PGIM

PRIVATE EQUITY & MACRO FACTORS

CASH FLOWS & PERFORMANCE

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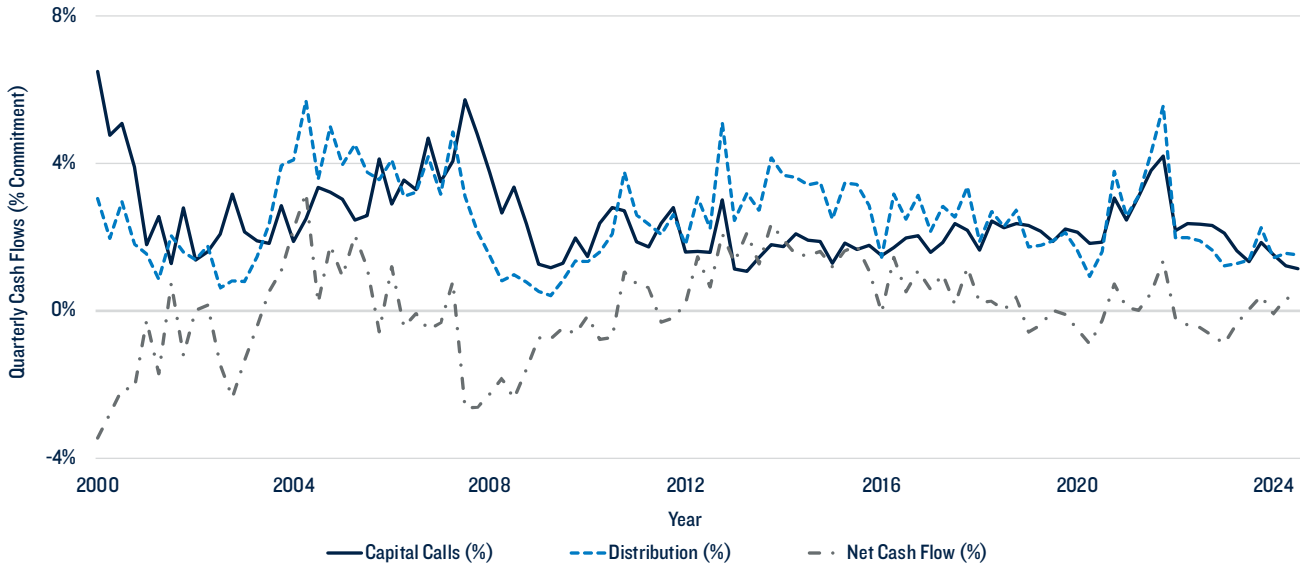
Beginning in 2022, private equity (PE) funds experienced a notable shift in cash flow behavior – capital calls and distributions declined significantly while net cash flows hovered around, and sometimes below, zero (Figure 1). These developments occurred alongside a rapidly changing public market & macroeconomic backdrop: rising interest rates, elevated market volatility, increasing valuation of public equity relative to PE, and tightening financial market lending conditions. Can changes in these "macro" factors (i.e., public market & macroeconomic conditions) explain changes in PE cash flow dynamics?

We show how macro factors relate to PE fund cash flows (contributions, distributions and net cash flows) conditional on fund age. What are the particular macro conditions associated with a fund's particular cash flow experience? We also show how macro factors around a fund's vintage year relate to fund lifetime performance and the cross-sectional performance dispersion. We systematically analyze these historical relationships and provide insights to help inform a CIO's asset allocation decisions. Figure 2 provides a high-level summary of the relationships between PE cash flow/ performance behaviors and macro factors.

CIO Takeaways

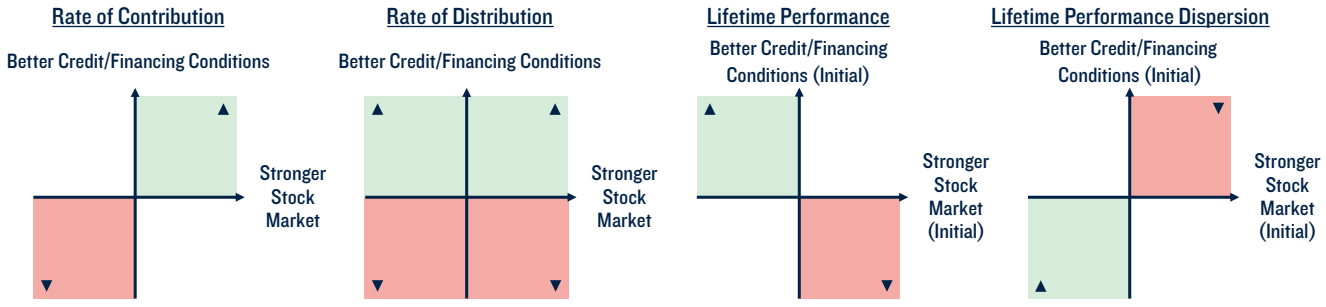
1. Rate of contribution accelerates amid lower financing costs, improved credit availability, stronger investor sentiment, robust economic activity and higher inflation.
2. Rate of distribution accelerates under favorable exit conditions driven by attractive public market valuations, lower credit spreads and stronger economic growth.
3. Recent slowdown in the rate of distribution might be due, in part, to worsening exit conditions caused by higher credit spreads and elevated bond market volatility.
4. PE fund lifetime performance improves when the initial macro environment offers lower purchasing cost and lower financing cost.
5. Lifetime performance dispersion between top and bottom funds widens with higher long-term rates, lower public equity valuation and lower inflation around the vintage year.

Figure 1: PE Cash Flows; Q1 2000-Q3 2024



Source: MSCI Burgiss and PGIM. Provided for illustrative purposes only.

Figure 2: PE Cash Flow & Performance Behaviors in Response to Macro Factors



Note: Green ▲ quadrants indicate increase in cash flow/performance measures; Red ▼ quadrants indicate decrease in cash flow/performance measures. Economic growth and inflation are not shown here for simplification purposes, but stronger/weaker stock market tends to reflect higher/lower economic growth. Source: PGIM. Provided for illustrative purposes only.

Fund Cash Flow Dynamics and Macro Factors

To investigate how fund cash flows relate to macro factors we regress various fund cash flow measures (our dependent, or LHS, variable) on a set of contemporaneous or lagged macro factors (our independent, or RHS, variables). We construct PE fund cash flow variables in a way consistent with how fund cash flows evolve over a fund's lifecycle and how they are typically defined in fund cash flow models.[1] We focus on three annual measures, aggregated across funds, either by fund age or by fund vintage year:[2]

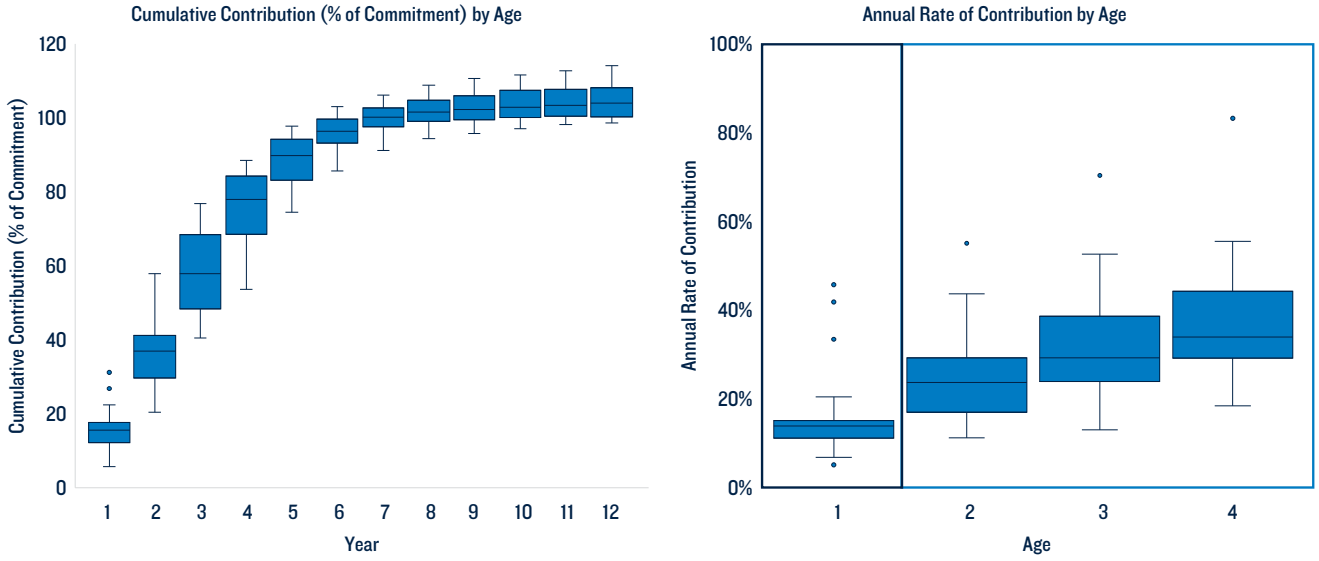
1. Rate of Contribution (RC): $\boldsymbol{RC_t} = \dfrac{\text{Contribution}_t}{\text{Uncalled Capital}_{t-1}}$
2. Rate of Distribution (RD or Distribution Yield): $\boldsymbol{RD_t} = \dfrac{\text{Distribution}_t}{\text{NAV}_{t-1}*(1+G_t)} = \dfrac{\text{Distribution}_t}{\text{NAV}_t - \text{Contribution}_t + \text{Distribution}_t}$
3. Net Cash Flows (NCF): $\boldsymbol{NCF_t} = \dfrac{\text{Distribution}_t - \text{Contribution}_t}{\text{Commitment Amount}}$

Using annual cash flow rates rather than dollar amounts offers advantages: 1) normalization to avoid distortions that would arise from variations in dollar commitment levels and 2) consistency with the cash flow measures in the standard Takahashi-Alexander cash flow model. Establishing a link between these cash flow rates and macro factors allows our analysis to be useful for practical applications.

