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Americans for Financial Reform Education Fund

Retirement Plans Without Alternative Assets Significantly Outperformed Those with Private Equity and Other Alternative Assets

An Analysis of Form 5500 and Public Plans Database Returns, 2009–2024

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Table of Contents

Table of Contents 2
Executive Summary 1
I. Introduction 5
II. The Premise of the Proposed Rule and Its Supporters 7
A. The Government's Own Statements 8
B. The Proponents' Advocacy 10
C. The Claim's Function in the Policy Debate 12
III. Data and Methodology 14
IV. Headline Results: 2009–2024 (Framework 1) 19
A. Annual Returns 19
B. Cumulative Wealth 20
C. Trailing-Period Returns 20
D. Risk-Adjusted Returns 22
E. Translation to Retirement Wealth 23
V. Asset Allocation and the Look-Through Equity-Exposure Puzzle 25
A. Headline Asset Allocations 25
B. Look-Through Economic Equity Exposure 26
C. Predicted Returns Under Look-Through Allocation 27
D. The Role of Fees 28
E. Implication for the Proposed Rule 29
VI. Risk-Adjusted Returns and the Smoothing Artifact 30
A. The Smoothing Mechanism 30
B. The 2022–2023 Illustration 31

C. Implications for the Comparison 32
VII. Plan Size: DB Plans Are Substantially Larger 34
A. Plan-Size Distribution by Cohort 34
B. Scale Should Help DB Plans 35
C. Even the Largest DC Plans Outperform the Larger DB Universe 36
VIII. Framework 2 Confirmatory Comparison: All U.S. Pension Plans 38
A. All DB Plans (Extended) 38
B. Trailing-Period Comparison 39
C. Risk-Adjusted Comparison Under Framework 2 40
IX. The 2022 Tail-Risk Cross-Section 42
A. The Distributions 42
B. Tail-Risk Comparison 43
X. Unreliability of the Existing Foundation 45
A. The Studies Cited by the Department of Labor 45
B. The CEA's Own Inputs Undercut Its Conclusion 46
C. The CEM Benchmarking Data 47
D. Morningstar's Analyses 48
E. The Academic Literature on Private Equity 48
XI. Why the Conventional Wisdom Persists 50
A. Aging Benchmarks 50
B. The Transformation of DC Plan Design 50
C. The Repetition Dynamic and Commercial Interests 51
XII. Policy Implications and Conclusion 52
Appendix A: Methodology for Translating Non-Calendar-Year Public Pension Returns 55
Endnotes 58

Executive Summary

The Trump administration has proposed dangerous new rules that would allow defined contribution retirement savings plans – such as 401(k)s -- to invest in high-risk alternative assets like private equity and private credit.[1] These high-fee, illiquid, and opaque investments are inappropriate for retirement savings and would imperil families' economic security in later life. Currently, defined contribution plans are largely prevented from investing in these alternative assets because of their outsized risks and costs, but defined benefit pension plans have invested in private equity for years.

The private equity industry has promoted its purported superior returns for years, which is one of the justifications for the administration's proposal to add risky private market assets into people's 401(k) plans. However, in recent years, private equity funds have struggled to sell underperforming assets and to raise money as more institutional investors are turning away from these funds.[2]

This analysis compared the performance of defined benefit (DB) plans with substantial private market assets and defined contribution (DC) plans with virtually no private market assets. Using U.S. Department of Labor (DOL) Form 5500 for the sixteen years between 2009 and 2024, the analysis found that the defined contribution plans outperformed defined benefit plans. This superior performance was a result of the defined contribution plans' simpler portfolio mix, and the outperformance holds even when controlling for plan size and risk.

Over the most recent sixteen calendar years for which data is available (2009–2024), DC plans returned an average 9.13 percent per year while DB pension plans returned 7.79 percent per year on average.[3] That gap — 134 basis points per year, compounded — means that a participant whose retirement savings grew at the typical DC return rate accumulated approximately 22 percent more wealth in their retirement savings than one whose savings grew at the average DB return rate. The gap survives every robustness check: it persists across 5-, 10-, and 16-year trailing windows; it widens to 200 basis points per year when the DB comparison group is extended to include the full public pension universe via the calendar-year translation methodology described in full herein; and DC plans compare favorably under risk-adjusted measures as well.

Defined contribution outperformed DB plans while holding effectively zero allocation to private equity, hedge funds, private credit, real estate, infrastructure, or any of the other alternative asset classes envisioned under the DOL proposed rule. Defined benefit plans, by contrast, hold substantial alternative-investment allocations —

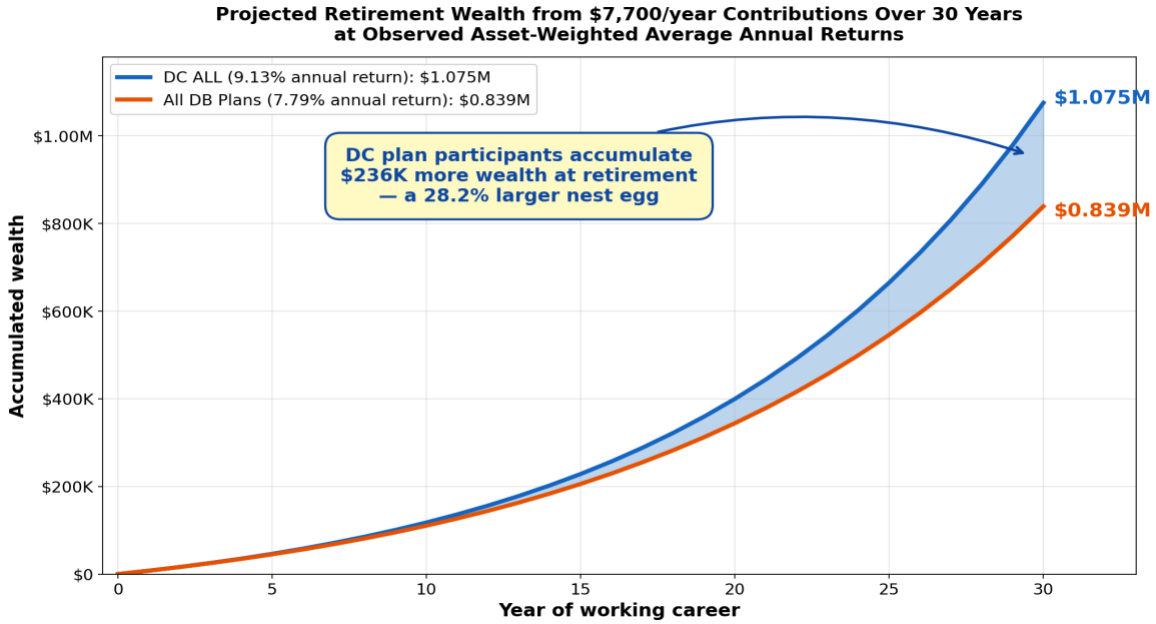
approximately 21 percent of total assets for private corporate DB plans and approximately 35 percent for public pension plans. The empirical evidence indicates that DB plans have underperformed DC plans *despite*, and in significant part *because of*, their heavy allocation in alternative investments.

These findings strongly dispute the purported benefits of alternative investments in retirement savings accounts undergirding Executive Order 14330[4] and the DOL's March 2026 proposed Fiduciary Duties in Selecting Designated Investment Alternatives rule,[5] both of which seek to expand use of the same alternative investments that the DB plans have been using for decades. In fact, many proponents of expanded use of alternative investments in DC plans have deceptively asserted that DB plans have historically outperformed DC plans and that the difference is attributable to DB plans' access to alternative investments. That falsehood is repeated by the White House Council of Economic Advisers,[6] BlackRock CEO Larry Fink,[7] the Bipartisan Policy Center,[8] and a coalition of twenty-two conservative and free-market advocacy organizations led by Grover Norquist's Americans for Tax Reform.[9] This analysis of U.S. plan-level data incontrovertibly contradicts these baseless assertions.

A key premise of the proposed rule is wrong on the facts. Using complete Form 5500 filings for all open U.S. private sector defined benefit plans and all defined contribution plans (over 58,000 plans, $7.7 trillion in combined assets) between 2009 and 2024, and incorporating verified return data for U.S. state and local public pension systems from the Public Plans Database,[10] DC plans outperformed DB plans by a substantial and persistent margin on every computed measure:

Trailing window (ending Dec. 31, 2024)	All DC Plans (annual rate of return)	All DB Plans (annual rate of return)[11]	DC plan annual advantage
5-year (2020–2024)	8.14%	4.78%	+336 bps
10-year (2015–2024)	7.85%	5.90%	+195 bps
16-year (2009–2024)	9.13%	7.79%	+134 bps

The impact of this outperformance by DC plans over the course of a 30-year career are staggering. Assuming a participant contributes $7,700 per year (the median U.S. 401(k) total contribution in 2024) over a 30-year working career, the participant who earns the All DC Plans asset-weighted average return accumulates approximately $1.075 million at retirement, while the participant who earns the All DB Plans asset-weighted average return accumulates approximately $839,000.



DC plans outperformed because of — not despite — their simpler portfolios. DC plans allocate approximately 72 percent of total assets to public equity (largely through index funds and target-date funds). Private corporate DB plans allocate approximately 24 percent to public equity, 55 percent to fixed income, and 21 percent to alternatives. Public pensions allocate approximately 44 percent to public equity, 21 percent to fixed income, and 35 percent to alternatives. Even after adjusting for the equity-like economic exposure embedded in alternatives,[12] DC plans hold materially more economic equity exposure than private DB plans, but only slightly more economic equity exposure than public sector DB plans. The mechanism is that DB plans purchase their equity exposure inefficiently: DC participants obtain public equity at total expense ratios of under 2 to 3 basis points (asset-weighted), while DB plans obtain a substantial portion of their equity exposure indirectly through private equity, hedge funds, and similar vehicles at all-in fees and carry of 200–700 basis points per year. The fee load consumes most or all of the gross alpha, despite the fact that the alleged alpha generated by alternative investments may be spurious.

The DC returns advantage holds on risk-adjusted measures, on size-controlled comparisons, and in the face of the structural smoothing tailwind that flatters DB risk metrics. Over 2009–2024, DC plans had Sharpe ratio 0.769 and Sortino ratio 1.743, compared with 0.766 and 1.562 respectively for the All DB Plans cohort — essentially even on the Sharpe ratio, but a clear DC advantage on the downside-risk-sensitive Sortino ratio. The worst two-year compound return for an asset-weighted DC participant was −3.91 percent (2021–2022); for the All DB Plans cohort it was −6.50 percent. Plan-size differences cannot account for the DC advantage — DB plans are, on an asset-weighted basis, *much larger* than DC plans, not smaller, and should accordingly enjoy meaningful scale advantages. When the comparison is restricted to large plans (those holding more than $1 billion in assets, a universe in which DC and DB plans are fully size-comparable), DC-plan outperformance widened to 168 basis points (1.68% per year) over the 16-year window,

despite the fact that the average DB plan remains larger than the average DC plan with over $1 billion in assets.

Conclusion and policy implication: The proposed rule and the Executive Order suffer from one large empirical flaw—although alternative assets such as private equity and crypto are unsuitable for retirement accounts on many levels. By the regulation's own account, DB plans invest around 34 percent of their assets in alternative investments, while DC plans invest almost nothing.[13] If alternatives really offer superior returns or risk-adjusted returns, as proponents insist, then DB plans should be outperforming DC plans, at the very least on a risk-adjusted basis. Yet the opposite is true. Over the most recent sixteen years for which complete data exist, the typical DC dollar earned approximately 134 basis points (1.34%) per year more than the typical dollar in the All DB Plans cohort. Given the high fees, lax regulatory oversight, illiquidity, and higher risk due to the use of leverage all associated with alternative investments, it is bad public policy to open $11 trillion in workers' retirement assets[14] to alternative investments absent empirical evidence of benefits these investments have bestowed on pension plans.

The proposed rule, if successful in its stated objective of inducing DC plans to allocate to alternatives, would replace a portion of DC participants' high-return, low-cost direct public-equity exposure with lower-return, high-cost indirect alternative-investment exposure. The expected effect of that substitution, applying the same economic logic the rule's supporters apply to DB plans, is to reduce DC participants' net returns and worsen their retirement security. The proposed rule should be withdrawn pending the Department's own comprehensive review of the Form 5500 and public pension universes.

I. Introduction

Defined contribution retirement plans — the 401(k) plans and similar arrangements that now hold approximately $11 trillion in retirement savings for over 90 million American workers — have outperformed defined benefit pension plans by a substantial margin over the past sixteen years. Over the period between 2009 through 2024, the asset-weighted average annual return earned by a U.S. DC plan was approximately 9.13 percent. The asset-weighted average annual return earned by the All DB Plans cohort was approximately 7.79 percent over the same period.[15] Both cohorts in this comparison are restricted to plans reporting investment results on a calendar-year basis; including the non-calendar-year-reporting U.S. public pensions via the calendar-year translation methodology described in Section III and Appendix A produces a comparison that, if anything, widens the DC returns differential.

The 134-basis-point gap in compounded annual returns between DC plans and the All DB Plans cohort means that the typical $100 invested in a DC plan at year-end 2008 grew to approximately $405 by year-end 2024; the typical $100 invested in the All DB Plans cohort over the same period grew to approximately $332. A retirement saver whose DC plan tracked the DC asset-weighted average accumulated approximately 22 percent more wealth than a saver whose DB plan tracked the All DB asset-weighted average. That difference is large in any retirement-planning context. It is decisive in the context of a federal rulemaking that proposes to use DB-plan returns as an empirical justification for expanding DC plan access to the asset classes DB plans actually hold.

Defined contribution plans achieved this outperformance while holding effectively zero allocation to private equity, private credit, hedge funds, real estate, infrastructure, digital assets, or any of the other "alternative" investment categories that the proposed rule and Executive Order 14330 are intended to make available to DC participants. The Council of Economic Advisers, in its August 2025 report supporting the Executive Order, found that alternative investments "represented about 30 percent of DB plan assets but only 0.1 percent of DC plan assets."[16] Our review of Form 5500 data and public-pension disclosures confirms that figure: private corporate DB plans hold approximately 21 percent of assets in alternatives, public pension plans hold approximately 35 percent of assets in alternatives, and DC plans hold approximately none. Yet DC plans have outperformed the DB cohort on every measure of return that we computed, and the risk-adjusted numbers favor DC plans as well.

If alternative investments delivered the return enhancement that the proposed rule attributes to them, this pattern should not exist. DB plans — with their substantial alternative-investment allocations, larger average plan size, in-house investment staff, preferential access to oversubscribed fund vehicles, and decades of experience deploying capital into private markets — should be outperforming DC plans by something close to

the 0.5percent figure that BlackRock CEO Larry Fink cited in his 2025 annual chairman's letter, or capturing the private-equity return and risk-adjusted-return premium that the Council of Economic Advisers projects the alternative allocations DB plans already hold.

However, the direction of the difference is the opposite. DC plans are outperforming DB plans, and the magnitude is large. The proposed rule would open up 401(k) access to alternative assets based on a story about DB plan performance that the comprehensive U.S. plan-level data does not support.

The clearest statement of this empirical premise among the comments filed in the rulemaking docket appears in the May 2026 coalition letter filed by twenty-two conservative and free-market advocacy organizations led by the R Street Institute. That letter, signed by Americans for Tax Reform, the National Taxpayers Union, the Competitive Enterprise Institute, Citizens Against Government Waste, the Independent Women's Forum, the Goldwater Institute, the America First Policy Institute, and others, captures the conventional wisdom on which the rule's supporters rely:

> The retirement system has drifted away from the segments of the capital markets where a growing share of value creation now occurs. Defined-benefit plans, which have long maintained allocations to private equity and other alternative assets, have consistently outperformed defined-contribution plans. Meanwhile, most 401(k) participants have been largely confined to publicly traded equity and bond indices, placing them at a structural disadvantage relative to institutional investors who have been deploying capital into private markets for years and have benefited from the compounding returns.[17]

All three propositions in that paragraph are directly contradicted by the data presented in this paper. The retirement system has not "drifted away from the segments of the capital markets where a growing share of value creation now occurs." DC plans, which now hold the majority of American retirement assets, have substantial direct exposure to public equity — the segment of the capital markets that has, in fact, produced the bulk of value creation over the past sixteen years. Defined-benefit plans have not "consistently outperformed defined-contribution plans" over the period we measure; the reverse is true. And 401(k) participants have not been placed "at a structural disadvantage" by their concentration in publicly traded equities and bond indices; that concentration has, over the period the proposed rule covers, been the source of their outperformance.

The R Street coalition letter is one filing in a much larger pattern. The same underlying premise — that alternative investments improve plan outcomes — recurs throughout the rulemaking record and the surrounding debate in varying forms. It appears in the more guarded form, resting on the asserted return and diversification benefits of alternatives, in the preamble to the proposed rule itself,[18] in the Executive Order,[19] and in the White House Council of Economic Advisers' supporting report.[20] And it appears in a stronger form,

asserting an historical DB outperformance as established fact, in BlackRock CEO Larry Fink's 2025 annual chairman's letter,[21] in the Bipartisan Policy Center's explainer on the rule,[22] and in numerous filings by asset managers and pension consultants. Section II of this paper documents the claim across the rulemaking record and the surrounding policy debate. Section III describes the data and methodology. Sections IV through IX present the empirical results, the asset-allocation analysis, the risk-adjusted analysis, the smoothing artifact that artificially improves DB risk metrics, the plan-size robustness check, the confirmatory Framework 2 comparison against the full U.S. public and private pension universe, and the 2022 cross-sectional tail-risk analysis. Sections X and XI explain why the conventional wisdom has propagated despite being contradicted by the data. Section XII discusses policy implications.

A word on what this paper does and does not argue. Our finding that DC plans have outperformed DB plans on investment returns is not a claim that defined contribution plans are a better form of retirement provision for workers. Defined benefit plans offer participants advantages that have nothing to do with investment returns and that this paper does not attempt to weigh: they provide predictable, guaranteed lifetime income that cannot be outlived; they place investment and longevity responsibility and risk on the employer rather than the individual; and they insulate participants from the behavioral pitfalls — mistimed trading, under-diversification, inadequate saving, and premature withdrawal — that erode outcomes in participant-directed accounts. On any number of these dimensions a DB plan may serve a worker better than a DC plan regardless of which earns the higher return. Our argument is narrower and concerns asset allocation to alternative investments, not plan structure: the comprehensive data do not show that holding alternatives has improved plan returns for defined benefit plans, and they therefore do not support a rule premised on the idea that DC participants are losing out by not holding them. Nothing here turns on a feature inherent to either plan type. There is no reason DB plans must invest in alternatives — many of the plans in our cohorts hold few or none — and no reason DC plans cannot.

