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Chapter 12

Unlocking Retail Access to Private Equity Investments through Defined Contribution Plans

Over the past few decades, U.S. capital markets have witnessed significant growth in private markets relative to public ones. Along with this shift, the U.S. retirement system has witnessed the emergence of defined contribution (DC) plans as the dominant retirement vehicle for millions of Americans. The U.S. Securities and Exchange Commission's (SEC) accredited investor definition and the U.S. Department of Labor's (DOL) Employee Retirement Income Security Act (ERISA) fiduciary rules have long impeded retail investors' access to private market investments. With the structural shift in U.S. capital markets toward private markets and the changing composition of the U.S. retirement system toward DC plans, retail investors' access to invest in private markets through their DC plans has become ever more pertinent.

For DC plans, including 401(k)s, the litigation risk and lack of clear guidance under DOL's ERISA fiduciary rules have long deterred these plans from offering their plan participants investment options with exposure to private market investments, though no legal prohibition exists. As a result, millions of Americans have been deprived of the growth opportunities and diversification benefits of private markets through their DC retirement plans. On August 7, 2025, President Trump issued the Executive Order "Democratizing Access to Alternative Investments for 401(k) Investors," which encourages DC plan sponsors to provide plan participants with access to funds that include allocations to alternative (including private market) investments (White House 2025).[1] In response, DOL rescinded guidance issued in 2021 that discouraged DC plans from investing in private market assets (DOL 2025), marking a significant step toward unlocking private market access for millions of Americans.

In this chapter, the CEA quantifies the economic benefits of expanding retail access to private equity investments through their DC retirement plans. It shows that these benefits extend not just to retail investors but also to private fund managers, private companies, financial markets, and the real economy.

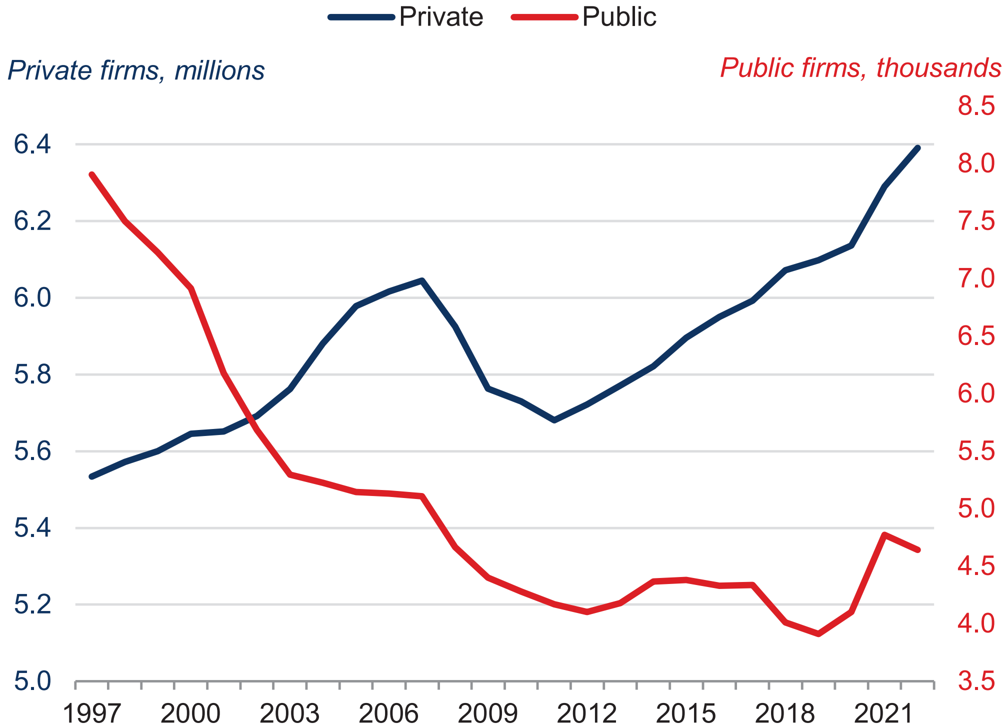
The Evolving U.S. Capital Market and Retirement System

Since the late 1990s, the shrinking public market and rise of private markets have shaped the structure of U.S. capital markets. From 1997 to 2024, the number of public companies dropped by more than half, from 8,800 firms to 4,000 firms, while the number of private companies increased by about two-thirds, from 20 million to 35 million (Wharton 2012; Weitzman 2023; U.S. Census Bureau 2001, table 1). Figure 12-1 illustrates this trend, showing the number of U.S. public firms and private firms, excluding nonemployer firms. In terms of gross assets, U.S. private funds with investment advisers registered by the SEC or who are exempt have more than tripled, from $9.5 trillion in 2012 to $30.9 trillion in 2024 (SEC 2024).

The commonly cited reasons for this structural change are the increasing regulatory burdens in public markets, such as the Sarbanes-Oxley Act of 2002 (Doidge, Karolyi, and Stulz 2017; Gao, Ritter, and Zhu 2013), deregulatory changes that increased private fundraising limits (Ewens and Farre-Mensa 2020), and increased demand from institutional investors (Lerner, Schoar, and Wongsunwai 2007; Kaplan and Strömberg 2009). Academic research points to additional reasons, like short-term pressure in public markets; tax reforms that

[1] Alternative investments generally encompass a broad range of asset classes that do not fall within the conventional asset classes of stocks, bonds, or cash. Private market investments, the focus of this chapter, constitute one category of alternative investments. Private market investments refer to direct and indirect interests in equity, debt, or other financial instruments that are not traded on public exchanges, including non-publicly traded vehicles such as private funds. Private funds, such as private equity funds (PE), venture capital funds (VC), or hedge funds, are pooled investment funds that must comply with the terms of an appropriate exemption or exclusion from the registration requirements in the federal securities laws.

Figure 12-1. Number of U.S. Private and Public Firms, 1997–2022



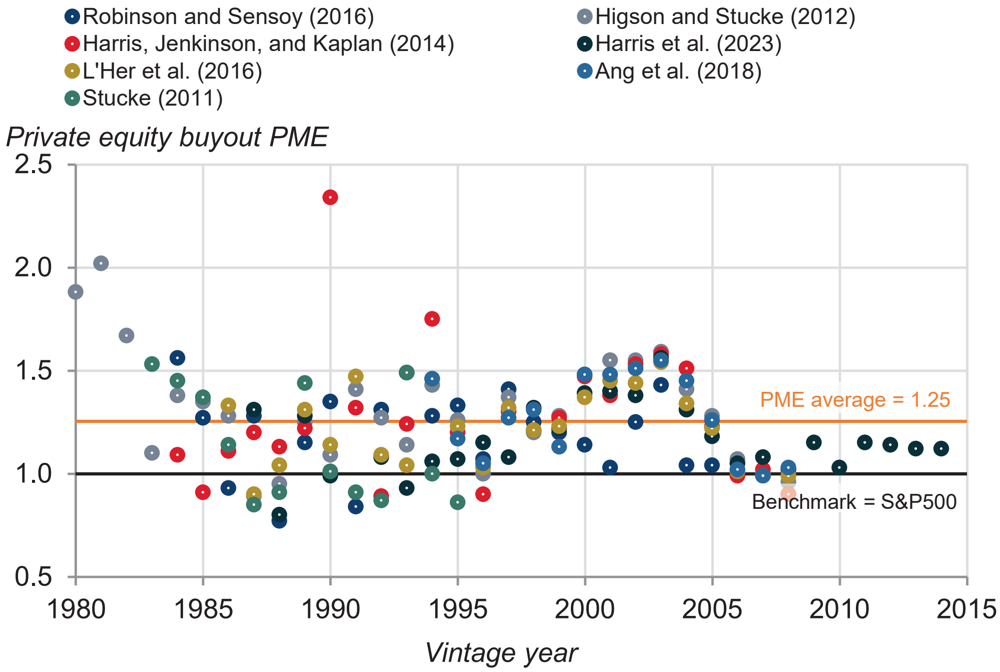
Sources: U.S. Census Bureau (2025); Statistics of U.S. Businesses; CEA calculations.
Note: Excludes nonemployer firms.

reduced advantages for public companies, such as the Tax Reform Act of 1986 (Carroll and Joulfaian 1997; Dyrda and Pugsley 2025); and the rise of intangible-intensive companies that are typically undervalued by public markets (Doidge et al. 2018).