We first aggregate fund cash flow measures (RC, RD and NCF) by fund age (in years). Then, we further aggregate our cash flow variables into fund **age groups.** This age grouping approach preserves the key characteristics of PE cash flow behavior across different stages of fund lifespan and improves estimation inference, without sacrificing the interpretability of our findings.[3]

For RC, we focus on the early years of a fund's life as capital calls are usually front-loaded (GPs call 71% of commitments, on average, by age 4 – see Figure 3). Since RC for age 1 is usually smaller than for ages 2-4, we group age 1 on its own and group ages 2-4 together.

Figure 3: Cumulative Contribution (% of Commitment) & Annual Rate of Contribution, by Age

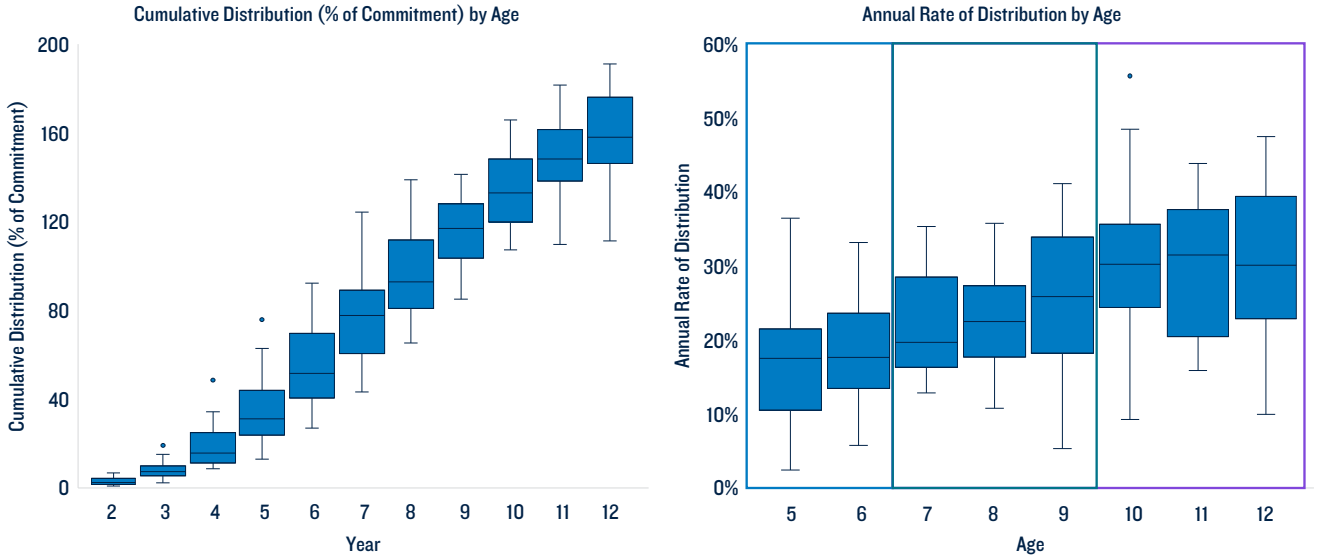


Note: The box spans from first quartile (Q1) to third quartile (Q3) (interquartile range, or IQR), with a line inside marking the median. The whiskers extend from the box to 1.5 times the IQR. Data points falling outside the whiskers are outliers. Source: MSCI Burgiss and PGIM. Provided for illustrative purposes only.

[1] The age-dependent cash flow measures (RC & RD) are the same parameters as in the Takahashi-Alexander cash flow model.
[2] We obtain PE fund cash flow and performance (i.e., PME, public-market-equivalent) data from MSCI-Burgiss. We then calculate the 1995-2023 annual cash flow metrics (actual rate of contribution and rate of distribution, by fund age) and performance metrics (average PME for each performance quartile, by vintage).
[3] The choice is primarily motivated by the data and the objective of uncovering systematic relationship between PE cash flow dynamics and the public market & macroeconomic environment. Analyzing each specific age year in isolation may introduce noise or limit the statistical power of the results. By grouping fund ages into broader categories that reflect similar stages of the fund lifecycle, we aim to enhance our ability to detect patterns linked to public market & macroeconomic factors. We acknowledge that this age grouping approach involves qualitative judgement. Our grouping aims to reflect the broad cash flow patterns of PE funds. We also conducted sensitivity checks and made adjustment where necessary to ensure robustness.

For RD, we focus on the latter part of a fund's life where meaningful distributions tend to materialize (Figure 4). Based on empirical RD patterns, we aggregate fund ages into three groups: 5-6, 7-9 and 10-12. We observe that age group 5-6 typically marks the initial phase where distribution activities begin to pick up, followed by age group 7-9, where the RD accelerates. Finally, age group 10-12 generally represents a phase where funds mature and exit any remaining assets. While this choice of grouping involves qualitative judgement, it provides a practical framework that captures fund-level lifecycle distribution dynamics observed across vintages.

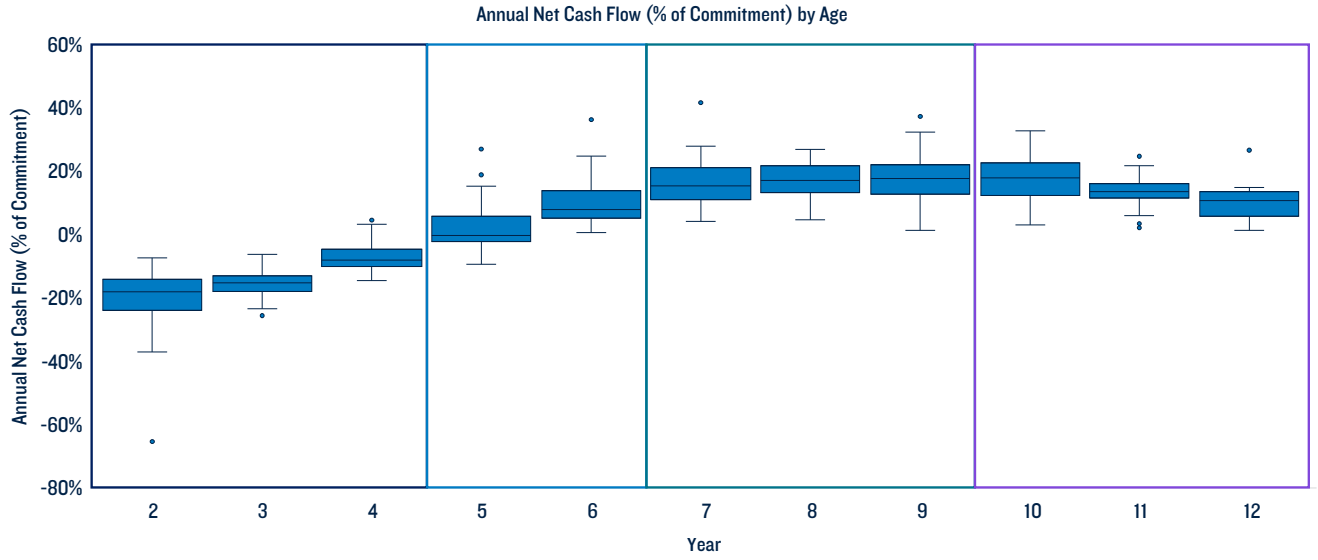
Figure 4: Cumulative Distribution (% of Commitment) & Annual Rate of Distribution by Age



Note: The box spans from first quartile (Q1) to third quartile (Q3) (interquartile range, or IQR), with a line inside marking the median. The whiskers extend from the box to 1.5 times the IQR. Data points falling outside the whiskers are outliers. Source: MSCI Burgiss and PGIM. Provided for illustrative purposes only.

Finally, for the analysis of NCF, we adopt an age grouping that aligns with RC and RD (Figure 5).[4] Specifically, we use the following age groups: 2-4, 5-6, 7-9 and 10-12.

Figure 5: Net Cash Flow (% of Commitment) by Age



Note: The box spans from first quartile (Q1) to third quartile (Q3) (interquartile range, or IQR), with a line inside marking the median. The whiskers extend from the box to 1.5 times the IQR. Data points falling outside the whiskers are outliers. Source: MSCI Burgiss and PGIM. Provided for illustrative purposes only.

[4] See Appendix 1 for the NCF results, which can be partly explained by combining the RC and RD analyses. However, divergences may occur since the three cash flow measures are derived with different denominators and need further exploration.

Selection of Macro Factors: Public Market & Macroeconomic Data

Macro Factors: We consider a wide range of possible public market and macroeconomic variables (factors) – measured on an annual basis – that are potentially related to PE cash flows and performance (Figure 6). They include: 1) equity market factors (i.e., returns, volatility, equity risk premium, equity valuation, and the relative valuation between PE and public equity), 2) bond market factors (i.e., returns, volatility, yields/rates, term premium, and credit market conditions), and 3) macroeconomic factors (i.e., economic growth and inflation).[5] Some factor categories contain multiple factor candidates. For example, under equity returns, in addition to cap-weighted large-cap index, we also consider equal-weighted small-cap indexes for two reasons: a) small-cap companies – typically offering better valuation arbitrage and higher growth potential than large-cap companies – are more likely to be in PE fund portfolios, and b) cap-weighted returns can be biased towards mega-cap stocks.

Factor Selection: To select macro factors, we apply LASSO (least absolute shrinkage and selection operator) to combat overfitting while preserving prediction accuracy.[6] If LASSO selects multiple factors under the same factor category (e.g., both CAPE and the S&P 500 Trailing 1y P/E under public equity valuation), we only keep the factor with the lowest p-value and drop any others.

