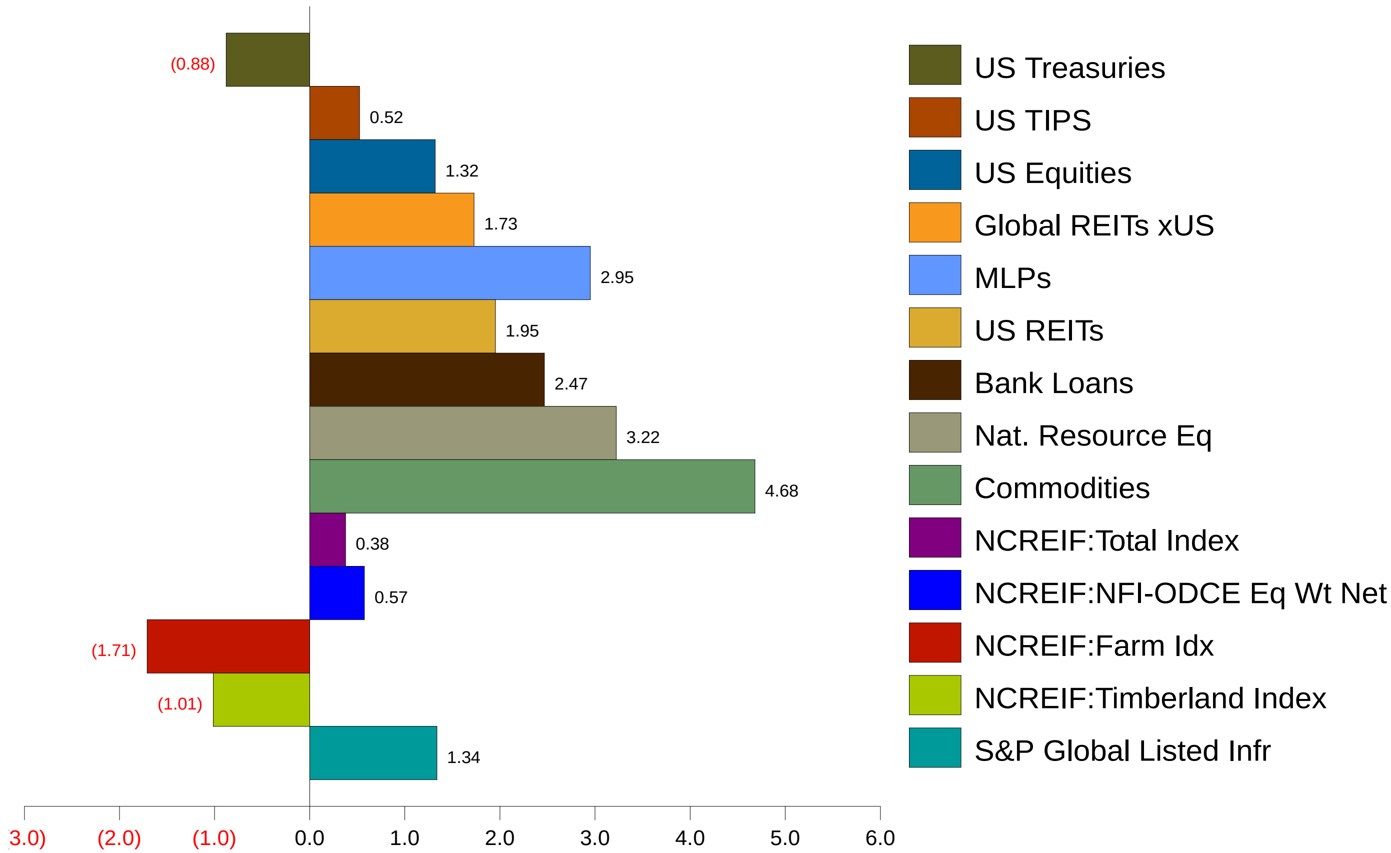
Potential Benefits of Real Assets

Portfolio diversification	Real assets tend to have complementary return profiles relative to stocks and bonds.
Predictable and steady streams of income	Real assets tend to have predictable and steady cash-flow streams supported by regulated or contractual revenues and attractive operating margins.
Capital appreciation potential	As the backbone of the global economy, real estate, infrastructure and sustainable resources are all subject to long-cycle fundamental drivers. Examples include population growth, urbanization trends and periodic supply constraints that can lead to capital appreciation.
Potentially higher risk-adjusted returns	Historically, the volatility of many real asset classes has been lower than that of equities, leading to higher risk-adjusted returns.
Inflation protection	History shows that real assets have outperformed stocks and bonds in periods of unexpected inflation, based on total return. One reason is that the cash flows of the underlying assets tend to rise with inflation.

Inflation Betas of Various Sectors

Relative to CPI All Urban for 15 Years Ended March 31, 2018

- Inflation beta is a measure of the responsiveness of an asset's returns to observed changes in inflation
  - For example, one dollar worth of commodity investment has the potential to provide more than four dollars worth of inflation hedging
- Real assets tend to exhibit positive inflation betas
  - This is particularly the case over longer time periods
  - Private investments show lower measured betas due to smoothed valuations



Historical Performance Characteristics

Callan Database Median and Index Returns* for Periods Ended March 31, 2018

	Last Quarter	Last 2 Quarters	Last Year	Last 3 Years	Last 5 Years	Last 10 Years	Last 15 Years	Standard Deviation	Sharpe Ratio
Total Real Estate Database	1.96	3.93	7.67	9.35	10.52	3.85	7.31	9.48	0.54
NFI-ODCE Value Wtd (Net)	1.97	3.85	7.11	9.00	10.41	4.16	7.32	7.36	0.63
NCREIF Property	1.70	3.53	7.12	8.72	10.00	6.09	9.00	5.21	1.27
NCREIF Farmland	2.93	5.95	8.77	8.16	10.78	12.27	14.78	7.74	1.49
NCREIF Timberland	0.92	2.46	3.79	3.44	6.09	4.06	7.54	5.59	0.82
Global REIT Database	-3.59	0.77	6.68	3.16	5.81	5.25	10.58	20.87	0.38
EPRA/NAREIT Developed REIT	-4.30	-0.64	4.23	2.45	4.99	4.24	10.24	21.54	0.36
Alerian MLP	-11.12	-11.96	-20.07	-11.24	-5.85	5.60	9.32	17.05	0.89
FTSE Devel Infra 50/50	-4.64	-2.73	4.61	5.50	7.37	6.61	--	15.73	0.33
Bloomberg Commodities	-0.79	3.57	2.49	-3.76	-8.65	-8.01	-1.70	17.98	0.07
Barclays TIPS	-0.79	0.46	0.92	1.30	0.05	2.93	4.18	5.31	0.80
Consumer Price Index (CPI-U)	1.23	1.11	2.36	1.86	1.40	1.57	2.04	2.01	0.08
S&P 500	-0.76	5.84	13.99	10.78	13.31	9.50	10.10	17.51	0.13
Barclays Aggregate	-1.46	-1.08	1.20	1.20	1.82	3.63	3.95	3.49	0.90

* Returns less than one year are not annualized.
All REIT returns are reported gross in USD.
Sources: Alerian, Barclays, Bloomberg, Bureau of Labor Statistics, Callan, Dow Jones, NCREIF, The FTSE Group, S&P