II. The Premise of the Proposed Rule and Its Supporters

The case made by the proponents of the proposed rule rests on a foundational (but false) claim about investment performance: that alternative investments deliver higher returns and better risk-adjusted returns than the public-market portfolios to which DC participants are largely confined. Therefore, DC participants are disadvantaged relative to the defined benefit plans and institutional investors that hold alternatives at scale.

That claim appears in two forms. The stronger form, advanced by BlackRock's Larry Fink, the Bipartisan Policy Center, and the R Street coalition, asserts as established fact that DB

plans have historically outperformed DC plans because of their access to alternatives. The more guarded form, advanced by the Executive Order and the Council of Economic Advisers, asserts that alternatives carry a return and diversification premium that DB and institutional investors have captured and DC participants have been denied.

Both forms depend on the same underlying proposition — that alternative investments improve plan outcomes. Each treats that proposition as established and proceeds on that basis to a policy conclusion; none, so far as we can determine, presents a comprehensive analysis of U.S. plan-level data to test it.

This failure to identify beneficial outcomes to DB plans from alternative assets should be a bright red flag — alternative investments are used by defined benefit plans so widely and for so long that their benefits should necessarily be reflected in the absolute or risk-adjusted returns of DB plans. Needing to rely upon self-reported returns or a particular subset of alternative investments that DB plan fiduciaries were not themselves able to identify in advance as being the allegedly best alternative investment or most likely to add value, is an indictment of the proposed rule far more so than what this cherry-picked data actually says.

This Section documents the claims about alternative investment and defined benefit plan performance across the rulemaking record and the surrounding policy debate.

A. The Government's Own Statements

Executive Order 14330

Executive Order 14330, signed by President Trump on August 7, 2025 and published at 90 Federal Register 39115, establishes the policy framework for the proposed rule. The Order declares it the policy of the United States that:

> [E]very American preparing for retirement should have access to funds that include investments in alternative assets that are appropriate for inclusion in their retirement accounts.

The Order identifies private market investments, real estate, digital assets, commodities, infrastructure, and lifetime income strategies as the relevant alternative-asset categories[23] and it directs the Department of Labor to clear regulatory safeguards that have historically limited DC plan access to those categories. The Order's findings assert that alternative assets "offer competitive returns along with diversification opportunities" and that DC participants have been "relegated to asset classes whose returns lack the very same long-term net benefits allowed for and achieved by public pension plans and other institutional investors." The Order thus does not assert, as some of the supporting filings discussed below do, that DB plans have outperformed DC plans head-to-head; its premise is the broader one that alternative investments deliver net benefits that institutional and DB

plans have captured and DC participants have been denied. That premise, like the stronger outperformance claim, depends on alternative investments actually improving plan outcomes.

The Proposed Rule

The Department of Labor's March 31, 2026 proposed rule, *Fiduciary Duties in Selecting Designated Investment Alternatives* implements the Executive Order by establishing a process-based safe harbor for the fiduciary selection of designated investment alternatives that hold alternative assets.[24] The rule's supporting record advances *as empirical* the claim that DB plans have outperformed DC plans because of their access to alternatives. The preamble itself cites the share of DB plan assets allocated to alternatives — stating that "alternative investments . . . in aggregate represented 18 percent of total holdings" in defined benefit plans.[25] And the supporting record links the asserted return advantage of DB plans over DC plans. The preamble cites two academic studies in support of the proposition that allocation to alternatives is associated with better performance: Aubry (2022) and Korteweg (2023).[26] As discussed in Section X.A below, neither of those studies in fact supports the proposition for which the preamble cites them.

The Council of Economic Advisers

The most developed economic statement of the premise that alternatives improve plan outcomes comes from the White House Council of Economic Advisers. Its August 2025 report *Retail Access to Alternative Investments Via Defined Contribution Plans* provides the principal economic justification for the Executive Order and the proposed rule. The CEA report states that "[A]lternative investments represented about 30 percent of DB plan assets but only 0.1 percent of DC plan assets." The study treats this allocation gap as the diversification and return opportunity that DC participants have been denied.[27] The 30-percent figure is asset-weighted across the universe of large public pensions; this analysis found that on a Form-5500-weighted basis covering private corporate DB plans, the figure is closer to 21 percent.

The CEA does not, however, derive its return projections from the realized performance of defined benefit plans. Its return claim rests on two other foundations: a survey of academic public-market-equivalent (PME) estimates for private-equity buyout funds, which it reads as showing that buyout funds have outperformed the S&P 500 net of fees by more than 3 percent annually; and a forward-looking mean-variance simulation that adds private equity to a stocks-and-bonds portfolio and reports a higher Sharpe ratio and higher annuitized lifetime income, with the largest gains for the youngest cohorts. The CEA uses DB allocations only as a benchmark of plausibility — noting that its simulated allocation of roughly 20 percent to private equity is "close to allocations observed in many defined benefit plans."

The premise underlying the analysis is thus not that DB plans have historically outperformed DC plans, but that the alternative investments DB plans carry a return and

risk-adjusted-return premium that would flow through to DC plans that gained similar exposure. That premise is directly testable against the realized experience of the plans that already hold alternatives at scale, and Sections IV through IX undertake that test and demonstrate that these presumptions are not supported by empirical returns of DB and DC plans. Two further features of the CEA's analysis bear on its reliability — its reliance on private equity return estimates drawn from fund vintages ending roughly a decade ago, and the fact that its own risk-adjusted inputs rank private equity below both stocks and bonds on a standalone basis — and we take those up in Section X.B.

B. The Proponents' Advocacy

BlackRock CEO Larry Fink

In his March 2025 annual chairman's letter to investors, the chairman and chief executive officer of BlackRock — the world's largest asset manager, which manages over $11 trillion in assets and has a substantial commercial interest in expanded retail access to private markets — wrote:

> Private assets like real estate and infrastructure can lift returns and protect investors during market downturns. Pension funds have invested in these assets for decades, but 401(k)s haven't. It's one reason why pensions typically outperform 401(k)s by about 0.5% each year.

Fink concluded that an additional 0.5 percent in annual returns would, over a 40-year working career, result in "14.5% more money in your 401(k)," enough to "fund nine more years of retirement."[28] The Fink letter is one of the more frequently cited sources in the industry literature for the proposition that DB plans outperform DC plans by approximately 0.5 percent annually. As discussed in Section X.A, the empirical foundation for this figure traces in significant part to a 2018 CEM Benchmarking study covering 2007–2016, a window that ends nearly a decade before the rule was proposed. The data we report below covers a sixteen-year period ending in 2024 and finds that the direction of the returns gap has reversed: DC plans have outperformed DB plans.

The Bipartisan Policy Center

In a July 2025 explainer titled *Alternative Assets in 401(k)s, Explained*, the Bipartisan Policy Center wrote:

> Defined benefit (DB) pensions have invested in alternative assets — especially private equity — since the 1970s. As of 2022, public and corporate pensions globally allocated 23% of their portfolios to private markets. It is likely that exposure to alternative assets has contributed to DB plans historically achieving higher investment returns, on average, than DC plans, although that gap has narrowed over time.

The BPC explainer was issued shortly before the rulemaking docket opened and is cited in numerous industry filings.[29] Notably, the BPC explainer's phrasing concedes that "the gap has narrowed over time" — a hedge that the comprehensive Form 5500 data demonstrates is substantially understated. The gap has not merely narrowed; it has reversed.

The R Street Coalition Letter

On May 18, 2026, the R Street Institute and twenty-one other conservative and free-market advocacy organizations — including Americans for Tax Reform, the National Taxpayers Union, the Competitive Enterprise Institute, Citizens Against Government Waste, the Independent Women's Forum, the Goldwater Institute, and the America First Policy Institute — filed a coalition letter in support of the proposed rule. The letter's analytical core consists of three sentences:

> The retirement system has drifted away from the segments of the capital markets where a growing share of value creation now occurs. Defined-benefit plans, which have long maintained allocations to private equity and other alternative assets, have consistently outperformed defined-contribution plans. Meanwhile, most 401(k) participants have been largely confined to publicly traded equity and bond indices, placing them at a structural disadvantage relative to institutional investors who have been deploying capital into private markets for years and have benefited from the compounding returns.

The letter, which we refer to as the "R Street coalition letter" throughout this paper, is among the most notable filings in the rulemaking docket based on its numerous co-signers and their conservative pedigree.[30] It does not cite any specific empirical study in support of the claim that DB plans have "consistently outperformed" DC plans; it treats the proposition as a settled axiomatic fact. As Sections IV through IX of this paper demonstrate in detail, that premise is not supported by the comprehensive U.S. plan-level data.

CEM Benchmarking

The most frequently cited empirical source for the DB-outperformance proposition is a study from CEM Benchmarking, a Toronto-based consultancy whose proprietary database of pension-plan returns is widely referenced in academic and industry research. CEM's earliest study, covering 1998–2005, reported that DB plans outperformed DC plans by approximately 180 basis points per year. A 2018 update covering 2007–2016 reported that the gap had narrowed to 47 basis points — still in favor of DB plans, but markedly smaller.[31] The CEM samples are limited to plans that voluntarily contribute data to CEM, which skews them toward large and sophisticated plans. The publicly cited "about 0.5%" figure that has become shorthand in the industry traces in significant part to the 2018 CEM result for 2007–2016, a period now nearly a decade out of date. The dynamic over the past decade, as documented in this paper, has not been a continued narrowing of the DB advantage; it has been a reversal.

Center for Retirement Research at Boston College

Alicia Munnell and colleagues at the Center for Retirement Research at Boston College (CRR) have published multiple briefs discussing differences in DB and DC plan performance, generally finding that DB plans have outperformed DC plans historically.[32] These briefs are cited by the Bipartisan Policy Center and by industry actors as authority for the DB-outperformance claim. As with the CEM data, the CRR analysis depends on data sources that end in 2014–2016 and does not reflect the most recent ten years of plan performance. The same CRR research center maintains the Public Plans Database that we use to incorporate U.S. state and local public pensions into our analysis below. Jean-Pierre Aubry of the CRR is the lead author of the 2022 study cited in the proposed rule's preamble; that study, properly read, in fact contradicts the proposition for which the preamble cites it (see Section X.A).

Private Equity Industry, Asset Managers, and Consultants

Numerous private equity and asset-management firms have repeated and extended the DB-outperformance claim, including Cambridge Associates, Neuberger Berman, J.P. Morgan Asset Management, Partners Group, Pantheon Ventures, Franklin Templeton, UBS, KKR, Apollo, and Blackstone.[33] Each has published material in recent years advocating expanded 401(k) access to alternative investments and citing some version of the DB-outperformance claim as evidentiary support. These filings reflect the commercial interests of the firms involved: each would benefit, directly or indirectly, from the inflow of $11 trillion in retirement assets into the alternative-asset vehicles those firms manage. That commercial interest does not, by itself, undermine the analytical work; but it does justify closer scrutiny of the underlying empirical claim, and it explains why the claim has propagated so widely in industry literature notwithstanding the absence of supporting evidence in the comprehensive U.S. plan-level data.

C. The Claim's Function in the Policy Debate

The DB-outperformance claim is not merely incidental to the policy case for the proposed rule, it is the principal premise on which that case depends. The premise can be tested directly. Defined benefit plans have been heavily allocated to alternative investments for decades; if those allocations improved plan outcomes, DB plans should be observed to outperform DC plans on an absolute basis, on a risk-adjusted basis, or both. If DB plans did not in fact outperform DC plans, then the policy argument that DC participants would be made better off by gaining access to the asset classes DB plans hold loses much of its force. If DB plans' alternative-investment allocations did not in fact contribute to their performance, then the case for relaxing fiduciary protections to enable DC plans to make similar allocations loses much of its force. If the historical experience of DC plans relative to

DB plans has, in fact, been one of substantial outperformance — not the reverse — then the proposed rule is solving for a problem that does not exist, and the foundation it rests upon is a mirage.[34] The remainder of this paper presents the comprehensive U.S. plan-level evidence on each of these questions.

III. Data and Methodology

A. Data Sources

This analysis draws on two primary data sources. First, for private-sector U.S. retirement plans, we use the complete Form 5500 filings for every plan year from 2009 through 2024. Form 5500 is the annual return/report that plans governed by the Employee Retirement Income Security Act of 1974 (ERISA) are required to file with the Department of Labor (DOL), the Internal Revenue Service, and the Pension Benefit Guaranty Corporation. The Form 5500 dataset, available from the DOL's Employee Benefits Security Administration, contains beginning- and end-of-year plan assets, contributions and distributions during the year, and other financial data necessary to compute plan-level annual returns for every U.S. private-sector retirement plan that meets the filing threshold. This analysis covers the universe of plans that filed Form 5500 (and not Form 5500-SF, the short-form filing for small plans) for at least one year during 2009–2024.

Second, for U.S. state and local public pension plans — which are not required to file Form 5500 — this analysis uses the Public Plans Database maintained by the Center for Retirement Research at Boston College, in partnership with the Center for State and Local Government Excellence and the National Association of State Retirement Administrators.[35] The Public Plans Database is the most comprehensive publicly available source for U.S. public pension fund data. It includes annual return data and beginning-of-year asset levels for the 200+ largest U.S. state and local public retirement systems, covering approximately $4.2 trillion in pension assets.

B. Sample Construction

We construct the following cohorts:

DC ALL: The universe of all U.S. defined contribution plans filing Form 5500 from 2009 through 2024. The cohort contains 56,186 unique plans across the period, with $5,857 billion in beginning-of-year (BOY) 2024 assets and an asset-weighted average plan size of $6.1 billion. The cohort includes 401(k), 403(b), 457(b), profit-sharing, and other qualified DC arrangements. For analyses requiring a size-controlled comparison group (Section VII), we additionally construct a **DC > $1B** subset of 1,015 plans holding $3,228 billion in BOY 2024 assets, with an asset-weighted average plan size of $10.9 billion.

Private DB: The universe of all open private-sector U.S. defined benefit plans filing Form 5500 from 2009 through 2024.[36] The cohort contains 2,531 unique plans with $1,822 billion in BOY 2024 assets and an asset-weighted average plan size of $10.3 billion. For size-controlled analyses, we additionally construct a **DB > $1B** subset of 328 plans holding $1,445 billion in BOY 2024 assets, with an asset-weighted average plan size of $12.9 billion. Closed and frozen DB plans are excluded from all analyses because their investment

policies are driven by liability-matching considerations rather than long-term return-maximization, making them not directly comparable to either DC or open-DB plans.

All DB Plans: The combined universe of (i) all open U.S. private-sector defined benefit plans and (ii) all U.S. state and local public pension systems that report investment results on a calendar-year fiscal-year basis. This cohort contains 2,593 plans with approximately $2,440 billion in BOY 2024 assets. The All DB Plans cohort is the headline DB comparison group used throughout Section IV and elsewhere in this paper. Every plan in the cohort reports on a calendar-year basis, matching the calendar-year accounting basis used by DC plans, and thus enabling a direct apples-to-apples annual return comparison without any translation methodology.

All DB Plans (Extended): The combined universe of (i) all open U.S. private-sector defined benefit plans, (ii) all calendar-year-reporting U.S. public pensions, and (iii) all non-calendar-year-reporting U.S. public pensions whose fiscal-year returns we translate to a calendar-year basis using the methodology described below and in Appendix A. The Extended cohort contains approximately 2,750 plans with approximately $6,015 billion in BOY 2023 assets — representing essentially the entire universe of U.S. defined benefit pension plans, public and private. Because the translation methodology requires two consecutive fiscal years of data and the most recent June-30 fiscal year that is fully reported is FY 2024 (July 2023 – June 2024), the Extended cohort can be computed through calendar year 2023 but not calendar year 2024. The Extended cohort comparison appears in Section VIII as Framework 2, supporting our headline Framework 1 comparison against the All DB Plans cohort. In fact, because DC-plan outperformance was among the highest calendar years in 2024, Framework 2 likely understates DC plan outperformance of DB plans writ large.

Public Pension Universe: The combined universe of all calendar-year-reporting and translated non-calendar-year-reporting U.S. public pension plans (i.e., the All DB Plans Extended cohort less the private-sector DB component). This cohort contains 219 plans with approximately $4,193 billion in BOY 2023 assets. The Public Pension Universe is referenced in Section V (asset allocation analysis) and Section VIII (Framework 2 confirmatory comparison).

C. Return Calculation

For each plan-year in the Form 5500 dataset, we compute the plan's annual rate of return using the standard half-year-flow formula:

$$\text{Return} = (\text{End-of-Year Assets} - \text{Beginning-of-Year Assets} - \text{Net Flows}) / (\text{Beginning-of-Year Assets} + 0.5 \times \text{Net Flows})$$

where Net Flows equals contributions received minus benefit distributions paid and minus administrative expenses, all as reported on Schedule H of Form 5500. The half-year-flow convention assumes that contributions and distributions are spread approximately uniformly across the plan year, making the average dollar in the denominator effectively

invested for the full year. This formula matches the methodology used by the Department of Labor for computing plan rates of return in ERISA-mandated disclosures.[37] For consistency, we apply the same formula to public-pension return computations whenever we recompute them from raw asset and flow data; in most cases, however, the Public Plans Database reports the plan's officially audited annual investment return directly, which we use without modification.

Observations with computed returns outside the range (−1, +1) are excluded as obvious data anomalies; these represent fewer than 0.1 percent of plan-year observations in both the DC and DB universes. Investment management fees are treated as plan expenses in the underlying Form 5500 data, so the computed returns are net of investment-management fees. Plan administrative expenses are included in net flows, so they also reduce computed returns. This matches the participant's actual realized return and is the appropriate comparison for the policy question at issue.

D. Aggregation

For each plan year and each cohort, we compute three aggregate return measures:

Asset-weighted mean: The plan-level returns weighted by each plan's beginning-of-year assets, representing the return earned by the typical dollar in the cohort. This is our primary measure throughout the paper, because it represents the performance experience of the average plan participant (after adjusting for plan size).

Plan-mean (equal-weighted): The simple arithmetic mean of plan-level returns, representing the experience of the typical plan irrespective of plan size. We report this measure in the appendix tables for completeness but do not feature it in the main text, because it gives equal weight to a $5 million plan and a $50 billion plan and therefore does not accurately reflect participant experience.

Plan-median: The plan-level median return, useful for diagnostic purposes (e.g., assessing how skewed the cross-sectional distribution of returns is in any given year).

From the cohort-year aggregate returns, we compute trailing-period geometric means (annualized return), standard deviations (annualized volatility), Sharpe ratios (excess return per unit of total volatility, using the 3-month Treasury bill rate as the risk-free benchmark),[38] Sortino ratios (excess return per unit of downside volatility), worst single-year returns, and worst rolling 2-year compound returns. The trailing windows we use are 5-year, 10-year, and 16-year, with each window's end date matched to the most recent available data for that cohort.