Figure 6: List of Potential Macro Factors

Macro Factors	Public Market		Macroeconomic
	Equity Market	Bond Market	
Returns	S&P 500 TR S&P 500 Equal Weight TR S&P SmallCap 600 Equal Weight TR Russell 2000 Equal Weight TR	10y UST TR	
Yields / Rates		10y UST Yield 10y UST Real Yield 2y UST Yield 3m SOFR	
Volatility	VIX VIX Change vs. Vintage Year	MOVE MOVE Change vs. Vintage Year	
Equity Risk Premium / Term Premium	1/CAPE - 10y UST Yield 1/CAPE - 10y UST Real Yield	10y UST Yield - 3m UST Yield	
Equity Valuation	CAPE S&P 500 Trailing 1y P/E Russell 2000 Value P/E		
Private-Public Equity Relative Valuation	PE-S&P 500 EV/EBITDA Difference		
Credit Market Conditions		Baa Corp Bond Spread Fed's NFCI Bank Loan Tightening/Easing	
Economic Growth			Real GDP Growth Fed's CFNAI
Inflation			CPI Inflation

Note: All returns are total returns calculated using end-of-period index levels, while other factors are measured as annual averages. The 6m lags of all factors are calculated using quarterly data where available, and as averages of contemporaneous data and 1y lags otherwise. The PE-S&P 500 EV/EBITDA difference calculation combines data from Bloomberg and Statista. The Chicago Fed's NFCI (National Financial Conditions Index) measures the tightness of the financial conditions. The Chicago Fed's CFNAI (Chicago Fed National Activity Index) tracks the overall economic activity and related inflationary pressure. The Fed's Bank Loan Tightening/Easing metric is based on the senior loan officer opinion survey, measuring whether the bank lending standards for large and middle-market firms are tightening or easing. Source: PGIM. Provided for illustrative purposes only.

[5] Surprises in economic growth and inflation may also impact PE cash flows and performance. They are not included due to lack of reliable data but might be reflected – to some extent – by related factors such as VIX and MOVE.
[6] Alternative factor selection methods such as stepwise regression can rank the marginal importance of each factor. In practice, these methods may select similar factors as LASSO does, leaving our major findings largely intact.

Macro Factors & Rates of Contribution

Figure 7 presents the RC regression results for its two age groups (1 and 2-4), controlling for prior cumulative contribution (% of commitment) and fund age. Age dummy variables (e.g., the "Age = 3" variable equals 1 when it is age 3 and equals 0 otherwise) are added to the regression to account for PE funds' intrinsic impact of age on RC that cannot be explained by macro factors. All annual macro factors are lagged by 6 calendar months to reflect the typical delay between fund launch and capital calls.

For illustration purposes, let's take the results for the first age group (i.e., age 1) as an example. The numeric values in columns 1-17 are the coefficient estimates of the *selected* macro factors in a multivariate regression, while a blank cell means the corresponding macro factor is not selected (e.g., S&P 500 Total Return). The coefficient estimates denoted with ***/**/* and highlighted in dark/medium/light green (columns 8-11 & 14) are statistically significant at the 1%/5%/10% level, respectively.

GPs tend to accelerate capital contributions under favorable macro conditions. On the public equity side, higher returns and valuations (columns 1 & 6) – signals of strong momentum or investor sentiment – encourage more aggressive capital deployment. Meanwhile, higher PE valuations relative to public equity (column 7) suggest a stronger deal environment with more transaction activities where GPs deploy capital.

In the bond market, lower long-term interest rates and tighter credit spreads (columns 9 & 11) reduce the cost of financing, while compressed term premia (column 10) signal strong investor confidence in economic stability, both encouraging faster capital calls. Interestingly, elevated volatilities in both equity and bond markets (columns 3 & 8) are associated with higher RC. In volatile markets, investment opportunities may arise that lead GPs to accelerate capital calls.

From a macroeconomy perspective, stronger economic activity and higher inflation (columns 13 & 14) tend to increase RC, suggesting that GPs view these environments as conducive to capital deployment.

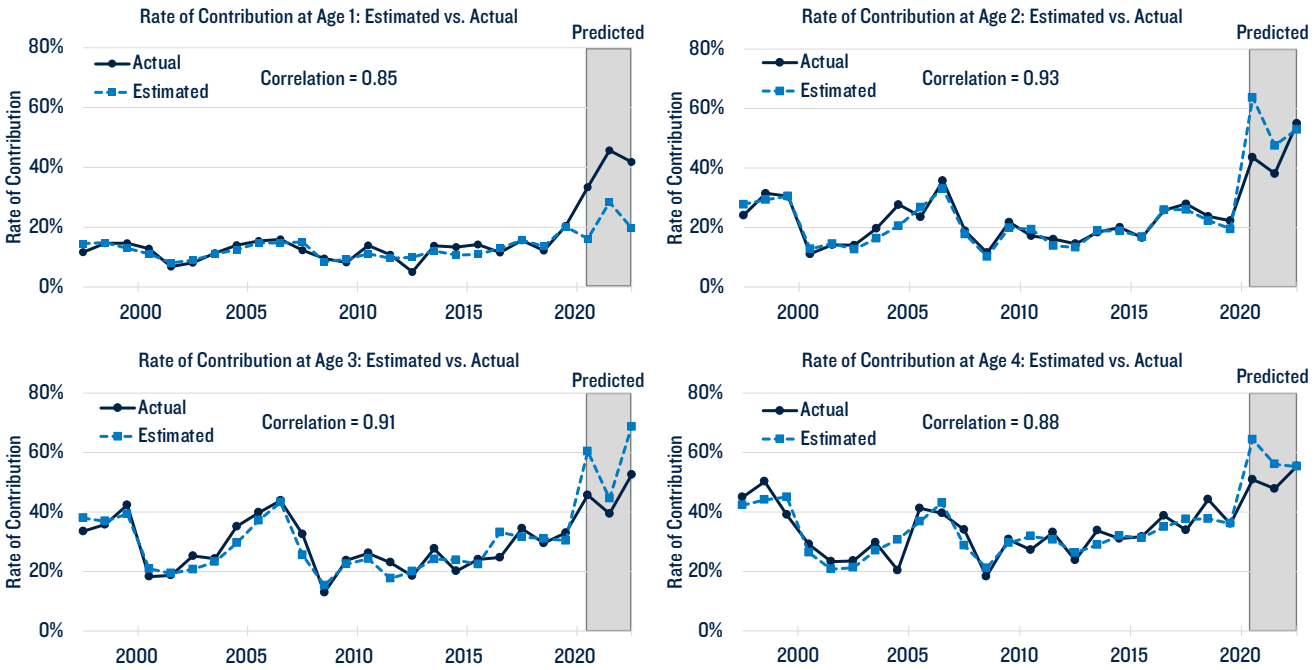
Figure 7: Multivariate Regression of Rate of Contribution on Macro Factors (with 6m lags), by Age Group; 1995-2023

Column No.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Group by Age	No. of Obs.	Public Market											Macroeconomic			Private Market			Goodness of Fit		No. of Factors Selected
		Equity Market							Bond Market												
		Returns		Volatility	Equity Risk Premium	Equity Valuation		Private -Public Equity Relative Valuation	Volatility	Yields / Rates	Term Premium	Credit Market Conditions	Economic Growth		Inflation						
		S&P 500 TR	S&P SmallCap 600 Equal Weight TR	VIX	(1/CAPE - 10y UST Real Yield)	CAPE	Russell 2000 Value P/E	PE-S&P 500 EV/ EBITDA Difference	MOVE	10y UST Yield	(10y UST Yield - 3m UST Yield)	Baa Corp Bond Spread	Real GDP Growth	Fed's CFNAI	CPI Inflation	Prior Cumulative Contribution %	Age = 3 (Dummy)	Age = 4 (Dummy)	Adj.R^2	P-value of F-stat	
1	26		0.357	0.022		0.016		0.034	0.012 ***	-24.370 ***	-12.470 *	-55.160 **	-0.395		10.138 **				79%	0%	10
2-4	78	1.006 ***		0.015 *			0.010 ***	0.029 **	0.006 ***		-16.815 ***	-29.694 ***		0.202 ***		0.034 ***	0.333 ***	0.566 ***	84%	0%	11

Note: In columns 1-17, numeric values are the beta coefficient estimates and ***/**/* (dark/medium/light green) denotes statistical significance at the 1%/5%/10% level, respectively. Intercept estimates are available but not reported to save space. Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

We estimate RC using the factors selected, holding back the last three years for out-of-sample prediction purposes (shaded area in Figure 8). Our RC model shows strong accuracy, both in-sample and out-of-sample, with estimated values closely tracking actual ones. The correlations between the actual RCs and the estimates (full sample) range from 0.85 to 0.93 across fund ages, averaging 0.89. The model's predictions for the years since 2021 broadly capture actual PE fund cash flow dynamics.

Figure 8: Estimated vs. Actual Rate of Contribution



Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

Macro Factors & Rates of Distribution

Figure 9 provides the RD regression results, segmented by three age groups (5-6, 7-9, and 10-12), controlling for prior cumulative distribution (% of commitment) and fund age. Age dummy variables are added to the regression to account for PE funds' intrinsic impact of age on RD. Again, we lag the annual macro factors by 6 calendar months to reflect the gap between the GP's exit decision and distribution payment. PE distributions are inherently tied to both the stage of the fund's lifecycle and the macro factor environment. The variation in our model's factor selection across age groups suggests that the macro drivers of RD vary across a fund's life.

For funds in the initial distribution phase (age group 5-6), RD rises when the relative valuation of PE falls below that of public equity (column 7), motivating GPs to exit investments. Higher bond returns, lower bond market volatility and improved credit availability (columns 8, 10 & 14) indicate more favorable debt market conditions for exits, including refinancing or strategic buyouts.

