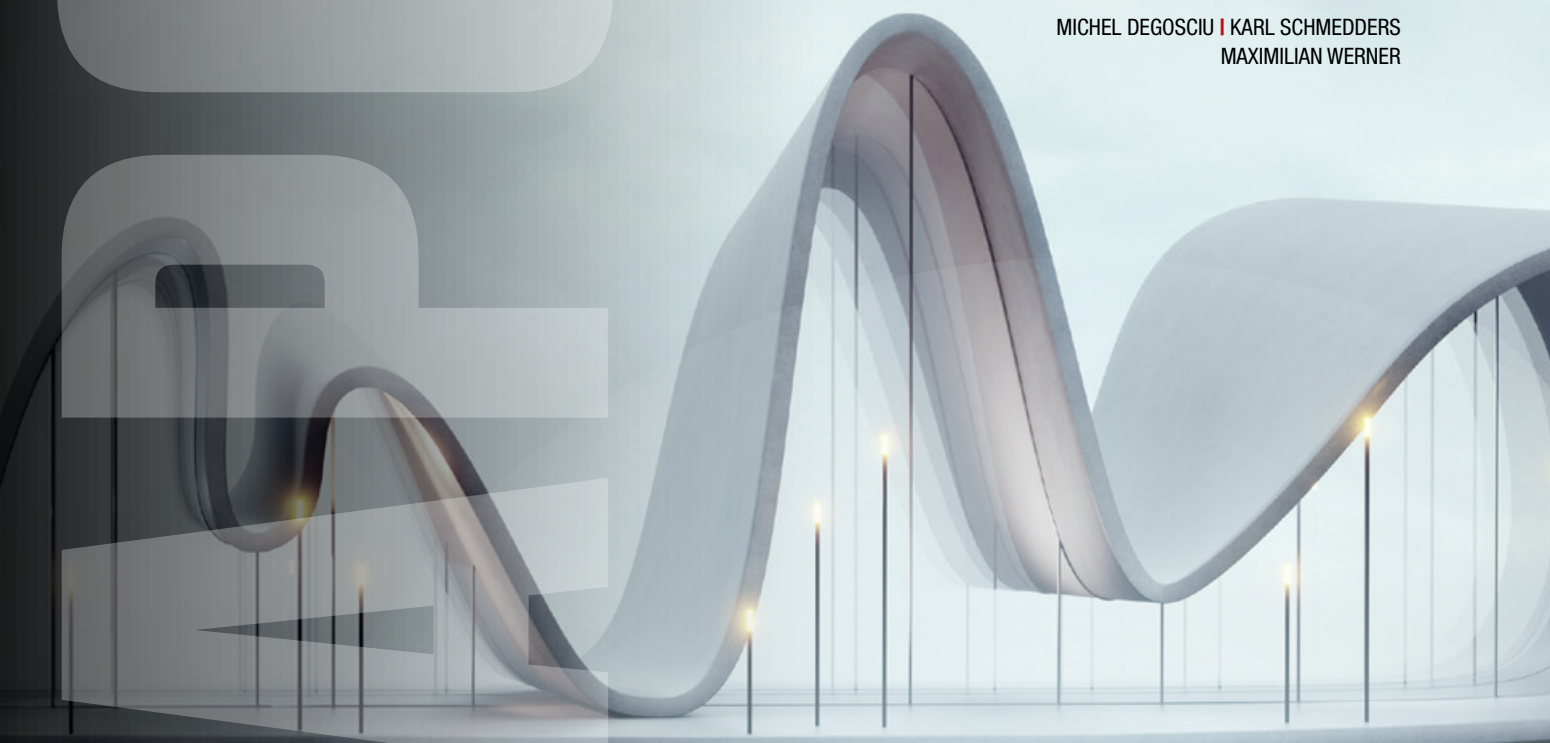
THE CAPCO INSTITUTE
JOURNAL
OF FINANCIAL TRANSFORMATION

GOVERNANCE OF CORPORATES

Cycles in private equity markets

MICHEL DEGOSCIU | KARL SCHMEDDERS
MAXIMILIAN WERNER



BALANCING
INNOVATION & CONTROL

a wipro company

#59 JUNE 2024

THE CAPCO INSTITUTE

JOURNAL OF FINANCIAL TRANSFORMATION

RECIPIENT OF THE APEX AWARD FOR PUBLICATION EXCELLENCE

CONTENTS

GOVERNANCE OF TECHNOLOGY

08 Data and AI governance
Sarah Gadd, Chief Data Officer, Bank Julius Baer

20 "Data entrepreneurs of the world, unite!" How business leaders should react to the emergence of data cooperatives
José Parra-Moyano, Professor of Digital Strategy, IMD