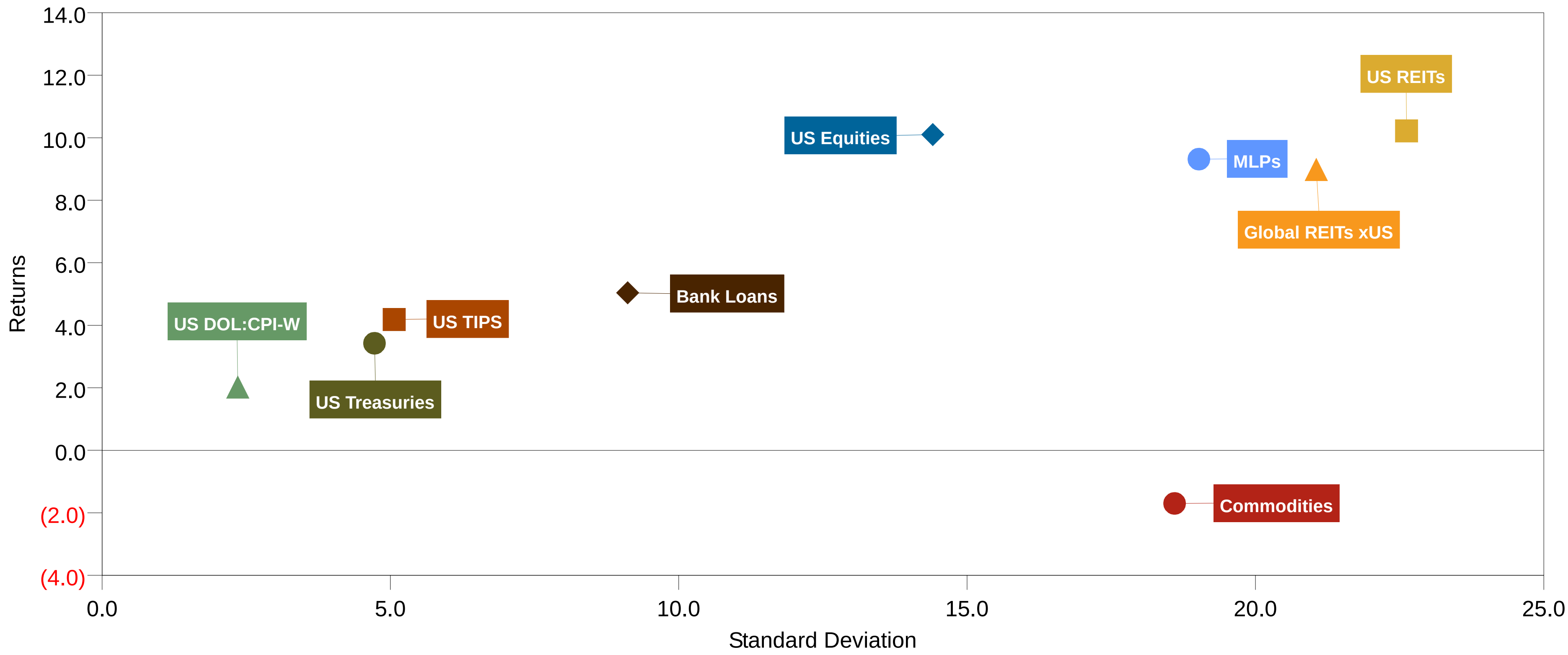
Alternative Real Assets to Complement Real Estate

- Mendocino could consider expanding real asset exposure to provide a more diversified inflation hedge
- Callan believes private real estate should comprise the core of a real asset exposure:
  - Provides a solid long-term hedge with a reasonably high level of short-term correlation to inflation
  - During normal markets real estate provides a high level of current income, a relatively high rate of return, low observed volatility, and is a good diversifier to a stock and bond portfolio
- Private real assets to consider as complements to real estate:
  - Infrastructure
  - Timber
  - Agriculture
  - Public Real Assets
- Consider strategies that support the modeled risk/return of the Policy Target selected in the asset allocation study
- Consider meaningful allocations and strategies that are readily implementable for Mendocino's size and situation
  - Replace part of the current 11% real estate exposure, and/or
  - Increase overall real asset exposure
    - *Funding source and impact on total portfolio*

Diversified Public Real Assets

Public Real Assets - Risk/Return

15 Years Ended March 31, 2018



- Historically, many of the underlying asset classes in real assets have substantially higher volatility in returns than TIPS
- While constructing a real assets portfolio balancing the inflation hedging characteristics with the volatility of the real asset sectors is key to maximizing return per unit of risk

Public Real Assets – Multi-Asset Class Strategies

A Diversified Approach Is Beneficial

- No single asset class has proven to be a perfect inflation hedge over various market conditions
- TIPS generally perform well during periods of rising inflation, but tend to lose value when inflation declines
- Commodities have also performed well in rising inflation markets but have lost value when inflation remains persistently high or declines
- Broadly diversified equities have tended to lose value during periods of rising inflation but perform well in falling and stable (either high or low) inflation markets
- To provide protection over various inflation scenarios, investment managers have introduced strategies that invest in multiple inflation-sensitive asset classes

Diversified Real Assets Portfolios

Off-the-Shelf Solutions

Benefits

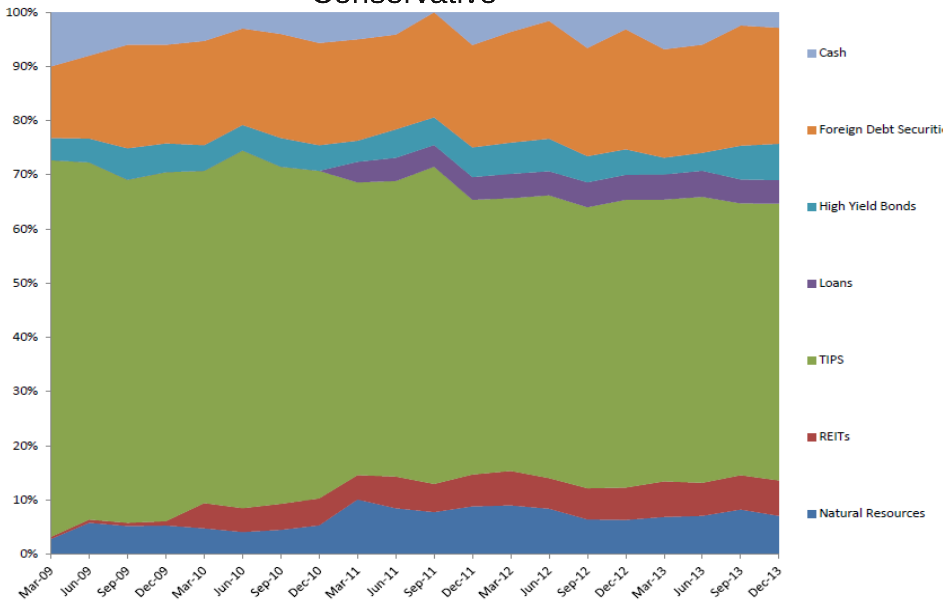
- Immediate diversification across multiple inflation hedging asset classes
- Disciplined rebalancing approach allows for capturing upside return while limiting total portfolio volatility
- Having a diversified mix of investments may better hedge commodity price and inflation risk than just a single strategy allocation (e.g. commodities only)
- Allowing managers to allocate across strategies and make relative value decisions enhances their ability to add alpha and protect against inflation
- Reasonable fees and liquidity

Considerations

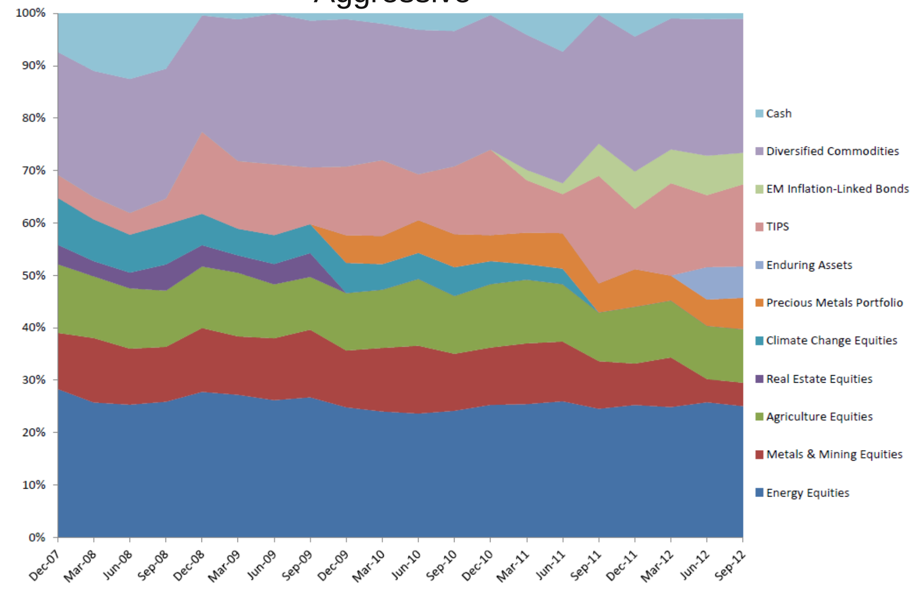
- Many of the product offerings are relatively new, thus most have limited track records
- Implementation across managers is disparate and varies widely regarding the intended mix of real assets and the amount of risk taken and experienced
- Because asset allocation varies widely among products, benchmarks vary and comparing products can be challenging
- Benchmarking is difficult as most utilize a custom benchmark rather than a commonly accepted and available index
  - Because of this, comparing products presents a challenge as most have different risk budgets and return objectives.

