

Capital Market Assumptions and Asset Allocation Review

San Diego City Employees' Retirement System

July 9, 2020

Discussion Outline

| | |
|------------------|--------------------------------|
| Section 1 | Executive Summary |
| Section 2 | Capital Market Assumptions |
| Section 3 | SDCERS' Asset Allocation |
| Section 4 | Conclusions and Recommendation |
| Section 5 | Appendix |

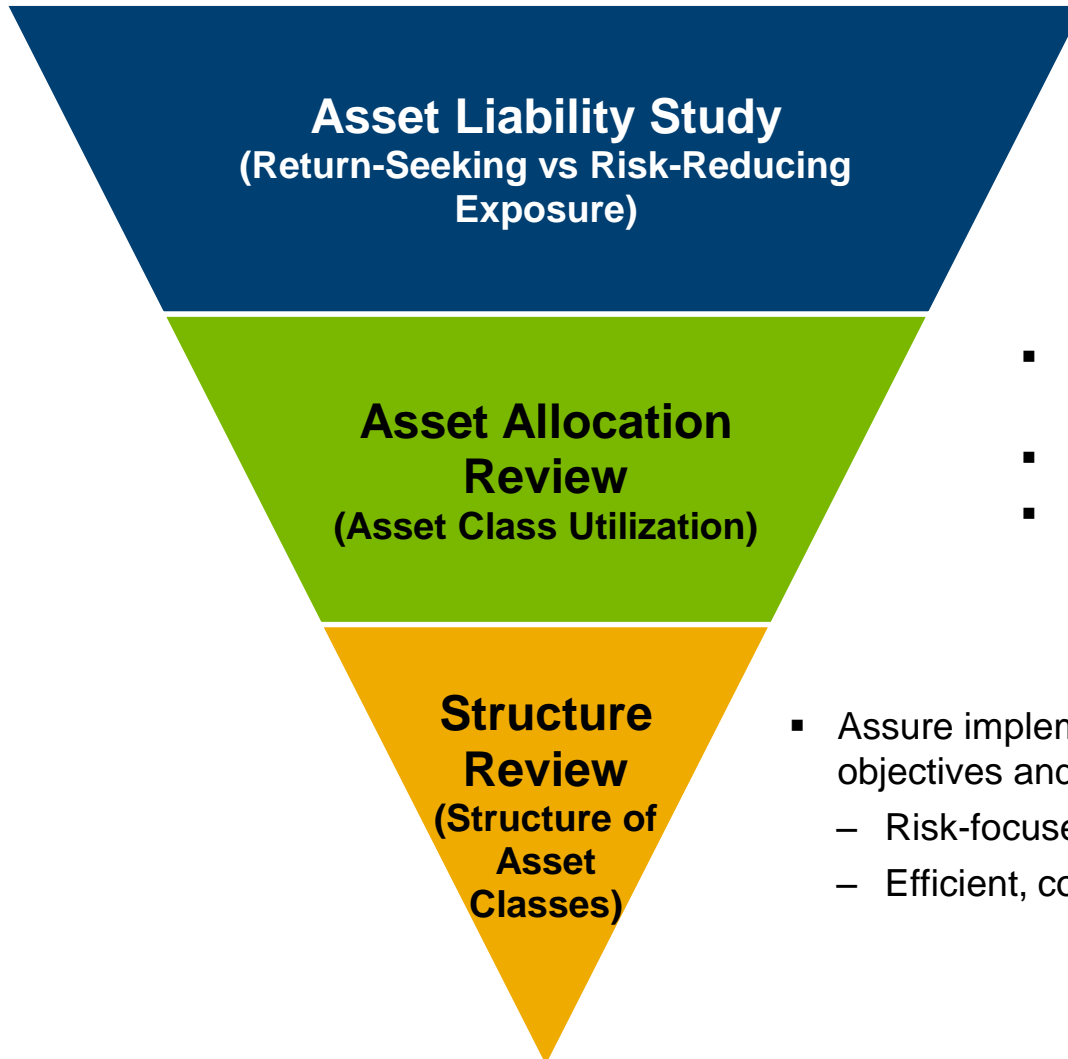
Agenda Tracker

| | |
|------------------|--------------------------------|
| Section 1 | Executive Summary |
| Section 2 | Capital Market Assumptions |
| Section 3 | SDCERS' Asset Allocation |
| Section 4 | Conclusions and Recommendation |
| Section 5 | Appendix |

Introduction

- Asset allocation is the primary driver of long-term success
- Recent Asset Liability Study re-affirmed the 78/22 mix between return-seeking and risk-mitigating assets as an appropriate risk posture for SDCERS
- Asset allocation studies determine the composition of the return-seeking and risk-mitigating allocations and considers:
 - Long-term return expectations
 - Inflation protection
 - Costs
 - Flexibility
 - Risk control / diversification
 - Liquidity needs
 - Resources
- Asset Allocation is reviewed annually to ensure the portfolio is appropriately positioned
- The following material covers:
 - Aon’s Capital Market Assumptions
 - Review of SDCERS’ Asset Allocation
 - Recommendation to increase the allowable allocation to the Opportunity Fund to 10%

Overview of the Investment Policy Process



Asset Liability Study (Return-Seeking vs Risk-Reducing Exposure)

- Important to set strategy in context of plan liabilities
- 2018 AL Study re-affirmed 78/22 return-seeking/risk-mitigating risk posture

Asset Allocation Review (Asset Class Utilization)

- Translate results of A/L study to an actionable strategic asset allocation
- Long-term in nature
- Most important factor in driving returns

Structure Review (Structure of Asset Classes)

- Assure implementation conforms with stated objectives and risk tolerance
 - Risk-focused approach
 - Efficient, cost-effective implementation

Investment Policy Risk Management Summary

- The below table highlights the hierarchy of investment risks and the tools and procedures in place to address these risks

| Risk Management Tool | Risks Addressed | Observations |
|---|---|---|
| 1. Asset Liability Study <ul style="list-style-type: none"> • Stochastic and Deterministic scenario analysis • Efficient Frontier Analysis • Stress Tests • Liquidity Analysis/Stress Test | <ul style="list-style-type: none"> • Ability to pay promised benefits • Assets (return + contributions) do not grow with liabilities • Liquidity | <ul style="list-style-type: none"> • Expected to reach full funding within 20 years • 78/22 appropriate risk posture given time horizon and return needs • Ability to invest in illiquid assets with no concerns regarding paying benefits |
| 2. Asset Allocation Study <ul style="list-style-type: none"> • Mean Variance analysis • Historical scenario analysis • Forward looking (stochastic) scenario analysis • Deterministic Scenario Analysis • Factor Analysis | <ul style="list-style-type: none"> • Return shortfall • Diversification / Concentration Risk • Left tail risk | <ul style="list-style-type: none"> • Long-term return expected to exceed actuarial assumed return • Well-diversified portfolio with balanced risk exposures • Recognize explicit 'protection' role of risk-reducing allocation • Appropriate inflation hedge • Flexibility in implementation |
| 3. Structure Review <ul style="list-style-type: none"> • Market coverage • Equity exposure • Active / Passive • Active Risk Contribution • Interest Rate Exposure • Credit Exposure • Active Manager Review | <ul style="list-style-type: none"> • Unintended biases • Concentration Risk (active risk, geographic, style, size, etc.) • Active management • Cost structure | <ul style="list-style-type: none"> • Broad, well-diversified exposure across markets • Deliberate active risk taking • Efficient use of low cost options • Appropriate monitoring and reporting policies • Focus on high conviction active managers |

Key Takeaways and Recommendation

Key Takeaways:

- We continue to believe the current asset allocation positions the Total Fund well to achieve SDCERS' long-term investment objectives
 - Broadly diversified with allocations across major asset classes
 - Meaningful allocation to alternatives
 - Flexibility via the opportunity fund
 - Appropriate downside and inflation protection
 - Adequate liquidity
- Over the past 10 years, SDCERS has made significant enhancements to asset allocation and we believe the current Policy continues to be well constructed and see no significant changes needed
- That said, we have identified a modest change that we believe can provide incremental value

Recommendation:

- Given the success and current allocation of the Opportunity Fund, and the potentially attractive opportunities on the horizon, Aon recommends SDCERS increase the allowable allocation to the Opportunity Fund from 8% to 10%
 - Provides greater flexibility to take advantage of attractive opportunities (like TALF)
 - Does not automatically trigger a greater allocation
 - Implementation approach remains unchanged; allowable range recommended 0 - 10%

Agenda Tracker

| | |
|------------------|--------------------------------|
| Section 1 | Executive Summary |
| Section 2 | Capital Market Assumptions |
| Section 3 | SDCERS' Asset Allocation |
| Section 4 | Conclusions and Recommendation |
| Section 5 | Appendix |