26 Revolutionizing data governance for AI large language models
Xavier Labrecque St-Vincent, Associate Partner, Capco
Varenya Prasad, Principal Consultant, Capco

32 Municipal data engines: Community privacy and homeland security
Nick Reese, Cofounder and COO, Frontier Foundry Corporation

40 Human/AI augmentation: The need to develop a new people-centric function to fully benefit from AI
Maurizio Marcon, Strategy Lead, Analytics and AI Products, Group Data and Intelligence, UniCredit

50 Building FinTech and innovation ecosystems
Ross P. Buckley, Australian Research Council Laureate Fellow and Scientia Professor, Faculty of Law and Justice, UNSW Sydney
Douglas W. Arner, Kerry Holdings Professor in Law and Associate Director, HKU-Standard Chartered FinTech Academy, University of Hong Kong
Dirk A. Zetzsche, ADA Chair in Financial Law, University of Luxembourg
Lucien J. van Romburg, Postdoctoral Research Fellow, UNSW Sydney

56 Use and misuse of interpretability in machine learning
Brian Clark, Rensselaer Polytechnic Institute
Majeed Simaan, Stevens Institute of Technology
Akhtar Siddique, Office of the Comptroller of the Currency

60 Implementing data governance: Insights and strategies from the higher education sector
Patrick Cernea, Director, Data Strategy and Governance, York University, Canada
Margaret Kierylo, Assistant Vice-President, Institutional Planning and Chief Data Officer, York University, Canada

70 AI, business, and international human rights
Mark Chinen, Professor, Seattle University School of Law

GOVERNANCE OF SUSTAINABILITY

82 Government incentives accelerating the shift to green energy
Ben Meng, Chairman, Asia Pacific, Franklin Templeton
Anne Simpson, Global Head of Sustainability, Franklin Templeton

92 Governance of sustainable finance
Adam William Chalmers, Senior Lecturer (Associate Professor) in Politics and International Relations, University of Edinburgh
Robyn Klingler-Vidra, Reader (Associate Professor) in Entrepreneurship and Sustainability, King's Business School
David Aikman, Professor of Finance and Director of the Qatar Centre for Global Banking and Finance, King's Business School
Karlygash Kuralbayeva, Senior Lecturer in Economics, School of Social Science and Public Policy, King's College London
Timothy Foreman, Research Scholar, International Institute for Applied Systems Analysis (IIASA)

102 The role of institutional investors in ESG: Diverging trends in U.S. and European corporate governance landscapes
Anne Lafarre, Associate Professor in Corporate Law and Corporate Governance, Tilburg Law School

112 How banks respond to climate transition risk
Brunella Bruno, Tenured Researcher, Finance Department and Baffi, Bocconi University

118 How financial sector leadership shapes sustainable finance as a transformative opportunity: The case of the Swiss Stewardship Code
Aurélia Fäh, Senior Sustainability Expert, Asset Management Association Switzerland (AMAS)

GOVERNANCE OF CORPORATES

126 Cycles in private equity markets
Michel Degosciu, CEO, LPX AG
Karl Schmedders, Professor of Finance, IMD
Maximilian Werner, Associate Director and Research Fellow, IMD

134 Higher capital requirements on banks: Are they worth it?
Josef Schroth, Research Advisor, Financial Stability Department, Bank of Canada

140 From pattern recognition to decision-making frameworks: Mental models as a game-changer for preventing fraud
Lamia Irfan, Applied Research Lead, Innovation Design Labs, Capco

148 Global financial order at a crossroads: Do CBDCs lead to Balkanization or harmonization?
Cheng-Yun (CY) Tsang, Associate Professor and Executive Group Member (Industry Partnership), Centre for Commercial Law and Regulatory Studies (CLARS), Monash University Faculty of Law (Monash Law)
Ping-Kuei Chen, Associate Professor, Department of Diplomacy, National Chengchi University

158 Artificial intelligence in financial services
Charles Kerrigan, Partner, CMS
Antonia Bain, Lawyer, CMS

DEAR READER,

In my new role as CEO of Capco, I am very pleased to welcome you to the latest edition of the Capco Journal, titled **Balancing Innovation and Control**.