Off-the-Shelf Portfolios – Options Vary Considerably

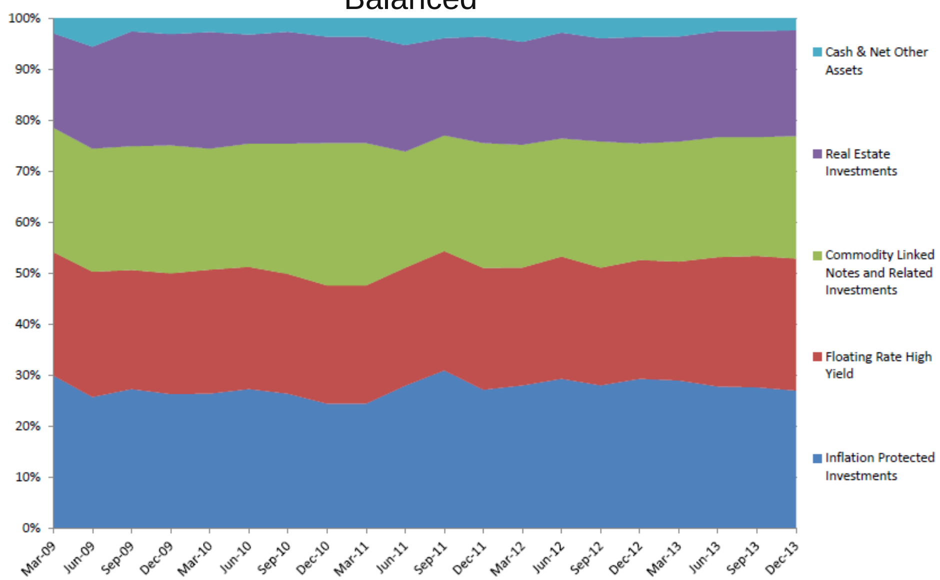
Conservative



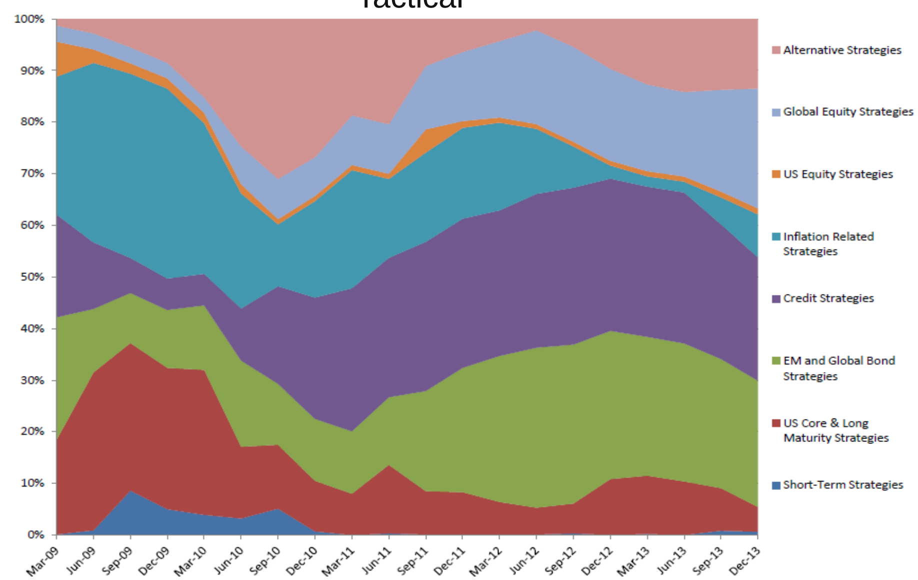
Aggressive



Balanced



Tactical



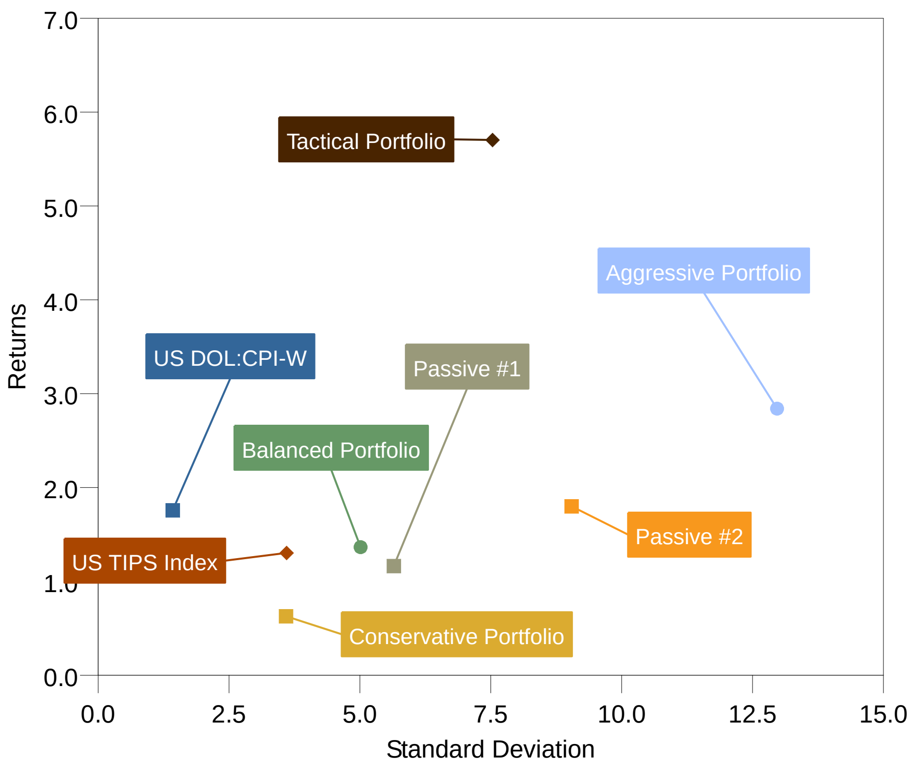
Benchmarking

- Benchmarks are not consistent across multi-asset class “real asset” strategies due to the underlying construction of the fund.
- Benchmarks range from simple to complex as the following examples show:
  - CPI plus a percent
  - Bloomberg Barclays U.S. TIPS: 1-10 Year Index.
  - MSCI All Country World Commodity Producers Index
  - 25% BB US TIPS Index, 20% Dow Jones - UBS Roll Select Commodity Index, 25% S&P Global Large MidCap Commodity and Resources Index, and 20% Dow Jones US Select REIT Index
  - 45% BB US TIPS, 20% DJ UBS Commodity Index Total Return, 15% JP Morgan Emerging Local Markets Index Plus (Unhedged), 10% DJ US Select REIT Total Return, and 10% DJ UBS Gold Subindex Total Return
  - 30% BB U.S. Treasury TIPS Index, 20% Dow Jones UBS Commodity Index, 10% S&P N.A. Natural Resources Index, 10% Tortoise MLP Index, 10% Dow Jones Global Infrastructure Index, 10% Credit Suisse Leveraged Loan Index, and 10% FTSE EPRA/NAREIT Developed Index
  - 25% BofA ML Global Inflation-Linked Government Index, 35% Commodity Alpha Long-Bias Custom Benchmark consisting of DJ-UBS Commodity Index performance scaled monthly to target 10% estimated standard deviation and 30% blend of 33% DAX global Agribusiness and 67% S&P North American Natural Resources
- Lack of consistency leads to difficulty in comparing products to each other simply by looking at quantitative measures and peer groups

