

Understanding Returns for Public DB Plans

How Actuaries and Consultants Develop Forecasts

KEY ELEMENTS

- Public defined benefit plan sponsors should understand that actuaries and investment consultants offer assumptions on expected return that are inherently different and often do not match.
- Plan fiduciaries should be comfortable with these differences, because the two assumptions are used for different purposes and are based on different economic and financial inputs.
- Setting asset allocation is more complex than just solving for the portfolio that provides the expected return equal to the actuarial discount rate. Changes to actuarial assumptions should be done infrequently because these changes can have major impacts on a plan's funded status and overall health.



“Consultant expectations today are significantly below actuarial expectations, which will likely drive median actuarial expectations down from their current 7.0% level.”

Brady O’Connell
Investment Consulting

John Pirone
Capital Markets Research

Public defined benefit (DB) plans face intensifying pressure as modest expectations for future investment returns continue to fall short of actuarial discount rates. While this trend has been playing out for over a decade, post-pandemic market conditions have magnified the challenge as investment consultants continue to lower their capital markets assumptions in the face of steadily declining interest rates and rising equity market valuations, which both point to leaner future returns.

These lower expectations are pressuring public pension fiduciaries to reduce their actuarial investment return assumptions, but that typically translates to higher projected plan liabilities, a lower funded status, and ultimately higher contributions from employers and employees.¹

As a result, decision makers at public DB plans face a critical dilemma affecting the plan's future financial health: How to distinguish between the actuarial discount rates used to measure plan benefit obligations and the return expectations used to inform decisions on long-term strategic asset allocation. In this discussion, it is important the decision makers understand that actuaries and investment consultants offer assumptions on expected return that are inherently different: Actuarial discount rates assume a static return over time with no variability, whereas investment consultants estimate a median *and* a range of expected returns based on expected risk.

This paper reviews the differences between actuarial discount rates and consultant return forecasts. We remind fiduciaries of the importance of these two assumptions, why the numbers vary in practice and use, and why setting asset-allocation strategy is not simply an act of making the consultant return expectation match the actuarial discount rate. When seeking to understand the differences between these two numbers, fiduciaries should consider several reasons these two figures do not match: the time horizon over which they are used, historical plan returns relative to projections, inflation expectations, the historical context of discount rate changes at the plan, and the plan's use of active vs. passive investment management.

Economic Assumptions: The Province of Actuaries

Pension plans regularly estimate their future obligations to active and retired beneficiaries by forecasting liabilities. The actuary assigns a value to these future obligations by applying a discount rate to projected payments, establishing their present-day value.

To estimate pension plan liabilities, actuaries employ a series of assumptions to project how a plan is expected to grow:

- “Demographic” assumptions address the characteristics of plan participants, such as life expectancy, and are generally based on plan-specific circumstances and observations about participants’ lives and pay.
- “Economic” assumptions include variables like inflation and wage growth that are based on broad market observations.
- The discount rate is often referred to as the return on asset (ROA) assumption. This economic assumption is a critical metric for a present-day estimate of future liabilities. This number is used to

¹ Public retirement systems receive contributions from both employees and employers. These contributions combine with investment returns on pension assets to pay for plan benefits and expenses. Contribution levels for public plans are often negotiated, but in some cases they can be fixed (set by statute) or variable (determined by the plan).

calculate the present value of future liability projections. The higher the discount rate, the lower the present value of liabilities, and vice versa.

Exhibit 1
Impact of Discount Rate Changes on Present Value of Liabilities

Exhibit 1 illustrates the impact of lowering the discount rate on the present value of liabilities for a plan with future annual outflows of \$10 million over 30 years. A 1 percentage point decrease in the discount rate results in an approximate 10% increase in the present value of liabilities. Clearly the discount rate has a powerful impact on plan liability projections.

30-year Time Horizon

Hypothetical Discount Rate	8.0%	7.0%	6.0%
Present Value of Liabilities	\$112,577,833	\$124,090,412	\$137,648,312
% Change from Higher Discount Rate	-	+10.2%	+10.9%

Source: Callan

How Corporate, Public DB Plans Handle Actuarial Discount Rates

Practices for actuarial discount rates differ meaningfully between corporate and public DB plans. Public plans use an actuarial discount rate informed by their asset-allocation strategy and have more flexibility in setting the rate than corporate plans do. Corporate DB plans follow regulations that require the use of market-observed interest rates, such as a high-quality corporate bond market yield, as their discount rate. This has led to the proliferation of liability-driven investing, in which corporate plans invest in long duration bonds that track their actuarial discount rates so that interest rate changes impacting liabilities also impact the asset portfolios.