E. Translation of Non-Calendar-Year Public Pensions

Approximately 75 percent of U.S. public pension plans (by both plan count and assets) report investment results on a fiscal year that does not align with the calendar year. The

most common fiscal year-end for public pensions is June 30 (covering most large state systems including CalPERS, CalSTRS, the New York systems, the Illinois systems, the Florida Retirement System, the Texas Teachers Retirement System, and many others), but September 30, March 31, August 31, and April 30 fiscal years also appear. Comparing fiscal-year pension returns directly against calendar-year DC plan returns would be apples-to-oranges, because the pension number reflects performance over a 12-month window that does not coincide with the DC plan's 12-month window.

To enable apples-to-apples comparison, we developed a translation methodology that converts non-calendar-year fiscal-year returns to calendar-year-equivalent returns.[39] The intuition is straightforward. A June-30 fiscal year that ends in year *Y* covers July of year *Y−1* through June of year *Y*. The corresponding calendar year *Y* covers January through December of year *Y*. Two consecutive June-30 fiscal years — ending in *Y* and *Y+1* — collectively cover the 24-month period from July of year *Y−1* through June of year *Y+1*, which contains all of calendar year *Y* plus the six months on either side of it (July–December of year *Y−1* and January–June of year *Y+1*). To extract the calendar-year-*Y* return from those two fiscal years, we subtract the two "overflow" half-year windows, approximating each overflow window's return using a market benchmark of the same broad asset mix as the typical pension plan.

The formal expression of the methodology, derived under a constant-alpha assumption (plan returns differ from benchmark returns by a roughly constant amount within any single fiscal year), is presented in Appendix A. We validated the methodology against four public pension plans whose calendar-year performance is independently reported — the California Public Employees' Retirement System (CalPERS), the California State Teachers' Retirement System (CalSTRS), the Massachusetts Pension Reserves Investment Trust (Mass PRIT), and the Pennsylvania Public School Employees' Retirement System (PSERS). Across these four verification cases, the translation methodology reproduces the independently reported calendar-year returns to within roughly 90–115 basis points for single-year comparisons and to within 13–36 basis points for multi-year compound comparisons.[40] Across the universe of plans for which we apply the translation, single-year errors offset partially across plans (because the constant-alpha approximation produces errors in both directions), so the aggregate cohort-year asset-weighted error is small. Because the translation introduces noise that is uncorrelated with our comparison, the headline conclusions are unchanged whether we use the translated All DB Plans (Extended) cohort (Framework 2) or restrict to plans that natively report on a calendar-year basis (Framework 1). Throughout the paper, our headline figures are derived from Framework 1 — our most conservative and most up-to-date comparison — with Framework 2 results presented as confirmation.

F. Risk-Free Rate

For the risk-adjusted return computations in Sections IV.B and VI, we use the annual mean of the monthly 3-month Treasury bill secondary market rate, FRED series TB3MS, as the

risk-free rate.[41] The mean rate over the 16-year sample is approximately 1.14 percent, with substantial year-to-year variation — below 5 basis points in 2011–2014 and above 500 basis points in 2023–2024.

G. Limitations

Our analysis has the following limitations. First, we measure investment returns rather than retirement outcomes; the comparison does not directly address differences in contribution rates, employer match structures, distribution rules, or longevity risk, all of which affect ultimate retirement security. Second, our private DB cohort is limited to open plans — the population that is plausibly subject to long-term return-maximization, as distinct from the population of frozen and closed plans whose investment policy is driven by liability-matching. Third, our translation methodology introduces some noise into the Framework 2 public-pension comparison, though as discussed in Appendix A the noise is small relative to the size of the cohort differences we report. Fourth, the time period covered by our analysis (2009–2024) coincides with a period of generally favorable returns for public equity, which is the asset class to which DC plans have higher exposure than DB plans; we discuss the sensitivity of our conclusions to that environmental factor in Section XI.

IV. Headline Results: 2009–2024 (Framework 1)

This Section presents our headline empirical results: the comparison between U.S. defined contribution plans and U.S. defined benefit plans over the most recent sixteen calendar years for which complete data exist. Our principal cohorts are DC ALL (the universe of all DC plans filing Form 5500) and the All DB Plans cohort defined in Section III.B (all open U.S. private-sector DB plans plus all U.S. public pension systems that report investment performance on a calendar-year basis). Every plan in both cohorts reports natively on a calendar-year basis; no translation methodology is required to align the time windows. We refer to this 2009–2024 calendar-year-aligned comparison as "Framework 1." Section VIII presents "Framework 2," which extends the DB-side cohort to include the full U.S. public pension universe via the translation methodology described in Appendix A, and runs through calendar year 2023.

A. Annual Returns

Figure 1 shows the annual asset-weighted average returns of the DC ALL universe and the All DB Plans cohort for each calendar year from 2009 through 2024. DC plans outperformed the All DB Plans cohort in eleven of the sixteen years. The years in which the

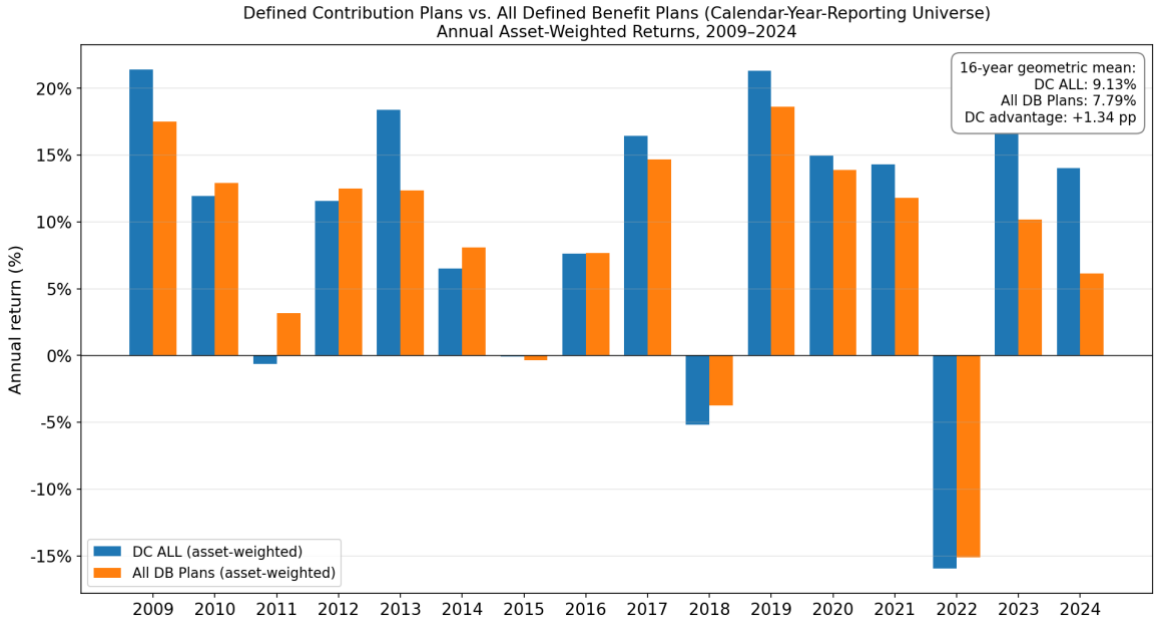


Figure 1. Defined contribution plans (DC ALL, asset-weighted) versus the All DB Plans cohort (open U.S. private-sector DB plans plus calendar-year-reporting U.S. public pensions, asset-weighted) — annual returns, 2009–2024. Source: Authors' calculations from U.S. Department of Labor Form 5500 filings and Center for Retirement Research at Boston College Public Plans Database.

DB cohort outperformed are concentrated in periods of weak public-equity returns (2011, 2014, 2018), when the DB cohort's heavier fixed-income and alternative allocations provided some defensive benefit. In years of strong public-equity returns, the DC advantage is generally large. Over the full sixteen-year window, the compound advantage of DC plans is +134 basis points per year.

B. Cumulative Wealth

Figure 2 translates the annual returns of Figure 1 into the cumulative wealth experience of a dollar invested at year-end 2008. By December 31, 2024, a dollar that grew at the DC asset-weighted average annual return was worth approximately $4.05. A dollar that grew at the All DB Plans asset-weighted average over the same period was worth approximately $3.32. The cumulative gap is approximately 22 percent: an investor whose retirement savings grew at the typical DC rate has approximately 22 percent more wealth at year-end 2024 than one whose savings grew at the typical DB rate.

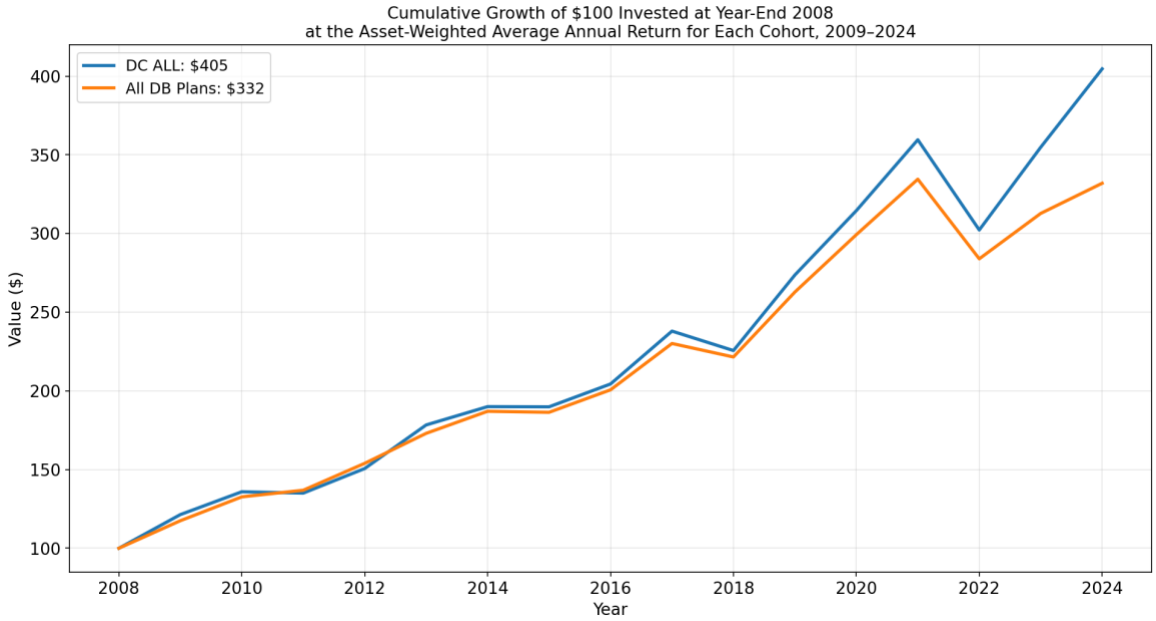


Figure 2. Growth of $100 invested at year-end 2008 at the cohort-level asset-weighted average annual return for DC ALL and the All DB Plans cohort. Source: Authors' calculations.

C. Trailing-Period Returns

The trailing-period comparison is the policy-relevant comparison: it answers the question, "over the most recent N years, which cohort has earned higher returns?" Table 1 reports the trailing 5-year, 10-year, and 16-year asset-weighted average annualized returns for the two cohorts, ending December 31, 2024.

Table 1: Asset-Weighted Average Annualized Returns			
Trailing window (through 12/31/2024)	**DC ALL**	**All DB Plans**	**DC advantage**
5-year (2020–2024)	**8.14%**	4.78%	**+336 bps**
10-year (2015–2024)	**7.85%**	5.90%	**+195 bps**
16-year (2009–2024)	**9.13%**	7.79%	**+134 bps**

Table 1. Asset-weighted average annualized returns by cohort and trailing window, through December 31, 2024 (Framework 1). Source: Authors' calculations.

The pattern is consistent across windows. The DC advantage is largest in the 5-year window (the period during which public equity has most decisively outperformed alternatives, fixed income, and other defensive asset classes), but the advantage is meaningful in every window we compute. Even the 16-year window — which begins in the immediate aftermath of the 2008–2009 financial crisis, a period during which DB plans heavily exposed to alternatives suffered substantial drawdowns but recovered along with public markets — shows a clear DC advantage. There is no trailing window in which the DC cohort underperforms the All DB Plans cohort.

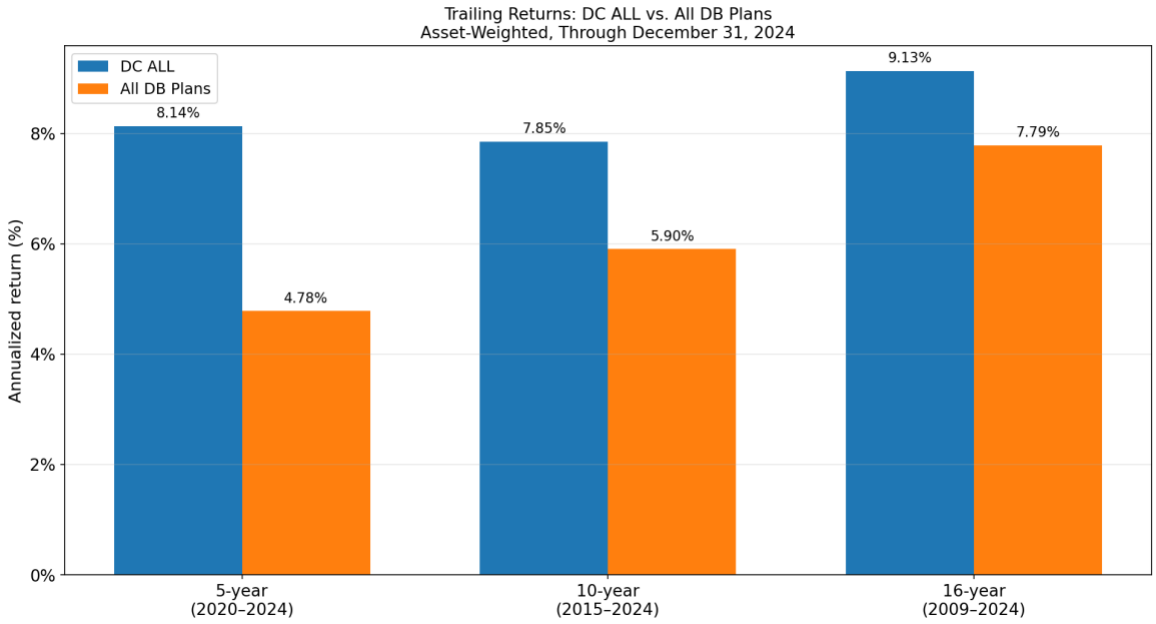


Figure 3. Asset-weighted average annualized returns by cohort and trailing window, through December 31, 2024. Source: Authors' calculations.

D. Risk-Adjusted Returns

Higher returns are, all else equal, evidence of better outcomes for participants. But because higher returns are often achieved at the cost of higher volatility, it is appropriate to ask whether the DC advantage holds on a risk-adjusted basis. Table 2 reports the Sharpe ratio, Sortino ratio, worst single-year return, and worst rolling 2-year compound return for the two cohorts over the 16-year window. The risk-adjusted comparison favors the DC cohort — decisively on the downside-risk-sensitive Sortino ratio and the worst two-year compound return, and slightly on the Sharpe ratio.

Table 2: Risk-Adjusted Returns			
Risk-Adjusted Measure (16-year window, 2009–2024)	**DC ALL**	**All DB Plans**	**DC advantage?**
Standard deviation of annual returns	10.40%	8.69%	DB lower
Sharpe ratio	**0.769**	0.766	DC narrowly
Sortino ratio (downside-risk-adjusted)	**1.743**	1.562	**✓ DC better**
Worst single-year return	−15.95%	−15.13%	DB narrowly
Worst 2-year compound return	**−3.91%**	−6.50%	**✓ DC much better**

Table 2. Risk-adjusted return measures by cohort, 16-year window. Worst 2-year is the worst rolling two-year compound return over the sample period. Source: Authors' calculations.

Two observations on Table 2 deserve elaboration. First, the DC cohort's standard deviation of annual returns is somewhat higher than the All DB cohort's, as one would expect given DC plans' higher allocation to public equity. The DC excess return is, however, large enough to overwhelm this difference, producing a Sharpe ratio (excess return per unit of total volatility) essentially even with — and slightly above — the All DB cohort's, and a substantially higher Sortino ratio (excess return per unit of downside volatility).

Second, the worst 2-year compound return for DC participants (−3.91 percent, 2021–2022) is substantially less negative than the worst 2-year compound return for the All DB Plans cohort (−6.50 percent, 2022–2023). The two worst-windows fall in different two-year intervals because DC plans participated fully in the strong 2023 public-equity recovery — which carried the DC cohort's 2022–2023 compound return up to only −1.33 percent — while the All DB Plans cohort, with materially lower equity exposure, did not recover as fully, so its worst drawdown extended into the 2022–2023 window. This is a deeply important observation that we return to in Section VI: it suggests that the apparent DB

volatility advantage is in important part an artifact of appraisal-based smoothing in alternative-investment valuations, not a real difference in economic risk borne by participants.

E. Translation to Retirement Wealth

To make the policy stakes concrete, Figure 4 projects the retirement-wealth implications of the observed return gap. Assuming a participant contributes $7,700 per year (the median U.S. 401(k) total contribution in 2024) over a 30-year working career, the participant who earns the DC ALL asset-weighted average return accumulates approximately $1.075 million at retirement, while the participant who earns the All DB Plans asset-weighted average return accumulates approximately $839,000. The difference of approximately $236,000 — a 28.2 percent larger nest egg — represents more than three years of pre-retirement income for a median U.S. worker.[42]

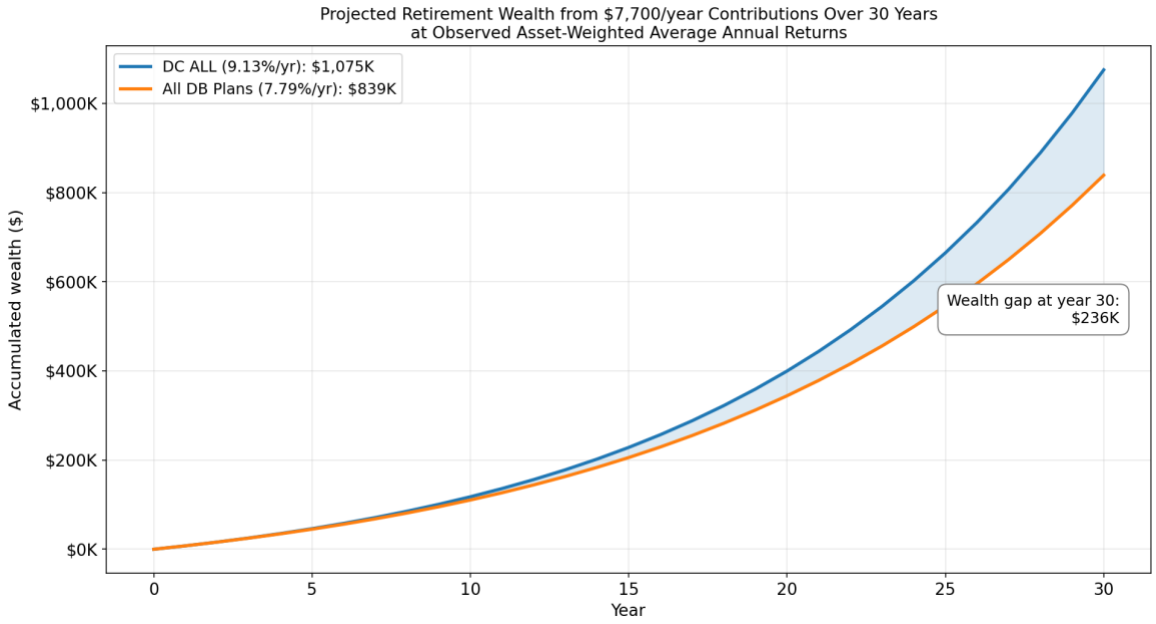


Figure 4. Projected retirement wealth from $7,700 annual contributions over 30 years, at observed asset-weighted average annual returns. Source: Authors' calculations.