As funds continue to mature (age group 7-12), fund managers tend to be under pressure to wind down positions and RD seems less reactive to macro factors, as evidenced by the diminishing explanatory power (the adjusted R^2's for age groups 7-9 and 10-12 are much lower (56% and 63%, respectively) than the 76% for age group 5-6). Nevertheless, the goodness of fit stays strong even in the later phases of fund lifetime. A potential explanation is that continuation vehicles and secondary solutions offer GPs greater flexibility to hold onto high-performing assets, extending the influence of macro factors on distributions. In addition to a less volatile bond market and better credit conditions (columns 9 & 11-13), stronger macroeconomic factors (column 15) also increase RD.

The recent slowdown in the rate of distribution might be due in part to worsening exit conditions such as higher credit spreads and elevated bond market volatility.

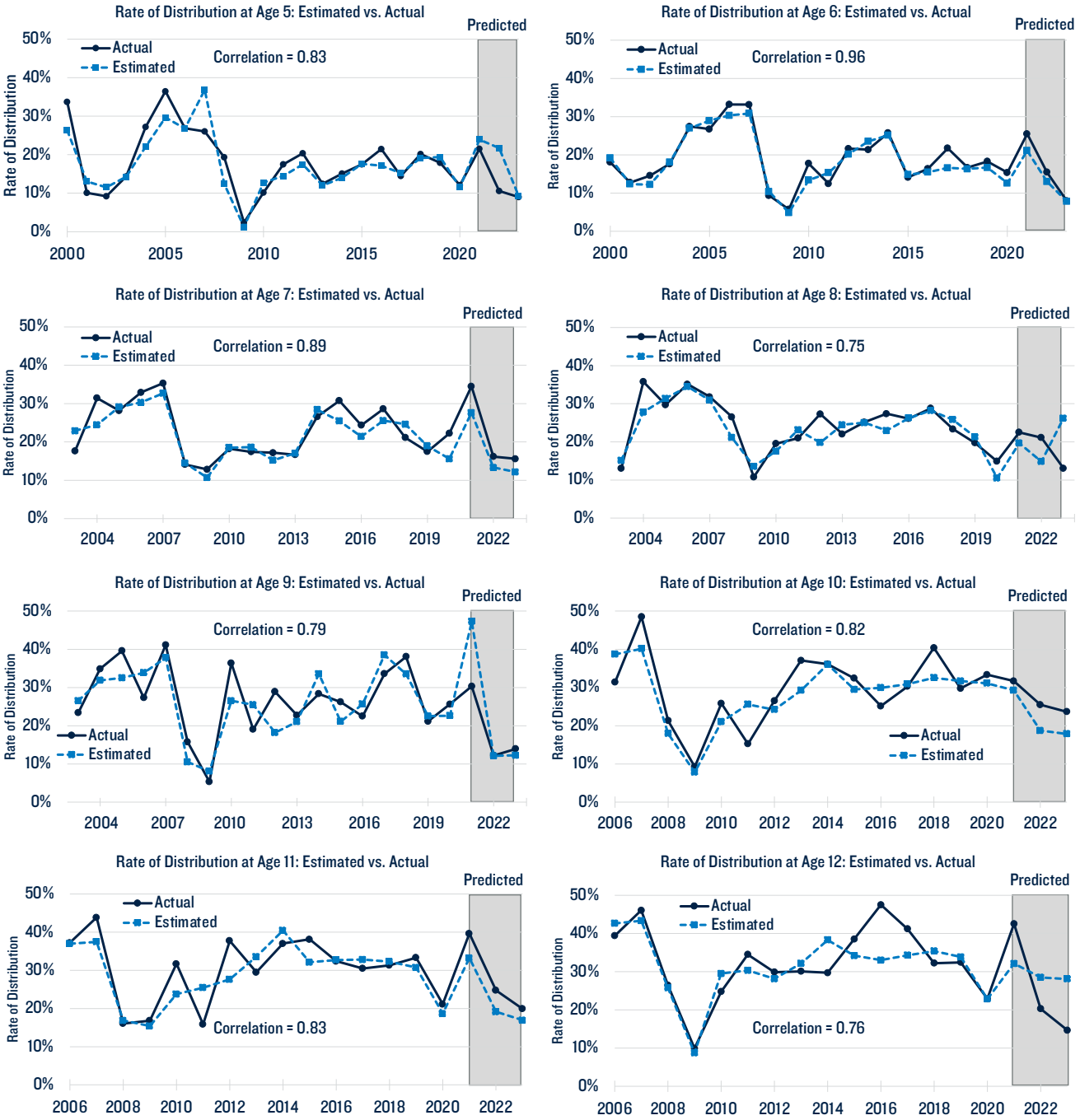
Figure 9: Multivariate Regression of Rate of Distribution on Macro Factors (with 6m lags), by Age Group; 1995-2023

Column No.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Group by Age	No. of Obs.	Public Market														Macro.	Private Market			Goodness of Fit		No. of Factors Selected
		Equity Market							Bond Market							Economic Growth						
		Returns		Equity Risk Premium	Equity Valuation			Private-Public Equity Relative Valuation	Returns	Volatility				Credit Market Conditions								
		S&P 500 TR	S&P Small-Cap 600 Equal Weight TR	(1/CAPE - 10y UST Real Yield)	CAPE	S&P 500 Trailing 1y P/E	S&P 500 Trailing 1y P/E (at Age 6) Change vs. Vintage Year	PE-S&P 500 EV/EBITDA Difference	10y UST TR	MOVE	MOVE (at Age 5) Change vs. Vintage Year	MOVE (at Age 7) Change vs. Vintage Year	MOVE (at Age 9) Change vs. Vintage Year	Baa Corp Bond Spread	Bank Loan Tightening/Easing	Fed's CFNAI	Prior Cumulative Distribution %	Age = 6 (Dummy)	Age = 9 (Dummy)	Adj.R^2	P-value of F-stat	
5-6	48	0.385			0.008	-0.003	-0.002	-0.059 **	1.233 *		-0.004 **				-0.701 **		0.029 ***	0.095		76%	0%	10
7-9	63		0.262					-0.038				-0.003 *	-0.004 **	-22.087 **					0.115	56%	0%	9
10-12	49			-5.530		-0.002				-0.009 ***						0.127 *	-0.008 **			63%	0%	5

Note: In columns 1-18, numeric values are the beta coefficient estimates and ***/**/* (dark/medium/light green) denotes statistical significance at the 1%/5%/10% level, respectively. Intercept estimates are available but not reported to save space. Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

Our RD model captures both the timing and magnitude of distribution behavior across fund age groups, with the correlations between the actual values and the estimates (full sample) averaging 0.83 (Figure 10).

Figure 10: Estimated vs. Actual Rate of Distribution



Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

Macro Factors & Lifetime Fund Performance

GPs typically commit capital over several years after fund launch. How much do macro conditions (financing costs, entry valuations, deal availability, and competitive dynamics) either at the vintage year, or up to 1-3y afterwards, influence fund performance? Challenging environments at fund launch, such as high interest rates or economic uncertainty, may compress entry multiples and favor managers with stronger operational expertise, potentially leading to wider performance dispersion across funds. In contrast, more favorable environments may lift performance across all managers, limiting manager differentiation. By focusing on the **initial** macro conditions, we aim to help CIOs better understand not only the drivers of PE fund **lifetime performance** but also the factors that influence the cross-sectional **lifetime performance dispersion** between top- and bottom-performers across vintages.

A PE fund delivers returns to LPs by financing, purchasing a company, adding value from operational improvements, and selling it. Consequently, a higher return can be generated from four sources: a lower financing cost, a lower purchasing price, a higher value-added, and a higher selling price (i.e., buy low, sell high). We focus on **financing & purchasing costs** since we study the impact of the initial macro factor environment around the vintage year. We expect macro factors that affect fund performance are also likely to drive performance dispersion across funds. We use lifetime pooled PME (public market equivalent, with S&P 500 as the benchmark index) to measure performance.[7]

We examine how fund performance is related to macro conditions at the vintage year, 1y after the vintage year, 2y and 3y afterwards. Macro factor conditions 1y after the vintage year have the best explanatory power (adj. R^2 = 75%, Figure 11). Lifetime performance improves when the initial macro environment offers 1) *lower purchasing cost* – driven by lower valuation, returns and volatility of public equity, cheaper valuation of PE relative to public equity, and slower economic growth (Figure 11, columns 1, 3-6 & 12-13); and 2) *lower financing cost* – due to lower rates, tighter credit spread, and higher inflation (Figure 11, columns 9, 10 & 14).