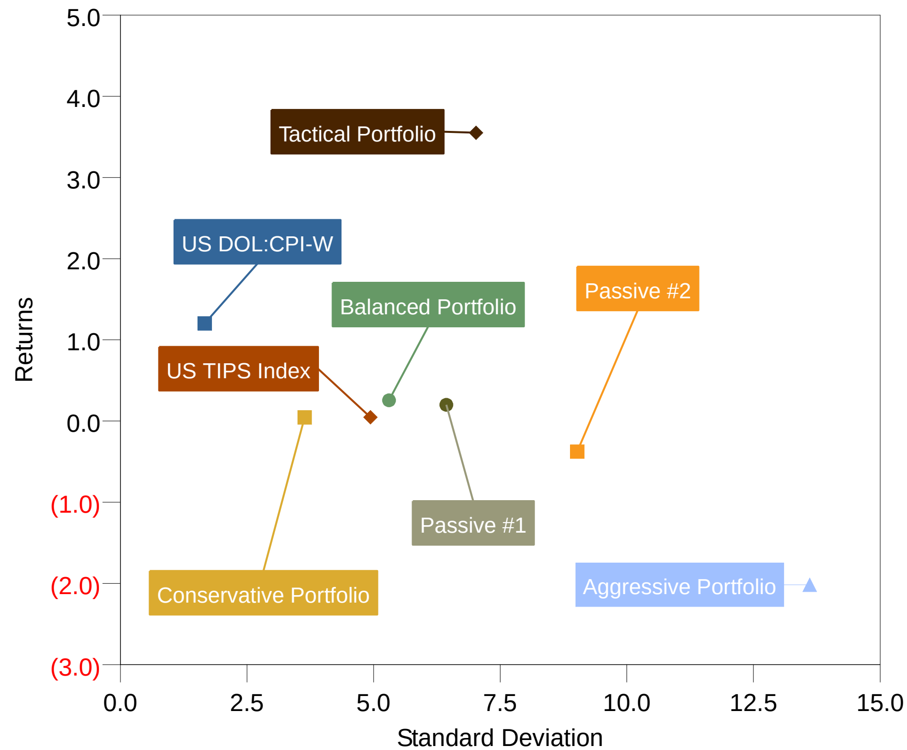
Real Assets Portfolios

Return & Risk Comparison

Risk/Return for 3 Years Ended March 31, 2018



Risk/Return for 5 Years Ended March 31, 2018



- The risk profiles of some of the real assets portfolios are similar to TIPS while others are more aggressive
  - Exposure to multiple asset classes helps dampen volatility

Direct Implementation Considerations

Diversified Public Real Assets

- Diversified Public Real Assets
  - Off-the-shelf or customized solution?
  - Lack of homogeneity across products means investors must directly consider the following prior to commencing a search:
    - *Should the option be more fixed income or equity-centric? Will impact the risk/reward profile and benchmark*
    - *Is the goal simply to provide exposure to these inflation-hedging strategies <u>or</u> is active management sought?*
  - Do we want value-added from the asset allocation decision?
    - *Value-added may come at the cost of greater complexity*
  - Is there a preference for a more strategic or tactical approach?
  - Benchmark selection will be predicated on the type of strategy and the underlying components
- Active vs. Passive Management
  - Positives
    - *Frequently rebalancing can exploit historically observed low correlation and high volatility of individual real return asset classes*
    - *Individual asset classes often exhibit structural barriers that can be managed*
  - Negatives
    - *Active management fees can be substantial*
    - *Potential dilution of inflation hedge from active management missteps*
- Is the exposure gained sufficiently diversifying to the total portfolio?
  - TIPS and commodities are the true diversifiers, other components are typically equity
  - Diversifies well the real estate exposure within real assets, less so the total portfolio

Timber Defined

Timber

Characteristics

Sources of Return

- Biological Growth
  - Source of more than 50% of investment return
  - Value can be stored “on the stump”
  - Lower fees than commingled funds
- Timber Prices
  - Source of about 25% of the investment return
  - Tied to broader economy
  - Conservation can inflate prices regionally
- Land Appreciation
  - Source of about 10% to 25% of the investment return
  - Higher and Better Use (“HBU”) has become more prevalent
  - Depends on real estate market
- Other
  - Hunting and fishing licenses and fees

Timberland Investable Universe

- Primary U.S. Timberland Regions
  - Southeast (South)
  - Pacific Northwest (West)
  - Northeast and North Central (Lake States)
- Primary International Timberland Regions
  - South America: Brazil, Uruguay, Chile, Paraguay
  - Asia: Australia, New Zealand
  - South Africa
  - Russia
  - Canada
- Stage of Growth
  - Mature: High Cash Flow Potential (Sawtimber)
  - Intermediate: Greatest Appreciation Potential (Chip-n-Saw)
  - Young: Lowest Commercial Value (Pulpwood)

Timber

Benefits and Considerations

Benefits

- Low correlation with other asset classes
- Biological growth component
- Income return
- Inflation hedge

Considerations

- Illiquidity
- Limited availability of investments
- Economic risks
  - Price volatility
  - Supply and demand risks
  - Illiquidity risk
  - Risk of overpaying
- Environmental risks
  - Fire and other natural disasters
  - Pest infestation and disease
  - Regulatory risk
- High fees relative to traditional investments

Direct Implementation Considerations

Timberland

- Timberland
  - Approximately 25 institutional managers including nine international managers
  - U.S. timberland index from a small and uneven set of contributors; no global index; performance data sparse for non-U.S./global; index dates to 1987
  - Returns are primarily unrealized; limited dispositions
  - Very illiquid; 15 to 20-year holding period
  - Building a global portfolio may require investment in multiple strategies
  - Separate accounts:
    - *$25 to $50 million*
    - *Diversified U.S., Regional U.S., Global, Pan-Regional, Specific Country Mixes*
  - Commingled funds:
    - *$1-$5 million minimums*
    - *Domestic, International and Global strategies available*
    - *Closed end, private equity-like structures and fees*
  - Limited opportunity to use public markets to invest -- Timber securities – only four total

Farmland Defined

Farmland

Characteristics

- Income producing investments in prime cropland, orchards and vineyards
- Distinction drawn between annual row crop and permanent crop in U.S.
  - Permanent crops take many years to enter into full production and require management expertise to not destroy future value
    - *Tree Nuts (i.e., almonds, walnuts, pistachios)*
    - *Tree or Bush Fruit (i.e., apples, cranberries, oranges)*
    - *Vineyards*
  - Annual row crops are planted each year and the manager typically outsources the farming and takes a percentage of the crop or a base fee as payment
    - *Vegetables (corn, potatoes, soybeans, tomatoes)*
    - *Grains (rice, wheat)*

Farmland

Benefits and Considerations

Benefits

- Low correlation with traditional asset classes
- Income return
- Inflation hedge

Considerations

- Illiquidity
- Management, particularly for permanent crops
- Water resources
- Natural disasters (i.e., floods)
- Limited institutional investment management universe
  – Three players in past, but growing universe in recent years; about 10 managers now
- High fees relative to traditional investments

Direct Implementation Considerations

Farmland

- Farmland
  - High and steady income return
  - Investor should be prepared for longer holding period (10+ years) than real estate
  - Implementation time lag of 3-4 years potentially
  - Approximately 10 managers; many with limited capacity, or small AUM, or limited track record. Trend of new entrants and international managers
  - Separate accounts are viable for $100 million+ allocations
  - Commingled funds with wide range of strategies, including open and closed end
  - Implementation globally requires multiple managers
  - Core farmland fees are approximately 1%; higher returning strategies have fees similar to non core real estate
  - Index dates to 1990 as does track record of some managers

Infrastructure Defined

What is the Driver for U.S. Infrastructure Investment Today?