Guidance for Actuaries

In advising public DB plan trustees, actuaries in the U.S. are guided by standards and practices from the Society of Actuaries, a professional trade organization, as well as regulations from government agencies (e.g., the Governmental Accounting Standards Board). Public pension actuaries have increasingly stressed in presentations to public plan boards their professional obligations under the Actuarial Standards of Practice (ASOP) 27 set by the Actuarial Standards Board (ASB), an organization providing guidance to professional actuaries. This obligation requires that actuaries identify any assumptions used by their clients that may “significantly conflict” with what the actuary deems reasonable. Actuarial firms keep a keen eye on return forecasts from investment consultants; these inputs often inform their advice to public plan boards on what range of discount rates strikes the actuary as reasonable.

Actuaries advise public plans on assumptions customized for their specific plans. As with most important fiduciary decisions, public pension boards can solicit advice from specialists, but they are ultimately responsible for adopting the plan’s assumptions. Hence it is essential that public plan board members understand actuarial assumptions and the implications of changing them.

Investment Consultants’ View of the Future

When setting long-term asset-allocation strategy, pension plan boards often rely on investment consultants or advisers to recommend a mix of assets and risk levels intended to achieve a plan’s targeted long-term return. Consultants’ return expectations for asset classes vary over time based on capital markets conditions. Callan updates our capital markets assumptions annually,² and key market inputs include economic data such as interest rate levels, forecasted inflation rates, equity market valuations, and projections for economic growth (such as global and country-specific estimates of GDP). Expectations for asset class returns are used along with two other critical forecasts—correlation of returns and risk or volatility—to identify “efficient” portfolios or combinations of asset classes that provide the highest return per unit of risk. This is a practical application of Modern Portfolio Theory developed by Harry Markowitz in 1952.

Forecasting asset class returns is very difficult over short periods of time, so most asset managers and consultants do so over

² Find our latest capital markets assumptions [here](#).

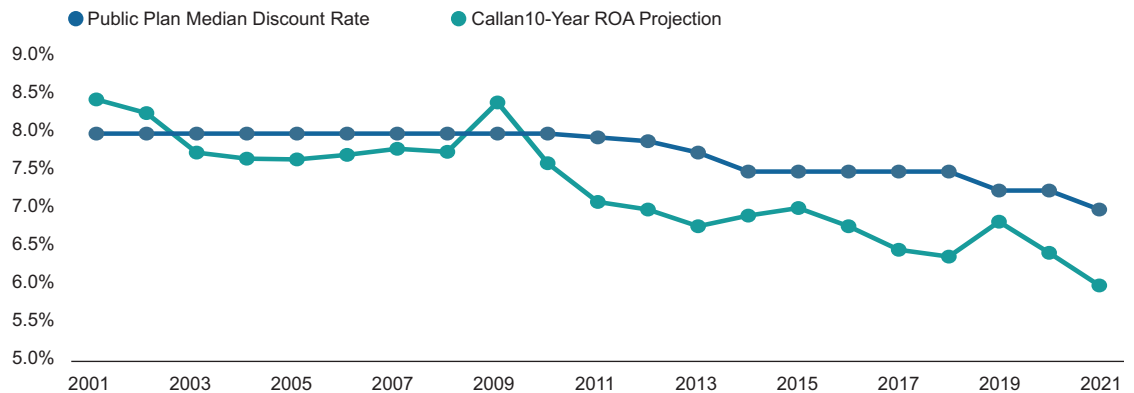
some “long-term” horizon. Practically speaking, 5-10 years is the most common, but several market participants also construct 30-year sets of capital markets assumptions. These very-long-term forecasts tend to look a lot like the long-term averages of asset class returns, risk, and correlations, as the time horizon is long enough to mitigate near-term market extremes and allows time for mean reversion. As an example, most consultant 10-year return forecasts for bonds rely upon simulations of the current very low level of interest rates reverting to more normal levels. This is likely to have an adverse impact on bond returns during the next 10 years. For periods beyond 10 years, the impact of this normalization in interest rates on bond returns should be more muted.