Figure 11: Multivariate Regression of Pooled PME on Macro Factors; 1995-2021

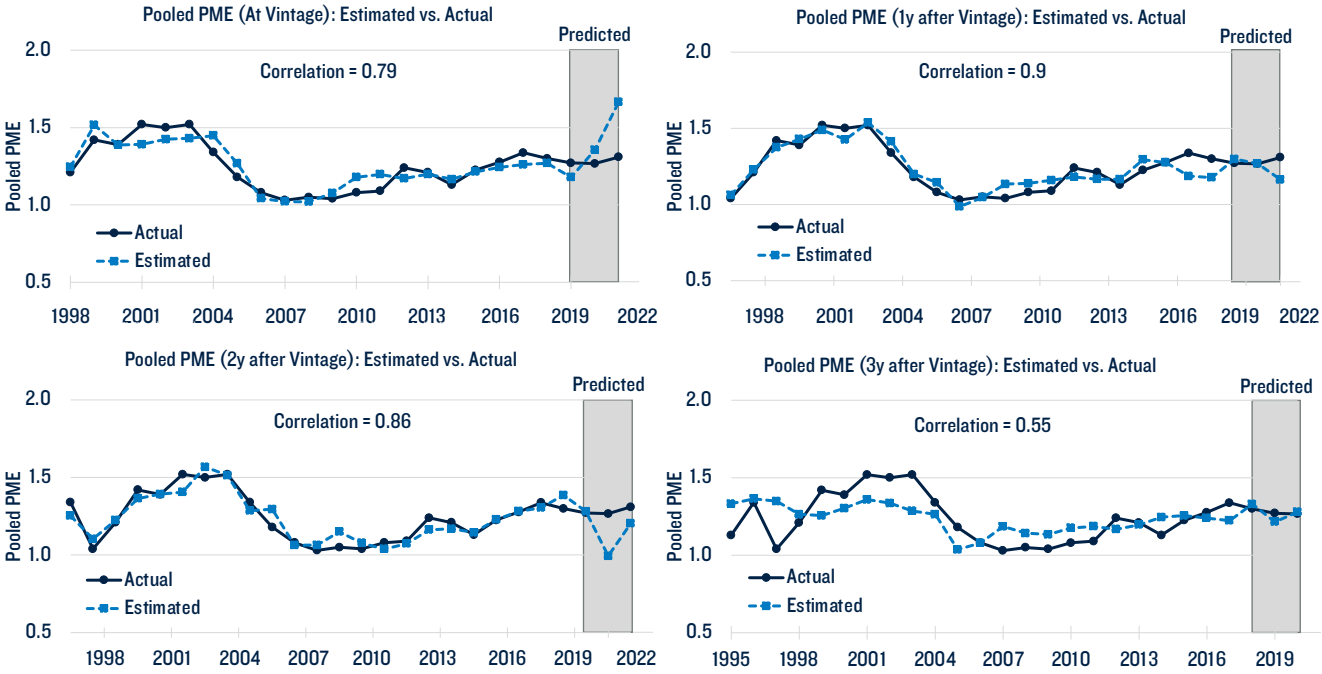
Column No.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Macro Factors	No. of Obs.	Public Market											Macroeconomic			Goodness of Fit		No. of Factors Selected
		Equity Market						Bond Market					Economic Growth		Inflation			
		Returns			Volatility	Equity Valuation	Private -Public Equity Relative Valuation	Returns	Volatility	Yield/ Rates	Credit Market Conditions							
		S&P 500 TR	S&P Small-Cap 600 Equal Weight TR	Russell 2000 Equal Weight TR	VIX	CAPE	PE-S&P 500 EV/ EBITDA Differ-ence	10y UST TR	MOVE	3m SOFR	Baa Corp Bond Spread	Fed's NFCI	Real GDP Growth	Fed's CFNAI	CPI Inflation	Adj.R^2	P-value of F-stat	
At Vintage	24		-0.159		-0.002	0.006	-0.050 ***	-0.027		-3.200 *		-0.014			-0.531	57%	0%	8
1y after Vintage	25	-0.305 **			-0.013 **		-0.061 ***	-0.017		-2.131 *		-0.080	-4.074 ***		3.662 **	75%	0%	8
2y after Vintage	26			-0.282 **		-0.019 ***	-0.082 ***	-0.153	-0.000	-4.531 **	-41.898 ***			-0.431 ***	0.574	73%	0%	9
3y after Vintage	26						-0.021 *				-9.312 **					24%	2%	2

Note: In columns 1-14, numeric values are the beta coefficient estimates and ***/**/* (dark/medium/light green) denotes statistical significance at the 1%/5%/10% level, respectively. Intercept estimates are available but not reported to save space. Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

[7] Alternative PE performance measures include IRR, TVPI, etc. The relative strength of PME is that it allows for a more direct and transparent comparison of PE fund performance to a public market index. For funds with ≥ 10y history, we use 10y PME as the lifetime PME. For funds with 3y to 9y history, we estimate their 10y PME based on the historical linear relationship between the average 10y PME and the average since-inception PME across funds. Appendix 2 contains analysis of the PME data.

Our pooled PME model demonstrates solid estimation and prediction accuracy for macro factors at and 1-2y after the vintage year, with correlations between estimated and actual values averaging 0.85 (Figure 12).

Figure 12: Estimated vs. Actual Pooled PME



Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM Provided for illustrative purposes only.

We define performance dispersion as the gap between average PME of top-quartile (Q1) and bottom-quartile (Q4) funds. We first analyze how macro factors affect PME dispersion (Figure 13) and then – for decomposition purposes – apply the *same* selected factors to help explain the performance of the top- and bottom-quartile fund groups (Figures 14-15).[8]

Macro factor conditions 1y after the vintage year have the best explanatory power (adj. R^2 = 73%, Figure 13). Notably, higher long-term real rates around the vintage year tend to widen the performance gap (Figure 13, columns 10 & 11). For top performers, elevated rates may present more alpha-generating opportunities through lower acquisition prices from higher discount rates, enhancing future returns (Figure 14, columns 10 & 11). Top performers could also be more selective and disciplined in deploying capital during periods of financial tightening. In contrast, bottom performers – lack of pricing power, deal access, and value-creation ability to navigate tighter financial conditions – seem to be negatively affected by higher financing costs (Figure 15, columns 10 & 11). They may also face more challenges supporting portfolio companies amid higher rates.

Lower public equity returns, volatility and valuation around the vintage year seem to favor top funds (vs. bottom funds) – perhaps from better expertise and resources to identify and capitalize on favorable valuation entry points – thus widening performance dispersion (Figures 13-15, columns 1, 3 & 6). Of the macroeconomic factors, lower inflation around the vintage year amplifies performance dispersion, perhaps through reducing acquisition costs for stronger funds while constraining revenue growth and exit activity for weaker funds (Figures 13-15, column 13).

To summarize, the same macro condition can create both fund performance tailwinds and headwinds (e.g., higher rates can *boost* returns through higher discount rates and lower purchasing costs while *hurting* returns through higher financing costs), and its net impact on fund performance depends on fund manager quality. Strong operational expertise to enhance fund performance – especially during challenging periods – is scarce and might only be possessed by top fund managers.

[8] See Appendix 2 for analysis on PME levels and the factors selected for the top-quartile and bottom-quartile PME groups.

Figure 13: Multivariate Regression of PME Dispersion (Q1 Funds - Q4 Funds) on Macro Factors; 1995-2021

Column No.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Macro Factors	No. of Obs.	Public Market												Macro.	Goodness of Fit		No. of Factors Selected
		Equity Market							Bond Market					Inflation			
		Returns		Volatility	Equity Risk Premium	Equity Valuation		Private -Public Equity Relative Valuation	Returns	Yields/Rates		Term Premium	Credit Market Conditions				
		S&P 500 TR	Russell 2000 Equal Weight TR	VIX	(1/CAPE - 10y UST Yield)	S&P 500 Trailing 1y P/E	Russell 2000 Value P/E	PE-S&P 500 EV/ EBITDA Differ-ence	10y UST TR	10y UST Yield	10y UST Real Yield	(10y UST Yield - 3m UST Yield)	Fed's NFCI	CPI Inflation	Adj.R^2	P-value of F-stat	
At Vintage	24		0.311				-0.007 *	-0.011			13.241 ***	6.220			56%	0%	5
1y after Vintage	25	-0.190		-0.021 **	-16.485	0.001		-0.003		0.816		8.707		-5.469 *	73%	0%	9
2y after Vintage	26	-0.554 *		-0.010				-0.023	0.275		12.859 ***	4.199	-0.123	-6.161 *	66%	0%	8
3y after Vintage	26	-0.353		-0.018 *		0.009		-0.031			11.009 *	9.980 *		-2.395	55%	0%	8

Note: In columns 1-13, numeric values are the beta coefficient estimates and ***/**/* (dark/medium/light green) denotes statistical significance at the 1%/5%/10% level, respectively. Intercept estimates are available but not reported to save space. Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

Figure 14: Applying the Macro Drivers of PME Dispersion to Q1 Fund Group PME; 1995-2021

Column No.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Macro Factors	No. of Obs.	Public Market												Macro.	Goodness of Fit		No. of Factors Selected
		Equity Market							Bond Market					Inflation			
		Returns		Volatility	Equity Risk Premium	Equity Valuation		Private -Public Equity Relative Valuation	Returns	Yields/Rates		Term Premium	Credit Market Conditions				
		S&P 500 TR	Russell 2000 Equal Weight TR	VIX	(1/CAPE - 10y UST Yield)	S&P 500 Trailing 1y P/E	Russell 2000 Value P/E	PE-S&P 500 EV/ EBITDA Differ-ence	10y UST TR	10y UST Yield	10y UST Real Yield	(10y UST Yield - 3m UST Yield)	Fed's NFCI	CPI Inflation	Adj.R^2	P-value of F-stat	
At Vintage	24		0.083				-0.003	-0.063 ***			2.434	1.929			50%	0%	5
1y after Vintage	25	-0.415		-0.017 *	-3.767	0.006		-0.053 **		-0.110		9.685 *		-1.793	65%	0%	9
2y after Vintage	26	-0.554 *		-0.014				-0.052 **	0.116		3.587	-0.450	-0.083	-2.036	46%	1%	8
3y after Vintage	26	-0.258		-0.025 **		0.009		-0.047 *			0.596	1.329		-0.037	18%	18%	8

Note: In columns 1-13, numeric values are the beta coefficient estimates and ***/**/* (dark/medium/light green) denotes statistical significance at the 1%/5%/10% level, respectively. Intercept estimates are available but not reported to save space. Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