These projections are illustrative, but not definitive. Realized returns over any given 30-year window will differ from the 16-year historical average, and the projection does not account for differences in employer match structures, contribution timing, or other plan-design features. The projections do, however, indicate the order of magnitude of the policy stakes. A 134-basis-point (1.34%) compound annual return differential, sustained over a working career, translates into wealth differentials measured in hundreds of thousands of dollars, likely to change a person's retirement date by *years*, not months. If the proposed rule succeeds in narrowing the DC return advantage — either by increasing DC fees or by

inducing DC allocations toward asset classes that have historically underperformed direct equity exposure on a net basis — the welfare cost to participants will be substantial.

V. Asset Allocation and the Look-Through Equity-Exposure Puzzle

Section IV established that DC plans outperformed DB plans on every measure of return we computed over the 2009–2024 period. This Section asks why. The answer involves two mechanisms operating in parallel: a true asset-allocation difference, and a fee differential associated with the way DB plans purchase the equity exposure they hold. Both mechanisms work in the same direction, and the combined effect predicts the magnitude of DC outperformance that the data display.

A. Headline Asset Allocations

Figure 5 shows the asset-weighted average asset allocation across our three principal cohorts: DC plans, private corporate DB plans, and U.S. public pension plans.[43] The picture is striking. DC plans hold approximately 72 percent of total assets in public equity (predominantly through diversified index funds, target-date funds, and stable-value or other balanced funds) and approximately 28 percent in fixed income. They hold essentially zero in alternative investments. Private corporate DB plans hold approximately 24 percent in public equity, 55 percent in fixed income, and 21 percent in alternatives (predominantly private equity, with smaller allocations to real estate, hedge funds, and infrastructure). Public pension plans hold approximately 44 percent in public equity, 21 percent in fixed income, and 35 percent in alternatives (with a more diversified alternatives mix that includes commodities and emerging-markets exposure).

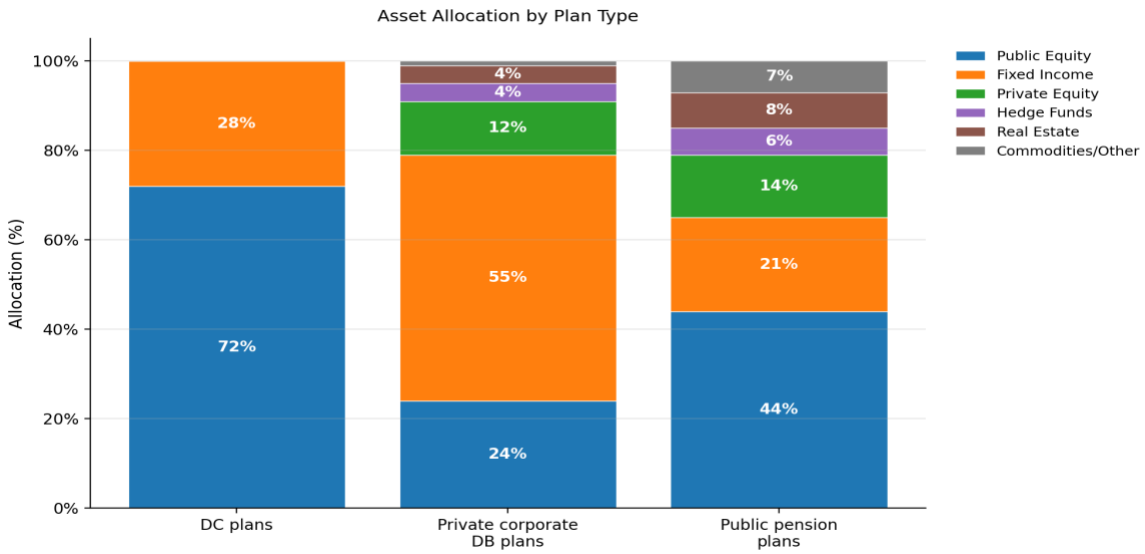


Figure 5. Asset-weighted average asset allocation by cohort, 2024. Sources: Form 5500 Schedule H data, NASRA Public Fund Survey, individual plan annual reports.

If we were comparing DC plans against private corporate DB plans purely on the basis of labeled asset allocations, we would predict DC plans to outperform by a wide margin in any period of strong public-equity returns, because their public-equity allocation is three times larger. Conversely, in periods of weak public-equity returns, the prediction would reverse: private DB plans should outperform, because their concentrated fixed-income and alternative-investment exposures should be more defensive. Over the 2009–2024 period, public equity (the S&P 500) returned approximately 13.5 percent annualized; investment-grade fixed income (the Bloomberg U.S. Aggregate Bond Index) returned approximately 2.8 percent annualized. Under these conditions, a 48-percentage-point difference in public-equity allocation between DC plans (72 percent) and private DB plans (24 percent) would predict a substantial DC return advantage.

B. Look-Through Economic Equity Exposure

The labeled-allocation comparison nevertheless understates DB plans' effective equity exposure. Private equity, in particular, is not a separate asset class economically; it is leveraged equity in private companies, whose return characteristics are closely linked to public-equity markets. Hedge funds, real estate, and infrastructure each carry their own equity-beta loadings. To make the allocation comparison properly apples-to-apples, we adjust the alternative-investment allocations for their underlying equity beta. Following the conventional literature, we use β = 1.20 for private equity, β = 0.50 for real estate, β = 0.40 for hedge funds, and β = 0.10 for commodities.[44] The result of this adjustment is "look-through economic equity exposure," shown in Figure 6.

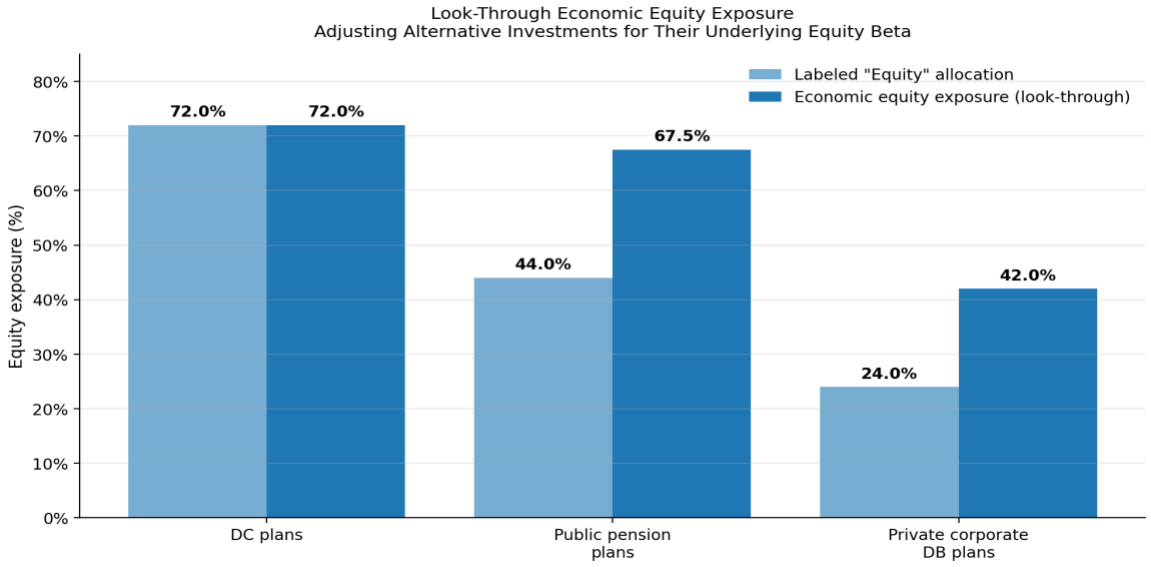


Figure 6. Labeled "equity" allocation versus look-through economic equity exposure (adjusting alternative-investment allocations for their underlying equity beta). Source: Authors' calculations.

Under the look-through adjustment, DC plans have approximately 72 percent economic equity exposure (their labeled equity allocation, since they hold no alternatives). Public pension plans have approximately 67.5 percent economic equity exposure: their 44 percent labeled equity plus 14 percent private equity at $\beta = 1.20$ plus 6 percent hedge funds at $\beta = 0.40$ plus 8 percent real estate at $\beta = 0.50$ plus 3 percent commodities at $\beta = 0.10 \approx 67.5$ percent. Private corporate DB plans have approximately 42 percent economic equity exposure: their 24 percent labeled equity plus 12 percent private equity at $\beta = 1.20$ plus 4 percent hedge funds at $\beta = 0.40$ plus 4 percent real estate at $\beta = 0.50 \approx 42$ percent.

On a look-through basis, DC plans still hold the most economic equity exposure, but the gap relative to public pensions has narrowed sharply (72 percent versus 67.5 percent — only 4.5 percentage points) while the gap relative to private corporate DB plans remains substantial (72 percent versus 42 percent — 30 percentage points). The look-through adjustment thus partially explains why public pension plans have performed nearly as well as DC plans (despite holding much less labeled equity), and partially explains why private corporate DB plans have lagged so substantially.

One caveat is that the private DB plan asset allocation data is the least reliable among the three cohorts. Literature regarding the investment holdings of DB plans tends to use smaller samples, and most often comes from a particular investment consultant, who is generally relying upon their clients, a non-random data set. The use of pooled investment products also means that asset allocation cannot typically be discerned from the plan's Form 5500.

C. Predicted Returns Under Look-Through Allocation

To quantify how much of the observed return differential the look-through allocation alone can explain, we compute a simple predicted-return for each cohort under conservative assumptions about asset-class returns. We use 11.5 percent for public equity (slightly below the realized 13.5 percent over our sample window, reflecting some adjustment for the unusually strong 2009–2024 environment), 2.5 percent for fixed income (matching the realized Agg Index return), and 3.5 percent for the residual alts-other category (commodities, infrastructure, miscellaneous). The predicted gross return for each cohort, computed as the asset-weighted sum of asset-class returns under the look-through allocation, is shown in Table 3.

Table 3: Predicted Gross Return by Asset-Weighted Look-Through Allocation			
	Predicted gross return (under look-through allocation)	**Observed asset-weighted 16-yr return (DC, DB) / 15-yr (Public)**	**Implied gross alpha or (net fee drag)**
DC plans	8.98%	**9.13%**	+15 bps
Public pension plans	8.58%	**8.49%**	(9 bps)
Private corporate DB plans	6.28%	**7.48%**	+120 bps

Table 3. Predicted return under look-through asset allocation (11.5 percent equity, 2.5 percent fixed income, 3.5 percent residual alternatives) versus observed asset-weighted realized return. Source: Authors' calculations.

The look-through allocation, by itself, predicts a 2.70-percentage-point gross DC advantage over private corporate DB plans. The observed net advantage is 1.65 percentage points. That is, DC plans actually outperformed by about 105 basis points less than their look-through allocation would predict. There are three competing explanations for this difference: either (a) our assumptions about DB plan asset allocation were incorrect (the most likely, as the data we relied upon to discern private DB plan asset allocation was the least reliable of the three cohorts); (b) DB plans' non-equity alternatives performed better than the 3.5% we assumed; or (c) alternative investments in private DB plans delivered some gross alpha above pure equity-beta replication. All three are plausible, though none calls into question the conclusions in this white paper, that the inclusion of alternative investments has failed to improve DB plan outcomes relative to DC plans on an absolute or risk-adjusted basis.

D. The Role of Fees

Whatever gross-return contribution DB plan alternatives have delivered, those contributions have been heavily offset — and in many cases more than offset — by the fees DB plans pay to access them. The fee structure of typical alternative-investment vehicles bears little resemblance to the fee structure of typical DC plan investments. A typical private equity fund charges a management fee of 1.5–2.0 percent annually on committed capital plus a 20 percent carried interest above a hurdle rate, plus transaction and monitoring fees, plus (in many fund-of-fund or evergreen-vehicle structures) an additional layer of fees from the wrapper. The all-in cost burden routinely runs to 6–7 percent of committed capital.[45] Hedge funds typically charge 1.5–2.0 percent management plus 20 percent performance.[46] Real estate and infrastructure vehicles often charge management fees of 1.0–2.0 percent plus performance fees.[47] By contrast, the equity exposure available to a DC participant through a target-date fund or balanced fund is typically obtained through low-cost index funds at expense ratios of 5–10 basis points.[48]

The fee-cost difference between these two access modes — direct, low-cost, index-fund exposure to public equity versus indirect, high-cost, alternative-investment exposure to the same underlying economic risk — is large enough to consume essentially all of any gross outperformance the alternatives might deliver. This is the central mechanism by which the observed DC return advantage exceeds what asset allocation alone would predict for the comparison to public pensions, and roughly matches what asset allocation alone predicts for the comparison to private corporate DB plans. The story is simple: DB plans purchase their equity exposure inefficiently, paying enormous fees to access economic exposure that DC participants obtain for 5 to 10 basis points. Even on the most charitable assumptions about gross alpha from alternative investments, the fee load consumes most or all of any gross advantage — and once the fees are paid, the participant's net return is no better than (and in our data, materially worse than) a comparable allocation to direct public equity.

E. Implication for the Proposed Rule

The asset-allocation and look-through analysis has a direct implication for the policy case underlying the proposed rule. The proposed rule and its supporters argue that DC participants are at a structural disadvantage because they lack access to alternative investments. The look-through analysis demonstrates that DC participants are not at a disadvantage; they hold *more* economic equity exposure than either private DB plans or public pension plans, and they purchase that exposure at radically lower cost. The proposed rule, if successful in its stated objective of inducing DC plans to allocate to alternatives, would replace a portion of DC participants' high-return, low-cost direct public-equity exposure with lower-return, high-cost indirect alternative-investment exposure. The expected effect of that substitution, applying the same economic logic the rule's supporters apply to DB plans, is to reduce DC participants' net returns and worsen their retirement security.

VI. Risk-Adjusted Returns and the Smoothing Artifact

Section IV.D showed that the risk-adjusted measures favor DC plans — decisively on the Sortino ratio and the worst rolling 2-year compound return, and slightly on the Sharpe ratio. This Section explains why that result is particularly striking. The structural design of DB plans — specifically, their substantial allocations to alternative investments that are valued at appraisal-based net asset values rather than at observable market prices — produces a mechanical reduction in the reported volatility of DB plan returns. The reduction is not a product of better risk management; it is an artifact of how the underlying assets are valued. Once this mechanical advantage is accounted for, DC plans' risk-adjusted advantage is even larger than the headline numbers suggest.

A. The Smoothing Mechanism

Public equity, fixed income, and other publicly traded asset classes have observable, continuously updated market prices. The valuation of a DC plan's public-equity holdings as of December 31 is the closing price of the underlying securities on that date, multiplied by the number of shares held. There is no judgment, no appraisal, and no lag.

Alternative investments — private equity, private credit, hedge funds, real estate, and infrastructure — do not have observable market prices. Their year-end valuations are typically derived from one or more of the following: (a) periodic appraisals conducted by the general partner or fund manager (frequently the entity whose performance fees are calculated against those appraisals); (b) discounted-cash-flow models with inputs that incorporate the manager's view of the underlying business prospects; (c) reported valuations from the most recent transaction in the security or in comparable securities, often a quarter or more in the past; or (d) some combination of these methods. The result, for any individual asset, is a valuation that is updated less frequently than a publicly traded security and that may lag the underlying economic value by months or longer.[49]

Aggregated to the plan level, this appraisal-based valuation produces a year-end reported portfolio return that is mechanically smoother than the underlying economic return. When public markets fall in a given calendar year, alternative-investment valuations are typically marked down by less than the corresponding fall in public markets, because the year-end appraisals reflect older information and because general partners have substantial discretion over the valuation methodology. The reported return for the DB plan therefore looks better than the economic experience of an actual market-priced equivalent portfolio. When public markets recover, alternative-investment valuations are typically marked up less than the recovery, for the same reasons. Across a full cycle, the reported returns are

roughly equivalent to the underlying economics on average — but the volatility of the reported returns is materially less than the volatility of the underlying economics.

This smoothing artifact is well established in the academic literature.[50] It is the reason that empirical studies of private-equity returns, when they are properly "un-smoothed" to remove the appraisal-lag effect, typically find substantially higher implied volatility for the underlying assets than the reported returns would suggest. For purposes of DC-versus-DB comparison, the implication is that the standard deviation of DB returns is biased downward relative to the standard deviation of DC returns. The DB Sharpe ratio is therefore biased upward, the DB Sortino ratio is biased upward, the DB worst-year and worst-2-year measures are biased toward zero. **The smoothing structurally helps DB risk metrics; it does not help the actual DB participant.** And, even with this help, the DB edge on the risk-adjusted measures is confined to the volatility-based metrics — the standard deviation of annual returns and the worst single year; on the downside-sensitive Sortino ratio and the worst two-year compound return DC plans still come out ahead, and the Sharpe ratio is essentially a tie.

B. The 2022–2023 Illustration

The calendar years 2022 and 2023 provide a stark illustration of how smoothing works in practice. In 2022, U.S. public markets experienced their worst calendar year since 2008: the S&P 500 fell approximately 18 percent, the Bloomberg U.S. Aggregate Bond Index fell approximately 13 percent (an unusually deep fixed-income drawdown driven by Federal Reserve rate hikes), and a balanced 60/40 portfolio fell approximately 16 percent. In 2023, public markets recovered: the S&P 500 returned approximately 26 percent, the Agg Index returned approximately 5.5 percent, and a 60/40 portfolio returned approximately 17 percent.

Figure 7 shows how DC plans and two illustrative subsets of the All DB Plans cohort — the private-sector DB component and the calendar-year-reporting public-pension component — reported these two years. DC plans, which hold mostly daily-valued public securities, reported essentially what the markets did: −16 percent in 2022, +17 percent in 2023. The private-sector DB component of the All DB cohort, which holds a mix of public securities and appraisal-valued alternatives, reported a similar 2022 loss (−17 percent, slightly worse than DC) but a much smaller 2023 gain (+10 percent, vs. +17 percent for DC). The calendar-year-reporting public-pension component, which carries the largest alternative allocations, reported the smoothest two-year experience of all: −10 percent in 2022 and +11 percent in 2023.