Consultant expected returns are used in asset-allocation and asset/liability studies to guide decisions about long-term asset-allocation strategy. As noted earlier, investment consultants not only establish a *median* future expected return for portfolios, but also a *range* that incorporates volatility and acknowledges the great uncertainty of the capital markets environment. Callan and other investment consultants typically rely on their 5- to 10-year capital markets forecasts in setting asset allocations. We think this time horizon appropriately balances most fiduciaries’ long-term time perspective while appropriately incorporating current market conditions, which are relevant to near-term investing decisions.

Comparing Actuarial and Consultant Expected Rates of Return

Actuarial discount rates and consultant projected return expectations rarely match. We compare these two rates over the past two decades to more fully understand the dynamics that cause them to change. In **Exhibit 2**, the actuarial rate of return is represented by the median public plan ROA provided by the National Association of State Retirement Administrators (NASRA), and the consultant rate of return is represented by Callan’s 10-year expected return for a consensus public plan asset allocation.³ Each dataset is updated annually, facilitating apples-to-apples comparisons.

Exhibit 2
Actuarial and Consultant Rates of Return



Sources: Callan, NASRA

³ Consensus public plan allocation modeled as 60% global equity/30% fixed income/10% real estate from 2001-2011. For 2012-2021, consensus allocation modeled as 60% global equity/25% fixed income/10% real estate/5% private equity to reflect the shift to more aggressive asset mixes over the past decade.

For the first decade, public plan median actuarial discount rates were stable at 8%. Consultant return projections were quite similar to the median discount rate, albeit with modest year-to-year changes reflecting the variability of underlying capital markets dynamics.

After the 2008 Global Financial Crisis (GFC), the Federal Reserve's crisis response of lowering short-term interest rates to zero drastically lowered consultant return projections for fixed income. Fixed income is the risk-mitigating anchor for public pensions, thus this materially reduced consultant expected returns at the total portfolio level as well.

Consultant expectations drove an industry-wide lowering of median actuarial discount rates over the five-year period immediately after the GFC from 8.0% to 7.5% as the gap between consultant and actuarial rates widened. Consultant expectations exerted a "gravitational pull" on actuarial expectations, bringing the median discount rate closer to (though not quite as low as) consultant return projections.

Interest rates slowly reverted upward over the latter part of the 2010s until 2020 when the Federal Reserve's response to the COVID-19 pandemic drove interest rates down to all-time lows. The impact of low interest rates coupled with high equity valuations created during the past decade of strong gains has reduced consultant return expectations to all-time lows, as well. Consultant expectations today are significantly below actuarial expectations, which will likely drive median actuarial expectations down from their current 7.0% level.

The Differences Between Actuaries and Investment Consultants

Actuarial assumptions and investment consultant capital markets projections are often both used in asset/liability studies. Differences between these figures may need to be addressed through an actuary-led review of plan economic and demographic assumptions called an "experience review" or "experience study."

Pension plan fiduciaries set the actuarial discount rates and asset-allocation strategy, so they need to be comfortable with the assumptions used by both their actuaries and investment consultants. These experts offer assumptions on expected return that inherently differ: actuarial discount rates assume a completely static return over time with no variability, whereas investment consultants estimate a median expected return as well as a range of returns based on expected risk.

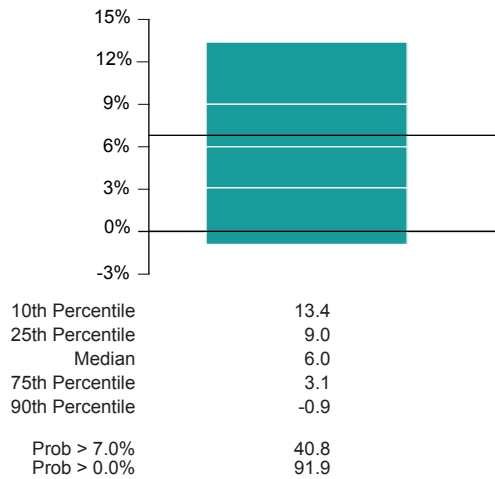
Despite these fundamental differences, many fiduciaries are forced to justify differences between their long-term actuarial discount rate and their expected investment consultant returns. When plan fiduciaries consider whether the consultant's expected return is sufficient relative to the required actuarial rate of return, it is important to note that the median represents a 50% probability of achieving that rate. The range of returns and associated probability are worth considering. The range of the distribution of returns is a function of the volatility of the asset mix.