With the rise in private markets and the fact that most companies do not make initial public offerings (IPOs) until they are past their peak-growth phase (Nain and Ying 2018), if at all, retail investors are faced with a smaller opportunity set that may limit diversification benefits and exclude high-growth investments. A key distinction between private and public markets is the higher growth potential of private companies (Asker, Farre-Mensa, and Ljungqvist 2011). Among the small subset of private companies that choose to pursue an IPO, their choice to do so at a late stage of their lifecycle means that public companies have generally become much larger and older relative to private companies (Kahle and Stulz 2017). As a result, many companies are already past their high-growth phase by the time they issue an IPO, limiting the investment opportunities available to retail investors (Finley 2019).

The recent academic literature finds that private equity (PE) buyout funds have consistently outperformed the Standard & Poor's (S&P) 500 by 20 to 27 percent over the fund's life and more than 3 percent annually (e.g., Harris, Jenkinson, and Kaplan 2014; Robinson and Sensoy 2016; Ang et al. 2018; and Harris et al. 2023). The three commonly used performance measures of private

Figure 12-2. Private Equity Performance–Public Market Equivalent (PME) by Vintage Year

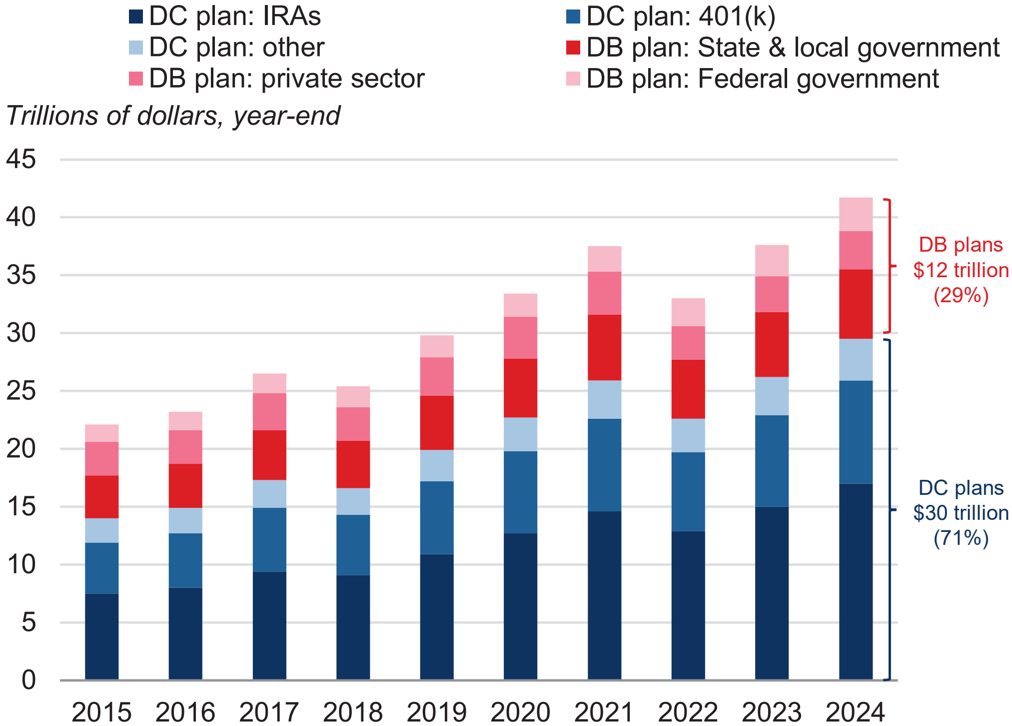


Sources: CEA calculations; literature estimates.
Note: PME estimates are for private equity (buyout) funds using the S&P 500 as the public market benchmark, calculated using the methodology of Kaplan and Schoar (2005).

fund returns are the internal rate of return (IRR), the public market equivalent (PME), and the ratio of total value to paid-in capital (TVPI) (INSEAD 2019). While the IRR and TVPI are absolute measures of performance, the PME is a relative measure that captures the net-of-fee performance of a PE fund relative to the hypothetical performance of a public market index using the fund's actual cash flows. Figure 12-2 shows the PME estimates for U.S. private equity (buyout) funds with vintage years 1980–2014. Most PME estimates are above 1, which is consistent with the outperformance of PE relative to public markets. This finding is robust when one excludes PE funds that are not fully liquidated (i.e., with majority realized investments). To address the fact that literature-estimated PMEs are not risk-adjusted and do not reflect the potential performance of a diversified portfolio that contains PE, as would be the case for defined contribution (DC) plans, this chapter simulates, in a subsection below, portfolios with and without a PE component and computes a risk-adjusted return to illustrate the potential benefit from including PE within a portfolio of traditional assets.

Alongside the growth of private markets, the U.S. retirement system has witnessed the emergence of DC plans, such as IRAs and 401(k)s, as the dominant investment vehicle for millions of Americans (DOL 2019). By shifting the investment risk and retirement funding responsibility from the employer to the employee, DC plans have emerged as a scalable, portable, and cost-efficient alternative to defined benefit (DB) plans—including Federal, State, local, and

Figure 12-3. U.S. Defined Benefit (DB) versus Defined Contribution (DC) Plan Assets, 2015–24



Sources: Investment Company Institute (ICI 2022, 2025) factbooks; CEA calculations.

some corporate pension plans (e.g., California Public Employees' Retirement System (CalPERS) and Federal Employees Retirement System (FERS)). As a result, the percentage of full-time private sector employees participating in DB plans has significantly dropped from 80 percent in 1985 to only 11 percent in 2023 (BLS 2004, 2024). As of year-end 2024, DB plan assets were $12 trillion, whereas defined contribution plan assets were $30 trillion (ICI 2025), about 70 percent of all U.S. retirement assets (see figure 12-3).

Because of the SEC's accredited investor regulation and litigation risk under ERISA's fiduciary rules, defined contribution plans' allocation to private markets, as of 2024, has been negligible, with 30 percent allocation by DB plans relative to only 0.1 percent allocation by defined contribution plans (Ghosh 2024; Hall 2025). The scale of U.S. retirement assets held by DC plans suggests a substantial cost for retail investors who miss out on the high-growth opportunities and diversification benefits of private markets.