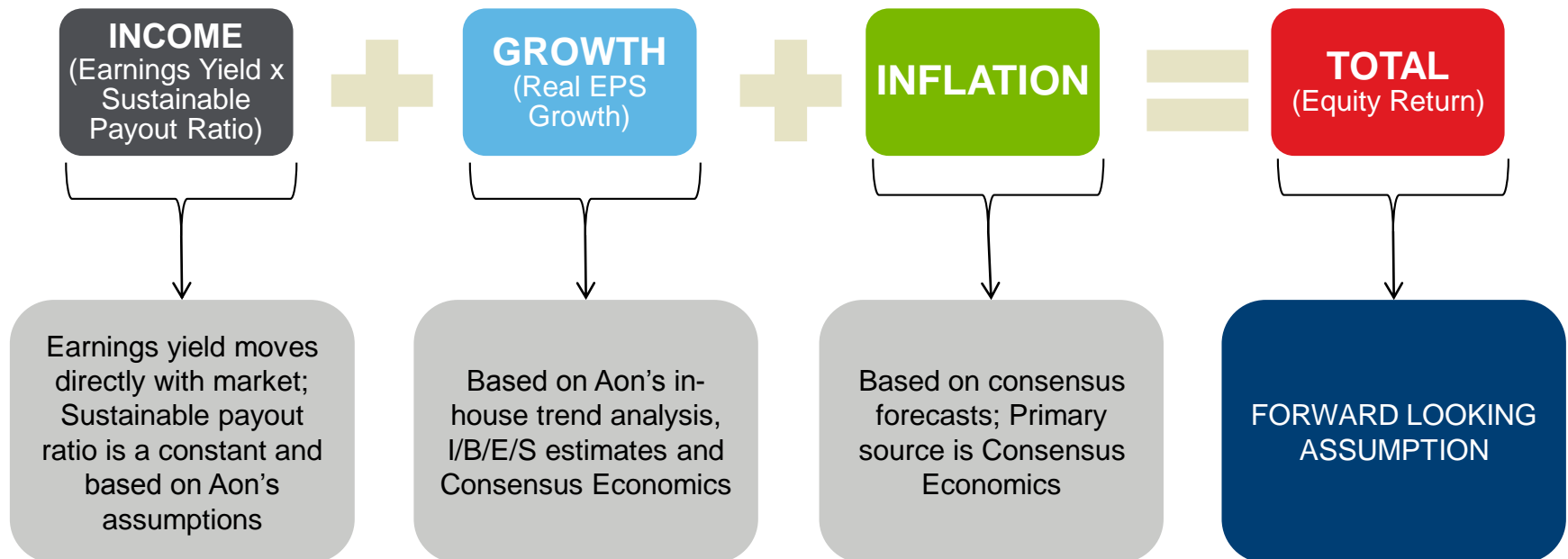
Aon Capital Market Assumptions Overview

- What are they?
 - Asset class return, volatility and correlation assumptions
 - Long-term: (10- and 30-year), forward-looking assumptions
 - Best estimates: (50/50 probability of better or worse long-term results than expected)
 - Quarterly: Updated on a quarterly basis to reflect current market pricing/levels
- Return assumptions most critical
 - Market Returns: no active management value added or fees (except for hedge funds and private equity, where traditional passive investments are not available)
- Volatility assumptions are set with a forward-looking view, considering:
 - Implied volatilities priced into option contracts of various terms
 - Historical volatility levels
 - For illiquid asset classes, such as real estate, de-smoothing techniques are employed when assessing historic volatility levels
 - The broad economic/market environment
- Correlation assumptions are formulated with reference to historic experience over different time periods and during different economic conditions

Framework: Building Block Approach

- Expected return estimates for equity and fixed income are developed using a building block approach
 - Expected returns based on observable information in the equity and fixed income markets and consensus estimates for major economic and capital market inputs, such as earnings and inflation
 - Where necessary, judgment-based modifications are made to these inputs
- Return assumptions for other asset classes are based on historical results, current market characteristics, and professional judgment from our specialist research teams

Example: Equities



Coverage

| Fixed Income | Equities | Alternatives | Macro Variables |
|--|--|--|--------------------|
| Nominal Government Bonds | All major regions covered including Emerging Markets | Hedge Funds (7 Single Strategies; Fund of Hedge Funds; Broad Hedge Funds) | Inflation |
| Inflation-linked Government Bonds | U.S. Large and Small Cap | Real Estate (Total Market, Core and U.S. REITs) | Currency Movements |
| Corporate Bonds | Non-U.S. Developed and Emerging Markets | Private Equity | |
| High Yield Debt | Global Equity | Infrastructure | |
| Bank Loans | Equity Insurance Risk Premium (High Beta) | Commodities | |
| Emerging Market Debt (Hard, Local, Corporate) | | Equity Insurance Risk Premium (Low Beta) | |
| Multi-Asset Credit | | | |
| Private Debt (Direct Lending) | | | |

- Continually expanding coverage
- Equities and Bond assumptions formed at regional level for the U.S., U.K., Europe ex-U.K., Japan, Canada, Australia and Switzerland. Real estate assumptions for U.S., U.K., Canada and Europe

SDCERS' Expected Risk and Return

30-Year Asset Class Expected Nominal Return and Risk*

| Asset Class | SDCERS Long-Term Policy | Expected Return* | Expected Risk |
|---|-------------------------|------------------|---------------|
| U.S. Equity | 18.0% | 6.9% | 17.4% |
| Non-U.S. Equity | 15.0 | 7.9 | 20.1 |
| Global Equities | 8.0 | 7.5 | 18.0 |
| U.S. Intermediate Duration Fixed Income | 22.0 | 1.8 | 3.6 |
| Emerging Market Debt | 5.0 | 4.6 | 12.7 |
| Real Estate | 11.0 | 6.5 | 17.6 |
| Private Equity | 10.0 | 9.8 | 24.5 |
| Infrastructure | 3.0 | 8.3 | 14.0 |
| Opportunity Fund** | 8.0 | 6.5 | 14.1 |
| Cash | -- | 1.1 | 1.5 |
| Total Fund Expectations | 2020 CMAs | | 2019 CMAs |
| Expected Nominal Return* | 6.66% | | 6.91% |
| Risk (Standard Deviation) | 11.74% | | 11.76% |
| Sharpe Ratio (Reward/Risk) | 0.474 | | 0.341 |

*Based on Aon's 2Q 2020 Capital Market Assumptions. Returns are nominal. U.S. Inflation (CPI) assumption is 2.1%.

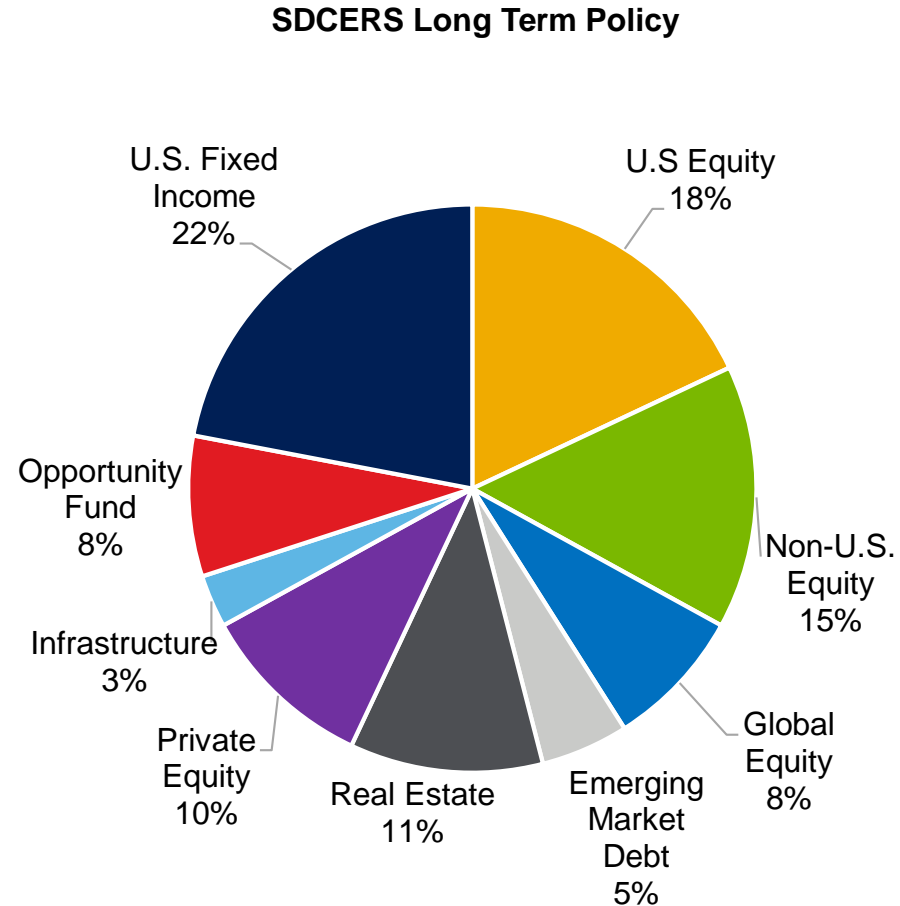
**Opportunity Fund modeled 78% global equities / 22% intermediate bonds.