Exhibit 3 illustrates Callan’s range of returns and associated probabilities for a hypothetical diversified portfolio of assets. In this example, an asset mix with a median expected return of 6.0% and a volatility of 13.3% has a roughly 40% probability of achieving a 7.0% return over a 10-year period. In many cases, it is in the hands of the actuaries to determine what probability of achieving a specific return is adequate to maintain or change the actuarial discount rate assumption.

Exhibit 3

Range of Projected Rates of Return

Projection period: 10 years



Source: Callan; asset mix is the same as used for Exhibit 2

Setting investment strategy and asset allocation is more complex than just finding the asset allocation with an expected return that matches the actuarial discount rate. This process can be technical, so we articulate factors for fiduciaries to consider when viewing both figures that can support an understanding of why these two numbers do not match.

Time Horizon

Actuarial discount rates are set for the very long term (typically 30 years). Investment consultants typically focus on 5- to 10-year time periods for projected returns. Investment consultant expectations also factor in current market conditions, a critical investment decision-making input, while actuarial discount rates may not.

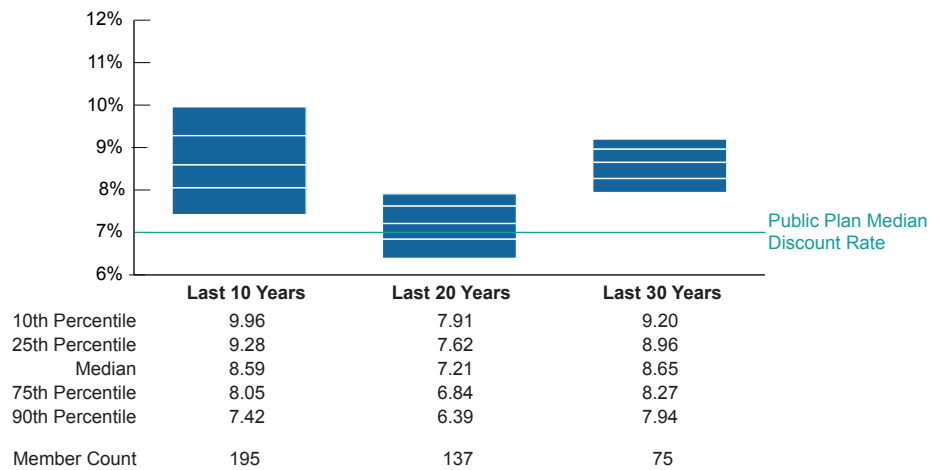
Fiduciary considerations: Estimates for 10- and 30-year time horizons may not differ by much at times, but given the long-term business cycle, there are periods when expectations for different time horizons can vary meaningfully. Forecast differences between time horizons can be most significant at extremes of capital markets cycles (e.g., after periods of extraordinarily good or bad returns). Now is likely one of those times as interest rates are low and anticipated to revert to higher levels in the coming decade. Returns for risky assets have recently been strong; both actuaries and investment consultants are cautioning that this is likely unsustainable as investment returns typically revert to long-term averages.

Long-Term Actual Returns

Actuaries often consider a plan’s long-term historical return experience when setting future assumptions. Investment consultants do not typically rely on historical returns when creating forecasts, but rather focus on current market conditions and economic forecasts when setting forward-looking capital markets projections.

According to Callan data, public DB plans have generally been successful in exceeding—*on average*—their actuarial return expectations. **Exhibit 4** shows a modest median 20-year return thanks to three equity bear markets: the bursting of the Tech Bubble, the GFC, and the recent pandemic drop. During the past 30 years, however, even the poorest-performing public DB plans—those in the 90th percentile—nearly achieved an 8% return—a discount rate commonly used 30 years ago.

Exhibit 4
Public DB Plan
Geometric Returns
Periods ended 6/30/21



Source: Callan; data reflect returns of the Callan Public Fund Sponsor Database Group

Fiduciary considerations: Long-term investment returns have been a critical source of funds to pay plan liabilities, but investment returns alone are generally insufficient to maintain a healthy funded status. Contributions must be made to fill any gaps. At a very high level, differences between plans with the best and worst funded status often come down to historic contributions and benefits. Funding challenges faced by public plans today are by and large a function of inadequate contributions. Many governments have simply failed to make required contributions to plans even while liabilities have naturally increased due to explicit increases in benefits or the natural growth in liabilities that comes with increased life expectancy.