Retail Access to Investments in Private Markets: An Overview of Regulatory Barriers

The U.S. SEC's accredited investor definition that sets forth minimum income and net worth requirements has restricted direct retail access to private market investments since 1982.[2] The SEC defines accredited investors as individuals who exceed income or net worth thresholds, have professional certifications, are "knowledgeable employees" of private funds, or are a "family client" of a family office (SEC 2025). In principle, these criteria are supposed to serve as proxies for an investor's level of financial sophistication and tolerance for risk. In practice, the criteria have proven to be an insufficient proxy and highly restrictive—only 18.5 percent of U.S. households meet the definition (SEC 2023). With the accredited investor definition prohibiting direct retail access to private markets, retail investors must rely on retirement plans pooling capital and investing in private funds as a single institutional accredited investor or qualified purchaser to give retail nonaccredited investors access to private markets (Poterba, Venti, and Wise 2009).[3]

Relative to DB plans, DC plans face higher litigation risk under DOL's ERISA fiduciary rules, for two reasons.[4] First, responsibility for investment risk and allocation decisions falls on the employer under DB plans compared with the employee under DC plans (Broadbent, Palumbo, and Woodman 2006). DC plans are, therefore, easier to sue, since the responsibility for funding the promised benefit does not fall on the employer, as in DB plans (Katz 2021). In *Thole v. U.S. Bank N.A.* (2020), the Supreme Court held that DB plan participants lack constitutional standing to sue plan fiduciaries for breach of fiduciary duty. Second, liability under ERISA is tied to the prudence, low-cost, and adequate disclosure for each investment within the portfolio under DC plans compared with the overall portfolio under DB plans (Stoel Rives LLP 2022).

The key reason for the limited adoption among DC plans is that DOL has issued limited and mixed guidance regarding private market investments. In 2020, DOL issued guidance stating that offering PE within a multi-asset, professionally managed fund does not violate ERISA, subject to certain provisions (DOL 2020). In 2021, DOL issued supplemental guidance warning that small DC plans do not have the expertise to manage PE investments due to their illiquid and complex nature (DOL 2021). The supplemental guidance essentially added

[2] The accredited investor definition was formalized in 1982 with the SEC's adoption of Regulation D. This definition was further amended by the 2010 Dodd-Frank Act and the 2012 JOBS Act. In 2020, the SEC expanded the accredited investor definition to add licensed professionals but maintained the income and net worth criteria, among others. Under these criteria, retail investors are only able to directly invest in offerings registered with the SEC, such as public company offerings and offerings of registered investment companies.

[3] Retail nonaccredited investors can obtain indirect exposure to private market investments through pooled investment vehicles, currently limited to registered investment companies, business development companies, and real estate investment trusts. Certain registered fund structures, such as interval funds and business development companies, provide a certain amount of guaranteed periodic liquidity while enabling the flexibility to hold illiquid securities obtained in exempt offerings (i.e., private market investments).

[4] The litigation risk for DC plan managers when including private market investments stem from participants filing class action lawsuits for breaches of fiduciary duty such as through excessive fees, inadequate due diligence, and imprudent investment selection processes.

caution and limited the potential for offering PE investments only to large and well-established DC plans. In 2025, DOL rescinded the 2021 supplemental guidance in response to President Trump's Executive Order encouraging retail access to alternative assets (DOL 2025; White House 2025). By rescinding the 2021 guidance, DOL has taken an important step in unlocking private market investments for millions of Americans through their DC plans.

The Quantitative Benefits of Expanding Retail Access to Private Equity Investments through Defined Contribution Plans

This section describes the quantitative benefits of expanding retail access to private markets through DC plans. The analysis here focuses on one class of private market investments—private equity—and notes that there may be an additional benefit from DC plan investment in other classes of alternative investments.

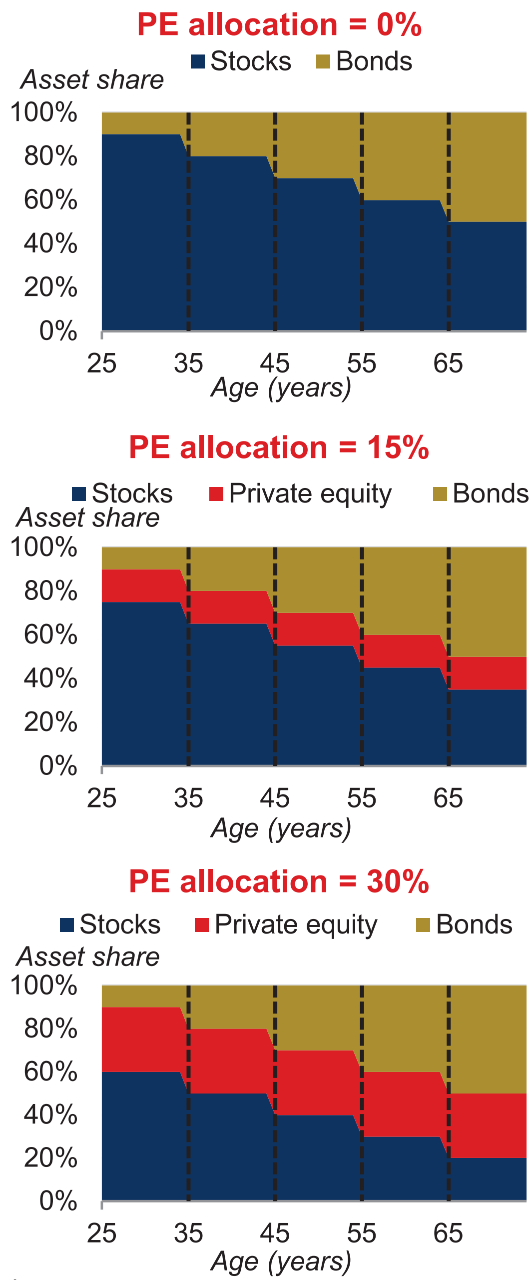
Diversification and Higher Risk-Adjusted Returns for Retail Investors

In addition to outperformance relative to public equity, the inclusion of private market investments within a diversified portfolio may enhance risk-adjusted returns. The imperfect correlation of private market investments with traditional assets such as stocks and bonds may allow private market investments to function as a diversifying asset class within a broader investment portfolio. In particular, the addition of PE to a traditional portfolio of stocks and bonds enables investors to achieve a higher level of excess return per unit of risk (risk-adjusted return) than would otherwise be possible. The analysis here uses mean variance analysis to demonstrate the potential diversification benefit of including PE in a portfolio of traditional assets.

Portfolio weights. To mimic portfolios for various age groups, the analysis here constructs portfolios with a fixed allocation to bonds that increases with age. It particularly relies on the typical glide path used in retirement portfolios that shifts the portfolio's allocation from high-risk assets to low-risk assets as an investor approaches retirement (Vanguard 2020). For each set of portfolios, the fixed allocation to bonds is varied from 10 percent (young) to 50 percent (old) to reflect the shift to less risky assets with age. Figure 12-4 shows illustrative weights by age cohort under different PE allocations. Thus, a bond allocation of 10, 20, 30, 40, and 50 percent would correspond to the typical allocation observed for, respectively, a 25-, 35-, 45-, 55-, and 65-year-old.

Two sets of portfolios are constructed: (1) traditional portfolios with stocks and bonds ("non-PE portfolios") and (2) alternative portfolios with stocks, bonds, and private equity ("PE portfolios"). For non-PE portfolios, the allocation

Figure 12-4. Illustrative Private Equity (PE) Allocations (Weights) by Age Cohort



Source: CEA calculations.

to stocks is defined residually as the difference between 100 percent and the fixed allocation to bonds. For PE portfolios, the allocation to PE is varied from 5 to 30 percent, and for stocks, residually, as the difference between 100 percent and the sum of the fixed bond and PE allocations. Overall, there are five non-PE portfolios and thirty PE portfolios (for the implied weights, see figure 12-5).