Agenda Tracker

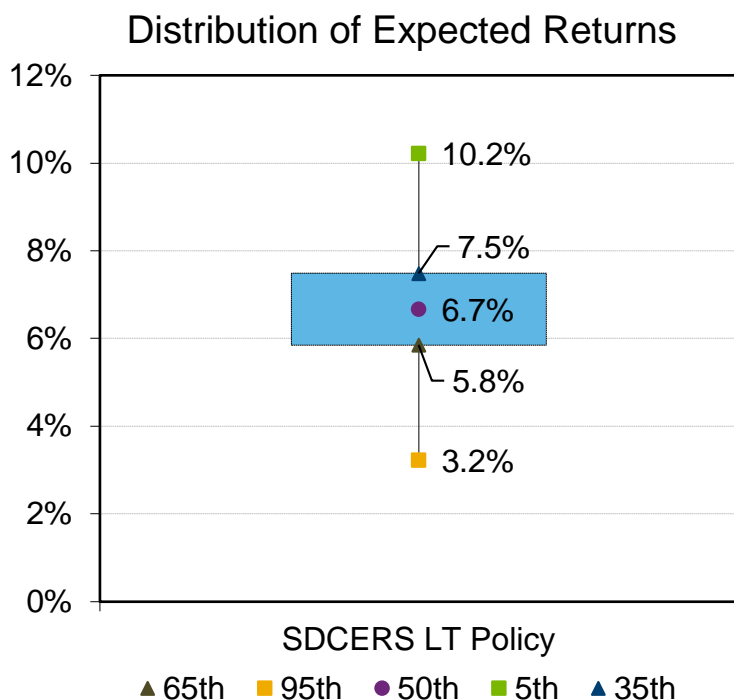
| | |
|------------------|--------------------------------|
| Section 1 | Executive Summary |
| Section 2 | Capital Market Assumptions |
| Section 3 | SDCERS' Asset Allocation |
| Section 4 | Conclusions and Recommendation |
| Section 5 | Appendix |

SDCERS' Asset Allocation

| Asset Class | Role |
|-----------------------------|---|
| U.S. Equity | <ul style="list-style-type: none"> • Capture global growth • Capital appreciation • Long-term inflation hedge |
| Non-U.S. Equity | |
| Global Equity | |
| Emerging Market Debt | <ul style="list-style-type: none"> • Diversified source of return |
| Real Estate | <ul style="list-style-type: none"> • Returns in excess of bonds • Income-stream • Inflation-hedge • Added diversification |
| Private Equity | <ul style="list-style-type: none"> • Higher returns than public equity • Skill-based return enhancement • Diversified growth |
| Infrastructure | <ul style="list-style-type: none"> • Skill-based return enhancement • Diversified growth • Long-term inflation protection |
| Opportunity Fund* | <ul style="list-style-type: none"> • Provide flexibility in implementation |
| Total Return-Seeking | 78% |
| U.S. Fixed Income | <ul style="list-style-type: none"> • Downside-protection • Liquidity |
| Total Risk-Reducing | 22% |



SDCERS' Distribution of Expected Returns



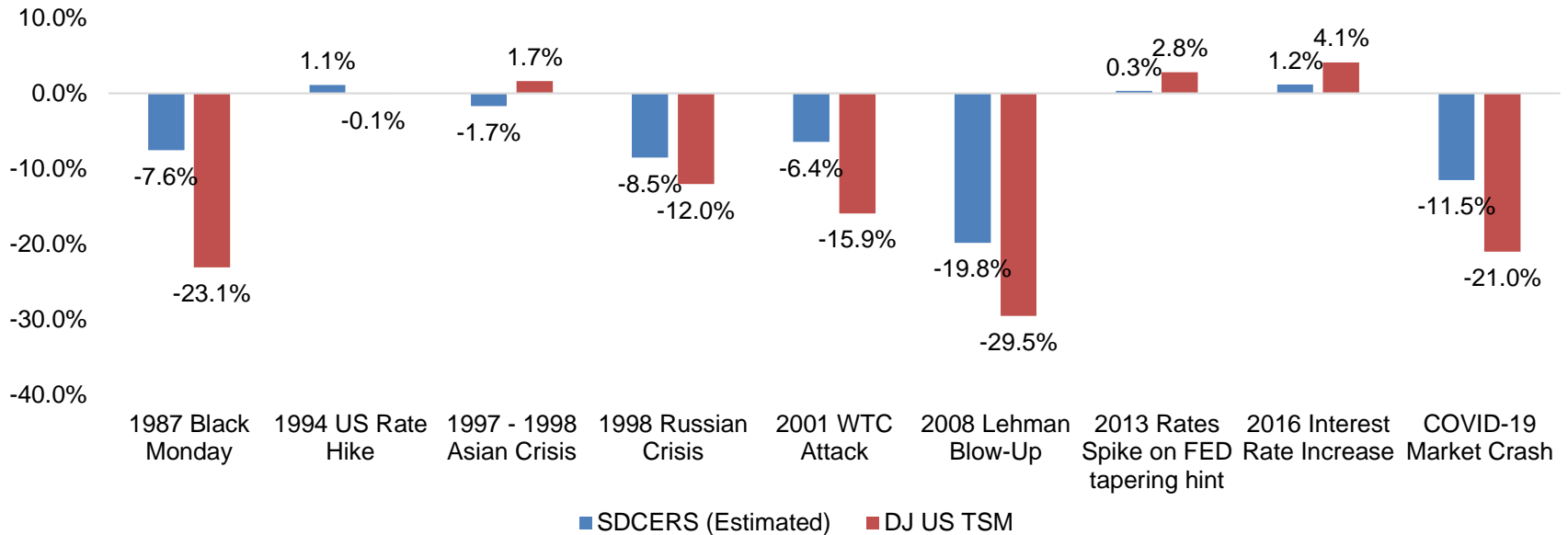
| SDCERS Total Fund 30-Year Expectations | |
|--|--------|
| Expected Nominal Return | 6.66% |
| Risk (Standard Deviation) | 11.74% |
| Sharpe Ratio (Reward/Risk) | 0.474 |

Based on AHIC 2Q 2020 30 year Capital Market Assumptions

- Capital market assumptions provide a range of expected returns
- Expectations are derived from simulated market and economic scenarios, including ones similar to 2020 YTD.
 - Correlations are also not assumed to be static
- SDCERS' asset allocation has been constructed for long-term growth as well as the ability to weather short and medium-term volatility
 - Dedicated fixed income allocation
 - Diversified return-seeking allocation
 - Opportunity Fund to provide strong risk-adjusted returns and take advantage of attractive and timely opportunities
 - Appropriate liquidity profile and use of alternatives

Historical Stress Testing

SDCERS Simulated Performance – Based on 12/31/2019 Actual Allocation



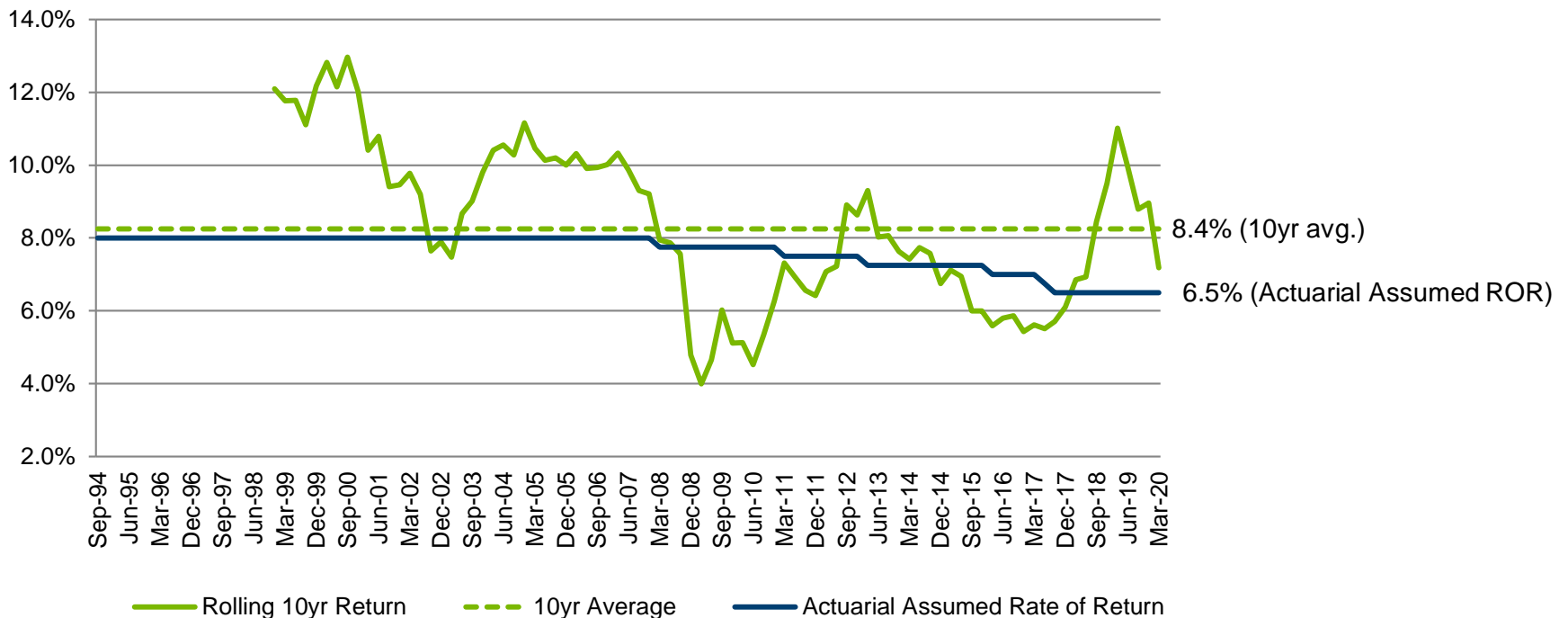
| | 1987 Black Monday | 1994 US Rate Hike | 1997 - 1998 Asian Crisis | 1998 Russian Crisis | 2001 WTC Attack | 2008 Lehman Blow-Up | 2013 Rates Spike on FED tapering hint | 2016 Interest Rate Increase | COVID-19 Pandemic |
|------------|-------------------|-------------------|--------------------------|---------------------|-----------------|---------------------|---------------------------------------|-----------------------------|-------------------|
| Start Date | Q4 1987 | Q1 1994 | Q4 1997 | Q3 1997 | Q3 2001 | Q3 2008 | Q2 2013 | Q3 2016 | Q1 2020 |
| End Date | Q4 1987 | Q4 1994 | Q4 1997 | Q3 1997 | Q3 2001 | Q4 2008 | Q2 2013 | Q3 2016 | Q2 2020 |