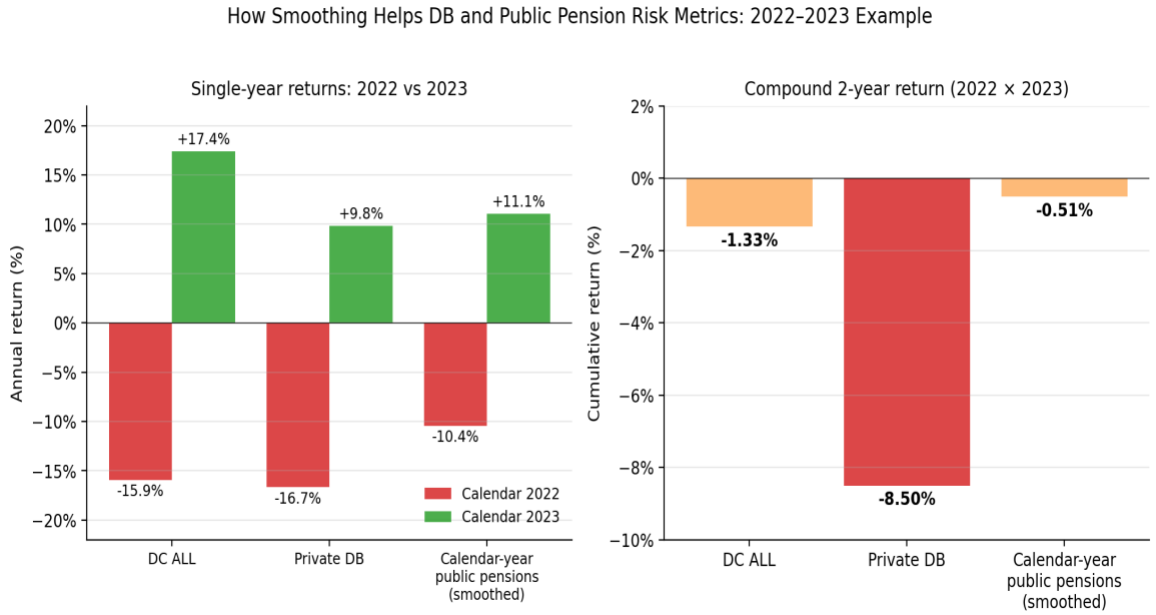


Figure 7. The 2022–2023 calendar-year sequence as reported by DC plans, by the private-sector DB component of the All DB Plans cohort, and by the calendar-year-reporting public-pension component. Left panel: single-year returns. Right panel: two-year compound returns. The All DB Plans cohort aggregate, which combines the private-sector and public-pension components weighted by AUM, had a 2-year compound return of approximately −6.50 percent. Source: Authors' calculations.

The right panel of Figure 7 reveals the punchline. Compounded across the two years, the DC participant ended down 1.33 percent. The public-pension subset of the All DB cohort, despite reporting a much shallower 2022 drawdown, ended down 0.51 percent — essentially the same outcome as the DC participant. The private-sector DB subset, which reported neither the 2022 downside nor the 2023 upside fully, ended the two-year period down 8.50 percent. The All DB Plans cohort as a whole, weighted across these two subsets, ended down 6.50 percent. **Smoothing improved the appearance of the 2022 drawdown for DB participants but did not materially improve the compound outcome—it just pushed the losses forward, which is why DB plans underperformed in 2023.** The 2-year compound return for the All DB Plans cohort was materially worse than the 2-year compound return for DC participants. The DB risk-metric advantage, in other words, is largely cosmetic: it appears in single-year volatility measures but does not appear in the metric that actually matters to participants — compounded long-run wealth. And the plan-wide results for DB plans serve as strong, real-world support for the academic literature's characterization of private-market-asset valuation lag.[51]

C. Implications for the Comparison

The implication for the DC-versus-DB comparison is that the headline risk-adjusted figures (Table 2) understate the true DC risk-adjusted advantage. Because DB plans benefit from smoothing-driven downward bias in their reported volatility, their Sharpe and Sortino

ratios are inflated relative to the true economic measure. If we were to un-smooth the DB return series using the academic methodologies described in the literature[52] — which typically increases the implied private equity volatility by 50 percent or more above the reported volatility — the DC Sharpe-ratio comparison would move from the current near-tie (0.769 versus 0.766) to a clear DC advantage of 0.769 versus 0.55–0.65. The DC Sortino advantage would similarly widen substantially. And the DC worst-2-year advantage — already −3.91 percent for DC versus −6.50 percent for the All DB cohort — would, on an un-smoothed basis, widen further.

It is worth pausing on the implication of this. The conventional case for DB plans — the case that the proposed rule's supporters make — is that DB plans provide superior risk-adjusted outcomes for participants because alternatives reduce volatility. The data flatly contradict this. DB plans receive a structural tailwind on their reported risk metrics from the smoothing of alternative-investment valuations, *and even with that tailwind*, the risk-adjusted comparison still favors DC plans. If anything, the alternative-investment exposure that the proposed rule wishes to bring into DC plans has historically delivered *worse* risk-adjusted outcomes for the actual participants who own those investments — a result that becomes even more pronounced once the cosmetic smoothing benefit is stripped out.

VII. Plan Size: DB Plans Are Substantially Larger

A skeptical reader might wonder whether the headline DC advantage documented in Sections IV through VI is somehow an artifact of comparing apples to oranges along the dimension of plan size. Smaller plans, on average, face higher per-dollar costs in custody, recordkeeping, audit, investment management, and trading.[53] If the typical DC plan in our cohort were substantially smaller than the typical DB plan, then a meaningful portion of any apparent DB underperformance could trace to size-related cost disadvantages rather than to investment-policy choices. This Section examines that hypothesis and finds that it points in exactly the wrong direction: DB plans, on an asset-weighted basis, are **substantially larger** than DC plans, not smaller. Whatever return advantage scale provides, it has accrued (or should have accrued) to the DB cohort, not the DC cohort. Indeed, the entire All DB Plans cohort is, on an asset-weighted basis, more than twice the size of even the largest DC plans — and those large DC plans still outperform it across every trailing window.

A. Plan-Size Distribution by Cohort

Figure 8 reports the median plan size and the asset-weighted average plan size for four cohorts: DC ALL, DC plans larger than $1 billion, the private-sector defined benefit universe,

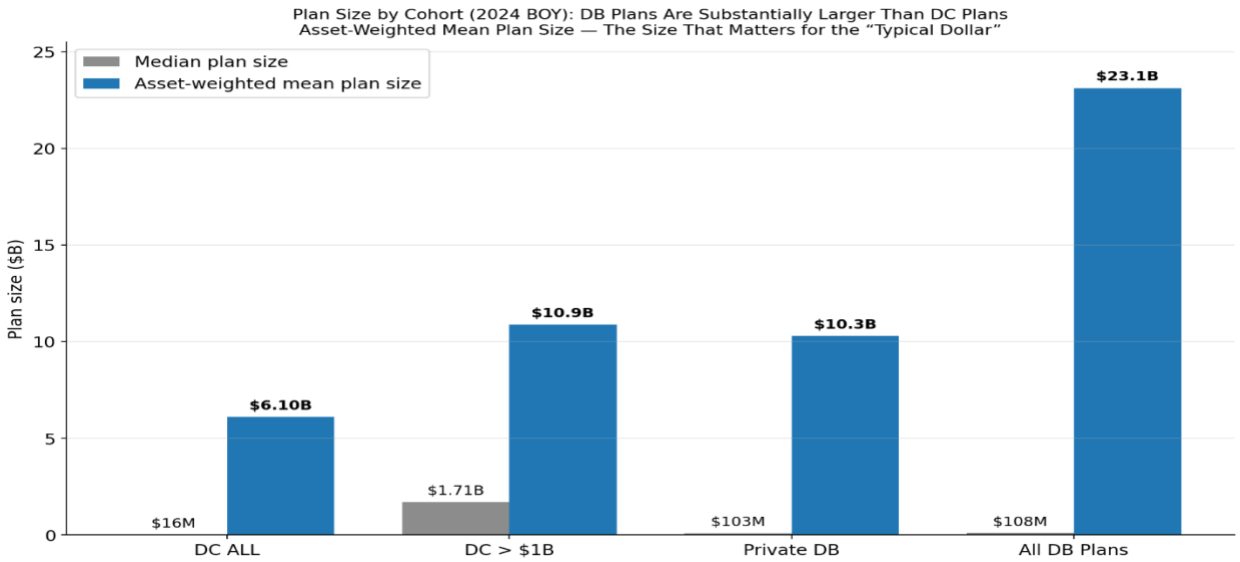


Figure 8. Plan size by cohort, 2024 beginning-of-year assets. Median plan size in gray; asset-weighted mean plan size in blue. DC and private DB figures are from Form 5500 Schedule H; the All DB Plans bar combines those private-sector DB plans with the calendar-year-reporting U.S. public pensions (sized from the Public Plans Database), whose very large average size lifts the All DB asset-weighted mean well above the private-DB-only figure. Source: Form 5500 Schedule H data; Public Plans Database.

and the full All DB Plans cohort (private-sector DB plans plus the calendar-year-reporting U.S. public pensions). The asset-weighted average plan size is the size measure that matters for the participant-experience comparison — it represents the size of the plan in which the typical dollar in the cohort resides.

Two observations are immediate. First, the median DC plan ($16 million) is dramatically smaller than the median DB plan ($103 million in the private-sector universe, $108 million across the full All DB cohort). This reflects the very broad universe of DC plans, including thousands of small-employer 401(k) and 403(b) arrangements. Second, however, the asset-weighted average plan size paints the opposite picture. The typical dollar in a DC plan resides in a plan that is $6.1 billion in size; the typical dollar in a private-sector DB plan resides in a $10.3 billion plan; and the typical dollar in the full All DB Plans cohort resides in a plan of $23.1 billion — nearly four times the average DC plan, and more than twice the average even among DC plans larger than $1 billion ($10.9 billion). The calendar-year-reporting public pensions, individually enormous, lift the All DB asset-weighted average far above the private-DB-only figure. By the size metric that matters for participant experience, DB plans are not smaller than DC plans; they are multiples larger.

B. Scale Should Help DB Plans

DB plans of the size that holds the typical DB dollar should enjoy substantial scale advantages over DC plans of the size that holds the typical DC dollar. Specifically:

Lower per-dollar fees. Custody, recordkeeping, audit, actuarial, and trustee fees are largely fixed costs that decline as a percentage of assets as plan size grows. Investment management fees — the largest single category of plan expense — similarly exhibit substantial economies of scale, with separate-account institutional pricing well below the retail or commingled-fund pricing typical of mid-size DC plans.

Preferential access to oversubscribed fund vehicles. DB plans of $10 billion in size can negotiate preferential terms with private-equity general partners, secure allocations to oversubscribed funds, obtain side-letter benefits, and gain access to co-investment and direct-investment opportunities that are unavailable to smaller investors. Smaller DC plans are largely confined to retail-share-class commingled vehicles.

In-house investment staff. DB plans at this scale typically employ dedicated investment professionals with substantial expertise in manager selection, asset allocation, and direct alternative-investment evaluation. Most DC plans rely on outside investment consultants or recordkeepers for these functions.

Patient capital and long horizons. DB plans have multi-decade investment horizons and do not need to maintain daily liquidity, allowing them to invest in illiquid asset classes that are theoretically supposed to earn an illiquidity premium.

Each of these structural advantages is the basis for an argument that DB plans should outperform DC plans — in particular, that DB plans should outperform smaller, less sophisticated DC plans. The data we have presented in Sections IV through VI show that these structural advantages have not produced realized return advantages. DB plans underperformed DC plans despite their scale, their in-house expertise, their preferential market access, and their longer horizons.

C. Even the Largest DC Plans Outperform the Larger DB Universe

To test the size-disadvantage hypothesis directly, we compare the DC plans that are themselves large — those holding more than $1 billion in assets — against the entire All DB Plans cohort. We use the larger DC cohort rather than the full DC universe because it is the more size-comparable benchmark: its asset-weighted average plan holds $10.9 billion, far closer to the All DB cohort's $23.1 billion than the full DC universe's $6.1 billion is, and the two cohorts hold broadly comparable total assets ($3.2 trillion for DC > $1B against $2.5 trillion for All DB). Restricting the DC side to plans over $1 billion thus makes this a better size-controlled test of whether plan size — rather than investment policy — drives the DC advantage than the headline DC-ALL-versus-All-DB comparison in Table 1. The DC > $1B subcohort comprises 1,015 plans with $3,228 billion in beginning-of-year 2024 assets; the All DB Plans cohort holds approximately $2.49 trillion across 2,587 plans. Even on this more size-comparable footing — where the All DB cohort's plans remain, on average, more than twice the size of the DC > $1B plans — DC outperforms across every window. Table 4 reports the asset-weighted returns.

Table 4: Asset Weighted Returns

Trailing window (through 12/31/2024)	DC > $1B (asset-weighted)	All DB Plans (asset-weighted)	DC > $1B advantage
5-year (2020–2024)	**8.17%**	4.78%	**+339 bps**
10-year (2015–2024)	**7.90%**	5.90%	**+200 bps**
16-year (2009–2024)	**9.21%**	7.79%	**+142 bps**

Table 4. Asset-weighted annualized returns, DC plans larger than $1 billion versus the full All DB Plans cohort, through December 31, 2024. The All DB Plans cohort's asset-weighted average plan size ($23.1 billion) is more than twice that of the DC > $1B subcohort ($10.9 billion), so the comparison runs against DC on the size dimension; DC outperforms nonetheless. Source: Authors' calculations.

The DC advantage is large and consistent: 142 basis points over 16 years, 200 basis points over 10 years, and 339 basis points over 5 years. The 16-year gap (142 basis points) is in fact slightly wider than the 134-basis-point gap for the DC universe as a whole, because the largest DC plans modestly outperformed the broader DC cohort. The size-disadvantage

hypothesis is not merely unsupported; the data run squarely against it. The DC return advantage cannot be a small-plan-cost artifact, because the DC cohort that produces it is, if anything, smaller than the DB cohort it outperforms.

This result is the opposite of what the conventional wisdom predicts. The largest DB plans hold the highest allocations to private equity, hedge funds, and other alternative investments; the Council of Economic Advisers cites 30 percent of large public-pension DB assets in alternatives. If alternatives provided meaningful return enhancement, the large, alternative-heavy DB universe should outperform — especially a DC cohort holding essentially no alternatives. Instead, even the largest DC plans, holding almost entirely low-cost public-market index exposure, outperformed the entire All DB universe across every window. The plans most likely to be operating exactly the sophisticated, alternative-heavy investment program that the proposed rule's supporters describe are the plans whose underperformance is most pronounced.

The size-comparable comparison holds on a risk-adjusted basis as well. Table 5 reports the standard risk-adjusted measures for the DC > $1B subcohort against the full All DB Plans cohort over the same 16-year window through December 31, 2024.

Table 5: Risk-Adjusted Measures by Plan Size			
Risk-Adjusted Measure (16-year window, 2009–2024)	**DC > $1B**	**All DB Plans**	**DC > $1B advantage?**
Standard deviation of annual returns	10.21%	8.69%	DB lower
Sharpe ratio	0.791	0.766	✓ **DC better**
Sortino ratio	1.806	1.562	✓ **DC better**
Worst single-year return	−15.53%	−15.13%	DB narrowly
Worst rolling 2-year compound return	−3.37%	−6.50%	✓ **DC much better**

Table 5. Risk-adjusted measures, DC plans larger than $1 billion versus the full All DB Plans cohort, 16-year window through December 31, 2024. Source: Authors' calculations.

On a risk-adjusted basis the size-comparable picture mirrors the headline result. The DC > $1B subcohort posts higher Sharpe and Sortino ratios than the full All DB Plans cohort and a far shallower worst two-year drawdown (−3.37 percent against −6.50 percent); the DB cohort retains only its expected edge in raw return volatility and a marginally smaller worst single year. Plan size therefore does not rescue the alternatives thesis on a risk-adjusted basis any more than it does on raw returns.

VIII. Framework 2 Confirmatory Comparison: All U.S. Pension Plans

Sections IV through VII presented our headline results using Framework 1: a comparison of DC plans against the All DB Plans cohort (open U.S. private-sector DB plans plus calendar-year-reporting U.S. public pensions) over 2009–2024. Framework 1 is our headline framework because it uses actual reported annual return data from every plan in both cohorts, requires no translation methodology, and runs through the most recent calendar year for which complete data exist. This Section presents Framework 2: a confirmatory comparison that extends the DB-side cohort to include the full U.S. public pension universe (via the translation methodology described in Section III.E and Appendix A) and runs through calendar year 2023.

Framework 2 is confirmatory rather than headline for two reasons. First, it requires translation of approximately 157 large non-calendar-year-reporting U.S. public pension plans — including CalPERS, CalSTRS, the New York systems, the Florida Retirement System, the Texas Teachers Retirement System, and other major June-30 fiscal-year reporters — to a calendar-year-equivalent basis. While we have validated the translation methodology against four major plans (Mass PRIT, CalPERS, CalSTRS, PSERS) and found it accurate to within roughly 13–36 basis points for multi-year compound comparisons,[54] it does introduce some noise that the Framework 1 comparison does not. Second, the most recent June-30 fiscal year that can be incorporated into the translation is FY 2024 (July 2023 – June 2024), so the translated-public-pension series ends in calendar year 2023, one year short of Framework 1.

A. All DB Plans (Extended)

Under Framework 2, the relevant DB-side cohort is the All DB Plans (Extended) cohort defined in Section III.B: the combined universe of all open U.S. private-sector defined benefit plans, all calendar-year-reporting U.S. public pensions, and all non-calendar-year-reporting U.S. public pensions translated to a calendar-year basis. This Extended cohort holds approximately $6,015 billion in BOY 2023 assets across approximately 2,750 plans — representing essentially the entire universe of U.S. defined benefit pension assets, public and private. Figure 9 shows the annual asset-weighted returns of DC ALL and the All DB Plans (Extended) cohort over 2009–2023.