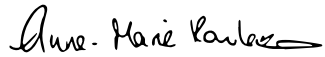
The financial services and energy sectors are poised for another transformative year. At Capco, we recognize that this is a new era where innovation, expertise, adaptability, and speed of execution will be valued as never before.

Success will be determined based on exceptional strategic thinking, and the ability to leverage innovative new technology, including GenAI, while balancing a laser focus on risk and resilience. Leaders across the financial services and energy industries recognize the transformative benefits of strong governance while needing to find the optimal balance between innovation and control.

This edition of the Capco Journal thus examines the critical role of balancing innovation and control in technology, with a particular focus on data, AI, and sustainability, with wider corporate governance considerations. As always, our authors include leading academics, senior financial services executives, and Capco's own subject matter experts.

I hope that you will find the articles in this edition truly thought provoking, and that our contributors' insights prove valuable, as you consider your institution's future approach to managing innovation in a controlled environment.

My thanks and appreciation to our contributors and our readers.



Annie Rowland, **Capco CEO**

CYCLES IN PRIVATE EQUITY MARKETS[1]

MICHEL DEGOSCIU | CEO, LPX AG
KARL SCHMEDDERS | Professor of Finance, IMD
MAXIMILIAN WERNER | Associate Director and Research Fellow, IMD

ABSTRACT

In this study, we analyze three decades of return data from listed private equity (LPE) companies, focusing on the return averages and volatilities of two notable market indices and comparing them to a global equity index. Our findings indicate that LPE has generated higher average returns, commensurate with its higher volatility, in comparison to the global index. Additionally, we observe that, on average, LPE companies have traded at a discount to their book values since the Great Financial Crisis. Importantly, this discount exhibits a strong negative correlation with an indicator of macro-financial stress, which emerges as a predictive factor for LPE market performance.

1. INTRODUCTION

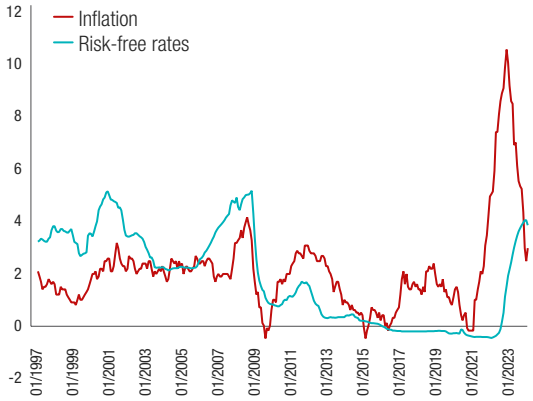
In recent years, the aftermath of the COVID-19 pandemic and the ongoing conflict in Ukraine have profoundly reshaped the global economic landscape. Nations worldwide are grappling with a resurgence of inflation, a challenge that had remained largely dormant for decades. The U.S., the E.U., Canada, Australia, and Japan, among other countries, have all experienced consumer price index increases[2] not seen in over thirty years. This significant surge in inflation across these major economies has highlighted substantial economic shifts, manifesting in a widespread and impactful rise in the cost of goods and services. This inflationary wave, fueled by external shocks and the strategic responses of governments and central banks, prompted a notable increase in interest rates throughout 2022 and 2023. Figure 1 presents the respective time series for monthly inflation within the eurozone and its monthly risk-free rate (derived from German treasury bills).[3]

Unsurprisingly, this economic environment has posed significant challenges for investors, who have been navigating the repercussions of these inflationary pressures for asset values, interest rates, and investment strategies. This has marked a period of recalibration and of heightened uncertainty in global financial markets. A 2023 survey of global institutional investors revealed that this macro-financial regime shift has been a top priority of investors.[4] The survey reports that 80% of participating investors agreed "that the world is dramatically changing and that portfolios must evolve to keep pace," 56% recognized "that the current environment is unlike any they've seen in their careers," and 64% expected their "inflation mitigation strategies" to have a duration of two years or more. The survey further documents that, as investors have had to navigate the complexities of a different economic climate, a growing inclination toward diversifying portfolios with private assets has emerged. A striking 72% of survey participants planned "to increase their private markets allocation over the next five years." This striking proportion naturally leads us to ask why so many institutional investors want to increase their exposure to private markets during a time of heightened economic uncertainty.