Portfolio mean-variance. For each of the 35 simulated portfolios shown in figure 12-5, the portfolio mean, variance, and Sharpe ratio are estimated using equations 1 through 3 and inputs from table 12-1. For portfolio p, the portfolio mean return (r_p) is the weighted average of the expected returns of each asset in

Figure 12-5. Portfolio Allocations (Weights) in Simulated Private Equity (PE) versus non-PE Portfolios

	Bonds allocation	PE allocation: 0%	5%	10%	15%	20%	25%	30%
		Implied stocks allocation = (100% – bonds allocation – PE allocation)						
		Non-PE portfolio	*PE portfolios*					
Young	10%	90%	85%	80%	75%	70%	65%	60%
↓	20%	80%	75%	70%	65%	60%	55%	50%
	30%	70%	65%	60%	55%	50%	45%	40%
	40%	60%	55%	50%	45%	40%	35%	30%
Old	50%	50%	45%	40%	35%	30%	25%	20%

Source: CEA calculations.
Note: Green indicates allocation to safe assets such as bonds and red indicates allocation to riskier assets such as stocks and private equity.

the portfolio. The portfolio variance (σ_p^2) measures the return variance of each asset as well as the covariance between asset returns to capture diversification benefits. The portfolio Sharpe ratio $(Sharpe_p)$ captures the excess return an investor earns per unit of risk and reflects a risk-adjusted return.

$$r_p = w_{p,PE}r_{PE} + w_{p,PU}r_{PU} + w_{p,B}r_B \tag{1}$$

$$\sigma_p^2 = w_{p,PE}^2\sigma_{PE}^2 + w_{p,PU}^2\sigma_{PU}^2 + w_{p,B}^2\sigma_B^2 + 2w_{p,PE}w_{p,PU}\sigma_{PE,PU} + 2w_{p,PE}w_{p,B}\sigma_{PE,B} + 2w_{p,PU}w_{p,B}\sigma_{PU,B} \tag{2}$$

$$Sharpe_p = \frac{r_p - r_f}{\sigma_p} \tag{3}$$

where:

- $r_p, r_{PE}, r_{PU}, r_B, r_f$: returns for portfolio (p), private equity (PE), public equity (PU), bonds (B), and a short-term risk-free asset (f).
- $w_{p,PE}, w_{p,PU}, w_{p,B}$: portfolio weights for private equity, public equity, and bonds.
- $\sigma_p^2, \sigma_{PE}^2, \sigma_{PU}^2, \sigma_B^2$: variances for portfolio, private equity, public equity, and bonds.
- $\sigma_{PE,PU}, \sigma_{PE,B}, \sigma_{PU,B}$: covariances between private equity and public equity, private equity and bonds, public equity and bonds.
- σ_p: standard deviation of the portfolio.

The inputs to the portfolio mean-variance analysis use annualized estimates over the period 1998–2020 from Korteweg and Westerfield (2022). For stocks and bonds, the estimates are based, respectively, on the Vanguard Total Stock Market Index (VITSX) and the Vanguard Total Bond Market Index Fund (VBTIX). For PE, the estimates are based on Cambridge Associates' U.S. Private

Table 12-1. Inputs for Portfolio Mean-Variance Analysis

	Stocks	Bonds	Private equity
Mean	7.58	4.89	10.04
Standard Deviation	17.67	3.41	25.91
Sharpe Ratio	0.32	0.90	0.31
Correlations			
Stocks	1	–0.39	0.82
Bonds		1	–0.39
Private equity			1

Source: Korteweg and Westerfield 2022.
Note: We use the unsmoothed estimates for private equity buyout funds to address the net asset value–staleness problem.

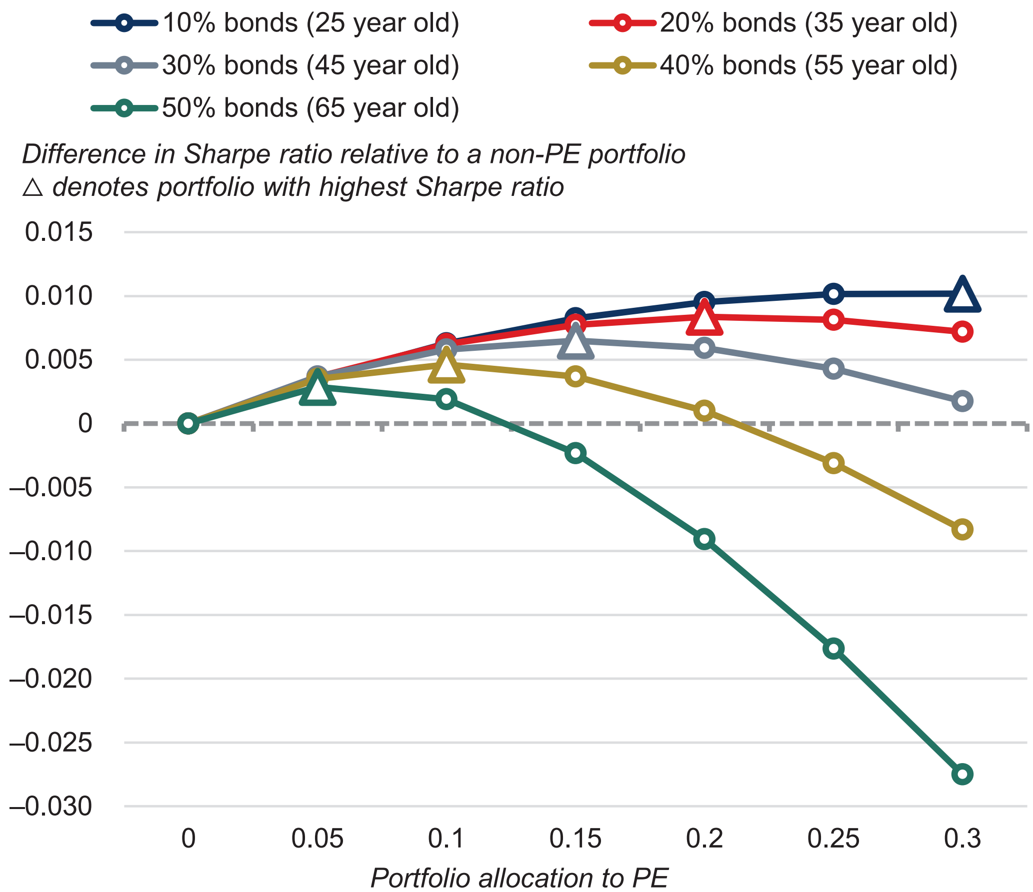
Equity Benchmark Index, which tracks the performance of a portfolio of PE funds on a net-of-fee basis. To overcome the problem of the staleness in net asset values ("NAV-staleness") observed in private markets due to less frequent valuations and reporting delays by private fund managers, the analysis here relies on the unsmoothed estimates for PE (buyout) calculated by the authors. Table 12-1 reports the mean, standard deviation, and Sharpe ratio for each of the three assets as well as the correlations between assets.[5] Note that bonds have the highest Sharpe ratio, followed by stocks and PE.

Portfolio Sharpe ratio. For each of the 35 simulated portfolios, a risk-adjusted return (Sharpe ratio) is calculated from equation 3 to assess the diversification benefit from adding PE to a traditional portfolio of stocks and bonds. For each age cohort, the PE and non-PE portfolios are compared to identify who benefits most from adding PE, and at which allocation of PE. A higher Sharpe ratio for a portfolio with PE relative to one without PE is consistent with a diversification benefit. Figure 12-6 shows the difference in Sharpe ratios between PE and non-PE portfolios for each age cohort (based on the relative allocation to bonds with age).

Mean-variance findings. The mean-variance analysis (see figure 12-6) points to three key findings. First, all age cohorts benefit from higher risk-adjusted returns (Sharpe ratio) by adding a 5–10 percent PE allocation to a traditional portfolio of stocks and bonds. Second, the younger age cohorts benefit more from an allocation to PE relative to older age cohorts. Younger age cohorts realize a higher risk-adjusted return from an allocation to PE over the entire range of 5–30 percent, whereas older age cohorts realize lower risk-adjusted returns from an allocation to PE that exceeds 5–10 percent. For older cohorts, the higher PE allocations result in lower Sharpe ratios because they

[5] The covariances for equation 2 are computed by scaling up the correlations (from table 12-1) by the product of the standard deviations of the two assets (e.g., $\sigma_{PE,PU} = \rho_{PE,PU} \times \sigma_{PE} \times \sigma_{PU}$).