Analysis uses manager return data to earliest possible date, and benchmark return data when manager data is not available
 Analysis reflects policy asset allocation as of 12/31/2019
 SDCERS actual performance does not go back to 1987

SDCERS' Historical Experience

- SDCERS' 10-year return has averaged over 8.4% over the past 20+ years
 - SDCERS' has earned an annualized 8.0% over the trailing 25-years (as of 3/31/20)
- While our current long-term expected nominal return (6.7%) is lower than recent experience, it is above the Plan's actuarial assumed rate of return of 6.5%

SDCERS' Total Fund 10-Year Rolling Returns



Asset Allocation: Key Areas of Focus

- Below we highlight the key areas of focus for SDCERS asset allocation and how the current Policy addresses each

| Focus Area | Role | SDCERS's Coverage | |
|----------------------|--|--|---|
| Diversification | <ul style="list-style-type: none"> Risk control Balanced returns | <ul style="list-style-type: none"> Exposure to six major and commonly used asset classes | ✓ |
| Alpha Source | <ul style="list-style-type: none"> Beta not sufficient to meet investment objectives | <ul style="list-style-type: none"> Alternatives Active risk budget | ✓ |
| Inflation Protection | <ul style="list-style-type: none"> Align with expected gradual rate increase | <ul style="list-style-type: none"> Short duration posture Real Estate TIPs within active portfolios | ✓ |
| Flexibility | <ul style="list-style-type: none"> Allow for opportunistic allocation | <ul style="list-style-type: none"> Opportunity Fund allocation | ✓ |
| Liquidity | <ul style="list-style-type: none"> Ability to pay promised benefits in normal and adverse markets | <ul style="list-style-type: none"> Approx. 70% invested in liquid assets Liquidity reviewed regularly | ✓ |
| Downside Protection | <ul style="list-style-type: none"> Avoid losses in weak or negative equity markets | <ul style="list-style-type: none"> Dedicated risk-reducing allocation High quality orientation Elements within Opportunity Fund | ✓ |
| Efficiency | <ul style="list-style-type: none"> Straightforward, simple asset allocation Cost effective | <ul style="list-style-type: none"> Streamlined Policy Deliberate risk taking Strong use of passive allocations | ✓ |

Agenda Tracker

| | |
|------------------|--------------------------------|
| Section 1 | Executive Summary |
| Section 2 | Capital Market Assumptions |
| Section 3 | SDCERS' Asset Allocation |
| Section 4 | Conclusions and Recommendation |
| Section 5 | Appendix |

Summary Conclusions

- SDCERS asset allocation remains broadly appropriate and well positioned to achieve its long-term objectives
 - Broadly diversified with allocations across major asset classes
 - Meaningful allocation to alternatives
 - Flexibility via the opportunity fund
 - Appropriate downside and inflation protection
 - Adequate liquidity
- Over the past 10 years, SDCERS has made significant enhancements to asset allocation and we believe the current Policy continues to be well constructed and see no significant changes needed
- In Aon's 2019 Asset Allocation review, we identified the following future considerations which we follow-up on in the next slide
 - Modestly reduce private equity allocation: No immediate action, will continue to monitor
 - Shift EMD allocation to Multi-Asset Credit (MAC): No immediate action, will continue to evaluate
 - Increase Opportunity Fund maximum: For consideration today - recommend increasing allowable range to 0 - 10%
- Please see following slides for more detail

2019 Future Considerations: Follow-up

- During the 2019 asset allocation review we provided three ideas for future consideration
- Aon and the SDCERS Investment Team evaluated these considerations and provide an update below:

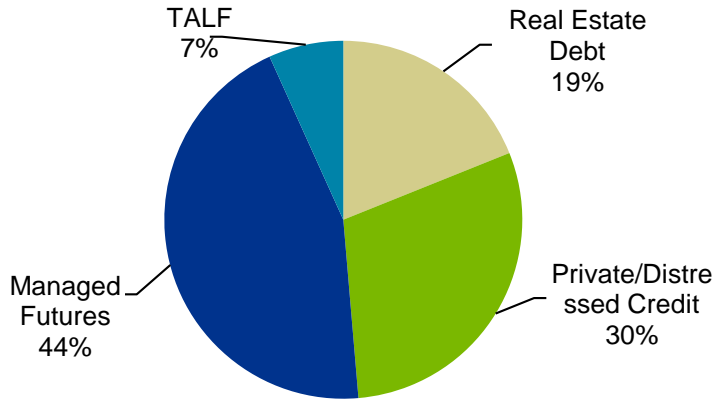
| Consideration | 2019 Comments | 2020 Update |
|---|---|--|
| Reduce Private Equity <ul style="list-style-type: none"> • Re-allocation two percentage points to public equity | <ul style="list-style-type: none"> • Maintains growth role of assets • Gradually reduces volatility and improves liquidity • Modest reduction in expected return, though net positive risk/return trade-off • Currently private equity allocation is approx. two percentage points overweight | <ul style="list-style-type: none"> • Enhanced return from PE may be desired given recent market volatility • SDCERS liquidity profile remains appropriate • SDCERS closed approx. \$72M in secondary sales over the year • PE modestly overweight, partly as a result of market movements • Will continue to evaluate |
| Introduce Multi-Asset Credit (MAC) <ul style="list-style-type: none"> • Shift EMD to a MAC allocation | <ul style="list-style-type: none"> • Offers tactical allocations across high yield, bank loans, EMD and IG credit • Provides efficient, timely and comprehensive exposure to return-seeking FI • 2019 medium-term outlook suggests delaying any potential shift to MAC | <ul style="list-style-type: none"> • Diversifying the return-seeking fixed income portfolio will provide benefits • Though long-term risk/return impact is modest • Current medium-term outlook continues to favor local EMD • Will continue to evaluate |
| Revisit Opportunity Fund Max <ul style="list-style-type: none"> • Increase 8% max allocation | <ul style="list-style-type: none"> • Provides flexibility to efficiently implement attractive and/or opportunistic ideas • Since inception, the OF has earned an annualized 8.9% • Existing strategies will distribute dollars back to SDCERS in coming years | <ul style="list-style-type: none"> • OF is approximately 7% of total fund assets, before TALF assets invested • OF continues to be successful providing attractive risk-adjusted returns • See following slides for recommendation |

Opportunity Fund: Provides Flexibility in Implementation

- ***Not all investment opportunities fit neatly within clearly-defined asset class lines***
 - Investments may have low to no asset class / beta exposure (or) temporal and varying exposure to asset classes over time
 - For instance: managed futures, multi-strategy investments
- ***From time to time, investors may also be faced with opportunities that are truly “opportunistic” in nature***
 - Relative value opportunities that arise periodically due to market dislocation, extremes in asset pricing
 - For instance: TALF, PPIP, and distressed credit investments
- ***Commitments may be relatively small and not warrant the creation of a dedicated allocation***
 - For instance: commodities, TIPS
- The constraints of an asset allocation should not preclude investors such as SDCERS from accessing interesting and attractive opportunities
- Avoids having to alter asset allocation every instance opportunities as noted above arise