Among private market investments, "listed private equity"

[1] We are very grateful to Jonas Vogt for helpful discussions and to Dave Brooks for outstanding editorial support on previous versions of this manuscript.
[2] http://tinyurl.com/ycy5vk7u
[3] Throughout the present paper, the data for the monthly risk-free rate is computed from OECD data on German short-term interest rates. The combined and transformed data covers the period 12/31/1993 to 12/29/2023. The data was taken from the OECD's data portal. See Section 2.2 for further details.
[4] http://tinyurl.com/35ysk6yb

Figure 1: Monthly inflation and the risk-free rate in the eurozone



Monthly inflation and the risk-free rate in the eurozone for the period 01/01/1997 to 12/29/2023. Inflation refers to the HICP – Overall index (ICP.M.U2.N.000000.4.ANR), published on the European Central Bank (ECB) data portal; last accessed January 5, 2024. Both rates are given as percentages.

(LPE) stands out as a particularly intriguing option due to its unique blend of private equity's potential returns and the liquidity of public markets. In this article, we delve into a targeted examination of LPE investments. Specifically, we analyze the interplay between future returns, price-to-book ratios, and the landscape of macro-financial uncertainty. Our investigation posits that periods of macro-financial distress can often lead to a structural underestimation of (listed) private equity's value, presenting savvy investors with opportunities for substantial gains.

2. LISTED PRIVATE EQUITY (LPE)

Private equity (PE) refers to investment funds that directly invest in private companies or engage in buyouts of public companies, resulting in these companies delisting from public stock exchanges. These funds are managed by professional investment firms and aim to create value through strategic improvements, operational efficiencies, and leveraging industry expertise. PE investments are typically characterized by long investment horizons and active management, with the goal of exiting these investments through sales or public offerings at a significant profit.

Under the broader umbrella of PE, a specific subgroup known as LPE exists. LPE firms are those PE entities that are themselves publicly traded on a stock exchange, offering investors the unique opportunity to engage with PE investments through publicly accessible shares. This arrangement combines the investment strategies of PE – such as direct investments in private companies, leveraged buyouts, and venture capital – with the liquidity and accessibility of public markets. LPE allows individual and institutional investors to partake of the potential returns of PE investments without the typical barriers to entry, such as high minimum investment thresholds and long-term capital commitments.

The common challenge within the realm of PE is the notable scarcity of accessible, reliable data. Transactions in PE typically involve unlisted companies, rendering the details of these deals largely opaque and seldom observable through hard, quantitative data. This lack of transparency can significantly hinder the ability of investors to perform thorough due diligence, accurately assess the value and potential of investments, and benchmark performance against relevant indices or competitors.

In contrast, LPE offers a compelling advantage in this regard. Being publicly traded entities, LPE firms are obligated to adhere to the regulatory requirements of stock exchanges, which mandate regular financial reporting and disclosure of material information. This transparency ensures that a wealth of data is available to investors, encompassing financial performance, investment strategies, and market positioning. Such information not only facilitates a more informed investment decision-making process, it also enables ongoing monitoring and analysis of the investment's performance. Consequently, LPE can serve as a bridge for investors seeking exposure to the PE sector's potential rewards, coupled with the transparency, liquidity, and data availability characteristic of public markets. This duality underscores the unique value proposition of LPE, marrying the growth and return potential of PE investments with the advantages of public market accessibility.

2.1 Data on LPE

For our analysis of LPE returns, we use two LPE indices provided by LPX AG, a Zurich-based provider of financial market data. The first index, the "LPX50 Listed Private Equity Index TR" (LPX50), offers a diversified representation across various dimensions, including geographic regions, PE investment styles, financing methods, and vintage years, thereby ensuring a comprehensive reflection of the LPE market. For our return analysis in this article, we use (EUR-based) month-end index values of LPX50 from December

1993 until December 2023. The second index, the "LPX Buyout Listed Private Equity Index TR" (LPXBO), is designed to represent the global performance of those LPE companies that pursue a buyout PE investment strategy. Buyout funds specialize in acquiring controlling interests in companies with the aim of increasing their value over time before eventually selling those companies for a profit. The LPXBO comprises the 30 most highly capitalized and liquid LPE companies, again diversified across regions, financing styles, and vintages. For the LPXBO we also use (EUR-based) closing monthly index values from December 1993 until December 2023.