Figure 12-6. Difference in Sharpe Ratios Between Private Equity (PE) and non-PE Portfolios by Age Cohort



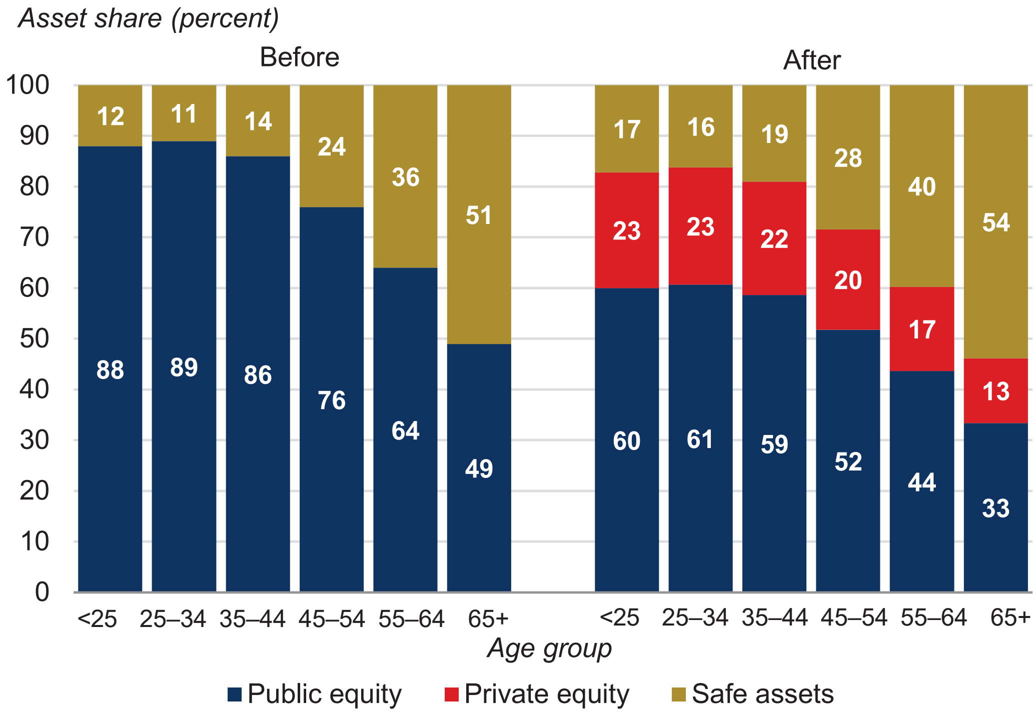
Source: CEA calculations.
Note: Each dot/triangle represents the difference in Sharpe ratio of a PE portfolio relative to a non-PE portfolio, where allocations to PE vary from 5-30 percent, allocation to bonds are fixed based on age cohort, and the residual allocation to stocks is such that weights sum to 100 percent.

already hold a high allocation of bonds that have a higher Sharpe ratio relative to stocks or PE (see table 12-1). Third, the portfolio with the highest Sharpe ratio corresponds to higher allocations to PE as age decreases. Overall, the analysis here is consistent with a diversification benefit (higher risk-adjusted return) from adding PE to a traditional portfolio comprising stocks and bonds, and that younger cohorts benefit the most.

Household Retirement Saving and Output Gains for the Real Economy

To estimate household retirement savings and output gains from expanding retail access to PE investments through their DC retirement plans, the analysis proceeds in two steps. First, mean-variance analysis finds the optimal household portfolio allocation to PE, given their risk aversion. Second, a Harberger (1962) two-sector equilibrium model estimates output gains from household allocation to PE. By integrating a household-level portfolio allocation with a

Figure 12-7. Portfolio Allocations Before and After Eliminating Private Equity Restrictions



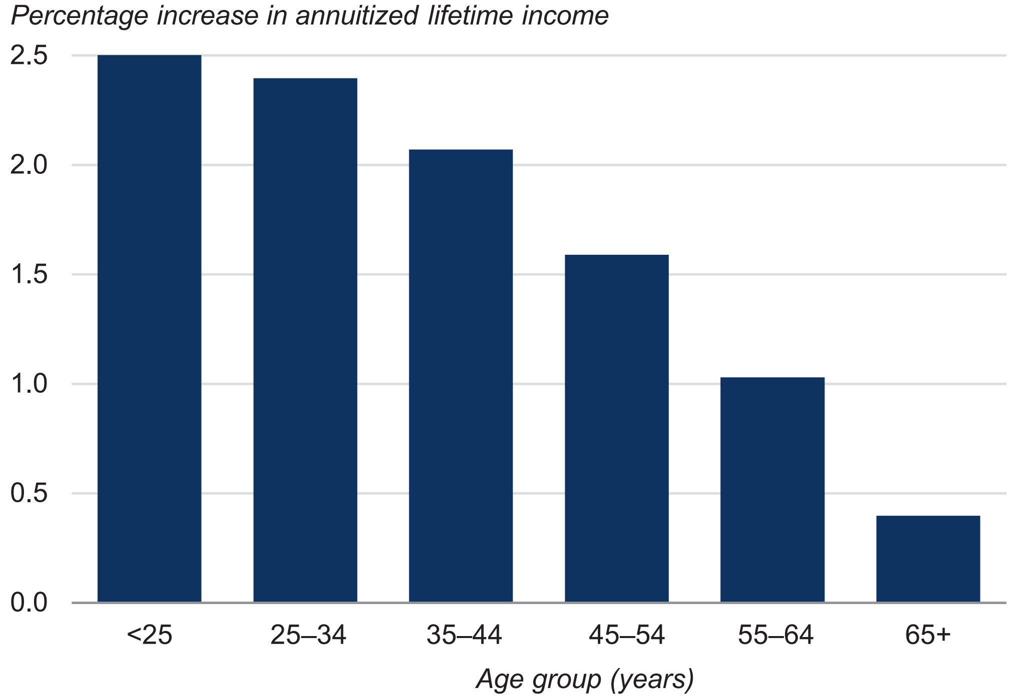
Source: CEA calculations.
Note: For calculation details, see the appendix to this chapter.

two-sector model, the analysis demonstrates that easing restrictions on DC plans to allow for more PE investments increases lifetime income for households and aggregate income for the United States.

Household allocation to private equity given risk aversion. To determine optimal household allocations to private equity, the analysis proceeds as follows (see the appendix for the calculation of figure 12-7). First, data from the Federal Reserve's Survey of Consumer Finances (Aladangady et al. 2023) on holdings in retirement accounts by age cohort are combined with data from Vanguard (2025, 57) on PE share by age cohort (see figure 12-7, left panel). Second, it is assumed that the observed holdings in PE are optimal and implied risk aversion is estimated by age cohort. Third, the implied risk aversion is used to find the optimal allocation between PE, public equity, and safe assets (see figure 12-7, right panel). Across all age cohorts, the analysis here finds that households would reallocate their holdings in public equity toward PE and safe assets. Overall, the weighted-average PE allocation is about 20 percent, corresponding to the allocation observed for DB plans (CalPERS 2024; BlackRock 2025).