Opportunity Fund Overview

Commitment Allocation \$740 million

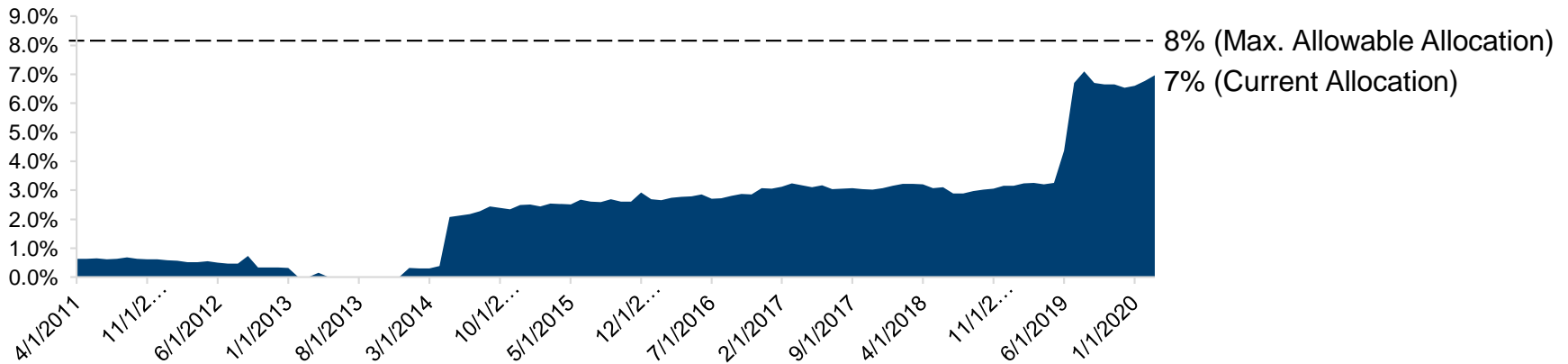


Annualized Net-of-Fee Performance

| As of March 2020 | 1-Year | 3-Years | 5-Years | Since Inception* |
|-----------------------------------|--------|---------|---------|------------------|
| Opportunity Fund | -3.9 | 4.2 | 5.8 | 5.8 |
| Opportunity Fund Benchmark | -8.4 | 1.7 | 2.7 | 2.8 |

*Inception Date of June 1, 2014

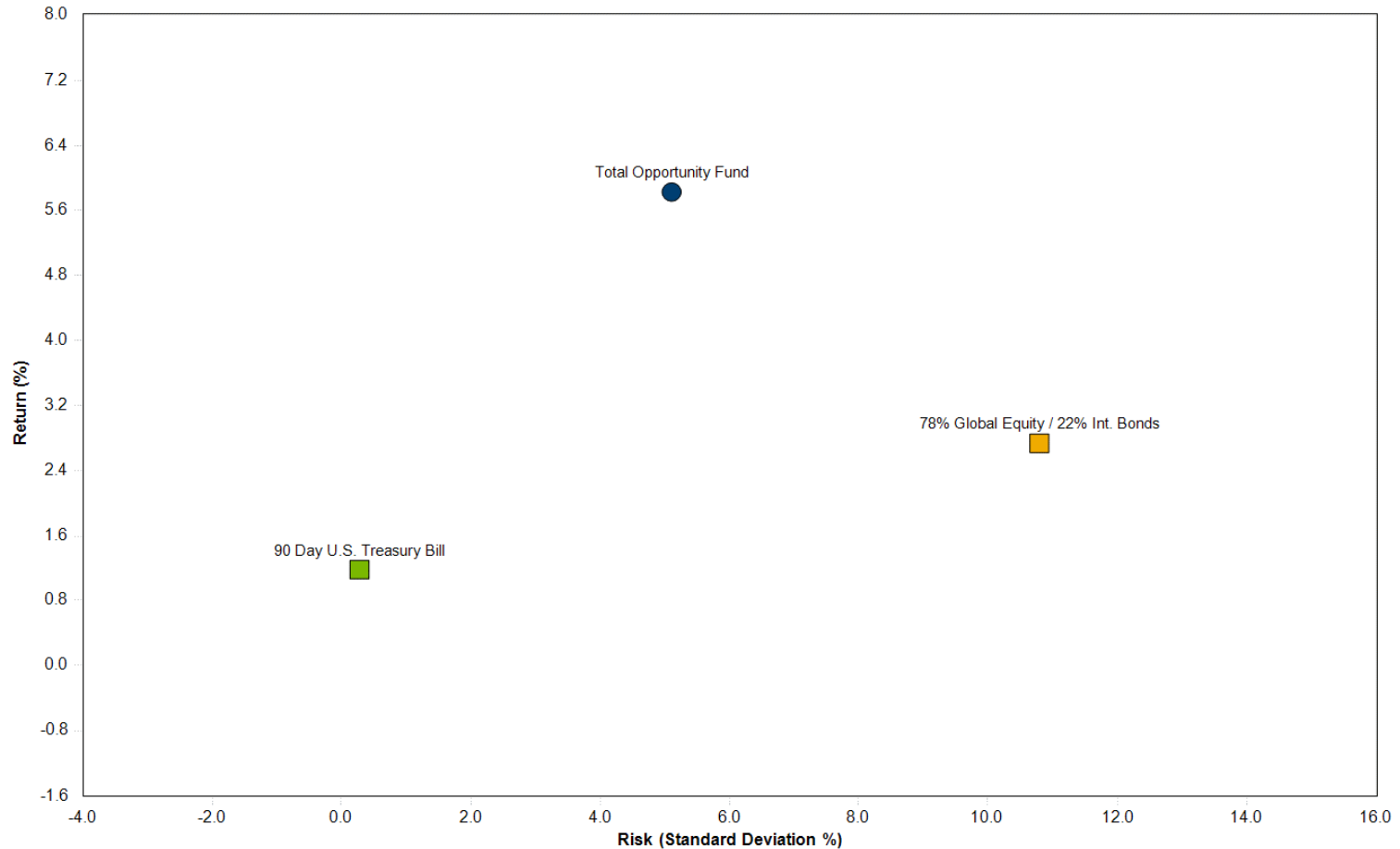
Opportunity Fund % of Total Fund as of March 31, 2020



Opportunity Fund: Risk vs. Return

5 Years Ending March 31, 2020

Risk and Return



Recommendation: Increase Allowable Allocation to Opportunity Fund

- Aon recommends SDCERS increase maximum allowable allocation to the Opportunity Fund from 8% to 10%
 - Implementation remains the same: No target allocation, rather, an allowable range of 0 – 10%
- SDCERS' has been successful with the Opportunity Fund allocation
 - Methodical and thoughtful construction to a diversified and complementary portfolio
 - Achieved better risk-adjusted returns than broader policy of 78% global equities and 22% intermediate bonds
- Recent TALF commitment bumps SDCERS' allocation to upper bound of allowable allocation (8%)
- Given recent market volatility, Aon anticipates opportunities surfacing from certain market dislocations over the next 6 – 18 months
- Higher maximum allocation provides flexibility to take advantage of attractive opportunities - does not automatically translate into a greater allocation

Current Potential Opportunities

- Similar to past allocations, Aon and SDCERS will conduct thorough due diligence on any future potential opportunities, including ensuring attractive risk/return profile and complementary fit to existing broader portfolio

| | What is it? | Return | Risk | Window | Horizon |
|---|---|--------------------------|---|----------------|---------------|
|  1 Credit Opportunities | Strategies looking to capitalize on credit dislocations driven by COVID-19. | High single to mid-teens | Comparable to High Yield Bonds | 05/20 to 12/20 | 5 to 7 Years |
|  2 Structured Credit | Invests in securitized assets that have dislocated, including TALF 2.0 securities. | Mid-single to low teens | Manager dependent. Investment Grade to High Yield levels of risk. | 05/20 to 12/20 | 5 Years |
|  3 Opportunistic Real Estate | Strategies that invest in public and private RE equity and debt that have dislocated from fundamentals. | Low to mid-teens | Greater than Core Real Estate. | 05/20 to 05/21 | 8 to 10 Years |

Agenda Tracker

| | |
|------------------|--------------------------------|
| Section 1 | Executive Summary |
| Section 2 | Capital Market Assumptions |
| Section 3 | SDCERS' Asset Allocation |
| Section 4 | Conclusions and Recommendation |
| Section 5 | Appendix |

Summary Changes to SDCERS' Asset Allocation

| Asset Class | Strategic Goal | Past Actions Taken |
|--|---|--|
| Return Seeking | | |
| Public Equities | Balance geographic allocation to be in line with global opportunity set; small-cap tilt | <ul style="list-style-type: none"> • Eliminated home-country bias • Created global equity allocation and increased from 5% to 8% • Created dedicated 1% emerging market equity allocation |
| Return-Seeking Fixed Income | Provide additional diversification to return seeking allocation | <ul style="list-style-type: none"> • Eliminated non-U.S. developed bond allocation • Created dedicated allocation to emerging market debt (EMD) • Increased EMD allocation from 3% to 5% |
| Alternatives | | |
| <i>Private Equity</i> <i>Infrastructure</i> <i>Real Estate</i> | Focus on areas of strength and conviction | <ul style="list-style-type: none"> • Increased PE target from 5% to 10% • Added 3% Infrastructure allocation • Maintained real estate allocation, but eliminated REITs |

Summary Changes to SDCERS' Asset Allocation (cont'd)

| Asset Class | Strategic Goal | Past Actions Taken |
|--------------------------|--|--|
| Return-Seeking | | |
| Opportunity Fund | Allow for maximum flexibility in implementation – for ideas that are purely opportunistic, transcend multiple asset classes, or those that have no persistent asset class exposure | <ul style="list-style-type: none"> • Committed to eleven strategies representing approx. 7% of Total Fund <ul style="list-style-type: none"> - Four opportunistic real estate debt strategies - Three opportunistic credit strategies - Three managed futures strategies - 2020 TALF Opportunity |
| Risk-Reducing | | |
| U.S. Fixed Income | Recognize explicit diversification role of “risk-reducing” fixed income | <ul style="list-style-type: none"> • Structured mandate to best meet objectives • Shortened duration to intermediate orientation |