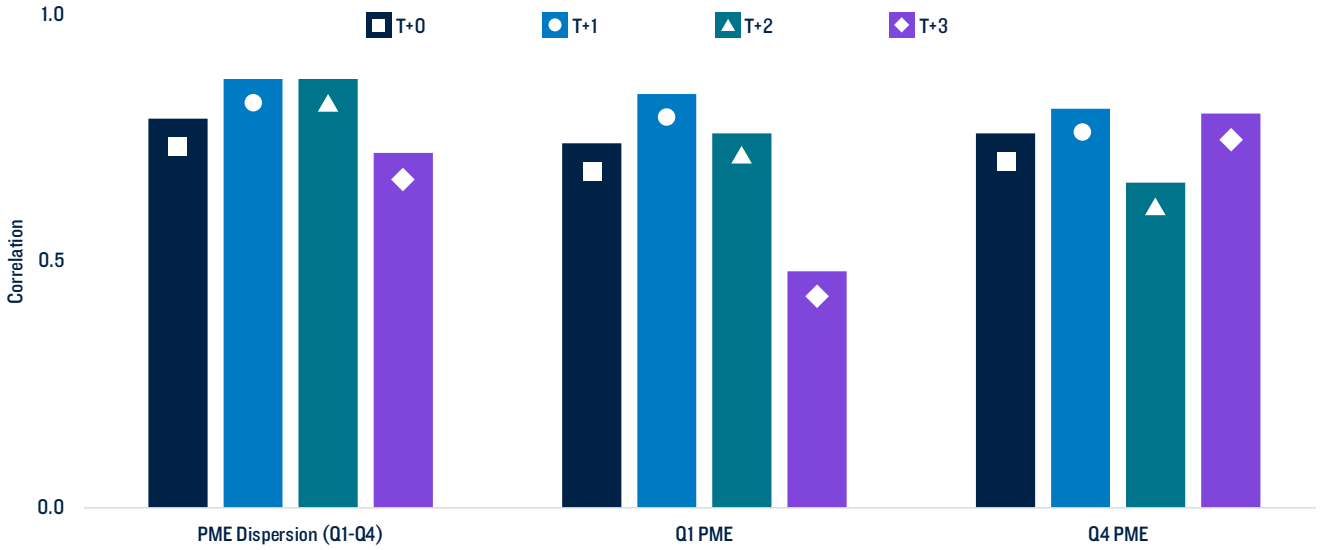
Figure 15: Applying the Macro Drivers of PME Dispersion to Q4 Fund Group PME; 1995-2021

Column No.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Macro Factors	No. of Obs.	Public Market												Macro.	Goodness of Fit		No. of Factors Selected
		Equity Market							Bond Market					Inflation			
		Returns		Volatility	Equity Risk Premium	Equity Valuation		Private -Public Equity Relative Valuation	Returns	Yields/Rates		Term Premium	Credit Market Conditions				
		S&P 500 TR	Russell 2000 Equal Weight TR	VIX	(1/CAPE - 10y UST Yield)	S&P 500 Trailing 1y P/E	Russell 2000 Value P/E	PE-S&P 500 EV/ EBITDA Differ-ence	10y UST TR	10y UST Yield	10y UST Real Yield	(10y UST Yield - 3m UST Yield)	Fed's NFCI	CPI Inflation	Adj.R^2	P-value of F-stat	
At Vintage	24		-0.229				0.004 *	-0.052 ***			-10.806 ***	-4.291			48%	0%	5
1y after Vintage	25	-0.225		0.005	12.718	0.004		-0.050 **		-0.927		0.979		3.676	55%	1%	9
2y after Vintage	26	0.000		-0.004				-0.029	-0.160		-9.273 **	-4.649	0.040	4.125	35%	4%	8
3y after Vintage	26	0.095		-0.007		-0.001		-0.016			-10.413 ***	-8.651 **		2.359	48%	1%	8

Note: In columns 1-13, numeric values are the beta coefficient estimates and ***/**/* (dark/medium/light green) denotes statistical significance at the 1%/5%/10% level, respectively. Intercept estimates are available but not reported to save space. Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

We estimate both performance dispersion and levels using the regression models above (Figures 13-15), again holding back the final three annual observations for out-of-sample testing. Our model demonstrates a solid fit with the data, with correlations between estimated and actual values averaging 0.81 for PME dispersion, 0.71 for top-quartile PME, and 0.76 for bottom-quartile PME (Figure 16).

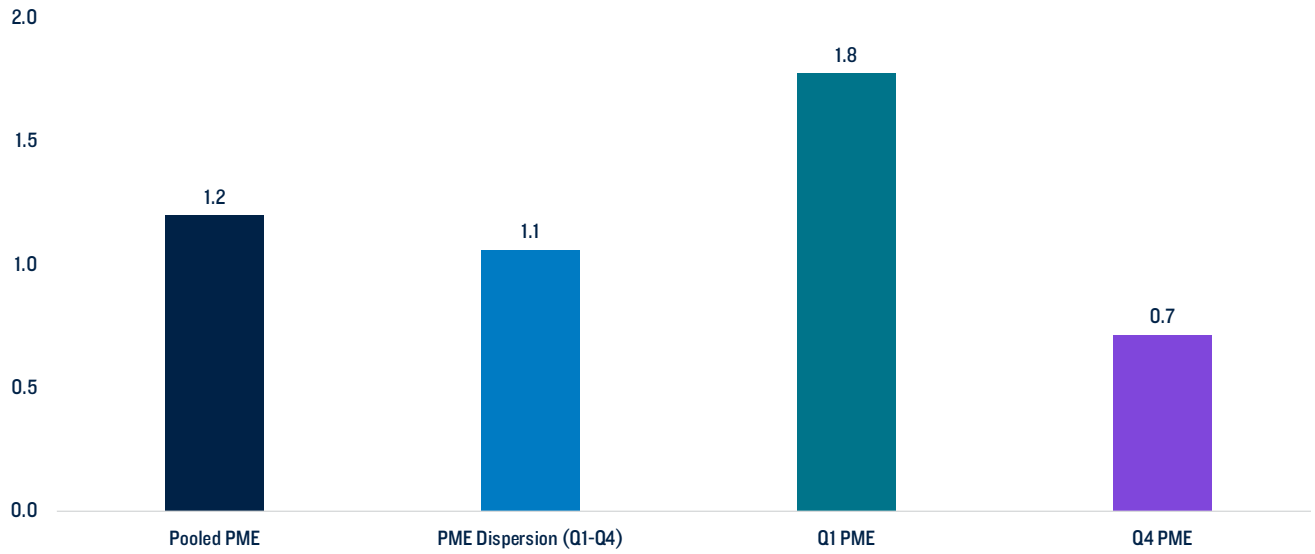
Figure 16: Correlation between Estimated and Actual Values for PME Dispersion, Q1 PME & Q4 PME, by Fund Performance Quartiles



Note: T+0, T+1, T+2 and T+3 stand for at and 1-3 years after the vintage year, respectively. Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

How will PE funds perform in the *future* given the *current* macro environment? Based on the current levels of macro factors (as of 2024), we forecast the future, lifetime pooled PME of vintage 2024 PE funds to be 1.2 and their PME dispersion to be 1.1 (Q1 PME forecast of 1.8 - Q4 PME forecast of 0.7, see Figure 17). Assuming a $100m initial commitment, our forecasts translate into PE funds gaining $20m on a pooled basis and top-quartile funds outperforming bottom-quartile funds significantly by $110m on average (top-quartile funds gaining $80m ($100m*(1.8-1)) vs. bottom funds losing $30m ($100m*(1-0.7)) – both relative to investing in S&P 500).

Figure 17: Forecasting Lifetime Pooled PME & PME Dispersion of Vintage 2024 PE Funds Using Macro Factors as of 2024



Note: Our forecasts are based on the coefficient estimates from the regressions of future lifetime pooled PME, PME dispersion, Q1 PME and Q4 PME on the macro factors at vintage year (see Figures 11 & 13-15). Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

Conclusion

Figure 18 summarizes those macro factors that drive PE cash flows and lifetime performance dispersion.

- *Rate of contribution* increases amid lower financing costs, improved credit availability, stronger investor sentiment, robust economic activity and higher inflation.
- *Rate of distribution* increases under favorable exit conditions, including attractive public market valuations, lower credit spreads and stronger economic growth.
- *Lifetime performance* improves when the initial macro environment offers lower purchasing cost and lower financing cost.
- *Lifetime performance dispersion* between top and bottom funds widens with higher long-term rates, lower public equity valuations and lower inflation around the vintage year, highlighting the importance of manager selection under these conditions.

Different macro factors influence PE fund cash flows and performance at various stages of a fund's lifecycle, highlighting the importance for CIOs to dynamically monitor the external environment across these phases when allocating to PE.

Figure 18: Macro Factors Impacting PE Cash Flows and Lifetime Performance Dispersion; 1995-2023

Column No.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
PE Cash Flows or Performance	Group by Age or Vintage	Macro Factors										
		Public Market									Macroeconomic	
		Equity Market				Bond Market					Economic Growth	Inflation
		Returns	Volatility	Equity Valuation	Private -Public Equity Relative Valuation	Returns	Volatility	Yields / Rates	Term Premium	Credit Market Conditions		
RC	1						+	–	–	–		+
	2-4	+	+	+	+		+		–	–	+	
RD	5-6				–	+	–			–		
	7-9						–			–		
	10-12						–				+	
Pooled PME	At Vintage				–			–				
	1y after Vintage	–	–		–			–			–	+
	2y after Vintage	–		–	–			–		–	–	
	3y after Vintage				–					–		
PME Dispersion	At Vintage			–				+				
	1y after Vintage		–									–
	2y after Vintage	–						+				–
	3y after Vintage		–					+	+			

Note: This figure summarizes the statistically significant results in Figures 7, 9, 11 & 13. Figure 2 is a simplified version of this figure, aggregating information over age or vintage groups. The +/- sign denotes a positive/negative relationship between the corresponding macro factor and PE cash flow or performance dispersion measure. Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

This paper is among the first to examine the *dynamic* relationship between macro factors and PE cash flows & performance throughout a fund's lifecycle. Our findings provide practical takeaways for those CIOs who construct & manage portfolios around macro scenarios:

- The observed empirical relationship can be leveraged to inform **forward-looking expectations**, allowing investors to align their PE cash flows & performance forecasts with their macro outlook.
- The analysis provides a foundation for scenario analysis and portfolio liquidity and performance **stress testing** – e.g., if public equity volatility spikes with a deep drawdown, what is the impact of rising PE capital calls and falling distributions on total portfolio liquidity?
- While keeping vintage diversification as a core principle, **dynamic commitment pacing strategies** can be designed to incorporate the prevailing macro environment to allow for better overall PE portfolio performance and better portfolio liquidity management.
- **Manager selection** is critical in today's environment with higher real rates, highlighting the need for more rigorous manager due diligence – focusing on GPs with proven discipline, better deal access, and value-creation ability.