The calculation of LPX index levels requires only two simple components: the share prices of the LPE firms included in the index and their relative index weights. However, understanding the fundamental value of an LPE firm requires navigating a more complex aspect. The share price of an LPE firm might not accurately reflect the total value of its investments in private companies, primarily because these investments lack publicly observable prices. Instead, the valuation of these private investments often relies on their book values, which are estimated figures that attempt to quantify the worth of the LPE firm's investments. And the sum of these book values provides an estimate of the LPE firm's book value.

Benjamin Graham's insightful observation to Warren Buffet,[5] "Price is what you pay; value is what you get," eloquently highlights the difference between the market price and the intrinsic value (book value) within the context of LPE firms. It is important to note that there is typically a discrepancy between the sum of an LPE firm's investment book values and its market capitalization. This difference underscores the challenge investors face in assessing the true value of LPE firms, as it requires looking beyond share prices to understand the underlying stocks' estimated worth.

Building on the distinction between the market price and the intrinsic value of LPE firms, it is pivotal for investors to explore the concept of premia and discounts in their market valuation. A market price trading at a premium indicates that the market value of an LPE firm exceeds the aggregate book value of its investments, suggesting that investors are willing to pay more than the estimated value of the underlying assets. This premium could be attributed to factors such as the management team's track record, anticipated growth of the portfolio companies, or the firm's strategic positioning within a high-growth sector.

Conversely, a market price trading at a discount to the aggregate book value of its investments implies that the market values the LPE firm less than it does the sum of its parts. This discount could arise from various concerns, including market skepticism about the valuation of the underlying investments, potential liquidity issues, or broader economic uncertainties impacting investor sentiment. Discounts offer an intriguing opportunity for investors who believe that the market has undervalued the LPE firm's portfolio, presenting a chance to invest in the firm's assets at a price lower than their perceived intrinsic value.

In our data analysis, we enhance the evaluation of the two LPE indices by incorporating their respective price-to-book ratios.[6] To specifically gauge the premium or discount at which each index is trading, we employ the following premium/discount (PD) indicator:

$$\frac{(\text{market price} - \text{book value})}{\text{book value}} = \frac{\text{market price}}{\text{book value}} - 1$$

This calculation clearly delineates the relationship between market capitalization and book value, providing a quantifiable measure of valuation sentiment. We have access to monthly data on the respective indicator for LPX50 and LPXBO from December 2002 until December 2023.

When the PD indicator yields a positive value, it signifies that the market capitalization of the index surpasses its book value, indicating that, on aggregate, the stocks within the index are trading at a premium. Conversely, a negative indicator value suggests that the market capitalization is less than the book value, denoting that, collectively, the stocks are trading at a discount. This methodology provides insights into current market perception, revealing whether investors are valuing the index components as worth more or less than their estimated net assets.

2.2 Additional data

To gauge the returns of the global stock market, we use the MSCI World Net TR Index (MSCI in the remainder of the article) on its EUR basis. This comprehensive index represents the performance of publicly listed large- and mid-cap companies across 23 developed market economies. The index captures about 85% of the free-float adjusted market

[5] http://tinyurl.com/yckbbdp9
[6] The data on the indexed book values for LPX50 and LPXBO is from LPX AG's database.

capitalization in each participating country. We transform OECD data[7] on German treasury bill rates to obtain a measure for the monthly risk-free rate in Europe. Our data on the market index and the risk-free rate covers the 360 months from January 1994 until December 2023.

In our analysis, we also employ an indicator of contemporaneous stress in the financial system. The Composite Indicator of Systemic Stress (CISS) is a financial stability indicator developed by the ECB to measure the systemic stress levels within the financial system of the eurozone.[8] The CISS combines information from various financial markets – including equity markets, bond markets, foreign exchange markets, money markets, and financial intermediaries – to provide a comprehensive view of systemic stress. It is designed to capture the interconnectedness of industries and markets and the potential for stress in one market or sector to spill over into others, thereby affecting the financial system's stability. By aggregating these various indicators, the CISS offers a single, continuous measure of systemic stress in real time. We make use of CISS data for the 252 months from January 2003 until December 2023.