Q2 2020 Assumptions (30-Year): Expected Returns and Risks

| | 30-yr | 30-yr | 30-yr | | |
|--------------------------------|---|--------------------------------------|---------------------|--------------|-------|
| | Expected Real Return ¹ | Expected Nominal Return ¹ | Expected Volatility | Sharpe Ratio | |
| Equity | | | | | |
| 1 | Large Cap U.S. Equity | 4.5% | 6.7% | 16.5% | 0.339 |
| 2 | Small Cap U.S. Equity | 5.0% | 7.2% | 22.5% | 0.271 |
| 3 | Global Equity | 5.3% | 7.5% | 18.0% | 0.356 |
| 4 | International Developed Equity | 5.3% | 7.5% | 19.5% | 0.328 |
| 5 | Emerging Markets Equity | 5.9% | 8.1% | 26.5% | 0.264 |
| Fixed Income | | | | | |
| 6 | Cash (Gov't) | -1.0% | 1.1% | 1.5% | 0.000 |
| 7 | Cash (LIBOR) | -0.5% | 1.6% | 2.0% | 0.250 |
| 8 | TIPS | 0.2% | 2.3% | 4.5% | 0.267 |
| 9 | Core Fixed Income (Market Duration) | 0.0% | 2.1% | 4.5% | 0.222 |
| 10 | Long Duration Bonds – Gov't / Credit | 0.2% | 2.3% | 11.0% | 0.109 |
| 11 | Long Duration Bonds – Credit | 0.9% | 3.0% | 12.5% | 0.152 |
| 12 | Long Duration Bonds – Gov't | -0.5% | 1.6% | 11.0% | 0.045 |
| 13 | High Yield Bonds | 2.3% | 4.4% | 12.0% | 0.275 |
| 14 | Bank Loans | 2.6% | 4.8% | 7.5% | 0.493 |
| 15 | Non-US Developed Bonds (0% Hedged) | 0.0% | 2.1% | 11.0% | 0.091 |
| 16 | Non-US Developed Bonds (50% Hedged) | -0.3% | 1.8% | 6.5% | 0.108 |
| 17 | Non-US Developed Bonds (100% Hedged) | -0.8% | 1.3% | 4.0% | 0.050 |
| 18 | Short Govt Bonds | -1.0% | 1.1% | 2.0% | 0.000 |
| 19 | Short Corporate Bonds | -0.3% | 1.8% | 2.5% | 0.280 |
| 20 | Intermediate Govt Bonds | -0.8% | 1.3% | 3.5% | 0.057 |
| 21 | Intermediate Corporate Bonds | 0.2% | 2.3% | 4.0% | 0.300 |
| 22 | 25-year Government Bond | -0.7% | 1.4% | 17.5% | 0.017 |
| 23 | Emerging Market Bonds (Sovereign USD) | 2.3% | 4.4% | 13.0% | 0.254 |
| 24 | Emerging Market Bonds (Corporate USD) | 1.8% | 3.9% | 11.0% | 0.255 |
| 25 | Emerging Market Bonds (Sovereign Local) | 2.4% | 4.5% | 14.5% | 0.234 |
| Alternative Investments | | | | | |
| 26 | Broad Hedge Funds ³ | 2.6% | 4.8% | 9.0% | 0.411 |
| 27 | Broad Hedge Funds ³ (Buy List) | 4.0% | 6.2% | 9.0% | 0.567 |
| 28 | Hedge Fund-of-Funds ² | 1.3% | 3.4% | 9.0% | 0.256 |
| 29 | Hedge Fund-of-Funds ² (Buy List) | 2.5% | 4.7% | 9.0% | 0.400 |
| 30 | Real Estate (Core) | 3.7% | 5.9% | 14.5% | 0.331 |
| 31 | U.S. REITs | 5.2% | 7.4% | 18.5% | 0.341 |
| 32 | Commodities | 1.5% | 3.6% | 17.0% | 0.147 |
| 33 | Private Equity | 7.5% | 9.8% | 24.5% | 0.355 |
| 34 | Infrastructure | 6.1% | 8.3% | 14.0% | 0.514 |
| 35 | Multi Asset Credit | 3.2% | 5.4% | 9.5% | 0.453 |
| 36 | ILS | 1.5% | 3.6% | 7.5% | 0.333 |
| 37 | Equity Insurance Risk Premium - High Beta | 4.3% | 6.5% | 11.0% | 0.491 |
| 38 | Equity Insurance Risk Premium - Low Beta | 2.4% | 4.6% | 5.5% | 0.636 |
| 39 | Private Debt (Direct Lending) | 4.4% | 6.6% | 17.0% | 0.324 |
| 40 | Alternative Risk Premia (ARP) | 3.4% | 5.6% | 9.5% | 0.474 |
| 41 | U.S. Inflation | 0.0% | 2.1% | 1.5% | 0.667 |

1) All expected returns are geometric (long-term compounded); rounded to the nearest decimal) and net of investment fees

2) Fund of hedge funds

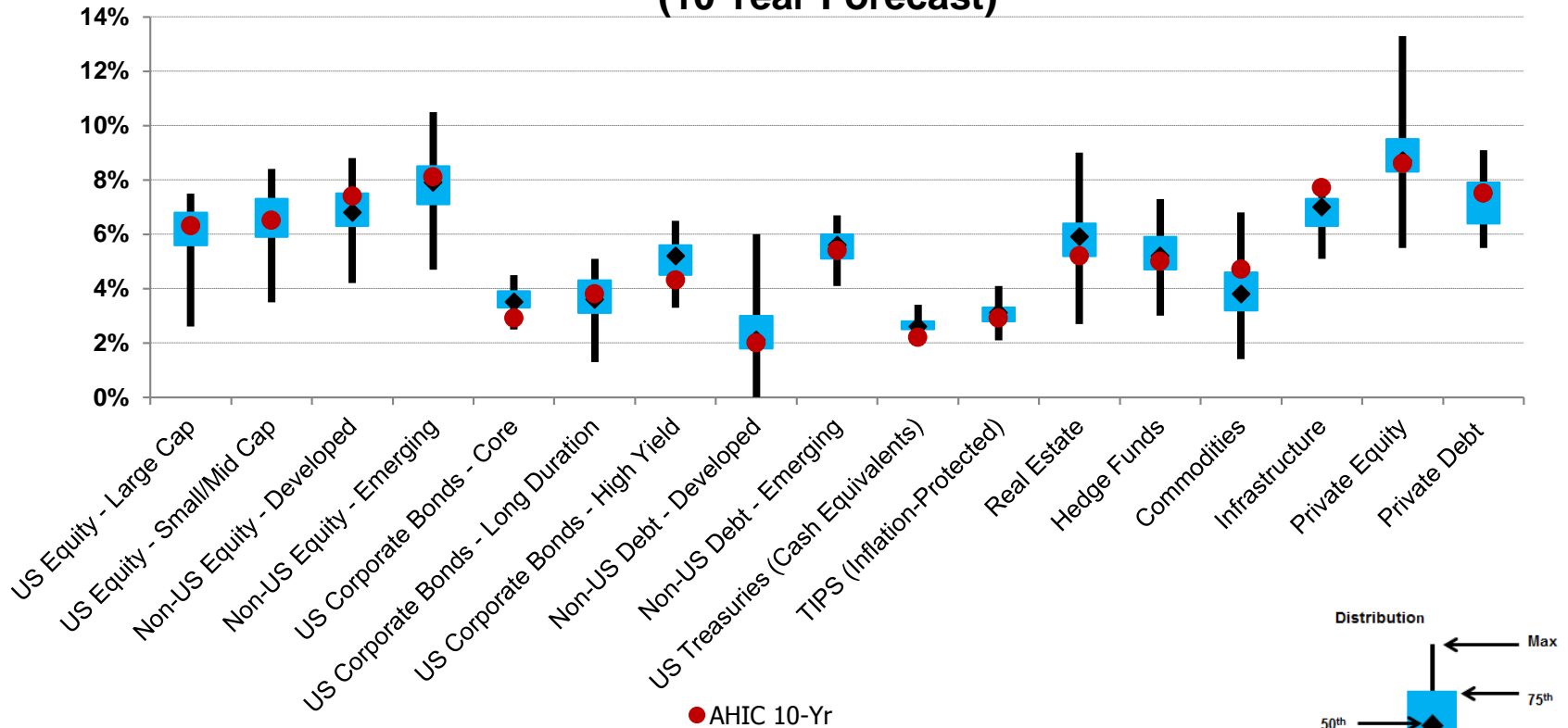
3) Diversified portfolio of Direct hedge fund investments