Annuitized increase in lifetime income. Given optimal household portfolio allocations, the analysis quantifies the additional lifetime income that households gain from indirect exposure to PE through their retirement plans. For each age cohort, the analysis projects the stream of returns from today

Figure 12-8. Annualized Increase in Lifetime Income by Age Group



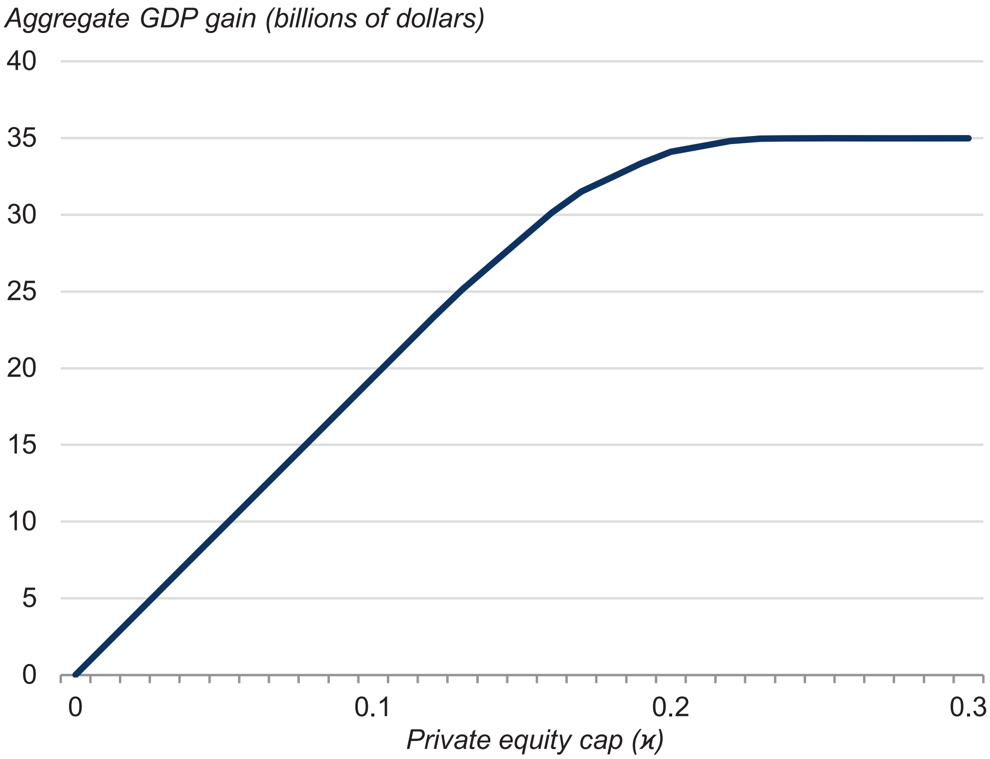
Source: CEA calculations.
Note: For calculation details, see the appendix to this chapter.

through the end of the cohort's life and converts it into a constant annuity payment discounted at the portfolio return. To compute the annuitized increase in lifetime income, the analysis repeats this calculation for household portfolio allocations with and without PE and finds the increase in household retirement investment portfolio income from an allocation to PE. Effectively, this metric captures the percentage increase in lifetime income for a participant with a PE portfolio allocation relative to a portfolio without a PE allocation, assuming the participant smoothed all future retirement income into a constant payout from today through the end of the participant's life (Boyle and Hardy 2003).

Figure 12-8 plots the annuitized increase in lifetime income by age cohort due to an allocation to PE by DC plans (see the appendix). The analysis finds that the youngest cohorts benefit the most, with a 2.5 percent increase in annuitized income relative to a 0.5–1.0 percent increase for the older cohorts. To calculate the overall increase in annuitized lifetime income, a weighted average of the annuitized percent increase is computed, with weights derived from cohort share of retirement wealth—an aggregate increase of 1.3 percent.

Output gains. The analysis here utilized a stylized, static model with two types of firms, public and private, that produce, using a Cobb-Douglas production function with capital and labor as inputs. The two sectors differ initially in their capital, labor, and productivity. Public and private capital stocks are inferred from observed U.S. stock market capitalization and gross assets held by

Figure 12-9. Output Gain as a Function of the Private Equity Cap



Source: CEA calculations.
Note: For calculation details, see the appendix to this chapter.

PE funds, respectively. To recover productivity and labor for each sector, the analysis relies on observed estimates of each sector's value added to gross domestic product (GDP) and require that wages are equalized across sectors. It is assumed that capital markets are segmented such that returns are not equalized between the two sectors. With initial conditions set, the analysis calculates the change in capital and labor allocations if DC retirement financial capital flows freely into the PE sector and the resulting gain in aggregate output, while holding the rest of the economy fixed.

Figure 12-9 plots the gain in GDP as a function of the PE cap (see the appendix). Because PE-backed firms are more productive than publicly listed firms (e.g., Asker, Farre-Mensa, and Ljungqvist 2011; and Davis et al. 2014), as restrictions on investing in PE are relaxed, more capital and labor are reallocated from the lower-productivity public sector to the higher-productivity PE sector. The analysis estimates that a full loosening of these restrictions would lead DC retirement plans to allocate about 20 percent of their portfolio to PE, which translates into an extra $35 billion in aggregate output, or about 0.12 percent of GDP.

This estimate of the increase in aggregate output could be understated, for several reasons: (1) There may be additional benefit from including private market investments other than PE such as venture capital or hedge funds. (2)

Assuming that nonequity portfolio allocations are risk-free overstates risk aversion and understates the propensity of households to shift to PE. And (3) if the model had captured dynamics, there could be an additional gain from the reallocation to the more productive PE sector in the form of higher aggregate capital.[6] At the same time, general equilibrium factors and relaxing the segmented capital markets assumption could dampen the estimated aggregate gains.

Access to a Large, Diversified, and Stickier Capital Base for Fund Managers and Private Companies

Private fund managers and fund portfolio (private) companies can significantly benefit from defined contribution plan investments due to their scale, diversification, and the long-term (stickier) nature of their capital. With respect to scale, if DC plans allocate 5–30 percent of their assets to private market investments, that would translate into $1.5–8.7 trillion in new capital for private fund managers and private companies, based on plan assets as of 2024. Because DC plan assets are growing faster relative to defined benefit plan assets, the new capital flowing to private fund managers / private companies is likely to also scale up with the growth in DC plan assets. From 2019 to 2024, DC plan assets witnessed an increase of 50 percent relative to only 20 percent for DB plan assets over the same period (ICI 2020, 2025).

With respect to diversification, private fund managers (general partners) are likely to benefit from diversifying their capital base because they typically rely on a concentrated base of limited partners (investors) to fund their portfolio companies. This diversification benefit can be especially pronounced during cyclical slowdowns, insulating private fund managers and portfolio companies from liquidity shocks that can slow down capital deployment and exits. With respect to its long-term (stickier) nature, DC plan assets are typically invested until retirement (for 30+ years) and face significant penalties for early withdrawals, providing fund managers with a largely stable capital base. An additional benefit of DC plan assets for fund managers is their predictability, since allocations to DC retirement accounts typically stem from payroll contributions and automatic enrollment/deferrals, and follow systematic glide paths. The predictability of the income stream can help fund managers with investment sequencing and exit timing as well as fundraising to raise new private funds.

[6] Since the model is static, the increased capital and output almost entirely results from reallocation of capital from the less-productive public sector to the more-productive private sector. The CEA allows the extra income from higher returns to translate into slightly more savings and capital, but that effect is minuscule. If the CEA had modeled dynamics explicitly, the increased productivity of capital could generate higher aggregate capital through more investment, translating into additional gains not captured by the model's estimates. See the appendix for more details.