3. ANALYSIS OF LPE RETURNS

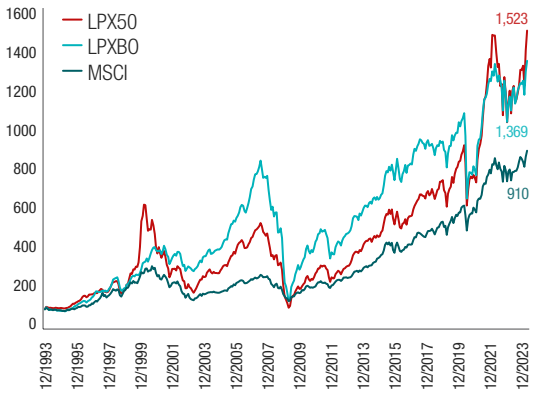
Figure 2 illustrates the cumulative monthly returns of LPX50 and LPXBO from December 31, 1993 to December 29, 2023, with the MSCI serving as a comparative benchmark. We mention several initial observations based on simple visual inspection. During the 30-year period, LPX50 and LPXBO significantly outperformed the MSCI benchmark, with absolute returns exceeding the benchmark by 67.4% and 50.4% respectively. Furthermore, both indices exhibit higher volatility compared to MSCI. This increased volatility is reflected in periods of significant outperformance followed by pronounced market corrections during times of economic downturn. Notably, major events, such as the bursting of the internet bubble in the early 2000s, the Great Financial Crisis (GFC) of 2007–2009, and the onset of the COVID-19 pandemic in early 2020, are distinctly visible in the trend lines. These events underscore the LPE indices' sensitivity to market dynamics, illustrating their potential for both higher rewards and higher risks.

3.1 Return statistics

We present some key summary statistics underlying our visual observations. Table 1 offers a closer look at the returns of LPX50, LPXBO, and MSCI indices, along with the risk-free rate. We observe that the average annualized (geometric) returns for LPX50 and LPXBO stand at 9.50% and 9.11% respectively, thereby notably outperforming MSCI's average annualized return of 7.64% during the past 30 years. This superior return performance of the LPE indices compared to MSCI underscores a possible reason for the attractiveness of this asset class among some groups of investors. Our second observation, the notably higher volatility of the LPE indices, is substantiated by their standard deviations (STD): 22.82% for LPX50 and 20.70 percent for LPXBO compared to 14.76% for MSCI. These quantitative results confirm the visual assessment of larger volatility in LPE markets.

A capital asset pricing model (CAPM) regression (based on data with 360 monthly excess returns) provides beta values of 1.26 for LPX50 and 1.07 for LPXBO. While both LPE indices exhibit a positive alpha, these are not statistically significant. The regressions yield R-squared values of 67% for LPX50 and 59% for LPXBO. For the LPE indices, which might be expected to have a higher component of specific (unsystematic) risk

Figure 2: Cumulative returns of LPX50, LPXBO, and MSCI



Cumulative monthly returns for LPX50, LPXBO, and MSCI for the period 12/31/1993 to 12/29/2023. The time series are normalized to the value of 100 on their starting date.

[7] We take German treasury bill data from the OECD data portal. More precisely, we take the values for Germany of the OECD (2024) "short-term interest rates" (indicator) for the period 31/12/1993 to 30/11/2023. The missing data point for December 2023 is taken from the OECD (2024) "short-term interest rates forecast" (indicator) as the Q4 2023 forecast to complete the period December 1993 to Dececember 2023. All data is transformed into a monthly time series.

[8] The CISS (CISS.D.U2.Z0Z.4F.EC.SS_CIN.IDX) data is from the ECB data portal. We took the NEW CISS series version instead of the original CISS and use the term CISS for simplicity. See Holló, D., M. Kremer, and M. Do Luca, 2012, "CISS – a composite indicator of systemic stress in the financial system," ECB working paper no. 1426, http://tinyurl.com/2uzrcbc9

Table 1: Return statistics

	RETURN	STD	BETA	SHARPE	SORTINO	TREYNOR
RETURN STATISTICS OVER 30 YEARS						
Private equity						
LPX50	9.50	22.82	1.26	0.43	0.64	0.077
LPXBO	9.11	20.70	1.07	0.44	0.61	0.084
Benchmarks						
MSCI	7.64	14.76		0.44	0.66	
Risk-free rate	1.97	0.54				
RETURN STATISTICS OVER 10 YEARS						
Private equity						
LPX50	12.98	20.85	1.35	0.69	1.03	0.106
LPXBO	8.09	19.39	1.23	0.50	0.70	0.078
Benchmarks						
MSCI	11.01	13.94		0.81	1.29	
Risk-free rate	0.16	0.33				