Q2 2020 Assumptions (10-Year): Expected Nominal Correlations

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 |
|--|------|------|------|------|------|------|------|-------|------|-------|------|-------|-------|-------|-------|-------|-------|------|------|-------|------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 Large Cap U.S. Equity | 1.00 | 0.92 | 0.96 | 0.78 | 0.72 | 0.09 | 0.09 | -0.05 | 0.05 | -0.01 | 0.08 | -0.13 | 0.62 | 0.48 | -0.04 | -0.04 | -0.01 | 0.03 | 0.09 | -0.06 | 0.08 | -0.13 | 0.45 | 0.42 | 0.47 | 0.66 | 0.53 | 0.67 | 0.53 | 0.37 | 0.67 | 0.33 | 0.69 | 0.38 | 0.56 | 0.01 | 0.91 | 0.52 | 0.32 | 0.32 | 0.07 |
| 2 Small Cap U.S. Equity | | 1.00 | 0.90 | 0.72 | 0.67 | 0.07 | 0.07 | -0.05 | 0.04 | -0.02 | 0.08 | -0.12 | 0.57 | 0.44 | -0.03 | -0.04 | -0.02 | 0.01 | 0.08 | -0.06 | 0.07 | -0.13 | 0.41 | 0.38 | 0.41 | 0.61 | 0.48 | 0.61 | 0.49 | 0.34 | 0.61 | 0.28 | 0.65 | 0.36 | 0.51 | 0.01 | 0.84 | 0.47 | 0.30 | 0.30 | 0.06 |
| 3 Global Equity | | | 1.00 | 0.90 | 0.84 | 0.08 | 0.08 | -0.05 | 0.05 | -0.01 | 0.09 | -0.13 | 0.66 | 0.50 | 0.14 | 0.11 | -0.02 | 0.02 | 0.09 | -0.06 | 0.08 | -0.13 | 0.49 | 0.47 | 0.56 | 0.64 | 0.51 | 0.65 | 0.52 | 0.38 | 0.65 | 0.40 | 0.67 | 0.37 | 0.62 | 0.01 | 0.88 | 0.49 | 0.35 | 0.33 | 0.08 |
| 4 International Equity | | | | 1.00 | 0.75 | 0.05 | 0.05 | -0.04 | 0.04 | -0.01 | 0.08 | -0.11 | 0.59 | 0.44 | 0.40 | 0.33 | -0.04 | 0.01 | 0.07 | -0.05 | 0.07 | -0.11 | 0.45 | 0.44 | 0.59 | 0.55 | 0.44 | 0.56 | 0.44 | 0.34 | 0.54 | 0.45 | 0.56 | 0.31 | 0.57 | 0.00 | 0.73 | 0.40 | 0.31 | 0.29 | 0.08 |
| 5 Emerging Markets Equity | | | | | 1.00 | 0.07 | 0.07 | -0.04 | 0.05 | 0.00 | 0.09 | -0.11 | 0.65 | 0.48 | 0.17 | 0.15 | -0.01 | 0.02 | 0.08 | -0.05 | 0.08 | -0.11 | 0.49 | 0.47 | 0.53 | 0.47 | 0.37 | 0.47 | 0.37 | 0.31 | 0.50 | 0.32 | 0.53 | 0.29 | 0.61 | 0.01 | 0.66 | 0.38 | 0.33 | 0.28 | 0.07 |
| 6 Gov Cash | | | | | | 1.00 | 0.98 | 0.41 | 0.46 | 0.21 | 0.18 | 0.23 | 0.14 | 0.15 | 0.12 | 0.29 | 0.59 | 0.90 | 0.82 | 0.61 | 0.50 | 0.15 | 0.15 | 0.06 | 0.02 | -0.04 | -0.04 | -0.04 | -0.04 | 0.13 | 0.08 | 0.20 | 0.08 | 0.11 | 0.12 | 0.24 | 0.17 | 0.37 | -0.03 | 0.21 | 0.51 |
| 7 LIBOR Cash | | | | | | | 1.00 | 0.40 | 0.46 | 0.21 | 0.19 | 0.23 | 0.15 | 0.17 | 0.12 | 0.28 | 0.58 | 0.88 | 0.81 | 0.60 | 0.50 | 0.15 | 0.15 | 0.07 | 0.02 | -0.03 | -0.03 | -0.03 | -0.03 | 0.13 | 0.08 | 0.20 | 0.08 | 0.10 | 0.13 | 0.25 | 0.17 | 0.37 | -0.02 | 0.21 | 0.50 |
| 8 TIPS | | | | | | | | 1.00 | 0.49 | 0.31 | 0.28 | 0.32 | 0.11 | -0.04 | 0.07 | 0.11 | 0.19 | 0.55 | 0.52 | 0.56 | 0.47 | 0.24 | 0.13 | 0.03 | -0.02 | -0.13 | -0.11 | -0.13 | -0.11 | 0.02 | -0.03 | 0.17 | -0.04 | 0.01 | 0.04 | 0.11 | -0.01 | 0.12 | -0.10 | 0.08 | 0.36 |
| 9 Core Fixed Income (Market Duration) | | | | | | | | | 1.00 | 0.85 | 0.85 | 0.77 | 0.31 | 0.04 | 0.19 | 0.35 | 0.59 | 0.71 | 0.78 | 0.89 | 0.97 | 0.66 | 0.46 | 0.19 | 0.13 | 0.01 | 0.01 | 0.01 | 0.01 | 0.06 | 0.04 | 0.07 | 0.04 | 0.05 | 0.27 | 0.11 | 0.06 | 0.15 | 0.07 | 0.11 | 0.12 |
| 10 Long Duration Bonds – Govt / Credit | | | | | | | | | | 1.00 | 0.96 | 0.95 | 0.14 | -0.15 | 0.18 | 0.31 | 0.50 | 0.42 | 0.45 | 0.71 | 0.73 | 0.93 | 0.34 | 0.09 | 0.06 | -0.05 | -0.04 | -0.05 | -0.04 | 0.01 | -0.01 | -0.02 | -0.01 | 0.01 | 0.11 | 0.06 | -0.02 | 0.05 | -0.04 | 0.04 | -0.12 |
| 11 Long Duration Bonds – Credit | | | | | | | | | | | 1.00 | 0.83 | 0.35 | 0.08 | 0.16 | 0.29 | 0.47 | 0.36 | 0.45 | 0.62 | 0.76 | 0.81 | 0.49 | 0.22 | 0.17 | 0.12 | 0.10 | 0.13 | 0.10 | 0.05 | 0.06 | 0.00 | 0.07 | 0.05 | 0.31 | 0.05 | 0.06 | 0.09 | 0.17 | 0.07 | -0.10 |
| 12 Long Duration Bonds – Govt | | | | | | | | | | | | 1.00 | -0.12 | -0.42 | 0.17 | 0.30 | 0.49 | 0.45 | 0.41 | 0.76 | 0.63 | 0.97 | 0.14 | -0.07 | -0.06 | -0.24 | -0.19 | -0.24 | -0.19 | -0.04 | -0.09 | -0.03 | -0.10 | -0.04 | -0.13 | 0.06 | -0.11 | 0.01 | -0.28 | 0.01 | -0.12 |
| 13 High Yield Bonds | | | | | | | | | | | | | 1.00 | 0.84 | 0.17 | 0.18 | 0.10 | 0.14 | 0.29 | 0.05 | 0.37 | -0.16 | 0.73 | 0.61 | 0.58 | 0.61 | 0.49 | 0.62 | 0.49 | 0.26 | 0.42 | 0.39 | 0.46 | 0.26 | 0.92 | 0.04 | 0.57 | 0.35 | 0.67 | 0.25 | 0.19 |
| 14 Bank Loans | | | | | | | | | | | | | | 1.00 | 0.06 | 0.05 | 0.00 | 0.00 | 0.17 | -0.23 | 0.15 | -0.42 | 0.43 | 0.56 | 0.43 | 0.64 | 0.50 | 0.64 | 0.51 | 0.22 | 0.33 | 0.27 | 0.37 | 0.22 | 0.82 | 0.03 | 0.37 | 0.22 | 0.84 | 0.16 | 0.13 |
| 15 Non-US Developed Bond (0% Hedged) | | | | | | | | | | | | | | | 1.00 | 0.96 | 0.30 | 0.16 | 0.16 | 0.19 | 0.18 | 0.16 | 0.22 | 0.20 | 0.49 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | -0.02 | 0.44 | -0.01 | 0.00 | 0.25 | 0.03 | -0.03 | 0.02 | 0.05 | 0.06 | 0.09 |
| 16 Non-US Developed Bond (50% Hedged) | | | | | | | | | | | | | | | | 1.00 | 0.57 | 0.33 | 0.33 | 0.35 | 0.34 | 0.27 | 0.26 | 0.19 | 0.44 | 0.00 | -0.01 | 0.00 | -0.01 | 0.02 | -0.01 | 0.40 | -0.01 | 0.01 | 0.26 | 0.07 | -0.01 | 0.07 | 0.04 | 0.08 | 0.13 |
| 17 Non-US Developed Bond (100% Hedged) | | | | | | | | | | | | | | | | | 1.00 | 0.63 | 0.62 | 0.60 | 0.58 | 0.43 | 0.23 | 0.08 | 0.07 | -0.04 | -0.04 | -0.04 | -0.04 | 0.04 | 0.00 | 0.07 | -0.01 | 0.04 | 0.11 | 0.14 | 0.04 | 0.18 | -0.02 | 0.11 | 0.17 |
| 18 Short Govt Bonds | | | | | | | | | | | | | | | | | | 1.00 | 0.91 | 0.88 | 0.72 | 0.31 | 0.20 | 0.06 | 0.01 | -0.15 | -0.12 | -0.15 | -0.12 | 0.09 | 0.04 | 0.18 | 0.03 | 0.07 | 0.09 | 0.22 | 0.09 | 0.30 | -0.13 | 0.18 | 0.44 |
| 19 Short Corporate Bonds | | | | | | | | | | | | | | | | | | | 1.00 | 0.80 | 0.86 | 0.29 | 0.35 | 0.17 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.08 | 0.17 | 0.08 | 0.10 | 0.29 | 0.19 | 0.14 | 0.29 | 0.12 | 0.18 | 0.38 |
| 20 Intermediate Govt Bonds | | | | | | | | | | | | | | | | | | | | 1.00 | 0.83 | 0.62 | 0.21 | 0.02 | -0.01 | -0.25 | -0.20 | -0.25 | -0.20 | 0.02 | -0.03 | 0.09 | -0.05 | 0.01 | 0.00 | 0.14 | -0.01 | 0.16 | -0.24 | 0.10 | 0.21 |
| 21 Intermediate Corporate Bonds | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.52 | 0.50 | 0.23 | 0.16 | 0.08 | 0.06 | 0.08 | 0.06 | 0.08 | 0.07 | 0.09 | 0.07 | 0.36 | 0.12 | 0.09 | 0.18 | 0.19 | 0.12 | 0.18 | |
| 22 25-year Government Bond | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.10 | -0.09 | -0.07 | -0.21 | -0.17 | -0.21 | -0.17 | -0.05 | -0.09 | -0.06 | -0.11 | -0.05 | -0.15 | 0.04 | -0.12 | -0.02 | -0.26 | -0.01 | -0.19 |
| 23 Hard Emerging Market Bonds | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.70 | 0.64 | 0.51 | 0.41 | 0.51 | 0.41 | 0.19 | 0.30 | 0.24 | 0.32 | 0.19 | 0.76 | 0.05 | 0.39 | 0.26 | 0.40 | 0.19 | 0.10 |
| 24 Corporate Emerging Market Bonds | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.61 | 0.55 | 0.44 | 0.56 | 0.44 | 0.17 | 0.28 | 0.26 | 0.28 | 0.16 | 0.72 | 0.02 | 0.38 | 0.23 | 0.45 | 0.16 | 0.09 |
| 25 Local Emerging Market Bonds | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.48 | 0.38 | 0.48 | 0.38 | 0.12 | 0.30 | 0.45 | 0.21 | 0.12 | 0.73 | 0.01 | 0.41 | 0.23 | 0.37 | 0.17 | 0.00 |
| 26 Broad Hedge Funds - without fees (Universe) | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.71 | 0.99 | 0.72 | 0.24 | 0.44 | 0.29 | 0.45 | 0.24 | 0.69 | -0.01 | 0.59 | 0.31 | 0.60 | 0.20 | 0.04 |
| 27 Broad Hedge Funds - without fees (BuyList) | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.72 | 0.99 | 0.19 | 0.35 | 0.23 | 0.36 | 0.20 | 0.56 | -0.01 | 0.48 | 0.25 | 0.48 | 0.17 | 0.03 |
| 28 Hedge Funds Universe | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.72 | 0.24 | 0.44 | 0.29 | 0.45 | 0.25 | 0.69 | -0.01 | 0.60 | 0.32 | 0.60 | 0.20 | 0.04 |
| 29 Hedge Funds Buy List | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.19 | 0.36 | 0.23 | 0.36 | 0.20 | 0.56 | -0.01 | 0.49 | 0.25 | 0.49 | 0.17 | 0.03 |
| 30 Core Real Estate | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.45 | 0.09 | 0.31 | 0.18 | 0.23 | 0.03 | 0.36 | 0.22 | 0.16 | 0.15 | 0.08 |
| 31 REITs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.21 | 0.48 | 0.27 | 0.37 | 0.02 | 0.61 | 0.35 | 0.22 | 0.22 | 0.06 |
| 32 Commodities | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.12 | 0.08 | 0.37 | 0.04 | 0.31 | 0.23 | 0.13 | 0.16 | 0.38 |
| 33 Private Equity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.32 | 0.38 | 0.02 | 0.64 | 0.36 | 0.24 | 0.23 | 0.07 |
| 34 Infrastructure | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.22 | 0.02 | 0.37 | 0.23 | 0.13 | 0.14 | 0.07 |
| 35 Multi Asset Credit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.03 | 0.52 | 0.31 | 0.69 | 0.22 | 0.14 |
| 36 ILS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.03 | 0.09 | -0.01 | 0.05 | 0.13 |
| 37 EIRP - High Beta | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.50 | 0.30 | 0.31 | 0.10 |
| 38 EIRP - Low Beta | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.15 | 0.28 | 0.20 |
| 39 Private Debt (Direct Lending) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.11 | 0.05 |
| 40 ARP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.12 |
| 41 Inflation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 |