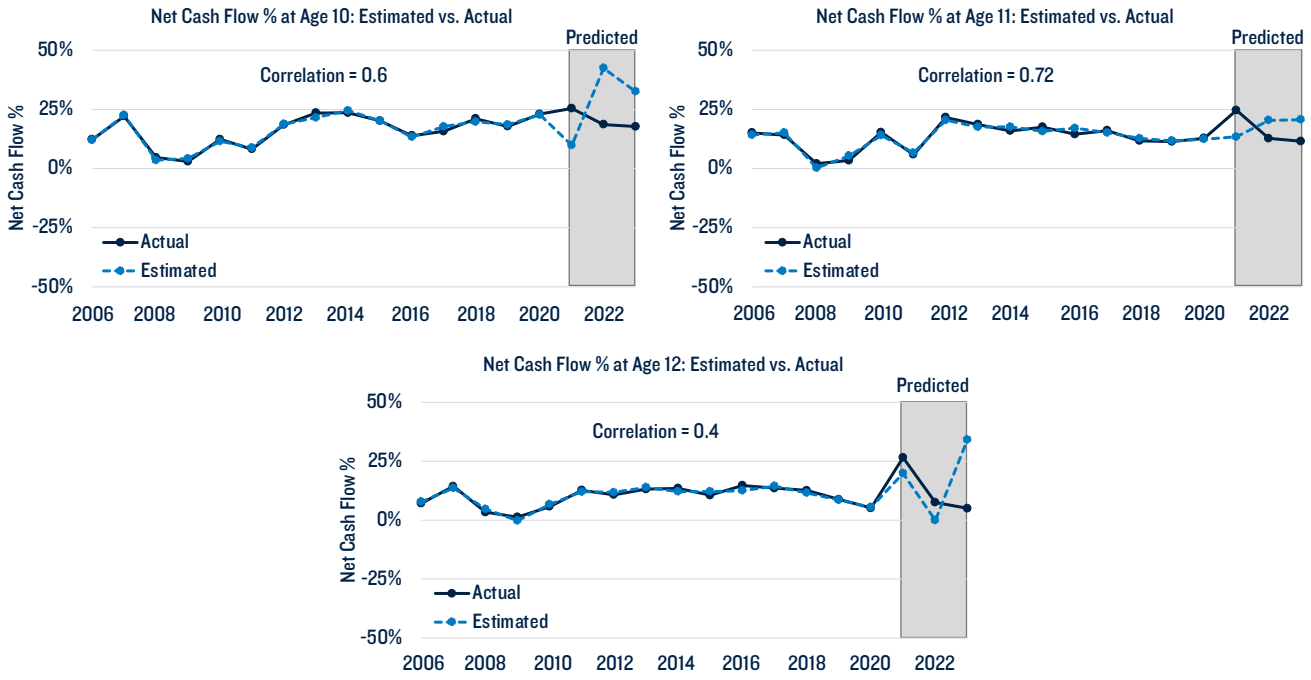
Appendix 1: Net Cash Flow (% of Commitment) Analysis

Figure A1: Multivariate Regression of Net Cash Flow % on Macro Factors (with 6m lags), by Age Group; 1995-2023

Row No.	Group by Age				2-4	5-6	7-9	10-12
	No. of Obs.				78	48	63	54
(1)	Public Market	Equity Market	Returns	S&P 500 TR	-0.048			0.146***
(2)				S&P SmallCap 600 Equal Weight TR		0.109**	0.117***	
(3)			Volatility	VIX (at Age 10) Change vs. Vintage Year				-0.001
(4)				VIX (at Age 11) Change vs. Vintage Year				0.004**
(5)			Equity Valuation	CAPE		0.004**	0.007***	-0.004
(6)			Equity Valuation Change	CAPE (at Age 2) Change vs. Vintage Year	-0.002			
(7)				CAPE (at Age 12) Change vs. Vintage Year				0.003**
(8)			Private-Public Equity Relative Valuation	PE-S&P 500 EV/EBITDA Difference				0.004
(9)		Bond Market	Returns	10y UST TR				0.154
(10)			Volatility	MOVE			0.000	
(11)				MOVE (at Age 7) Change vs. Vintage Year			0.000	
(12)				MOVE (at Age 9) Change vs. Vintage Year			-0.001*	
(13)				MOVE (at Age 10) Change vs. Vintage Year				0.000
(14)			Yields / Rates	10y UST Yield				-1.427
(15)			Term Premium	(10y UST Yield - 3m UST Yield)	0.752			-0.388
(16)			Credit Market Conditions	Bank Loan Tightening/Easing			-0.022	-0.147**
(17)	Macro.	Economic Growth		Fed's CFNAI	-0.012			0.017
(18)	Private Market			Prior Cumulative Contribution %	-0.005**	0.001		
(19)				Prior Cumulative Distribution %		0.004***		
(20)				Age = 3 (Dummy)	0.033**			
(21)				Age = 4 (Dummy)	0.120***			
(22)				Age = 6 (Dummy)		0.074***		
(23)				Age = 11 (Dummy)				-0.031**
(24)				Age = 12 (Dummy)				-0.064***
(25)	Goodness of Fit			Adj.R^2	54%	51%	58%	69%
(26)				P-value of F-stat	0%	0%	0%	0%
(27)	No. of Factors Selected				8	5	6	14

Note: In rows 1-24, numeric values are the beta coefficient estimates and ***/**/* (dark/medium/light green) denotes statistical significance at the 1%/5%/10% level, respectively. Intercept estimates are available but not reported to save space. Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

Figure A2: Estimated vs. Actual Net Cash Flow %, by Age Group



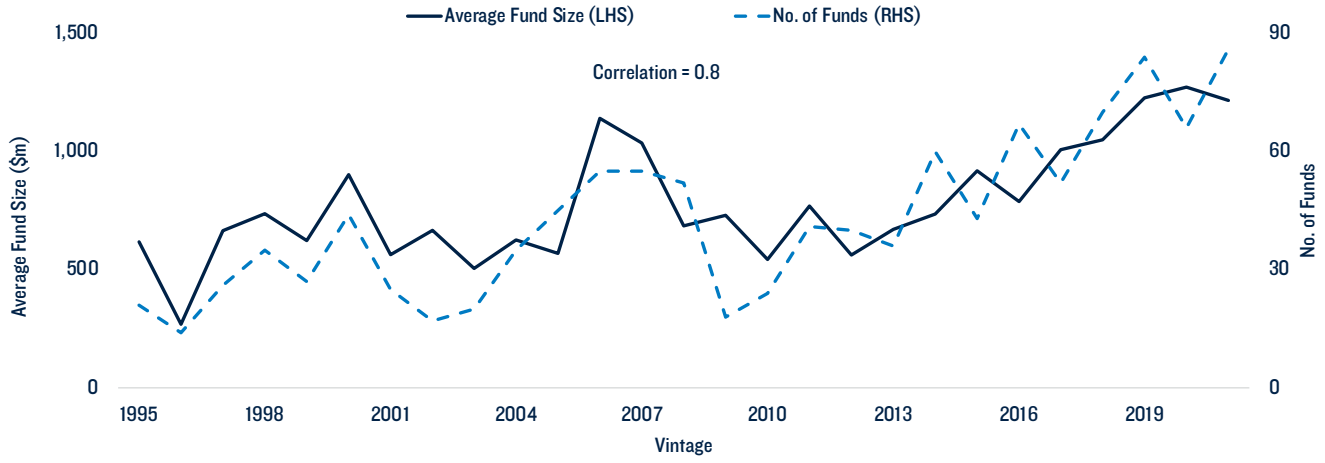
Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

Appendix 2: Lifetime Performance Further Analysis

We use MSCI-Burgiss PE buyout fund-level data. We consider vintages between 1995 and 2021 to ensure enough history (≥ 3y) while trying to maintain sufficient vintage-level sample size (27 observations). To reduce outlier bias, we filter out the largest 10% funds and the smallest 10% funds in each vintage. Each vintage contains 14 to 86 funds, with an average fund size ranging from ~$270m to ~$1,300m (Figure A3). Notably, smaller funds, on average, have performance either in the top-quartile (Q1) or bottom-quartile (Q4), while larger funds have moderate performance (Q2 & Q3) (Figure A4).

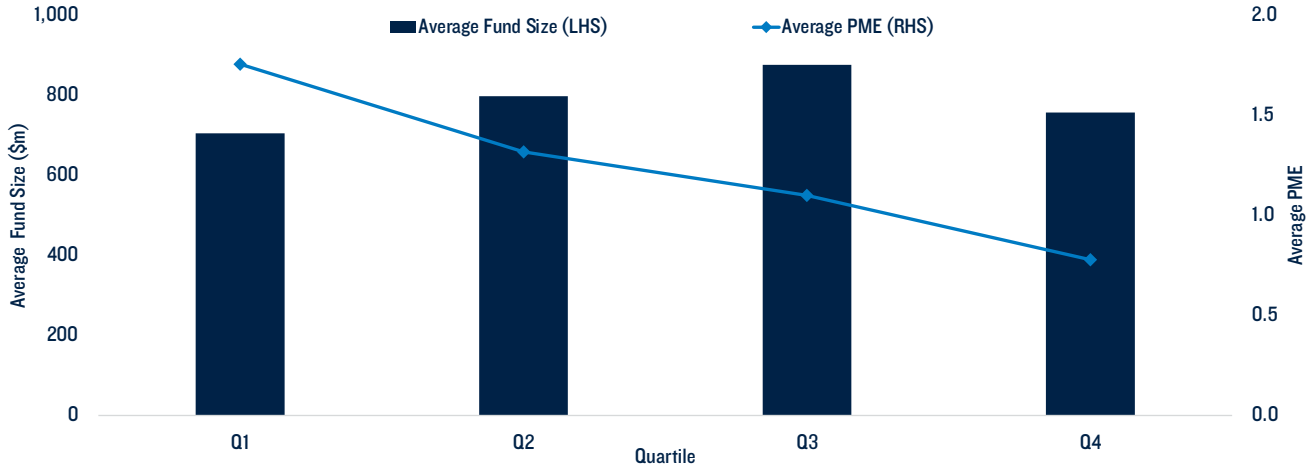
We define performance dispersion as the gap between the average PMEs of top-quartile funds and bottom-quartile funds. The size of performance dispersion has been significant, with an average dispersion of 0.98 PME units – equivalent to a remarkable $98m extra gain (compared to investing in S&P 500) assuming a $100m initial commitment. Performance dispersion has been highly correlated with long-term real rates (Figure A5). The cross-sectional volatility of PME, an alternative dispersion measure as a robustness check, is highly correlated with our quartile gap dispersion measure and would generate similar findings (Figure A6).