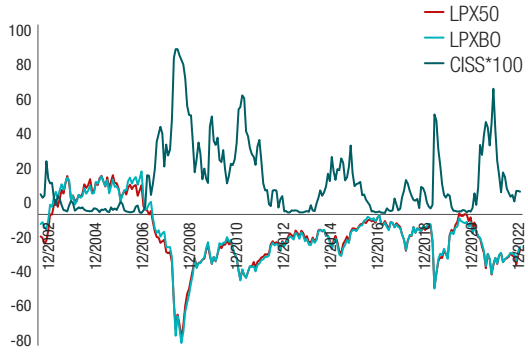
The reported figures are calculated from the 360/120 observations of the monthly returns for LPX50, LPXBO, MSCI, and the risk-free rate. All numbers, except for the beta values, are calculated with monthly data and then annualized using the standard annualization formulas and scaling factors. Averages and standard deviations are given as percentages. The ratios for the risk–return trade-offs are reported as decimals.

due to the nature of PE investments, these R-squared values suggest a stronger than expected correlation with the broader market. This result suggests that despite the PE nature of the LPE indices, the listed entities' returns are still significantly driven by market factors.

To further explore the risk–return trade-off, we report the Sharpe, Sortino, and Treynor ratios in Table 1. Notably, the (annualized) Sharpe ratios for all three indices are remarkably similar, suggesting that the higher returns associated with the LPE indices are proportionate to their increased volatilities. Similarly, the (annualized) Sortino ratios (with the reference point 0) are also close. In other words, the risk–return trade-off for the LPE indices aligns closely with that of MSCI. For completeness, we also report summary statistics for the most recent decade, from December 31, 2013 to December 29, 2023, in the bottom half of Table 1. This period was notably marked by the COVID-19 pandemic beginning in 2020 and the onset of the Russia–Ukraine war in 2022. These events significantly impacted financial markets, leading to observable changes in market volatility and trading volumes, as depicted in Figure 1.

We note that the average annualized (geometric) returns for LPX50 and LPXBO are 12.98% and 8.09%, respectively. This reveals that LPX50's return surpassed MSCI's average of 11.01%, whereas LPXBO's return did not. However, when considering risk-adjusted performance, both LPE indices lagged behind MSCI, as evidenced by their lower Sharpe and Sortino ratios. CAPM regression analysis yields beta values of 1.35 for LPX50 and 1.23 for LPXBO, indicating their respective sensitivities to market movements. The LPE indices exhibited negative but statistically insignificant alphas. The regression results also show R-squared values of 81% for LPX50 and 79% for LPXBO, suggesting a stronger correlation with MSCI in the last decade compared to the broader 30-year period.

Figure 3: Price-to-book ratios (PD indicators) versus the CISS



Price-to-book ratios for LPX50 and LPXBO against the (scaled) CISS from 12/31//2002 to 12/29/2023. The scaling factor for the CISS is 100.

3.2 Macro-financial stress, price-to-book ratios, and returns

Our visual inspection of the time series presented in Figure 2 clearly revealed the impact of various economic crises on the financial returns of the two LPE indices. Policymakers also call such time intervals periods of macro-financial stress. These periods are characterized by economic uncertainty, market volatility, and increased financial risk, affecting the broader economy and financial markets at large. Conventional wisdom claims that in periods of macro-financial stress, investor risk aversion tends to rise, leading to a decreased appetite for riskier assets. As many investors regard PE investments as riskier than more conventional assets, a shift in aggregate risk aversion can precipitate a decline in LPE share prices and, consequently, reduce returns for investors in these entities. Moreover, the portfolio companies within LPE firms' holdings may encounter financial hurdles during such economic downturns, which could further impact their performance, and, by extension, the returns delivered by LPE firms.

But it is not only LPE firms' share prices that suffer during periods of macro-financial stress. The book values of LPE firms may also be affected. If the portfolio companies experience deteriorating financial performance or if there are downward adjustments in their valuations due to adverse market conditions, it can lead to reductions in the book value of LPE firms. Moreover, impairments or write-downs may become more common during such periods, further impacting book values.

In the next step of our analysis, we examine the effects of macro-financial stress on the two LPE indices. Figure 3 depicts price-to-book ratios (the PD indicator) for LPX50 and LPXBO from December 2002 until December 2023. In addition, the figure shows the time series for the CISS financial stability index for the same period.