Aon Capital Market Assumptions vs. Peers

Expected Geometric Returns of 34 Investment Advisors (10 Year Forecast)



SOURCE: Horizon Actuarial survey of 2019 capital market assumptions from 34 independent investment advisors
 Expected returns of the survey are annualized over 10-years (geometric).
 AHIC expected returns are annualized over 10-years as of 2Q 2019

AHIC Versus Peers (2019 Horizon Survey)—10-Year Forecast

| Asset Class | Horizon Survey | | AHIC | | Difference (AHIC - Horizon) |
|--------------------------------------|-----------------|---------------|-------------------|---------------|--------------------------------|
| | 10 Year Horizon | | 10 Year Forecasts | | |
| | Expected Return | Expected Risk | Expected Return | Expected Risk | |
| US Equity - Large Cap | 6.3% | 16.2% | 6.3% | 17.0% | 0.0% |
| US Equity - Small/Mid Cap | 6.5% | 20.2% | 6.5% | 23.0% | 0.0% |
| Non-US Equity - Developed | 6.8% | 18.2% | 7.4% | 20.0% | 0.6% |
| Non-US Equity - Emerging | 7.9% | 24.7% | 8.1% | 27.0% | 0.2% |
| US Fixed Income - Core | 3.5% | 5.5% | 2.9% | 4.0% | -0.6% |
| US Fixed Income - Long Duration Corp | 3.6% | 10.5% | 3.8% | 11.0% | 0.2% |
| US Fixed Income - High Yield | 5.2% | 10.1% | 4.3% | 12.0% | -0.9% |
| Non-US Fixed Income - Developed | 2.1% | 7.6% | 2.0% | 5.5% | -0.1% |
| Non-US Fixed Income - Emerging | 5.6% | 11.3% | 5.4% | 14.0% | -0.2% |
| Treasuries (Cash Equivalents) | 2.6% | 2.3% | 2.2% | 1.0% | -0.4% |
| TIPS (Inflation-Protected) | 3.1% | 6.1% | 2.9% | 4.5% | -0.2% |
| Real Estate | 5.9% | 15.0% | 5.2% | 11.5% | -0.7% |
| Hedge Funds | 5.2% | 8.4% | 5.0% | 9.0% | -0.2% |
| Commodities | 3.8% | 17.7% | 4.7% | 17.0% | 0.9% |
| Infrastructure | 7.0% | 14.4% | 7.7% | 14.5% | 0.7% |
| Private Equity | 8.7% | 22.1% | 8.6% | 24.0% | -0.1% |
| Private Debt | 7.5% | 11.6% | 7.5% | 16.5% | 0.0% |
| Inflation | 2.2% | 1.7% | 2.2% | 1.0% | 0.0% |

Notes (Horizon Survey):

Source: Horizon Actuarial survey of 2019 capital market assumptions from 34 independent investment advisors
Expected returns are median annualized (geometric).

Notes (AHIC Forecasts):

AHIC Forecasts are for Q2 2019

US Equity - Small/Mid Cap forecasts represents AHIC forecasts for US Small Cap

US Fixed Income - Long Duration forecasts represents AHIC forecasts for Long Duration Credit

Non-US Fixed Income - Developed forecasts represents AHIC forecasts for Non-US Fixed Income - Developed (50% Hedged)

Non-US Fixed Income- Emerging forecasts represents AHIC forecasts for Sovereign Local Currency

Real Estate forecasts represents AHIC forecasts for Core Private Real Estate

Hedge Funds forecasts represents AHIC forecasts for Hedge Fund-of-Funds (Buy List)

Leading Methodologies & Reasons for Differences

Leading Methodologies

- Building Block
- Global Capital Asset Pricing Model (Global CAPM)
- Surveys
- Historical data (as a guide to future)
- Black-Litterman (combination of building block and CAPM)

Reasons for Differences

- Methodology
- Time Horizon
- Arithmetic vs. Geometric forecasts*
- Alpha (active management)*
- Inflation
- Investment Fees
- Asset class definition

* While some firms in Horizon survey responded with Arithmetic forecasts, the results have been converted to Geometric forecasts for comparison purposes. Additionally, the return expectations included in the Horizon survey are based on indexed returns (no "alpha"). However, AHIC return assumptions for certain asset classes include "alpha" or active management premium (e.g., Hedge Funds)