Liquidity and Price Discovery for Financial Markets

An important distinction between private and public capital markets is their degree of liquidity and price discovery. Public markets are characterized by high liquidity, transparency, and efficient price discovery, facilitated by regulated exchanges and broad investor participation. In contrast, private capital markets exhibit lower liquidity and transparency, with valuations determined through negotiated transactions rather than continuous market pricing. As a result, the NAV-staleness problem arises in private markets due to less frequent valuations and reporting delays (Easton et al. 2023).[7]

ERISA fiduciary rules governing DC plan investments require "fair" valuations at regular intervals. Therefore, private fund managers who choose to accept capital from DC plans may be encouraged to produce more frequent and audited valuations. As DC plans establish a significant footprint in private markets, an important implication is that price discovery and liquidity for private markets as a whole may witness a notable improvement.

Conclusion

U.S. regulatory restrictions—such as the SEC's accredited investor definition and DOL's lack of guidance under ERISA's fiduciary rules—have long restricted retail access to private market investments through their DC retirement plans. With the rise of private markets and the dominance of DC plans in the U.S. retirement system, the restrictions on retail access to private market investments impose a significant cost, not just to retail investors, but also to fund managers, private companies, financial markets, and the real economy. This chapter has demonstrated that retail access to private market investments has the potential to unlock several important benefits: (1) retail investors benefit from diversification and higher retirement income; (2) private fund managers and private companies benefit from access to a large, diversified, and stickier capital base; (3) financial markets benefit from improved liquidity and price discovery; and, (4) the real economy benefits from higher GDP.

The second Trump Administration has already taken an important step toward realizing these benefits by issuing an Executive Order that directs Federal regulators to revise guidance and rules, enabling defined contribution plans to offer retail investors access to private market investments when reasonably prudent (White House 2025).

[7] The NAV staleness problem arises when the fund's net asset value does not accurately reflect the current market value of the fund's underlying assets, due to the less frequent pricing of illiquid assets.

Appendix: Quantifying the Macro and Micro Effects of Portfolio Allocation to Private Equity Through Defined Contribution Plans

This appendix describes a tractable and static model used to quantify the macroeconomic effects of relaxing portfolio allocation caps for PE investments within DC retirement accounts. The model builds a micro-level household portfolio optimization and aggregates for macro effects. In the micro block, households solve a static portfolio problem under constant relative risk aversion (CRRA) preferences and constrained access to PE. When policy loosens constraints through expanding DC plans' access to PE, financial capital flows out of public equity and into PE. In the macro block, the extra capital allocated to PE induces a reallocation of labor between private and public markets.

Micro Effect: Portfolio Choice Problem

In the micro problem, a household chooses portfolio weights for PE, public equity, and a safe asset. A static economy in which there are three assets is considered here. A household can allocate its portfolio toward a risk-free asset (with portfolio weight ω^f), public equity (ω^{PUB}), or private equity (ω^{PE}). The portfolio is constrained by:

$$\omega^f = 1 - \omega^{PUB} - \omega^{PE}, \qquad 0 \le \omega^{PUB}, \;\; \omega^{PE} \le 1, \qquad 0 \le \omega^{PUB} + \omega^{PE} \le 1.$$

The vector of risky allocations is $\omega = (\omega^{PUB}, \omega^{PE})^T$. Each asset has respective returns R^f, R^{PUB}, and R^{PE}. The associated vector of excess returns, expected excess returns, and the covariance matrix is given by:

$$R^e = (R^{PUB} - R^f, R^{PE} - R^f)^T, \quad \mu = E[R^e], \quad \Sigma = \text{Var}(R^e).$$

To account for investors' desire to hedge against nonasset income risk (e.g., labor income or background consumption shocks), the analysis here introduces an additive hedging vector h. One can think of the household as solving a mean-variance problem derived from an approximation to a constant relative risk aversion utility parameterized by γ. The analysis compares the solution of the unconstrained problem to the solution with an additional constraint $\omega^{PE} \le \overline{\omega}^{PE}$.

Unconstrained problem. In the unconstrained problem, there is no restriction on PE holdings except that they must be less than 1. This is just the standard mean-variance ("M-V") problem:

$$\max_{\omega^{PUB},\omega^{PE}} \boldsymbol{\omega}^T(\mu + \text{h}) - \frac{\gamma}{2}\,\boldsymbol{\omega}^T\Sigma\boldsymbol{\omega}$$

Essentially, households are choosing portfolio allocations to maximize returns and minimize variance. The more risk-averse that households are, which is captured by a higher γ, the more they penalize the variance term. The resulting optimal portfolio weights are given by:

$$\Sigma\,\omega^* = \frac{1}{\gamma}\,(\mu + h) \quad \Longrightarrow \quad \omega^* = \frac{1}{\gamma}\,\Sigma^{-1}(\mu + h),$$

which is the standard M-V solution together with a hedging term, h.

Constrained problem. Up to now, it has been assumed that the households can freely choose allocations to PE. Instead, suppose there is a binding PE cap $\omega^{PE} \leq \varpi^{PE}$. This is shorthand for implicit limits on DC plans to hold PE. In the case where the cap binds, the household solves the one-dimensional problem:

$$\max_{0\leq\omega^{PUB}\leq 1-\varpi^{PE}} \left\{\omega^{PUB}(\mu^{PUB} + h^{PUB}) - \frac{\gamma}{2}[\sigma_{11}(\omega^{PUB})^2 + 2\,\sigma_{12}\,\omega^{PUB}\,\varpi^{PE} + \sigma_{22}(\varpi^{PE})^2]\right\}.$$

This has the solution:

$$\omega^{PUB} = \frac{(\mu^{PUB} + h^{PUB}) - \gamma\,\sigma_{12}\,\varpi^{PE}}{\gamma\,\sigma_{11}}.$$

To ensure that the household obeys feasibility constraints, the optimal public equity allocation is:

$$\omega^{PUB} = \min\left\{\max\left\{0, \frac{(\mu^{PUB} + h^{PUB}) - \gamma\,\sigma_{12}\,\varpi^{PE}}{\gamma\,\sigma_{11}}\right\}, 1 - \varpi^{PE}\right\}.$$

Private equity allocations without constraints. Now, it is asked how high the PE allocation would be as the constraint is relaxed for different age groups. This requires one to first calibrate parameters. The first set of parameters are common to all household types. It is assumed that the baseline return on the safe asset is the risk-free rate, r_f = 0.03 (3 percent annually). This serves as the benchmark for computing excess returns on risky assets. Thus, the expected excess return vector is specified as:

$$\mu = [\mu^{PUB} - r_f, \mu^{PE} - r_f]^{\mathrm{T}} = [0.08 - r_f, 0.10 - r_f]^{\mathrm{T}} = [0.05, 0.07]^{\mathrm{T}}$$

The variance-covariance structure of asset returns is defined from Korteweg and Westerfield (2022) as:

$$\Sigma = \begin{bmatrix} Var(PUB) & COV(PUB, PE) \\ COV(PE, PUB) & Var(PE) \end{bmatrix} = \begin{bmatrix} 0.031 & 0.038 \\ 0.038 & 0.067 \end{bmatrix}$$

These values approximate real-world observed volatilities and co-movements between public and private equity. To account for investors' desire to hedge against nonasset income risk (e.g., labor income or background consumption shocks), an additive hedging vector: $h = [0.0004, 0.0004]^T$ is introduced (see Duffee 2005). This term enters the first-order condition identically across age and asset classes, reflecting uniform marginal hedging benefits of risky assets.

The analysis distinguishes between age groups by variation in risk aversion. Vanguard (2025, figure 60) household financial survey data show asset allocations by age group. With return and volatility calibrations, the first-order condition from the mean-variance problem is used when $\omega^{PE} = 0$, and the equation is inverted to solve for γ given each age group's observed allocation to ω^{PUB}. The resulting values represent cohort-specific degrees of risk aversion that rationalize their baseline asset allocation under the assumed M-V framework with hedging preferences.