Figure A3: Average Fund Size & Number of Funds, by Vintage Year; 1995 – 2021



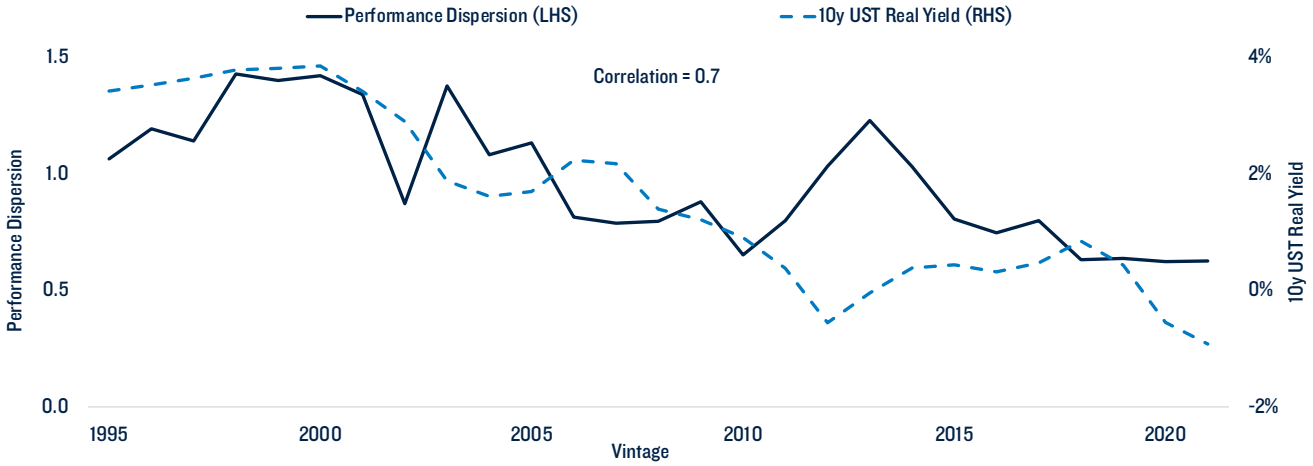
Source: Burgiss and PGIM. Provided for illustrative purposes only.

Figure A4: Average Fund Size & PME, by Performance Quartile; Vintages 1995 – 2021



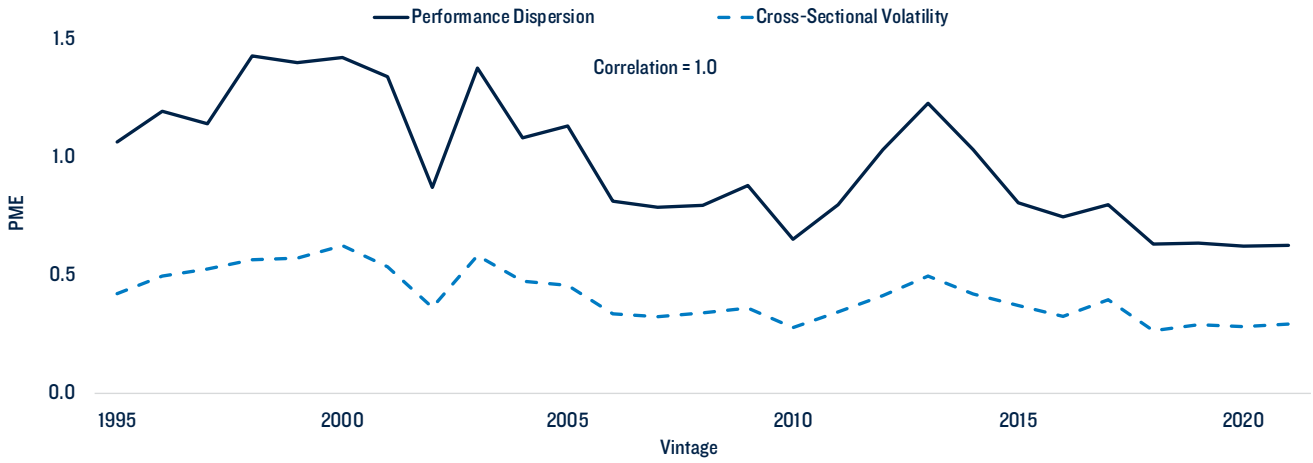
Source: Burgiss and PGIM. Provided for illustrative purposes only.

Figure A5: Fund Performance Dispersion & Real Rates, by Vintage Year; 1995 – 2021



Source: Burgiss, Haver Analytics, US Treasury and PGIM. Provided for illustrative purposes only.

Figure A6: Fund Performance Dispersion & Cross-Sectional Volatility, by Vintage Year; 1995 – 2021



Source: Burgiss and PGIM. Provided for illustrative purposes only.

Figure A7: Multivariate Regression of Q1 PME on Macro Factors; 1995-2021

Column No.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Macro Factors	No. of Obs.	Public Market												Goodness of Fit		No. of Factors Selected
		Equity Market						Bond Market								
		Returns	Volatility	Equity Risk Premium	Equity Valuation		Private -Public Equity Relative Valuation	Returns	Yields/Rates			Term Premium	Credit Market Conditions			
		S&P 500 TR	VIX	(1/CAPE - 10y UST Real Yield)	CAPE	S&P 500 Trailing 1y P/E	PE-S&P 500 EV/ EBITDA Difference	10y UST TR	10y UST Yield	10y UST Real Yield	2y UST Yield	(10y UST Yield - 3m UST Yield)	Fed's NFCI	Adj.R^2	P-value of F-stat	
At Vintage	24			-2.297			-0.063 ***							55%	0%	2
1y after Vintage	25	-0.329 *	-0.013 *			0.009 **	-0.041 **		6.211 **			6.427 **	-0.247 **	74%	0%	7
2y after Vintage	26	-0.455 **	-0.009		-0.018 **		-0.071 ***	0.239		-2.044	5.939		-0.144	56%	0%	8
3y after Vintage	26						-0.045 **							19%	2%	1

Note: In columns 1-12, numeric values are the beta coefficient estimates and ***/**/* (dark/medium/light green) denotes statistical significance at the 1%/5%/10% level, respectively. Intercept estimates are available but not reported to save space. Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

Figure A8: Multivariate Regression of Q4 PME on Macro Factors; 1995-2021

Column No.		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Macro Factors	No. of Obs.	Public Market														Macroeconomic			Goodness of Fit		No. of Factors Selected
		Equity Market							Bond Market							Economic Growth		Inflation			
		Returns		Equity Risk Premium	Equity Valuation			Private -Public Equity Relative Valua-tion	Returns	Volatility	Yields/Rates			Term Premium	Credit Market Condi-tions						
		S&P Small-Cap 600 Equal Weight TR	Russell 2000 Equal Weight TR	(1/CAPE - 10y UST Real Yield)	CAPE	S&P 500 Trailing 1y P/E	Russell 2000 Value P/E	PE-S&P 500 EV/ EBITDA Differ-ence	10y UST TR	MOVE	10y UST Yield	10y UST Real Yield	3m SOFR	(10y UST Yield - 3m UST Yield)	Baa Corp Bond Spread	Real GDP Growth	Fed's CFNAI	CPI Inflation	Adj.R^2	P-value of F-stat	
At Vintage	24																				0
1y after Vintage	25	-0.197				0.002		-0.040 **	-0.280		-4.951		-5.280 *		-19.446 **	-4.658 **		5.055 **	65%	0%	9
2y after Vintage	26		-0.271		-0.013			-0.058 ***	-0.399	0.004 **		-15.451 ***		-6.566 *	-26.716 ***	-2.259		-0.931	71%	0%	10
3y after Vintage	26		0.035	10.477 **			0.003 **	-0.035 **	-0.226	0.004 ***		-1.907		-3.818 *	-44.506 ***		-0.316 ***		89%	0%	10

Note: At vintage year, LASSO selects zero factor, suggesting a weak relationship between macro factors at vintage year and the lifetime performance of bottom-quartile funds. In columns 1-17, numeric values are the beta coefficient estimates and ***/**/* (dark/medium/light green) denotes statistical significance at the 1%/5%/10% level, respectively. Intercept estimates are available but not reported to save space. Source: AQR, Bain & Company, Bank of America Merrill Lynch, Bloomberg, Bureau of Economic Analysis, Bureau of Labor Statistics, Chicago Board Options Exchange, Chicago Mercantile Exchange, Dan Rasmussen, Federal Reserve Bank of Chicago, Federal Reserve Bank of New York, Federal Reserve Board, Haver Analytics, Intercontinental Exchange, LSEG Datastream, MSCI Burgiss, Pitchbook, Robert Shiller, Standard & Poor's, Statista, US Treasury, and PGIM. Provided for illustrative purposes only.

THE PURSUIT OF OUTPERFORMANCE

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