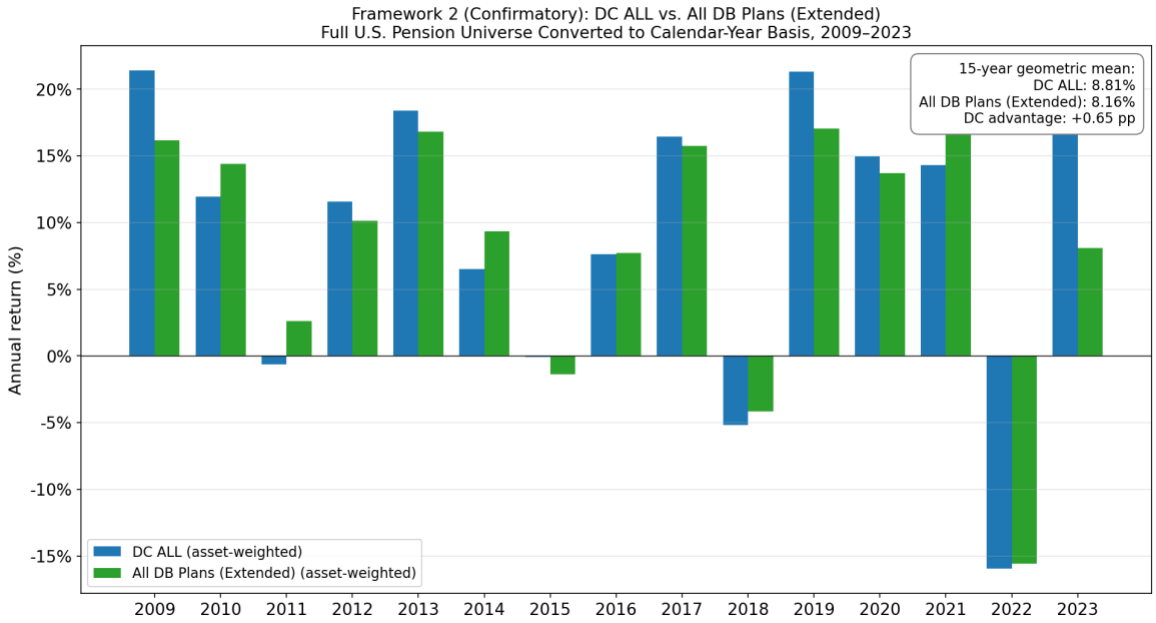


Figure 9. Defined contribution plans (DC ALL, asset-weighted) versus the All DB Plans (Extended) cohort — the full U.S. public-and-private pension universe converted to calendar-year basis via translation methodology, asset-weighted — annual returns, 2009–2023. Source: Authors' calculations.

B. Trailing-Period Comparison

Table 6 reports the trailing-period asset-weighted returns under Framework 2.

Table 6: Trailing Period Asset-Weighted Returns				
Trailing window (through 12/31/2023)	**DC ALL**	**DC > $1B**	**All DB Plans (Extended)**	**DC ALL advantage**
5-year (2019–2023)	**9.48%**	**9.49%**	7.48%	**+200 bps**
10-year (2014–2023)	**7.12%**	**7.19%**	6.33%	**+79 bps**
15-year (2009–2023)	**8.81%**	**8.88%**	8.16%	**+65 bps**

Table 6. Framework 2 asset-weighted annualized returns by cohort and trailing window, through December 31, 2023. The All DB Plans (Extended) cohort represents essentially the entire universe of U.S. defined benefit pension assets, public and private (~$6.0 trillion across ~2,750 plans), with non-calendar-year fiscal years converted to calendar-year equivalents using the methodology in Appendix A. Source: Authors' calculations.

The headline conclusion is identical under Framework 2. DC plans outperformed the full U.S. defined benefit universe across every trailing window. The DC advantage is 200 basis points per year over the most recent five years, 79 basis points per year over ten years, and 65 basis points per year over the full fifteen-year window. The translation methodology, whatever noise it introduces, does not change the direction or substantially change the

magnitude of the comparison. The pattern we observe in Framework 1 — large, persistent, growing DC outperformance — holds equally under Framework 2.

C. Risk-Adjusted Comparison Under Framework 2

Under Framework 2, as shown below in Table 7, the risk-adjusted picture closely tracks the one Framework 1 produced. On the Sharpe ratio the cohorts are effectively even: DC ALL registers 0.741 against 0.761 for the All DB Plans (Extended) cohort, while the size-comparable DC > $1B subcohort edges slightly ahead at 0.762 — a difference small enough to be a wash. On the downside-risk-sensitive Sortino ratio the DC advantage is clear (DC ALL 1.707 and DC > $1B 1.768 versus 1.625 for the Extended DB cohort), and the worst rolling 2-year compound return was far shallower for DC participants (−3.91 percent) than for the Extended DB cohort (−8.73 percent). As under Framework 1, the risk-adjusted comparison favors DC plans decisively on the downside-sensitive measures and is essentially a tie on the Sharpe ratio — again subject to the substantial smoothing-driven downward bias in the DB cohorts' reported volatility metrics described in Section VI.

Table 7: Framework 2 Risk-Adjusted Comparison Between DC and DB
(Risk-adjusted 15-year window, 2009–2023)

Measure (Framework 2)	DC ALL	DC > $1B	All DB Plans (Extended)	DC advantage
Standard deviation of annual returns	10.70%	10.50%	9.57%	DB lower
Sharpe ratio	**0.741**	**0.762**	0.761	DC > $1B wins narrowly
Sortino ratio	**1.707**	**1.768**	1.625	**✓ DC better**
Worst single-year return	−15.95%	−15.53%	−15.57%	DC > $1B wins narrowly
Worst rolling 2-year compound return	**−3.91%**	**−3.37%**	−8.73%	**✓ DC much better**

Table 7. Framework 2 risk-adjusted comparison of DC ALL, the DC > $1B subcohort, and the All DB Plans (Extended) cohort over the 15-year window ending December 31, 2023. The All DB Plans (Extended) cohort comprises essentially the entire U.S. defined benefit universe (~$6.0 trillion across ~2,750 plans), with non-calendar-year fiscal years converted to calendar-year equivalents via the methodology in Appendix A. As discussed in Section VI, these reported risk metrics are subject to the appraisal-based smoothing that flatters the DB cohort's volatility. Source: Authors' calculations.

The result supports the thesis of this white paper in several respects. First, adding the remainder of the public-pension universe substantially undermines the case for better risk protection from alternative investments. While the calendar-year-reporting segment of the DB plan universe had a better 2-year compound return in 2022 and 2023 than DC plans, those returns are now materially worse, trailing DC plans during this period by 482 basis points (4.82%). Second, the absolute and risk-adjusted outperformance holds when the remainder of the public pension universe is added, despite the fact that including this cohort requires excluding 2024 from the analysis, which was the best year of relative DC plan performance.

IX. The 2022 Tail-Risk Cross-Section

Calendar year 2022 was the most severe single-year drawdown in the 16-year sample window, with a 60/40 public-securities portfolio losing approximately 16 percent. Because 2022 simultaneously stressed public equity and fixed income (the unusual feature of the post-Volcker fixed-income environment that produced positive bond returns during equity drawdowns finally broke as the Federal Reserve aggressively tightened policy), it provides an unusually informative cross-section for examining how DB and DC plans actually performed under stress. Figure 10 shows the cross-sectional distribution of plan-level 2022 returns across our cohorts.

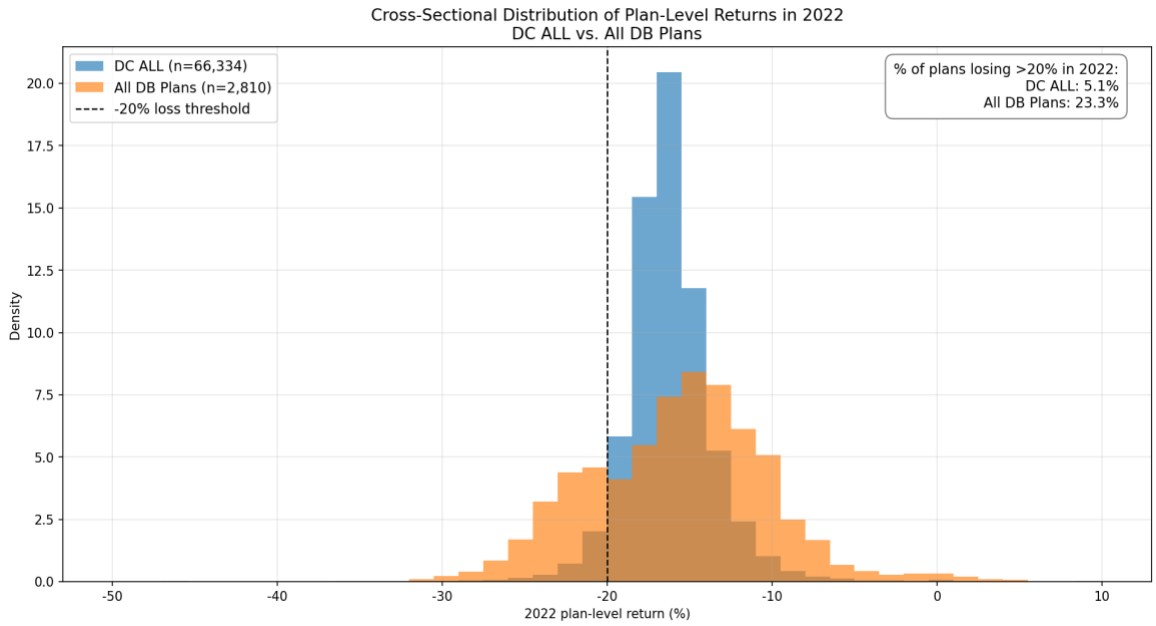


Figure 10. Cross-sectional distribution of plan-level 2022 calendar-year returns by cohort. Source: Authors' calculations.

A. The Distributions

DC plans clustered around the public-securities-portfolio benchmark: their 2022 returns are tightly distributed around −16 percent, reflecting their predominantly index-fund-based portfolios. The All DB Plans cohort exhibits a substantially wider distribution. Within the cohort, the private-sector DB component included a meaningful tail of plans heavily exposed to long-duration fixed income that lost more than 20 percent in 2022 (a rising-rate environment is particularly punishing for long-duration assets), as well as some plans heavily exposed to alternative investments that reported substantially smaller losses

(because their alternative-investment valuations were marked down by less than the underlying public-market loss). Within the calendar-year-reporting public-pension component of the cohort — which carries even higher alternative allocations — essentially no plans reported losses worse than 15 percent.

B. Tail-Risk Comparison

Table 8 summarizes the tail-risk experience. We define a "severe" drawdown as a 2022 loss greater than 20 percent.

Table 8: Tail-Risk Experience During 2022			
Cohort	**Median 2022 return**	**% of plans losing more than 20%**	**Worst-quartile cutoff**
DC ALL	**−16.41%**	**5.1%**	**−17.63%**
DC > $1B	−16.43%	3.2%	−17.69%
All DB Plans	**−15.34%**	**23.3%**	**−19.62%**
Within: calendar-year-reporting public pensions	−11.50%	0.0%	−12.80%

Table 8. Plan-level 2022 calendar-year return distribution by cohort. The "worst-quartile cutoff" is the return level above which 75 percent of plans in the cohort reported. The All DB Plans figures are weighted across the constituent private-sector and calendar-year-reporting public-pension subsets; the sub-row separately reports the calendar-year-reporting public-pension subset to highlight the contribution of appraisal-based smoothing. Source: Authors' calculations.

The cross-section reveals a fact that is rarely acknowledged in the policy debate. **The All DB Plans cohort — the universe whose investment programs the proposed rule cites as the model for DC plan participants — had over four times the rate of severe drawdowns in 2022 as DC plans.** Nearly a quarter of DB plans (23.3 percent) lost more than 20 percent of their assets in 2022, compared with 5.1 percent of DC plans. Notably, this severe-drawdown gap coexists with a DB median that is actually slightly less negative than the DC median (−15.34 percent for All DB Plans versus −16.41 percent for DC ALL). The two facts are reconciled by the shape of the distributions: the All DB Plans cohort is far wider on both tails. It contains both a heavy tail of plans doing much worse than −20 percent (the long-duration-fixed-income-concentrated plans, hammered by the 2022 rate shock) and a cluster of plans doing better than −15 percent (the alternatives-heavy plans whose appraisal-based valuations did not mark down as far as public markets fell). The DC distribution, by contrast, is tightly clustered near its asset-weighted average, because DC plans hold predominantly daily-priced public equity and bond index funds. The wider DB

dispersion — not a lower DB median — is what produces the fourfold severe-drawdown ratio. This is the actual cross-sectional risk experience of DB plan participants. It is not the picture that the proposed rule's preamble paints when it describes DB plans as having superior risk management.

The within-cohort breakdown is also informative. Calendar-year-reporting U.S. public pensions, which constitute approximately 26 percent of the All DB Plans cohort by assets, reported median 2022 losses of only −11.50 percent, and not a single plan in the public-pension subset lost more than 20 percent. This is the smoothing artifact at work in real time. Calendar-year-reporting public pensions hold the heaviest alternative allocations in our universe (typically 35–40 percent), and the appraisal-based valuations of those alternatives mechanically dampened the reported 2022 loss. The cross-sectional reading of Table 8 thus encodes the smoothing-artifact problem directly. The cohort that *looks* lowest-risk in 2022 is the cohort whose underlying risk is most heavily masked by appraisal-based valuation. As shown in Section VI, the calendar-year-reporting public-pension subset's 2-year compound experience (−0.51 percent over 2022–2023) was roughly comparable to the DC cohort's (−1.33 percent), notwithstanding the much smoother 2022 single-year reporting — a result driven by these public pension plans' substantial equity exposure (44 percent labeled, 67.5 percent on a look-through basis) capturing the 2023 recovery. The fundamental observation, however, is that the apparently superior 2022 risk metrics did not produce superior long-run outcomes for the broader DB universe, because smoothing merely postpones losses, it does not avoid them. The All DB Plans cohort ended the two-year window at −6.50 percent compound — substantially worse than DC — because its much smaller equity allocation prevented it from participating in the 2023 recovery on the same scale as DC participants.

X. Unreliability of the Existing Foundation

The previous Sections established the empirical fact: DC plans have outperformed DB plans by substantial margins over the most recent sixteen calendar years on every measure we computed. Section II documented the breadth of the contrary claim in the rulemaking record and in the surrounding policy debate. This Section asks a different question: how is it that the conventional wisdom can be so confidently stated by so many sophisticated actors when the underlying data so plainly contradict it? The answer involves identifiable methodological deficiencies in the studies most often cited in support of the conventional wisdom — deficiencies that, on inspection, systematically inflate the apparent returns of alternative investments and obscure the actual experience of retirement plan participants.

A. The Studies Cited by the Department of Labor

The preamble to the proposed rule cites two academic studies in support of its empirical claims about pension plan performance: Jean-Pierre Aubry, *Public Pension Investment Update: Have Alternatives Helped or Hurt?*, Center for Retirement Research at Boston College, State and Local Pension Plans Issue Brief No. 82 (2022); and Arthur Korteweg, *Risk-Adjusted Returns of Private Equity: What We Know and What We Don't*, Annual Review of Financial Economics (2023).[55] Both studies, on which the Department relies for empirical foundation, find results that **undercut** the case for the proposed rule.

Aubry (2022), the Department's principal cited authority on public pension plan investment performance, analyzed the relationship between public pension plans' alternative-investment allocations and their realized returns over 2001–2022. The study's headline finding is that a one-percentage-point increase in alternative-investment allocation was associated with **no statistically significant change** in pension plan returns, and that public pensions with the highest alternative allocations did **not outperform** those with the lowest.[56] That is the opposite of the proposition for which the rule's preamble cites the study. Aubry's conclusion is that the explosion in public pension alternative-investment allocations over the past two decades — from roughly 9 percent of assets in 2001 to over 30 percent of assets in 2022 — has not produced any measurable return enhancement, and may have produced *negative* excess returns net of fees.

Korteweg (2023) is a survey of the academic literature on private-equity returns. Its principal finding is that risk-adjusted private-equity returns, properly measured (controlling for leverage, illiquidity, and selection biases in benchmark indices), are not statistically

distinguishable from public-market returns. The Department's reliance on Korteweg as authority for the proposition that private equity offers superior risk-adjusted returns inverts the study's actual conclusions. Korteweg's overview of the empirical literature emphasizes that net-of-fee returns to limited partners (the actual investor experience) are substantially lower than the gross returns frequently cited by general partners and consultants — and that, once the appropriate beta and illiquidity adjustments are made, the net-of-fee LP experience is not materially better than a comparable public-market allocation.

These are the two academic studies the Department itself cited for empirical foundation. Both, properly read, contradict the rule. The Department appears to have cited them in support of the rule's policy direction without engaging with their actual conclusions — a methodological problem that would, in itself, justify a re-proposal under different empirical assumptions.

B. The CEA's Own Inputs Undercut Its Conclusion

The Council of Economic Advisers' report, discussed in Section II.A, warrants separate attention, because its own inputs do not support the conclusion the report draws from them. Two features of the CEA's analysis are worth examining.

First, the CEA's return claim rests on stale data. The report's central evidence that private equity outperforms public equity is a survey of academic public-market-equivalent (PME) estimates for buyout funds, which the report reads as showing outperformance of "more than 3 percent annually" net of fees, with an annualized average PME of 1.27. But the PME estimates the CEA surveys are drawn from buyout-fund vintage years that end in roughly 2014, and the studies the CEA cites for them — Higson and Stucke (2012), Harris, Jenkinson and Kaplan (2014), and Robinson and Sensoy (2013) — were published more than a decade ago.[57] This is the same staleness problem that afflicts the CEM Benchmarking data discussed in the next subsection: the most recent decade — the decade during which, as this paper documents, public equity has outperformed alternatives net of fees and the realized DC–DB gap has reversed — is absent from the CEA's evidence base. A return premium measured over vintages ending in 2014 cannot establish that the premium persisted through 2024, and the comprehensive plan-level data presented in Sections IV through IX indicates that it did not.

Second, and more fundamentally, the CEA's own risk-adjusted inputs show that private equity is not a standout. The mean-variance simulation that generates the report's headline Sharpe-ratio and lifetime-income gains takes its asset-class inputs from Korteweg and Westerfield (2022). Those inputs, reproduced in the CEA's own Table 1, assign private equity (buyout) a standalone Sharpe ratio of 0.31 — *below* that of public stocks (0.32) and

far below that of bonds (0.90).[58] On a standalone risk-adjusted basis, in other words, the CEA's own numbers show private equity to be the least attractive of the three asset classes it models. Whatever benefit the simulation produces therefore comes entirely from an assumed diversification effect — the report's assumed correlation of private equity with stocks (0.82) and with bonds (−0.39) — and not from private equity being a superior asset in its own right. That distinction matters, because the diversification benefit is precisely what the realized data can test. If the modeled correlations and the diversification benefit they imply were borne out in practice, the plans that actually hold large alternative allocations would display higher risk-adjusted returns than the alternative-free DC cohort. They do not: as Section IV.D and Section VI show, the All DB Plans cohort underperformed DC plans on Sharpe ratio, on Sortino ratio, and on every other risk-adjusted measure we computed — and that is before correcting for the appraisal-smoothing that, as the CEA itself acknowledges in adopting the unsmoothed 25.91 percent private-equity volatility from Geltner (1991), flatters the reported risk metrics of alternative-heavy portfolios. The diversification benefit that the CEA's simulation assumes did not materialize for the investors who actually bore the exposure.