Aging Infrastructure, Renewable Energy Targets and U.S. Energy Discoveries

Sector	Demand driver	Infrastructure Type
Energy	Development of gas and shale resources in the U.S.	Mid-stream energy assets related transmission and storage
Power	Trend for reduced carbon emissions and non-nuclear power	Wind, solar, hydro, geothermal power Energy storage
Transportation	Increased demand, historic underinvestment and aging infrastructure	Airports, seaports, rail and roadways
Water	Increased demand, historic underinvestment and aging infrastructure	Water utilities, wastewater systems
Communications	Increased demand with new technology	Telecom, fiber optic, cellphone towers
Social	Insufficient municipal budgets	Healthcare, judicial, education facilities Public Private Partnerships (PPP or P3)

Key Characteristics of an Infrastructure Asset

Long-lived assets critical to society

- Tangible or “hard” assets
- Extended useful lives
- Difficult to replace
- Low demand elasticity – price insensitive

Steady, sustainable cash flows with high predictability

- Contractual agreements
- Regulatory frameworks
- Limited commodity exposure
- Long term contracts

Significant barriers to entry

- High upfront costs
- Other obstacles that make it difficult to enter market
- Illiquid underlying assets

Attractive risk-adjusted returns

- High operating margins, not linked to business cycles
- Inflation protections
- Use leverage

Infrastructure

Listed vs Unlisted Investments

Listed Infrastructure Investments

- Consists of publicly traded stocks of companies engaged in infrastructure-related activities
- Economic infrastructure rather than social infrastructure
- Emphasis on appreciation

Strengths

- Quickly and easily assembled
- Liquidity
- Flexibility

Weaknesses

- Shares volatility of equity markets
- Higher emphasis on capital gains rather than income
- Appropriate benchmark undefined

Unlisted Infrastructure Investments

- Asset level investments
- Leverage can range from 20-75%+ on an asset level, generally less than 60% on an overall portfolio level
- Emphasis on income or appreciation depending on strategy

Strengths

- Cash flows may be very durable and backed by stable offtake contracts, with a measure of inflation linkage
- Assets may be highly monopolistic
- Appraisal-based valuations thus reduced price volatility

Weaknesses

- Diversification may be challenging due to large asset sizes
- Long hold periods, exit strategy may be unclear
- Appropriate benchmark undefined

Listed Infrastructure vs Other Asset Classes

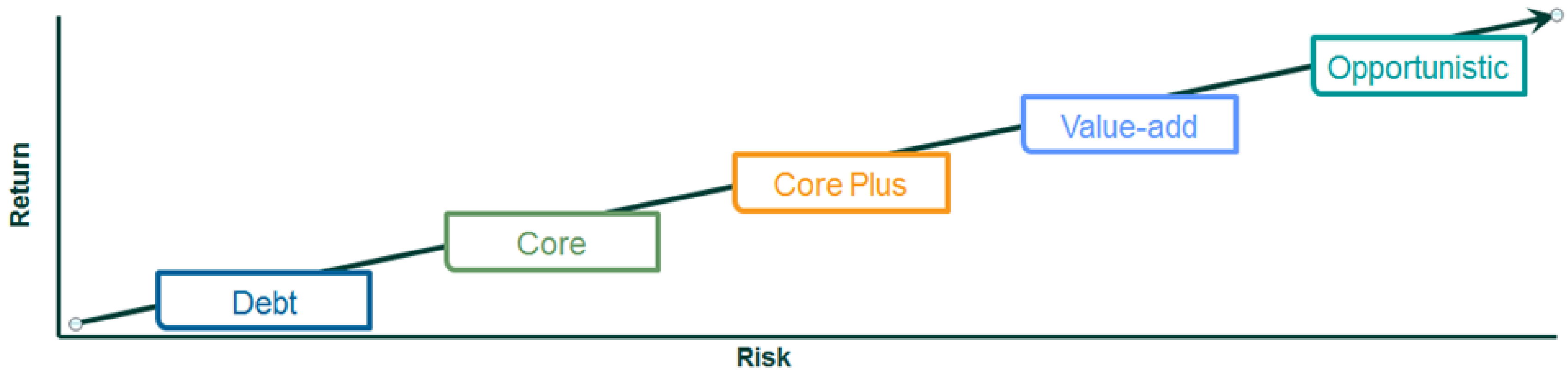
- Listed Infrastructure has exhibited reasonable diversification benefits relative to other key asset classes
- Relative to broad equities, diversification benefits are modest; returns and risk are comparable to those of equity
- However, Listed Infrastructure does provide valuable diversification relative to other inflation sensitive asset types

Correlation with FTSE Developed Infrastructure 50/50 for 12 Years ended March 31, 2018

FTSE Developed Infrastructure 50/50	1.00
U.S. Fixed Income	0.32
Global Fixed Income	0.54
Global High Yield	0.70
Global Equity	0.84
U.S. Equity	0.78
U.S. TIPS	0.38
Global Inflation-Linked	0.63
MLPs	0.55
Global REITs	0.80
Global Natural Resources	0.70
Global Utilities	0.92
CPI-U	0.08

Unlisted Infrastructure Offers a Range of Risk and Return

Greenfield is like Opportunistic Real Estate, Other Strategies Offer More Income Potential



	Debt	Core	Core Plus	Value-add	Opportunistic
Net Return estimate	Typically 3-5% over a fixed rate such as LIBOR	5-7%	8-10%	10-12%	13%+
Asset	Asset level Corporate level	Stable asset	Existing asset	Enhancement of existing asset	Development of a new asset
Cash flow to investors	Interest payments	Regular distributions from operating cash flow	Semi-regular distributions from operating cash flow	Cash flow may be reinvested into the assets and not paid to investors until the enhancement is complete	No cash flow during the development of the asset, which may take 3-10 years depending on the type of asset and complexity to develop
Investment stage	Debt	Brownfield	Brownfield	Brownfield	Greenfield

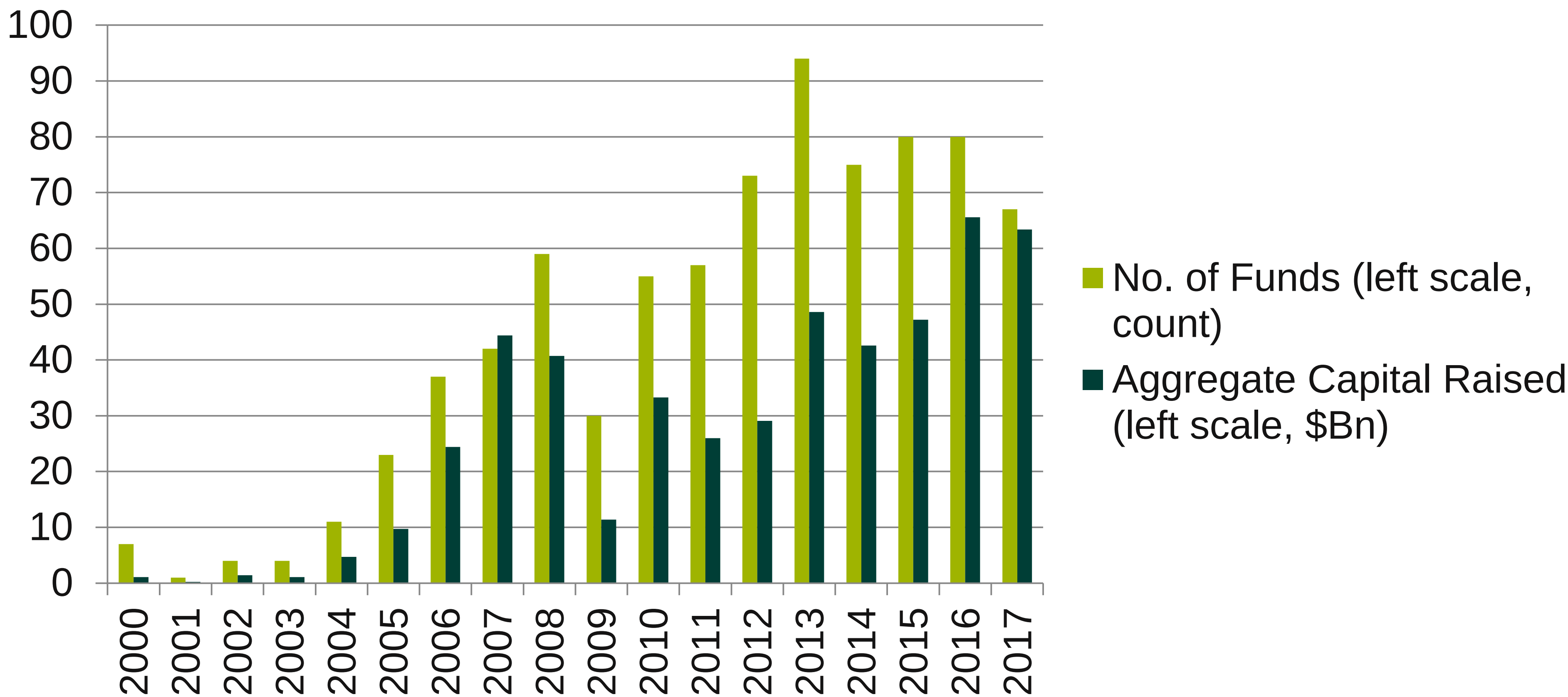
Note: return assumptions are representative of manager expectations in each space. These expectations differ from those used by Callan in our optimization model