Inflation Expectations

Actuaries typically make assumptions about future inflation as a component of their actuarial discount rate and certain benefit calculations. Historically, actuaries have recommended higher inflation assumptions than consultants based on longer time horizon projections, resulting in higher discount rates and

lower liability calculations. Recently, actuarial inflation assumptions have been closer to those of consultants. Investment consultants also embed assumptions about future inflation in their forecasts of investment returns. Investment consultant assumptions tend to focus more on current economic conditions and market-based indicators for investor expectations for future inflation (e.g., implied inflation can be observed by comparing interest rates on nominal U.S. Treasuries to the market interest rates for U.S. Treasury Inflation-Protected Securities).

Fiduciary considerations: Public pension trustees should review the inflation expectations from both their actuary and investment consultant. They may wish to compare the real (after inflation) investment return expectations from their consultants to the real actuarial discount rate to understand what portion of the gap between their actuarial discount rate and their consultant's projections is driven by differences in inflation expectations.

Review Intervals

Actuarial discount rates generally change infrequently, perhaps as part of an experience study conducted every three to five years, which formally reviews all actuarial assumptions. Fiduciaries often review their assumptions regularly, but changes are rare, although they have increased in recent years due in part to the significant disparity between the consultants' ROA and the actuarial ROA. Conversely, investment consultant capital markets assumptions generally change annually or more frequently.

Fiduciary considerations: Just as boards should be cautious about raising discount rates when market conditions look positive, they should be deliberate about lowering discount rates when conditions are unfavorable. As illustrated earlier, discount rates on average have been coming down over the past 20 years in a much more gradual manner than have Callan's expected return projections. Fiduciaries interested in the smooth management of pension plans need to regularly review these assumptions, but should exercise caution around extreme changes.

Active vs. Passive

Investment consultant projections typically focus on passive market return estimates (indices) for traditional asset classes and ignore estimated gains (or losses) from active management decisions. Investment consultants focus on passive market forecasts because these have typically been easier to estimate than active manager value added (or lost). Value added from active management is unique to each investor reflecting:

1. The degree of reliance on active vs. passive strategies
2. The historical success in adding value with active management
3. The current portfolio positioning regarding active management and how it differs from historic practices

Fiduciary considerations: When weighing the difference in actuarial discount rates and investment consultant return estimates, boards should consider a plan's recent and long-term level of value added from active management, what it currently expects in terms of value added from active management, and the costs involved in the investment program that are largely driven by higher-priced active management.

Plans with a history of successful use of active management may be more comfortable with a larger gap between their actuarial discount rate and their investment consultant's return estimate given the potential to close that gap with returns from active management in traditional asset classes.

Conclusion

When setting both actuarial discount rates and long-term asset-allocation strategies, public pension fiduciaries should be aware of what drives the differences between their actuarial discount rate and consultant's capital markets assumptions. Callan recommends boards consider the following factors when confronting differences between their actuarial discount rate and investment consultant return expectation:

- **Differences in time horizon:** Investment consultant forecasts generally cover a shorter period than actuarial discount rates do.
- **Long-term actual results:** How has a plan performed relative to both current assumptions as well as potential new discount rates being considered?
- **Inflation expectations:** In addition to nominal comparisons, compare real (after inflation) investment return expectations from their consultants to the real actuarial discount rate to understand what portion is driven by differences in inflation expectations.
- **Discount rate changes:** Consider the timing and magnitude of the last discount rate change. How often are these inputs evaluated?
- **Active management:** Evaluate the plan's success in achieving value-added from active management for traditional asset classes and consider the prospects for continuing to do so.

Setting asset allocation is more complex than just solving for the portfolio that provides the expected return equal to the actuarial discount rate. Changes to actuarial assumptions should be done infrequently and based on expert advice and recommendations because these changes can have major impacts on a plan's funded status and overall health.

In a lower expected return environment, selecting a portfolio to hit an overly aggressive return target can lead to adverse financial outcomes in the event of a material market correction. Fiduciaries should be very cautious about simply taking on more investment risk to achieve a higher return. Investment consultants projecting modest returns for the coming 10 years need to direct fiduciaries' attention to the task of investing through the coming 10-year period so that the pension plan maintains solvency until a future environment offers more favorable investment expectations. Fiduciaries may need to lower their actuarial discount rates to reflect the direction of expected asset return projections from investment consultants, but these two numbers are different and need not match.