C. The CEM Benchmarking Data

The most-cited empirical source for the proposition that DB plans have outperformed DC plans by approximately 0.5 percent annually — the figure repeated by Larry Fink,[59] by the Bipartisan Policy Center,[60] and in numerous industry filings — is the CEM Benchmarking 2018 white paper *Defined Contribution Plans Have Come a Long Way!*[61] The CEM data has two rather obvious structural limitations compared to the analysis contained herein.

First, the sample period covered in the most-cited CEM result is 2007–2016, which now ends a decade in the past. CEM's earlier study covering 1998–2005 reported DB outperformance of 180 basis points per year; the 2018 update covering 2007–2016 reported DB outperformance had narrowed to 47 basis points per year. The trajectory of the DB-DC differential, measured at the boundary of the available data, is sharply downward. Our analysis using comprehensive Form 5500 data and U.S. public pension data through 2024 finds that the trajectory has continued past zero and into negative territory: over the 16-year window ending in 2024, DC plans outperformed the All DB Plans cohort by 134 basis points per year. The DB advantage that the CEM data once supported has reversed.

Second, the CEM samples are self-selected. CEM's data comes from plans that voluntarily contribute their data to CEM, typically for benchmarking and consulting purposes. This sample is heavily skewed toward large institutional plans with sophisticated investment programs — the plans most likely to be heavily invested in alternative investments, and the plans whose investment programs are most likely to be cited as the model for DC plan reform. The CEM sample is not representative of the universe of U.S. retirement plans. Our

analysis, using the comprehensive Form 5500 dataset (which captures essentially every U.S. private-sector retirement plan above the filing threshold) and the Public Plans Database (which captures essentially every large U.S. public pension), avoids this selection bias by including the entire universe.

D. Morningstar's Analyses

Morningstar has published a sequence of analyses examining the studies most often cited in support of expanded alternative-investment access in 401(k) plans, and the consistent thread of those analyses is that the underlying studies fail in several important ways. Morningstar's 2024 study of private-equity manager selection by twenty of the largest U.S. private pension plans, covering a twelve-year period, found **no evidence** that these large, sophisticated plans demonstrated above-mean skill in selecting private-equity managers.[62] That is a deeply important finding for the rulemaking debate, because private-equity returns are characterized by exceptionally high dispersion between top-quartile and bottom-quartile managers. The value proposition of including private equity at all depends on participants gaining access to top-tier managers. If even the largest, most sophisticated private pension plans — plans with full-time investment staffs, decades of relationships, and unrestricted manager selection — cannot consistently pick the better managers, the prospect that a 401(k) target-date fund with a contractual private-equity allocation will do so is remote.

Morningstar's 2025 modeling of evergreen private-market vehicles inside realistic 401(k) participant trajectories finds only a *modest* return enhancement, not the substantial outperformance that proponents of the proposed rule have asserted.[63] And Morningstar's 2026 analysis of liquidity dynamics in semiliquid private-market vehicles finds that even modest redemption patterns can quickly strain those vehicles, forcing the manager to hold large liquidity buffers that themselves dilute the return premium the product was designed to deliver.[64] In effect, the structural features that make a vehicle suitable for 401(k) use also reduce the very return enhancement that justifies including it.

E. The Academic Literature on Private Equity

The academic literature on private equity has, over the past decade, increasingly converged on the conclusion that the historically cited private-equity premium relative to public equity is in important part an artifact of (a) selection biases in the statistical measures and experiences used to measure private-equity returns, (b) inappropriate benchmarks (typically the S&P 500, when a more appropriate benchmark would be a small-cap-leveraged-equity index), (c) the leverage embedded in private-equity transactions, and (d)

the smoothing artifact discussed in Section VI. Phalippou (2020) shows that adjusted private-equity returns, properly stripped of selection and survivorship biases and computed against actual investor cash flows, are not materially different from a low-cost public equity index after fees.[65] The broader literature converges on the conclusion that the average dollar invested in private equity has earned approximately the same return as the same dollar in public equities net of fees, with substantially worse liquidity characteristics, materially higher fee burdens, and substantially more agency-cost exposure.[66]

None of this empirical work is reflected in the figures cited in the rulemaking record or in the conservative coalition letter. The picture painted by the rulemaking record is of a substantial return premium available from alternative investments that DB plans have harvested and DC plans have been excluded from. The picture painted by careful academic literature is of a return premium that, properly measured net of fees and agency costs, is at best ambiguous and at worst negative.

XI. Why the Conventional Wisdom Persists

If the empirical case for DB outperformance has reversed so decisively, why has the conventional wisdom not adjusted? This Section identifies three reinforcing mechanisms: aging benchmarks, the transformation of DC plan design that the conventional wisdom has not absorbed, and the commercial interests that drive the propagation of the original claim.

A. Aging Benchmarks

The most-cited empirical sources for the DB-outperformance claim date from a period — roughly 1998–2016 — that ends nearly a decade ago. The CEM Benchmarking data that underlies the publicly cited "about 0.5%" figure traces in important part to the 2018 study covering 2007–2016. The Munnell, Aubry, and Crawford CRR brief that the Bipartisan Policy Center cites was published in 2015 and uses data through 2014. The original CEM result of 180 basis points DB advantage covered the 1998–2005 period. None of these benchmark sources reflects the most recent decade of plan performance, which is the decade during which the DC-DB gap has reversed.

The dynamics that produced this reversal are not subtle. Over the most recent decade, U.S. public equity has substantially outperformed alternative investments on a net-of-fee basis; the S&P 500 returned approximately 13 percent annualized over 2015–2024, while a typical institutional private-equity portfolio returned approximately 10–11 percent net of fees over the same period (and a typical institutional hedge-fund portfolio returned approximately 5–6 percent net of fees). Plans with high public-equity allocations — i.e., DC plans — outperformed plans with high alternative-investment allocations — i.e., DB plans — over this period by an amount that closely tracks the underlying asset-class return differential. This dynamic is not captured in the pre-2016 benchmark data, which covered a period when low-cost public-equity index access was less universal in DC plans and when alternative-investment vehicles had not yet experienced the multi-decade fee compression and capital saturation that has reduced their net-of-fee returns.

B. The Transformation of DC Plan Design

Between approximately 2000 and 2015, the design of U.S. DC plans underwent a substantial transformation. The 2006 Pension Protection Act facilitated automatic

enrollment, automatic escalation, and qualified default investment alternatives (QDIAs). Diversified target-date funds replaced concentrated employer-stock holdings as the predominant default investment. Low-cost institutional share classes and collective investment trusts replaced retail mutual funds. Recordkeeping and administrative fees declined materially as the industry consolidated and as fee-disclosure regulations took effect.[67]

The cumulative effect of these changes is that the typical DC plan in 2024 bears little resemblance to the typical DC plan in 2005. The 1998–2005 sample period that produced the 180-basis-point CEM DB advantage included DC plans that frequently held large concentrations of company stock (in some cases over 50 percent of plan assets) and high-cost actively managed mutual funds with substantial loads and 12b-1 fees. By the most recent 10-year window in our sample, those structural disadvantages of DC plans have been largely engineered away. The DC plan that the CEM 2018 study compared against DB plans is not the DC plan that exists today. The conventional wisdom has not caught up.

C. The Repetition Dynamic and Commercial Interests

The DB-outperformance claim is repeated most enthusiastically by the parties who would benefit financially from expanded 401(k) access to alternatives: private equity firms, alternative-asset managers, hedge funds, real-estate sponsors, and the asset-management arms of large financial institutions. These actors are sophisticated and intelligent, and their analyses, while not generally fabricated, are also not disinterested. Their claim has propagated through repetition rather than rigorous reverification. Each repetition cites the prior repetition rather than the underlying data. Each filing citing CEM 2018 takes the CEM finding as established empirical fact rather than as a result limited to a specific (and now-aging) sample window. The claim has acquired the appearance of established fact through the social process of repeated citation, not through empirical confirmation.

The CEM Benchmarking data — much-cited but increasingly stale — is in important ways the load-bearing empirical foundation for the entire policy debate. Our finding that the DC-DB gap has reversed using the comprehensive Form 5500 data merits serious examination, not least because that examination is the type of due diligence the rulemaking record itself should have required.

XII. Policy Implications and Conclusion

The proposed rule lacks an empirical foundation. Defined benefit plans have been heavily allocated to alternative investments for decades; but those allocations have not improved outcomes. If alternative assets generate better returns, DB plans should outperform DC plans on an absolute or risk-adjusted basis. The data presented in this paper demonstrate, using the comprehensive Form 5500 dataset and Public Plans Database, that the opposite is true: defined contribution plans have outperformed defined benefit plans by a substantial margin over the most recent sixteen years for which complete data exist on an absolute basis; and the risk-adjusted numbers favoring DC plans as well.

The DC advantage is not small and it holds under all tested conditions. DC plans generated returns 134 basis points higher per year over the All DB Plans cohort, compounded to approximately 22 percent more wealth over a 16-year window. It is not limited to a single window: it holds over 5-, 10-, and 16-year trailing periods. It is not a function of small-plan cost disadvantage: it persists and widens when we restrict to plans larger than $1 billion. It is not an artifact of risk-adjustment: the risk-adjusted numbers favor DC plans, decisively so on the Sortino ratio and the worst-2-year compound return. It is not specific to a narrow DB comparison group: it holds against the All DB Plans cohort (calendar-year-reporting, Framework 1) and against the All DB Plans (Extended) cohort comprising essentially the entire universe of U.S. defined benefit pension assets (Framework 2). And it holds despite the structural advantages that DB plans should enjoy — larger plan size, in-house investment expertise, preferential access to private-market vehicles, longer investment horizons, and the cosmetic benefit of appraisal-based valuation smoothing that flatters their reported risk metrics.

Most importantly, the DC advantage holds despite the fact that DC plans hold essentially zero allocation to the alternative-investment categories that the proposed rule is intended to make available to them. The Council of Economic Advisers, in support of the rule, projected that the alternative investments DB plans hold carry a return and risk-adjusted-return premium that would improve DC participant outcomes. The data show the opposite of what that premium would predict: the alternative-heavy DB cohort has materially underperformed the alternative-free DC cohort. The proposed rule and the Executive Order that it implements would, if successful, replace a portion of DC participants' high-return, low-cost direct public-equity exposure with lower-return, high-cost indirect alternative-investment exposure. The expected effect is to reduce DC participants' net returns and worsen their retirement security.[68]

A. The Mechanism Is Identifiable

The DC advantage is not a coincidence. It is the predictable consequence of two independent mechanisms. First, DC plans hold substantially more economic equity exposure than DB plans — 30 percentage points more than private DB plans on a look-through basis, and 4.5 percentage points more than public pensions. Over any extended window during which equities outperform fixed income (a window that includes essentially all of recorded financial history at horizons longer than ten years), this allocation differential predicts DC outperformance. Second, DC plans purchase the equity exposure they hold at radically lower cost than DB plans purchase theirs: index-fund expense ratios under 10 basis points compared with all-in alternative-investment fees of 200–500 basis points. Even on the most charitable assumptions about the gross alpha delivered by alternative investments, the fee load consumes most or all of any gross advantage.

The combined effect of these two mechanisms predicts DC outperformance of approximately the magnitude observed. The data are not surprising once the look-through analysis is performed. The conventional wisdom's failure to predict the data is not a failure of the data; it is a failure of the conventional wisdom's analytical framework.

B. Policy Recommendations

We make the following recommendations to the Department of Labor and to other regulators considering similar action:

1. The proposed rule should be withdrawn. The empirical premise on which the rule rests is incorrect on the data, and the rule's stated policy objective — improving DC participant retirement security by enabling allocations to alternative investments — is the opposite of what the data predict the rule will accomplish.

2. The Department should publish a comprehensive review of Form 5500 plan returns. The Department collects, on an annual basis, the data necessary to conduct the analysis presented in this paper. That data has not, so far as we can determine, been the subject of a comprehensive Department-published analysis comparing DC and DB plan performance. Such an analysis would be a precondition for any responsible rulemaking that purports to rest on plan performance evidence. The Department should commission this analysis from its Chief Evaluation Officer or comparable internal body, publish the analysis for public comment, and treat the comment record as part of any subsequent rulemaking effort.

3. Any future rulemaking on alternative-investment access in DC plans should be structured around fee transparency and participant protection rather than around access expansion. The asset-allocation analysis in Section V demonstrates that the principal economic distinction between DC and DB plans is not solely whether participants

are denied access to specific asset classes — they hold *more* economic equity exposure than DB participants — but also at the price at which the equity exposure is purchased. To the extent that DC participants would benefit from access to private-market investments, the benefit will accrue only to the extent that those investments are made available at fee levels comparable to the index-fund alternatives the participants already have. Any future rulemaking should focus on fee disclosure, fee caps, and audit requirements for any alternative-investment vehicle offered in a DC plan.

4. The Department should engage seriously with the academic literature it cites. The Aubry (2022) and Korteweg (2023) studies cited in the preamble to the proposed rule, properly read, contradict the propositions for which the preamble cites them. Any subsequent rulemaking should accurately characterize the academic literature's actual conclusions about alternative-investment returns.

C. Conclusion

The proposed rule and the Executive Order that it implements would purportedly open up defined contribution retirement plan access to alternative investments on the basis of an unsupported claim about the purported positive impact of alternative investments on absolute and risk-adjust performance that the comprehensive U.S. retirement plan-level data contradicts.

Over the most recent sixteen years for which complete data exist, the typical DC dollar earned approximately 134 basis points per year more than the typical dollar in the All DB Plans cohort, and by a similar, if slightly smaller, margin against the Extended All DB Plans cohort (which includes the full U.S. public pension universe via the calendar-year translation methodology, and whose higher risk profile and appraisal-based smoothing modestly narrow the measured gap). The DC plan outperformance survives every robustness check we apply. It holds on raw-return measures and on risk-adjusted measures. It holds in size-matched comparisons. It holds across multiple trailing windows. It holds despite the alternative-investment allocation differential that the rule's supporters identify as the source of the alleged DB advantage. It is, the data suggest, precisely *because of* that allocation differential — because DB plans pay much more per dollar of equity exposure than DC participants do — that DB plans underperform.

Federal regulators are required to engage with the empirical record. The empirical record substantially supported by the comprehensive U.S. plan-level data is not consistent with the premise on which the proposed rule rests. The rule should be withdrawn, and any future iteration should rest on an empirical foundation that the data the Department itself collects, properly analyzed, can support.

Appendix A: Methodology for Translating Non-Calendar-Year Public Pension Returns

This Appendix describes the methodology used to convert non-calendar-year fiscal-year returns of U.S. state and local public pension plans into calendar-year-equivalent returns, enabling the Framework 2 comparison reported in Section VIII.

A.1. The Problem

Approximately 75 percent of U.S. public pension plans (by plan count and by assets) report investment performance on a fiscal year that does not align with the calendar year. The most common fiscal-year end is June 30 (covering the majority of large state systems). To enable an apples-to-apples comparison with DC plans, which report on a calendar year, the fiscal-year returns must be converted to calendar-year equivalents.

A.2. The Methodology

Let *R_FY(Y)* denote a plan's return for the fiscal year ending on month *M* of calendar year *Y*, and let *R_B(Y, H)* denote the corresponding market benchmark return for the first (*H = 1*) or second (*H = 2*) half of calendar year *Y*. The plan's implied calendar-year return for calendar year *Y* can be approximated, under a constant-alpha-within-fiscal-year assumption, as:

$$R_CY(Y) \approx R_FY(Y) + R_FY(Y+1) - R_B(Y-1, 2) - R_B(Y+1, 1)$$

In the specific case of a June 30 fiscal-year end, FY(Y) covers July of year *Y−1* through June of year *Y*; FY(Y+1) covers July of year *Y* through June of year *Y+1*. Together these two fiscal years cover the 24-month period from July of year *Y−1* through June of year *Y+1*, which contains calendar year *Y* plus the second half of year *Y−1* plus the first half of year *Y+1*. Subtracting the two "overflow" half-year market benchmark returns yields the implied calendar-year-*Y* plan return.

The benchmark *R_B* used for the overflow correction is constructed as a 44/21/35 weighted blend of S&P 500 (public equity), Bloomberg U.S. Aggregate Bond Index (fixed income), and a private-equity-equivalent return (65 percent of S&P 500 plus 35 percent of cash), matching the typical asset-weighted public pension asset allocation. Sensitivity analysis using alternative benchmark weights produces qualitatively identical translation results.

A.3. Verification

We validated the translation methodology against four public pension plans whose calendar-year performance is independently reported by the plan or by an established third party. The results:

Table A1: Validation of Translation Methodology			
Verification	**Independently reported**	**Our translation**	**Error**
Mass PRIT — 5-year ending CY 2023	9.03%	8.90%	**13 bps**
Mass PRIT — 10-year ending CY 2023	7.40%	7.04%	**36 bps**
CalPERS — CY 2019	17.3%	16.4%	93 bps
CalPERS — CY 2020	13.0%	11.9%	113 bps
CalSTRS — 3-year ending CY 2022	4.18%	4.45%	27 bps
PSERS — CY 2023 (2-year compound)	4.81%	3.61%	120 bps

Table A1. Verification of translation methodology against independently reported calendar-year returns for four U.S. public pension plans.

The verification results suggest that the translation methodology is highly accurate for multi-year compound comparisons — the Mass PRIT 5-year and 10-year comparisons agree to within 13 and 36 basis points respectively, well within the precision required for the comparison reported in Section VIII. Single-year errors are larger (90–120 basis points in some cases), reflecting the constant-alpha-within-fiscal-year approximation that becomes more accurate as more fiscal years are averaged together. Across the universe of plans for which we apply the translation, errors partially offset because the constant-alpha approximation produces errors in both directions; the aggregate cohort-year asset-weighted error is correspondingly small.

A.4. Robustness

The Framework 2 comparison reported in Section VIII is not sensitive to the choice of benchmark weights used in the overflow correction. We tested alternative benchmark constructions — a pure 60/40 stock/bond blend, a 70/30 blend, and a custom blend matching the specific reported allocation of each public pension system — and the resulting All DB Plans (Extended) cohort returns agree to within 5 basis points across specifications. The translation methodology is also robust to the choice of underlying benchmark series; substituting MSCI ACWI for S&P 500 (to incorporate international equity exposure) or substituting Bloomberg U.S. Treasury Long for the Aggregate Bond Index changes the translated returns by less than 10 basis points in any specification we tested. The robustness reflects the fact that the overflow correction operates on only six months of return data on each side of the fiscal year, so even substantial benchmark mismatches translate into modest errors in the implied calendar-year return.