Unlisted Infrastructure: Closed-End vs Open-End Funds

	Closed-End	Open-End
Strategic consistency	**Manager typically states its strategic focus and associated targets once**, at fund's inception	**The manager of a perpetual structure may restate strategy and** targets through the reissuance of updated private placement memoranda
Fees	Range from 1.25-1.75% on commitments, then invested capital Incentive fees accrue with strong performance	Range from .75-1.00%, based on investor NAV Performance hurdles and incentive fees may apply
Target Returns	Typically 10-12% net IRR, or higher for some strategies Income return more likely after four or five years post-investment	Range from 8-12% net p.a. over the cycles Income is a significant component of return from the start
Investment discipline	**The fixed timeline biases the manager to select assets it can improve over the stated investment period**	**The manager is never forced to sell assets which may be irreplaceable, but may elect to exit less attractive assets**
Liquidity	Fund terms generally range from 10 to 12 years, with several additional years of extensions available to the manager **A growing secondary market for closed-end funds may permit investors to exit a closed-end fund before the end of that fund**	Periodic (often quarterly) liquidity provides greater flexibility **Fund liquidity is only as good as the liquidity of the underlying assets or ability of the manager to attract new commitments**

Infrastructure Fundraising Trends –
Over $60 Billion Raised in Both 2016 and 2017

Mega Funds are Increasingly Large

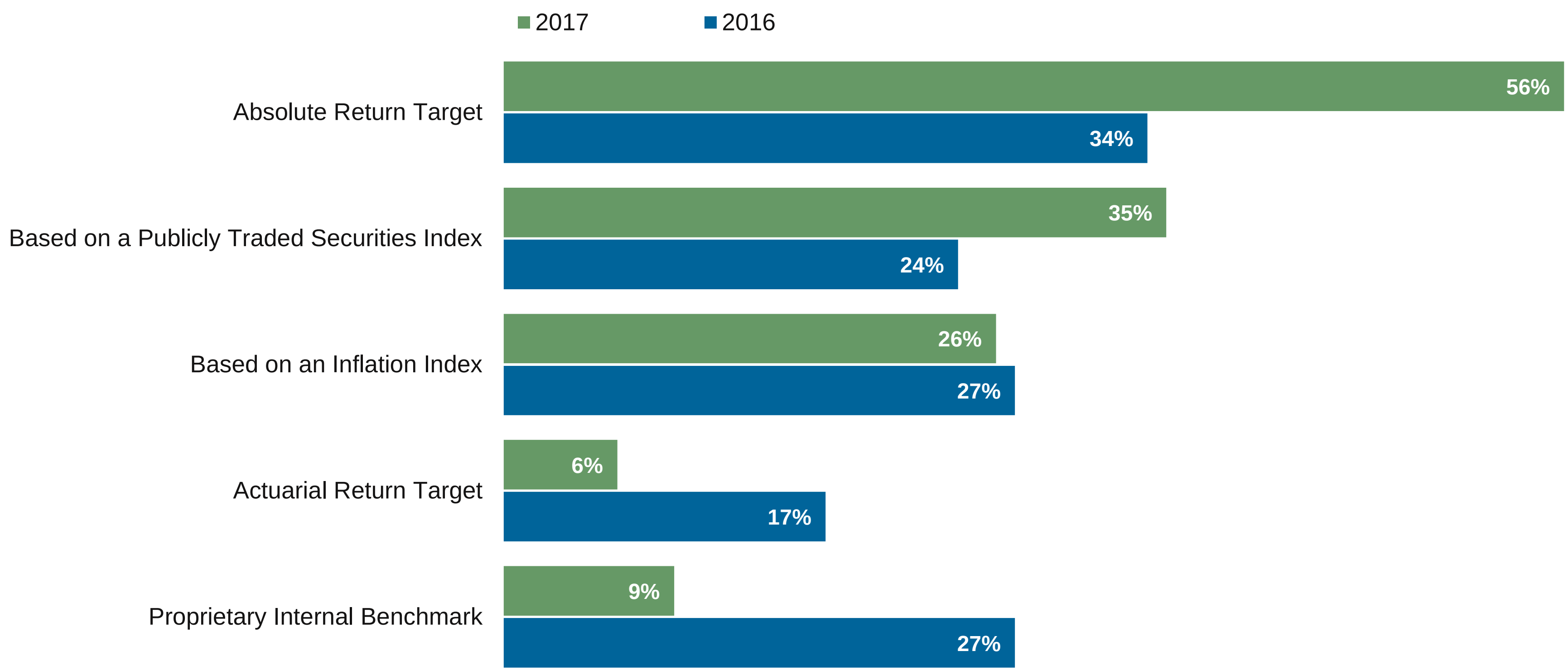


- Most of the capital to date has been raised for closed-end strategies
- However, open-end strategies are gaining on closed-end and gaining popularity: offer an attractive option for long term, ongoing exposure to infrastructure assets, with minimum required allocations ($10 m) appropriate for a fund the size of Mendocino