About the Authors



Brady O'Connell, CFA, CAIA, is a senior vice president in Callan's Chicago consulting office. Brady has consulted with a variety of clients, including corporate and public defined benefit plans, defined contribution plans, endowments and foundations. He is a member of Callan's Client Policy Review and Alternatives Review committees, and is a shareholder of the firm.

Brady has over 20 years of investment consulting experience. Prior to joining Callan in 2015, Brady was a partner with Aon Hewitt where he worked with a broad range of institutional investors. During his 18 years at Ennis, Knupp + Associates and subsequently Aon Hewitt, Brady held a number of different roles, including leading public market manager research as well as managing a team of consulting professionals.

Brady received his MBA in finance and marketing from Northwestern University's Kellogg School of Management. He earned a BBA in finance from the University of Michigan in Ann Arbor. He earned the right to use the Chartered Financial Analyst® designation and earned the right to use the CAIA designation. He is a member of CFA Institute and a member of the board of directors for CFA Society Chicago.



John Pirone, CFA, FRM, CAIA, is a senior vice president and a consultant in the Capital Markets Research group. He is responsible for assisting clients with their strategic investment planning, conducting asset allocation studies, developing optimal investment manager structures, and providing custom research on a variety of investment topics. John is a member of Callan's Alternatives Review Committee and a shareholder of the firm.

Prior to joining Callan in 2015, John was a managing director at BlackRock in the Client Solutions Group, advising major institutional clients throughout the Americas on total portfolio strategy issues.

From 1997 to 2009, John was a client advisory strategist at Barclays Global Investors. Previously, he was a fixed income analyst at Gifford Fong Associates.

John is co-author of "Optimizing Manager Structure and Budgeting Manager Risk," which received the Bernstein Fabozzi/Jacobs Levy award from *The Journal of Portfolio Management*.

John earned an MSc in finance from the London Business School, a MA in economics from the University of California, Santa Barbara, and a BA in biology from Washington University in St. Louis. He is a holder of the right to use the Chartered Financial Analyst® designation and has earned the right to use Financial Risk Manager and Chartered Alternative Investment Analyst designations, and is a member of CFA Institute and CFA Society San Francisco.

If you have any questions or comments, please email institute@callan.com.

About Callan

Callan was founded as an employee-owned investment consulting firm in 1973. Ever since, we have empowered institutional clients with creative, customized investment solutions backed by proprietary research, exclusive data, and ongoing education. Today, Callan advises on more than \$3 trillion in total fund sponsor assets, which makes it among the largest independently owned investment consulting firms in the U.S. We use a client-focused consulting model to serve pension and defined contribution plan sponsors, endowments, foundations, independent investment advisers, investment managers, and other asset owners. Callan has six offices throughout the U.S. Learn more at www.callan.com.

About the Callan Institute

The Callan Institute, established in 1980, is a source of continuing education for those in the institutional investment community. The Institute conducts conferences and workshops and provides published research, surveys, and newsletters. The Institute strives to present the most timely and relevant research and education available so our clients and our associates stay abreast of important trends in the investments industry.

© 2021 Callan LLC

Certain information herein has been compiled by Callan and is based on information provided by a variety of sources believed to be reliable for which Callan has not necessarily verified the accuracy or completeness of or updated. This report is for informational purposes only and should not be construed as legal or tax advice on any matter. Any investment decision you make on the basis of this report is your sole responsibility. You should consult with legal and tax advisers before applying any of this information to your particular situation. Reference in this report to any product, service or entity should not be construed as a recommendation, approval, affiliation or endorsement of such product, service or entity by Callan. Past performance is no guarantee of future results. This report may consist of statements of opinion, which are made as of the date they are expressed and are not statements of fact. The Callan Institute (the "Institute") is, and will be, the sole owner and copyright holder of all material prepared or developed by the Institute. No party has the right to reproduce, revise, resell, disseminate externally, disseminate to subsidiaries or parents, or post on internal web sites any part of any material prepared or developed by the Institute, without the Institute's permission. Institute clients only have the right to utilize such material internally in their business.

Callan

Corporate Headquarters

600 Montgomery Street
Suite 800
San Francisco, CA 94111
800.227.3288
415.974.5060

www.callan.com

Regional Offices

Atlanta
800.522.9782

Chicago
800.999.3536

Denver
855.864.3377

New Jersey
800.274.5878

Portland
800.227.3288

 [@CallanLLC](https://twitter.com/CallanLLC)

 [Callan](https://www.linkedin.com/company/callan)