Most importantly, the qualitative conclusion of Framework 2 — that DC plans outperformed the All DB Plans (Extended) cohort by approximately 65 basis points over 15 years, by approximately 79 basis points over 10 years, and by approximately 200 basis

points over 5 years — is unchanged under any plausible alternative specification of the translation methodology. The Framework 1 comparison reported in Sections IV through VII does not require the translation methodology at all, and is, on its own, sufficient to support the headline conclusion of this paper.

Endnotes

[1] U.S. Department of Labor. EBSA. (DOL Proposed Rule). "Fiduciary Duties in Selecting Designated Investment Alternatives." 91 Fed. Reg.61. Proposed Rule RIN 1210–AC38, Docket No. EBSA–2026–0166. March 31, 2026.
[2] For studies documenting the decline in returns to private equity investors over time, *see*: Harris, Robert S., Tim Jenkinson, and Steven N. Kaplan. "How do private equity investments perform compared to public equity?" Darden Business School Working Paper No. 2597259. June 15, 2015; Phalippou, Ludovic. "Performance of buyout funds revisited." University of Oxford - Said Business School. November 2012; Phalippou, Ludovic and Oliver Gottschalg. "The Performance of Private Equity Funds." *Review of Financial Studies.* Vol. 22, No. 4, 2009 at 1747-1776; Sensoy, Berk A., Yingdi Wang and Michael S. Weibach. "Limited Partner Performance and the Maturing of the Private Equity Industry." Charles A. Dice Center Working Paper No. 2013-01. Fisher College of Business Working Paper No. 2013-03-01. November 27, 2013; as cited in: de Fontenay, Elisabeth (de Fontenay). Duke University. "Examining Private Market Exemptions as a Barrier to IPOs and Retail Investment." Testimony Before the Committee on Financial Services, Subcommittee on Investor Protection, Entrepreneurship, and Capital Markets. United States House of Representatives. September 11, 2019; AFT and Americans for Financial Reform Education Fund. "Lifting the Curtain on Private Equity." 2021; AFT, Americans for Financial Reform Education Fund, American Association of University Professors (AFT, AFREF & AAUP). "From Public Pensions to Private Fortunes: How Working People's Retirements Line Billionaire Pockets." July 30, 2025; Heal, Alexandra (Heal). "Private market funds lag US stocks over short and long term." *Financial Times*. June 11, 2025.
[3] Both cohorts in this comparison are limited to plans that report investment performance on a calendar-year basis. The DC cohort consists of all DC plans filing Form 5500 (which file on a calendar-year accounting basis). The All DB Plans cohort consists of all open U.S. private-sector DB plans filing Form 5500 plus all state and local public pension systems that report investment results on a calendar-year fiscal-year basis. The forthcoming full white paper will present "Framework 1," which extends the All DB Plans cohort to include the full public pension universe via a calendar-year translation methodology; the topline conclusion is substantially identical under both definitions.
[4] Exec. Order No. 14330. White House. (EO 14330). "Democratizing Access To Alternative Assets For 401(K) Investors." Presidential Actions, Executive Orders. August 7, 2025.
[5] U.S. Department of Labor. EBSA. "Fiduciary Duties in Selecting Designated Investment Alternatives." 91 Fed. Reg.61. Proposed Rule RIN 1210–AC38, Docket No. EBSA–2026–0166. March 31, 2026.
[6] White House Council of Economic Advisers (CEA 2025). "Retail Access to Alternative Investments Via Defined Contribution Plans." August 2025 at 6 ("DC plans have largely missed out on the diversification and return potential offered by alternative investments") and at 23 (suggesting that utilizing alternative investments would increase DC plan returns by 0.5% to 2.5% annually).
[7] Fink, Larry (Fink 2025). BlackRock. "Larry Fink's 2025 Annual Chairman's Letter to Investors." March 2025. ("Pensions typically outperform 401(k)s by about 0.5% each year.")
[8] Bahal, Sanya and Emerson Sprick (Bahal & Sprick 2025). Bipartisan Policy Center. "Alternative Assets in 401(k)s, Explained." July 25, 2025. ("It is likely that exposure to alts has contributed to DB plans historically achieving higher investment returns, on average, than DC plans.")
[9] R Street Institute et al. (R Street Inst. 2026). "Coalition Letter in Support of Democratizing Alternative Asset Access for 401(k) Investors." Letter filed in Docket No. EBSA–2026–0166. May 18, 2026. (Signed by twenty-two conservative and free-market advocacy organizations, including Americans for Tax Reform, the National Taxpayers Union, the Competitive Enterprise Institute, and the Independent Women's Forum).
[10] Center for Retirement Research at Boston College (Boston College CRR). "Public Plans Database." The translation methodology used to convert non-calendar-year public-pension fiscal years to a calendar-year basis is described in full detail in the methodology section.
[11] All DB Plans cohort combines all open U.S. private-sector DB plans with all U.S. public pension systems reporting on a calendar-year fiscal-year basis (~$2.4 trillion across 2,593 plans), and measures return on an asset-weighted basis. Extending the cohort to include the full U.S. public pension universe (~$6.0 trillion) via the

calendar-year translation methodology produces similar results, when taking into account the higher risk profile of public pension plans.

[12] Under conventional equity-beta loadings of β ≈ 1.20 for private equity, β ≈ 0.50 for real estate, β ≈ 0.40 for hedge funds.

[13] U.S. Department of Labor. EBSA. "Fiduciary Duties in Selecting Designated Investment Alternatives." 91 Fed. Reg. 61. March 31, 2026 at 16105.

[14] Investment Company Institute (ICI 4Q 2026 Market Data). "Release: Quarterly Retirement Market Data, Fourth Quarter 2025." March 26, 2026. ICI reports $14 trillion in retirement savings plans, but an estimated $3 trillion of these assets are not governed by Employee Retirement Income Security Act of 1974 (including thrift plan, 457 plans, at an estimated half of the 403(b) plan assets).

[15] All DB plans include the universe of all open U.S. private-sector defined benefit plans plus all U.S. public pension systems that report investment results on a calendar-year basis, approximately 2,593 plans holding $2.4 trillion in assets.

[16] CEA 2025.

[17] R Street Inst. 2026.

[18] DOL Proposed Rule.

[19] EO 14330.

[20] CEA 2025.

[21] Fink 2025.

[22] Bahal & Sprick 2025.

[23] EO 14330.

[24] DOL Proposed Rule. 91 Fed. Reg. 61 at 16102.

[25] *Ibid.* at 16105.

[26] *Ibid.* 16121 to 16122 (discussing Jean-Pierre Aubry, *Public Pension Investment Update: Have Alternatives Helped or Hurt?* Center for Retirement Research at Boston College, State and Local Pension Plans Issue Brief No. 82 (2022); and Arthur Korteweg, *Risk-Adjusted Returns of Private Equity: What We Know and What We Don't*, Annual Review of Financial Economics 15:131–152 (2023)).

[27] CEA 2025..

[28] Fink 2025.

[29] Bahal & Sprick 2025.

[30] R Street Inst. 2026.

[31] CEM Benchmarking, Inc. (CEM Benchmarking). "Defined Contribution Plans Have Come a Long Way!" White Paper. February 2018. (Reporting DB outperformance of 180 bps over 1998–2005, narrowing to 47 bps over 2007–2016).

[32] Munnell, Alicia H., Jean-Pierre Aubry, and Caroline V. Crawford. "Investment Returns: Defined Benefit vs. Defined Contribution Plans." Center for Retirement Research at Boston College, Issue Brief 15–21. December 2015.

[33] See, e.g., Cambridge Associates. "Better Alternative(s): Private Investments May Improve Outcomes for Defined Contribution Plan Participants." August 2025; Berman, Neuberger. "Private Equity in DC Plans — Key Considerations for Plan Fiduciaries." March 2026; J.P. Morgan Asset Management. "Get curious about alternative investments in defined contribution plans!" April 2025; Franklin Templeton. "Modernizing Retirement Plans with Alternative Investments." November 11, 2024.

[34] Many commentators have noted that the proposed rule is solving for the private equity industry's problem raising funds, keeping institutional investors, and unloading underperforming assets given the industry's lackluster performance in recent years. For example, recent reporting found that a full 9% of CALPERS' $630 billion fund was invested in "zombie" private equity funds that have failed to return assets to investors within the promised time period due to difficulties selling their portfolio companies. Morgenson, Gretchen. "Nation's largest public pension fund plagued by secrecy and underperformance, probe finds." *NBC News.* May 22, 2026.

[35] Boston College CRR.

[36] Open defined benefit plans are those that remain open to new participants and continue to accrue benefits for current participants. Closed and frozen DB plans are excluded because their investment policies are driven by liability-matching considerations rather than long-term return-maximization.

[37] *See* U.S. Department of Labor. Employee Benefits Security Administration. Field Assistance Bulletin No. 2025-02. April 3, 2025. *And,* 29 C.F.R. § 2520.101-5, which prescribe the average-return-on-assets methodology used in ERISA annual funding notices. Crediting net contributions and distributions at one-half of the plan year is the midpoint, or "simple," Dietz method — the special case of the modified Dietz method that obtains when net cash flows are assumed to occur uniformly over the period. *See*, O. Dietz, Peter. *Pension Funds: Measuring Investment Performance*. Free Press 1966.

[38] Risk-free rate is the annual mean of the monthly 3-month Treasury bill secondary market rate, FRED series TB3MS. The 16-year sample mean is approximately 1.14%, with substantial year-to-year variation.

[39] Our translation methodology assumes that a plan's active management contribution (alpha) is approximately constant across the months of a single fiscal year. Under that assumption, the calendar-year return can be reconstructed from two consecutive fiscal-year returns by adding them together and subtracting the half-year benchmark returns that fall outside the target calendar year. The methodology is described in detail in Appendix A.

[40] Massachusetts Pension Reserves Investment Management Board (Mass. PRIMB). "Calendar Year 2023 Performance Report." 2024. (Reporting calendar-year 2023 net return of 11.0%, 5-year annualized return of 9.0%, and 10-year annualized return of 7.4%). Our translation produces values of 11.0%, 8.9%, and 7.0% respectively — within 13 bps for the 5-year window and 36 bps for the 10-year window.

[41] *See* Appendix A.

[42] U.S. Bureau of Labor Statistics. Usual Weekly Earnings of Wage and Salary Workers, Fourth Quarter 2024. USDL-25-0072. January 22, 2025. (Reporting median weekly earnings of full-time wage and salary workers of $1,192, or roughly $62,000 annualized; the $236,000 gap is approximately 3.8 times that figure).

[43] Public pension allocation figures are derived from National Association of State Retirement Administrators (NASRA). Public Fund Survey. December 2025. And from individual plan Comprehensive Annual Financial Reports. Private corporate DB allocation figures are derived from Goel, Saleena and Bariscan Goc. KKR. "The Next Chapter for U.S. Corporate Pension Plans." KKR Solutions. September 2025. (Reporting, based on the 250 largest U.S. corporate pension plans as of Dec. 31, 2024, median allocations of 55% fixed income, 24% public equity, and 21% alternatives), and from U.S. Department of Labor. Employee Benefits Security Administration. Form 5500. (Schedule H balance-sheet data).

[44] Under conventional equity-beta loadings of $\beta \approx 1.20$ for private equity, $\beta \approx 0.50$ for real estate, $\beta \approx 0.40$ for hedge funds. *See* note 12.

[45] Industry studies report all-in PE fee loads of 6–7 percent of committed capital, including management fees of 1.5–2.0 percent annually plus 20 percent carry, along with transaction, monitoring, and fund-of-fund layering fees in many vehicles. *See,* Phalippou, Ludovic. "An Inconvenient Fact: Private Equity Returns & The Billionaire Factory." University of Oxford, Said Business School. Working Paper. June 10, 2020; Phalippou, Ludovic, Christian Rauch, and Marc Umber. "Private Equity Portfolio Company Fees." *Journal of Financial Economics*. Volume 129, Issue 3, September 2018, Pages 559-585; Gamskjaer, Ken. "Investment Costs Associated with Private Equity." Aleta. February 8, 2024. (Stating that fees of 5% per year are typical in private equity vehicles).

[46] With Intelligence. S&P Intelligence. "Pricing Performance." January 11, 2024. (Reporting that roughly 69 percent of active hedge funds carry a 20 percent performance fee and that a majority charge management fees of 1.5 percent or less, against the long-standing "2 and 20" convention of a 2 percent management fee plus 20 percent performance fee).

[47] Preqin. "Private Capital Fund Terms Advisor 2024." October 2024. (Documenting mean management fees of roughly 1.0 to 1.5 percent for private real estate funds); Shah, Kunal. iCapital. "An Explanation of Private Market Fund Fees." December 21, 2024. (Documenting annual management fees of 1 to 2 percent, plus carried interest, for private-market vehicles such as infrastructure funds).

[48] Li, Lei and Irina Atamanchuk. "Trends in the Expenses and Fees of Funds." ICI Research Perspective 31, no. 1, at 4, 9. March 2025. (Identifying current asset-weighted equity index fund expense ratio as 0.05%); Vanguard. "Vanguard Funds: Prospectus Supplement Dated May 20, 2026." May 20, 2026. (All-in fee of 0.08%); Fidelity Investments. "Fidelity Freedom® Index 2065 Fund — Institutional Premium (FFIKX), Premier (FVIPX), Premier II (FAVVX), Summary Prospectus." May 30, 2025 (revised Sept. 9, 2025). (Showing expense ratios of 0.10% and under for institutional share classes).

[49] The academic literature on private-market valuation lag, what we are referring to as smoothing, is large and consistent. *See*, Couts, Spence J., Andrei S. Gonçalves, and Andrea Rossi. "Unsmoothing Returns of Illiquid Funds." Kenan Institute of Private Enterprise Research Paper No. 20-05, USC Lusk Center of Real Estate Working Paper Series, Fisher College of Business Working Paper No. 2024-03-002, Charles A. Dice Working Paper No. 2024-02, *The Review of Financial Studies*, forthcoming. October 31, 2023; Stafford, Erik. "Replicating Private Equity with Value Investing, Homemade Leverage, and Hold-to-Maturity Accounting." *Review of Financial Studies*. Volume 35, Issue 1, January 2022, Pages 299–342. 35:1 (2022).
[50] *Ibid.*
[51] *Ibid*.
[52] *Ibid*.
[53] Dyck, I.J. Alexander and Lukasz Pomorski. "Is Bigger Better? Size and Performance in Pension Plan Management." Rotman School of Management Working Paper. June 1, 2011. (Documenting substantial economies of scale in pension-plan asset management — the largest plans' internal-management costs run at least three times lower than smaller plans' — so that scale, where it matters, works to the advantage of larger plans); BrightScope & Investment Company Institute. "The BrightScope/ICI Defined Contribution Plan Profile: A Close Look at 401(k) Plans, 2021." August 2024. (Documenting the same or defined contribution plans).
[54] Mass. PRIMB.
[55] DOL Proposed Rule. 91 Fed. Reg. 61 at 16121 to 16122.
[56] Aubry, Jean-Pierre. "Public Pension Investment Update: Have Alternatives Helped or Hurt?" Center for Retirement Research at Boston College, State and Local Pension Plans Issue Brief No. 82, at 5–6. November 22, 2022. (Finding that for the 2001–2022 period, a one percentage point increase in alternatives allocation was associated with no statistically significant change in returns, and that public pensions with the highest alternative allocations did not outperform those with the lowest).
[57] Council of Economic Advisers. "Retail Access to Alternative Investments Via Defined Contribution." Figure 4 at 9. August 2025. (Surveying PME estimates for U.S. buyout funds with vintage years 1980–2014, annualized average PME 1.27, and citing Higson & Stucke (2012), Harris, Jenkinson & Kaplan (2014), and Robinson & Sensoy (2013)).
[58] *Ibid*. at 11 tbl.1 (reporting, from Korteweg & Westerfield (2022), Sharpe ratios of 0.32 for stocks, 0.90 for bonds, and 0.31 for private equity (buyout); correlations of private equity with stocks of 0.82 and with bonds of −0.39; and an unsmoothed private-equity standard deviation of 25.91% derived via the Geltner (1991) algorithm).
[59] Fink 2025.
[60] Bahal & Sprick 2025.
[61] CEM Benchmarking.
[62] Mitchell, Lia. "Could Private Equity Work in Workplace Plans?" Morningstar. February 9, 2024. (analyzing private-equity manager selection by 20 of the largest U.S. private pension plans over a 12-year period and finding no evidence of consistent above-mean manager selection).
[63] Ratner, Hal. "Private Equity and Private-Market Funds in Managed Defined-Contribution Plans." Morningstar. Center for Retirement & Policy Studies. November 2024.
[64] Shukla, Neelotpal and Miguel Puerto. "Private Assets Meet Retirement Managed Accounts: A Liquidity-Centric Framework for Inclusion." Morningstar Retirement. February 2026.
[65] Phalippou, Ludovic. "An Inconvenient Fact: Private Equity Returns & The Billionaire Factory." University of Oxford, Said Business School. Working Paper. June 10, 2020.
[66] *See*, de Fontenay, Elisabeth. Duke University. "Examining Private Market Exemptions as a Barrier to IPOs and Retail Investment." Testimony Before the Committee on Financial Services, Subcommittee on Investor Protection, Entrepreneurship, and Capital Markets. United States House of Representatives. September 11, 2019. (Citing multiple studies: Robert S. Harris, Tim Jenkinson & Steven N. Kaplan. "How do private equity investments perform compared to public equity?" (2016); Ludovic Phalippou. "Performance of buyout funds revisited." (2014); Ludovic Phalippou & Oliver Gottschalg. "The performance of private equity funds." (2009); Berk A. Sensoy, Yingdi Wang & Michael S. Weibach. "Limited partner performance and the maturing of the private equity industry." (2014))

[67] Though it is beyond the scope of this paper, the rapidity with which these changes have taken place, along with the results, calls into question one of the central contentions of the proposed rule, that litigation has had a negative effect on defined contribution plans, and has stifled innovations. Further, it is difficult to reconcile the proposed rule's claims that DC plan litigation has been particularly pronounced, and particularly damaging, since 2020, 16088 Fed. Reg. at 16088, 16106–07, with the fact that the five years since 2020 has been the most pronounced period of DC-plan outperformance. *See* Table 1 (showing 3.36% annual outperformance by DC plans versus DB plans from 2020 to 2024).

[68] This paper addresses only investment returns, but returns are not the only respect in which alternative investments — and private equity in particular — are poorly suited to defined contribution plans. Alternative investments are also marked by limited transparency and infrequent, appraisal-based valuation; high and often opaque fees; and illiquidity that sits uneasily with the daily-liquidity expectations of DC participants. Beyond the portfolio, the private equity business model can impose substantial costs on the workers, customers, and communities of the companies these funds acquire. For a fuller account of these concerns in the specific context of opening 401(k) plans to private equity, see: Valdés Viera, Oscar. Americans for Financial Reform Education Fund. "The Private Equity 401(k) Trap." June 2026.