Source: Preqin, January 2018

Benchmarking is Inconsistent and Challenging

Infrastructure faces issues similar to other illiquid assets like private equity



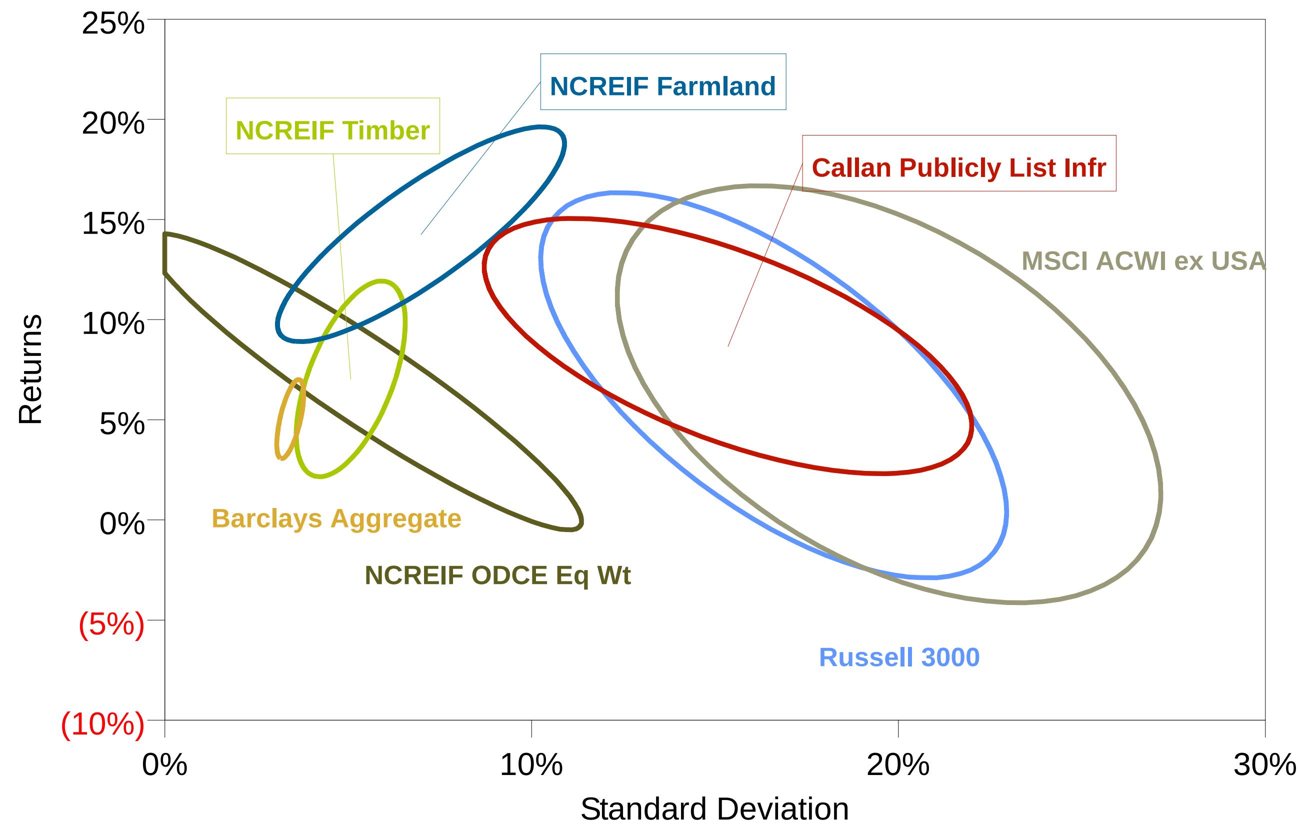
- Absolute return benchmarks remain most popular, with significant numbers of investors also using a publicly traded securities index as a secondary metric
- Listed infrastructure indices are gaining ground, but may not be entirely consistent with private infrastructure implementation, nor measured volatility

Source: Probitas, 2017 Infrastructure Investor Survey

Rolling Risk versus Return

- Risk
  - Private real estate's volatility levels fall between those of stocks and bonds
  - Timber and Farmland have exhibited return and risk in the same range as real estate, with higher returns reported for farmland
  - Listed infrastructure is equity
- Return
  - Stocks and private real estate, timber and farmland have generated greater returns than bonds but with a much wider dispersion of results
  - Returns for unlisted infrastructure are not reported on a comparable basis as listed infrastructure

Rolling 20 Quarter Scatter Chart for 15 Years Ended March 31, 2018



Note: U.S. private real estate is represented by NCREIF's ODCE Eq Wt Indices while listed infrastructure is represented by Callan's Publicly Listed Infrastructure peer group

Summary – Potential Alternative Real Asset Classes

- Infrastructure offers the greatest appeal to the Mendocino real assets portfolio
  - Timber and farmland are complex, very long-term commitments with few institutional offerings suitable for a fund the size of Mendocino
  - Public real assets include many factor exposures already present in the total portfolio (equity, interest rates); less diversifying than private strategies
- Private or unlisted infrastructure through an open-end commingled fund offers the most appealing access point
  - Listed infrastructure offers less diversification benefit to the total fund; equity return, risk and correlation
  - Unlisted infrastructure diversifies the real estate exposure in the real asset bucket
  - Better diversifies the rest of the investments in the total portfolio
  - More conservative return/risk profile than listed infrastructure, more consistent with the intent of the anchor real estate exposure
  - Offers suitable minimum required investments
  - Limited number of open-end funds on the market, but the opportunity set is growing; existing and soon-to-be opened funds could be appropriate for Mendocino
  - Callan has recently completed two searches in this area
- Benchmarking unlisted infrastructure presents a challenge
  - No suitable private infrastructure benchmark exists
  - Public infrastructure benchmarks vary widely in composition but all exhibit equity-like volatility, very different from the expectations for open-end commingled private infrastructure funds
  - Absolute return benchmarks are common (CPI +)
    - *These concepts suggest the strategies can never lose money over the short term*
    - *May provide an unrealistic hurdle in an equity market downturn, and*
    - *Underrepresent potential in a strong economic and capital market cycle.*

MCERA Real Asset Portfolio

Guiding Principles of Investment Structure

- Active management offers the potential to add value over the index and can be complementary to passive management.
  - Excess returns are more difficult to achieve in efficient markets such as large cap U.S. equity and U.S. fixed income
  - Potential for excess returns are compelling in small/mid cap US equity, non-US equity, emerging equity and non-US small cap equity
- Well-diversified market-neutral exposure with no unintended biases
  - Avoid overlapping mandates
  - May wish to purposefully add bias to small/mid cap U.S. equity and emerging markets equity for potential return enhancement
- Callan's overriding philosophy is to keep the structure as simple as possible
- Allocations to managers should be meaningful for the Plan
- The appropriate number of managers must balance style and relationship diversification with lower fees and more manageable monitoring
- Two primary influences on the appropriate number of managers
  - Size of the allocation relative to the total Plan
  - The higher the allocation, the greater the desired manager diversification
- Active versus passive
  - Fewer managers may be suitable when the portfolio is managed passively.

Where Does Infrastructure Fit in a Portfolio?

- Callan's Capital Market Expectations:
  - Used for long term strategic planning
  - Forward looking, yet anchored in history and reflecting current environment
  - Return, Risk, Correlation across institutional asset classes
  - Meant to be consumed as a "set", not in isolation
- Risk for private assets reflects "economic risk"
  - Observed standard deviations will be meaningfully lower due to valuation smoothing
- Implementation risk is high for niche asset classes
  - Limited universe, varying investment opportunity set, and definitional differences can lead to disparate product outcomes
- Private infrastructure has a return premium over private real estate, but with a commensurately higher risk

	1-Year Arithmetic	10-Year Geometric	Standard Deviation
Listed Infrastructure	8.5%	6.6%	20.80%
Private Infrastructure	8.0%	6.4%	18.95%
Listed Real Estate	8.4%	6.5%	20.70%
Private Real Estate	6.9%	5.8%	16.35%
Timber	7.4%	6.0%	17.40%
Agriculture	7.4%	6.2%	16.90%

Source: Callan LLC

2018 Capital Market Projections—Return and Risk

Summary of Callan's Long-Term Capital Market Projections (2018 – 2027)