Given parameters, the allocations are recomputed as a function of the constraint cap for each age group. Figure 12-7 shows the optimal allocations by age group when there is no cap.

Quantifying the gain in annuitized lifetime income. To assess the long-term welfare implications of PE reform, cohort-specific portfolio returns are translated into gains in annuitized lifetime income. For any cohort with T remaining years and return paths r_t^0 (pre-reform) and r_t^1 (post-reform), define the discount factor (d) and corresponding annuity factors (AF) as:

$$d_t^i = \prod_{\{s=0\}}^{t} \frac{1}{1 + r_s^i} \qquad AF_i = \left(\sum_{t=0}^{T} d_t^i \right)^{-1}, \quad i = 0{,}1.$$

The counterfactual no-cap return path r_t^1 is cohort-specific and age-dependent. For each cohort, future ages are mapped into the corresponding age-bin risk aversion and optimal portfolio weights are recomputed for each year. The starting point is the median age within each age group. When cohorts transition into the next age group, their risk aversion changes as well. Under these definitions, the percentage increase in annuitized lifetime income is:

$$\%Gain_i = 100 \cdot \frac{AF_1 - AF_0}{AF_0}.$$

For each cohort, the calculation gives the percentage increase in the size of the flat annual check (annuity) that could be drawn every year from today until death at 78 (life expectancy for the U.S. population) after accounting for transitions in age and reform to allow PE allocations in DC plans. The gain comes from the extra wealth due to higher returns from retirement portfolios. Because the annuity factor discounts later years more heavily, early-life return changes drive most of the gain. Consequently, younger cohorts experience larger gains from relaxing the cap on PE DC allocations. Figure 12-8 shows the annuitized increase in lifetime income by age cohort.

Inputs from the micro block are now used to compute aggregate effects from lifting implicit caps on PE allocations in DC retirement portfolios. The analysis here is of a static, two-sector Cobb–Douglas production economy, showing how lifting the PE cap leads to labor and capital reallocation across sectors, and it quantifies the resulting change in aggregate output.

Environment. The analysis looks at a small open economy with two sectors. Each sector $j \in \{PE, PUB\}$ produces with a Cobb-Douglas production function, given by:

$$Y_j = A_j K_j^{\alpha} L_j^{1-\alpha}.$$

It is assumed that labor is mobile across sectors, but that capital in each sector is pinned down by the household sector's portfolio choice. This assumption requires segmented capital markets. There is one unit of labor divided between sectors. The first-order condition for labor requires that, in each sector:

$$\text{MPL}_j(L_j) = (1-\alpha) \cdot \frac{Y_j}{L_j}.$$

Let $L_{PE} \in (0,1)$ denote the fraction of total labor allocated to the PE sector. Then, the public equity sector receives $L_{PUB} = 1 - L_{PE}$, and equilibrium requires:

$$\frac{Y_{PUB}}{1 - L_{\text{PE}}} = \frac{Y_{\text{PE}}}{L_{\text{PE}}}$$

The solution to the nonlinear equation given above yields the equilibrium labor allocation between sectors. Given initial value added by sector, how labor gets reallocated by sector, given a change in the capital stock, can be calculated.

Calibration. As a first step, the change in financial capital from the household block needs to be mapped onto a change in productive, physical capital in the real economy. To that end, an estimate of Tobin's q, which is the ratio of market to book capital, is used. Initial (pre-reform) capital stocks are computed in each sector by dividing financial capital[8] in each sector by an economy-wide estimate of q:[9]

$$K_{0,\,\text{pub}} = \frac{V_{\text{fin, pub}}}{q_{\text{pub}}} = \frac{48}{1.75},\; K_{0,\,\text{pe}} = \frac{V_{\text{fin, pe}}}{q_{\text{pub}}} = \frac{10}{1.75}$$

[8] The CEA gets the value of financial public capital from SIFMA (2024) and the value of private equity from SEC (2024, table 5.1).

[9] An aggregate proxy is used from the Federal Reserve's Flow of Funds Table B.103, lines 39 and 42 (Federal Reserve Bank of Saint Louis 2025). In particular, the market value of equities (line 42) is divided by net worth (line 39), which yields a figure of 1.75. This is assumed to be the same q for private and public firms.

Assuming the same q for private and public markets likely understates the PE capital stock, thus dampening any output gains. Because PE has an illiquidity premium, it would trade at a discount relative to public equity. The PE illiquidity premium implies that the current market price must be lower for the same capital stock.

Next, output is estimated for each sector Y_j. From Schlingemann and Stulz (2022), 25 percent of GDP is from public equity, while Ernst & Young (2024) estimates that 7 percent of GDP is produced by PE-backed firms. That implies a value added of $7.5 trillion and $2.1 trillion, respectively.[10] It is assumed that the capital share takes a standard value of 0.35, and is identical across sectors. Finally, sector-specific total factor productivity is calculated by solving for productivity for each sector A_j, given observed value added, capital, and labor:

$$A_j = \frac{Y_j}{K_{0,j}^{\alpha} \cdot L_{0,j}^{1-\alpha}}, \quad \text{for } j \in \{\text{pub}, \text{pe}\}$$

This ensures that the pre-reform economy exactly reproduces the observed value added of each sector.

Effect of private equity reform on aggregate outcomes. The analysis now considers how unrestricted PE allocations would affect aggregate outcomes. This is a function of two sources: reallocation to a higher productivity sector and a restrictive notion of capital deepening. After the policy reform, DC plan investors reallocate a share of their portfolios to PE. This triggers new financial flows into each sector:

$$\Delta F_j = K_{\text{DC}} \cdot \left(s_{1,j} - s_{0,j}\right),$$

where ΔF_j is the change in financial flows into each sector given the reform and $s_{1,j}$ is the post-reform PE allocation share. These flows translate into real capital increases, via Tobin's q:

$$\Delta K_j = \frac{\Delta F_j}{q_j}, \quad K_1^j = K_0^j + \Delta K_j$$

The analysis then solves for post-reform labor shares by reimposing equality of marginal products of labor:

$$(1-\alpha_{\text{pub}})A_{\text{pub}}\left(\frac{K_{1,pub}}{1-L_{\text{pe}}}\right)^{\alpha} = (1-\alpha_{\text{pe}})A_{\text{pe}}\left(\frac{K_{1,pe}}{L_{\text{pe}}}\right)^{\alpha}$$

[10] This relies on a nominal GDP of $30 trillion, which the CEA takes from BEA (2025, table 1.1.5, line 1) for 2025:Q1.

Post-reform sectoral output and the percent change are:

$$Y_{1,j} = A_j \cdot \left(K_{1,j}\right)^{\alpha} \cdot \left(L_{1,j}\right)^{1-\alpha}, \qquad \Delta Y_j(\%) = \left(\frac{Y_{1,j}}{Y_{0,j}} - 1\right) \cdot 100$$

This formula yields the percentage change in sectoral output from reallocation. Additional change comes from capital deepening. Because household returns go up, they save a little bit more because the marginal propensity to save (MPS) is positive. We use Sokolova (2023) to compute the MPS as approximately 0.18. As a result, the extra retirement capital is:

$$K_{\mathrm{DC}} = 30 \cdot \left(1 + \frac{\text{Aggregate Gain}}{100} \cdot \mathrm{MPS}\right)$$

Where the aggregate gain is the weighted increase in annuitized income. Finally, the GDP gain is computed as:

$$\Delta GDP(\%) = 0.25 \cdot \Delta Y_{\mathrm{pub}} + 0.07 \cdot \Delta Y_{\mathrm{pe}}.$$

Figure 12-9 shows the gain in GDP as a function of the PE cap.