Asset Class	Index	PROJECTED RETURN 1-Year Arithmetic	PROJECTED RETURN 10-Year Geometric*	PROJECTED RETURN Real	PROJECTED RISK Standard Deviation	Projected Yield
Equities						
Broad Domestic Equity	Russell 3000	8.30%	6.85%	4.60%	18.25%	2.00%
Large Cap	S&P 500	8.05%	6.75%	4.50%	17.40%	2.10%
Small/Mid Cap	Russell 2500	9.30%	7.00%	4.75%	22.60%	1.55%
Global ex-US Equity	MSCI ACWI ex USA	8.95%	7.00%	4.75%	21.00%	3.10%
International Equity	MSCI World ex USA	8.45%	6.75%	4.50%	19.70%	3.25%
Emerging Markets Equity	MSCI Emerging Markets	10.50%	7.00%	4.75%	27.45%	2.65%
Fixed Income						
Short Duration	Bloomberg Barclays 1-3 Yr G/C	2.60%	2.60%	0.35%	2.10%	2.85%
Domestic Fixed	Bloomberg Barclays Aggregate	3.05%	3.00%	0.75%	3.75%	3.50%
Long Duration	Bloomberg Barclays Long G/C	3.50%	3.00%	0.75%	10.95%	4.45%
TIPS	Bloomberg Barclays TIPS	3.10%	3.00%	0.75%	5.25%	3.35%
High Yield	Bloomberg Barclays High Yield	5.20%	4.75%	2.50%	10.35%	7.75%
Non-US Fixed	Bloomberg Barclays Glbl Agg xUSD	1.80%	1.40%	-0.85%	9.20%	2.50%
Emerging Market Debt	EMBI Global Diversified	4.85%	4.50%	2.25%	9.60%	5.75%
Other						
Real Estate	Callan Real Estate Database	6.90%	5.75%	3.50%	16.35%	4.75%
Private Equity	TR Post Venture Capital	12.45%	7.35%	5.10%	32.90%	0.00%
Hedge Funds	Callan Hedge FoF Database	5.35%	5.05%	2.80%	9.15%	2.25%
Commodities	Bloomberg Commodity	4.25%	2.65%	0.40%	18.30%	2.25%
Cash Equivalents	90-Day T-Bill	2.25%	2.25%	0.00%	0.90%	2.25%
Inflation	CPI-U		2.25%		1.50%	

** Geometric returns are derived from arithmetic returns and the associated risk (standard deviation).*

- The basis for asset allocation are the long-term expected characteristics of each asset class and how they interact with each other
- Most capital market expectations represent passive exposure (beta only); however, return expectations for private real estate, private equity, and hedge funds reflect active management because no effective market proxies exist
- All return expectations are net of fees

Source: Callan LLC

2018 Capital Market Projections—Correlation Coefficient Matrix

Key to Constructing Efficient Portfolios

	Correlation Matrix	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Broad Domestic Equity	1.00																		
2	Large Cap	1.00	1.00																	
3	Small/Mid Cap	0.97	0.94	1.00																
4	Global ex-US Equity	0.87	0.87	0.84	1.00															
5	International Equity	0.84	0.84	0.80	0.99	1.00														
6	Emerging Markets Equity	0.87	0.86	0.85	0.94	0.87	1.00													
7	Short Duration	-0.25	-0.24	-0.27	-0.27	-0.25	-0.29	1.00												
8	Domestic Fixed	-0.11	-0.10	-0.14	-0.13	-0.11	-0.16	0.87	1.00											
9	Long Duration	0.11	0.11	0.10	0.08	0.09	0.04	0.74	0.93	1.00										
10	TIPS	-0.05	-0.05	-0.08	-0.05	-0.03	-0.09	0.53	0.60	0.53	1.00									
11	High Yield	0.64	0.64	0.61	0.63	0.61	0.62	-0.14	0.02	0.19	0.06	1.00								
12	Non-US Fixed	0.01	0.05	-0.10	0.01	0.06	-0.09	0.48	0.51	0.54	0.34	0.12	1.00							
13	EMD	0.57	0.57	0.56	0.58	0.55	0.58	-0.04	0.10	0.14	0.18	0.60	0.01	1.00						
14	Real Estate	0.73	0.73	0.71	0.68	0.66	0.65	-0.17	-0.03	0.17	0.00	0.56	-0.05	0.44	1.00					
15	Private Equity	0.95	0.95	0.92	0.93	0.90	0.91	-0.26	-0.20	0.00	-0.11	0.64	-0.06	0.57	0.72	1.00				
16	Hedge Funds	0.80	0.80	0.77	0.76	0.73	0.76	-0.13	0.08	0.29	0.08	0.57	-0.08	0.54	0.61	0.78	1.00			
17	Commodities	0.15	0.15	0.15	0.16	0.16	0.16	-0.22	-0.10	-0.04	0.12	0.10	0.05	0.19	0.20	0.18	0.21	1.00		
18	Cash Equivalents	-0.04	-0.03	-0.08	-0.04	-0.01	-0.10	0.30	0.10	-0.04	0.07	-0.11	-0.09	-0.07	-0.06	0.00	-0.07	0.07	1.00	
19	Inflation	-0.01	-0.02	0.02	0.01	0.00	0.03	-0.20	-0.28	-0.29	0.18	0.07	-0.15	0.00	0.10	0.06	0.20	0.40	0.00	1.00

- Relationships between asset classes is as important as standard deviation
- To determine portfolio mixes, Callan employs mean-variance optimization
- Return, standard deviation and correlation determine the composition of efficient asset mixes

Source: Callan LLC

Why Add Private Infrastructure?

Modest shift in expected return and risk from addition of private infrastructure

Asset Classes	Target	Alternative Mixes	
		Mix 1 - 11% Real	Mix 2 - 15% Real
Broad US Equity	38	38	35
Global ex US Equity	29	29	28
Domestic Fixed	22	22	22
Real Estate	11	7	10
Infrastructure, Private	0	4	5
Totals	100	100	100
10 Year Returns	6.40	6.43	6.40
Risk (Standard Deviation)	13.90	14.05	13.87
Sharpe Ratio	0.29	0.29	0.29
% Real Assets	11	11	15

- Return and risk assumptions are similar for real estate and private infrastructure, so why bother?
  - Infrastructure represents differentiated return stream to real estate, public equity and fixed income, based on unique underlying characteristics – long life assets, stable cash flow, monopolistic, low demand elasticity
  - Diversification benefit will show up over the cycles in the capital markets – infrastructure will show different sensitivity to factors that drive stocks, bonds and real estate
  - A larger allocation to real assets (15% versus 11%) represents a greater diversifying position, divided between two complementary private investments (real estate and private infrastructure)
- Alternative 1 shifts 4% from real estate to fund private infrastructure; total dollars in real assets remains the same, exposure is now more diversified
- Alternative 2 increases real assets from 11% to 15%, funding the increase from equity (4%); real estate is reduced from 11% to 10%, infrastructure is set to 5%.

Current and Alternative Real Asset Structures

Style	Target Allocation (%, Real Estate)	Target Allocation ($, mm) as of 03/31/18	Alternative 1 ($, mm)	Alternative 2 ($,mm)
Private				
Core Open-Ended Real Estate				
RREEF America II Fund	50.0%	$28.0	$17.6	$25.4
Barings Core Property Fund	50.0%	$28.0	$17.6	$25.4
Private Open-end Infrastructure	0.0%	$0	$20.8	$26.0
Total	100.0%	$56.0	$56.0	$76.8

- Alternative 1 shifts 4% from real estate to fund private infrastructure; total dollars in real assets remains the same, exposure is now more diversified
- Alternative 2 increases real assets from 11% to 15%, funding the increase from equity (4%); real estate is reduced from 11% to 10%, infrastructure is set to 5%
  - Note: real estate allocation includes the MCERA headquarters building, so allocations to core managers are net of this investment (currently valued at $1.15 million)
- Return and risk changes for the total portfolio (depicted on previous page) are modest, given the expected return for private infrastructure is so close to that of real estate
- The diversification benefit will be more apparent through the active implementation of the infrastructure exposure

Summary and Conclusions

Mendocino Real Assets Exposure

- Plan has two open-end core real estate funds as its real asset exposure, targeting 11% of the total fund
- Current exposure is reasonable and could be maintained going forward. Size of the allocation was selected in the asset/liability study in 2016 and remains valid
- Plan could consider other private real assets to add to the portfolio to diversify real estate
  - Timber
  - Agriculture
  - Infrastructure
- Infrastructure appears to offer the best fit to the MCERA portfolio
  - Unlisted open-end infrastructure
  - Sizing:
    - *Could consider carving out 4% from the existing 11% real asset allocation, or*
    - *Expand the real asset portion to 15%, and divide the allocation to 10% real estate and 5% infrastructure*
    - *Both portfolios will offer comparable return and risk profiles for the total portfolio, with the second option offering greater diversification*
  - Benchmarking infrastructure will be a challenge; most investors use a combination of absolute return and an equity benchmark
  - Open-end funds continue to develop and Callan believes there are suitable offerings in the market for MCERA

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