Table 2: Correlations between the CISS and PD

	PD AND CISS	Δ1M (PD AND CISS)	Δ3M	Δ6M	Δ12M
LPX50	-0.786	-0.488	-0.719	-0.793	-0.826
LPXBO	-0.769	-0.493	-0.714	-0.788	-0.815

The reported figures are calculated from 253 monthly values of the price-to-book ratios for LPX50 and LPXBO, respectively, and the CISS index from 12/31/2002 to 12/29/2023. The first column reports correlations between the levels of the PD indicators and the CISS. The next four columns report correlations between absolute changes of the PD indicators and absolute changes of the CISS during the same time window. For example, the rightmost column depicts the correlation between the 12-month (absolute) change of the CISS and the contemporaneous 12-month (absolute) change of the price-to-book ratios of the two LPE indices.

In the years leading up to the onset of the GFC in 2007, the price-to-book ratio indicated an overvaluation of LPE firms, with their market values on average surpassing their book values. However, during the crisis and its immediate aftermath the market values of these firms dropped to less than half of their book values, signaling a significant undervaluation. Since then, both indices have consistently indicated that LPE firms are undervalued, suggesting that their market prices remain below what their balance sheets would imply.

A possible explanation for this persistent undervaluation since the GFC could be investor skepticism regarding the accuracy of book valuations. This skepticism might stem from concerns over the reliability of the valuations assigned to the illiquid assets held by LPE firms, which are often difficult to price accurately. As a result, investors may demand a discount to compensate for the perceived risk associated with potential overestimations of asset values on the firms' balance sheets. This discount, reflected in lower market prices relative to book values, serves as a buffer against the uncertainty surrounding the true worth of these firms' underlying investments.

The time series graphs in Figure 3 reveal that skepticism regarding the book valuations of LPE firms, leading to a demand for market discounts, intensifies during periods characterized by macro-financial stress. A visual examination of the graphs suggests a robust negative correlation between the CISS index and the PD (price-to-book) indicators, signifying that as financial stress increases, the discrepancy between market and book valuations widens. Reinforcing this observation, Table 2 presents a compilation of historical correlations between the CISS financial stability index and the price-to-book ratios, further illustrating the inverse relationship between macro-financial stress levels and the PD indicators.

The CISS index levels and the price-to-book ratios of LPX50 and LPXBO exhibit significant negative correlations, with coefficients of -0.786 and -0.769, respectively. Furthermore, the absolute changes in the CISS index and the price-to-book ratios for both indices are also strongly and negatively correlated. This implies that rises in the CISS index, signaling heightened macro-financial stress, are typically associated with reductions in the price-to-book ratios of both indices, and vice versa. Such a pattern underscores a direct inverse relationship between macro-financial stress levels and the valuation metrics of these LPE indices.

Table 3: Correlations between the CISS and the indices' returns

	RETURNS AND CISS	RETURNS AND Δ1M CISS
LPX50	-0.242	-0.431
LPXBO	-0.239	-0.442
MSCI	-0.171	-0.342

The reported figures are calculated from 252 monthly values of the returns for the three indices and from the CISS index from 12/31/2002 to 12/29/2023. The first column reports correlations between the returns and the CISS level. The second column reports correlations between the returns and the absolute changes of the CISS during the same time window.

Table 3 shows that this inverse relationship also holds between the CISS index and the returns of both LPE indices as well as those of MSCI. Notably, variations in the CISS index exhibit a stronger (more negative) correlation with the returns of these indices than do the absolute levels of the CISS itself. This finding suggests that fluctuations in macro-financial stress, as captured by changes in the CISS, are more closely linked to the performance of the LPE indices and MSCI than the actual level of the CISS is – highlighting the dynamic impact of financial stability on market returns.

Table 4 reports correlations between CISS changes and compound index returns for three, six, and twelve months. The correlations are stronger than for the one-month time window in the right column of Table 3.

Table 4: Correlations between CISS changes and compound index returns

	3M RETURNS AND Δ3M CISS	Δ6M	Δ12M
LPX50	-0.616	-0.673	-0.653
LPXBO	-0.607	-0.677	-0.643
MSCI	-0.553	-0.614	-0.611

The reported figures are calculated from 252 monthly values of the returns for the three indices and the CISS index from 12/31/2002 to 12/29/2023. The first column reports correlations between the three-month (absolute) changes of the CISS and the three-month compound returns of the stock indices. The next two columns report correlations for six-month and 12-month time windows.

While the correlations between contemporaneous values of the CISS index and LPE index returns present intriguing insights into the interaction between macro-financial stress and market performance, their practical utility for trading remains limited. The simultaneous observation of these variables offers little in the way of actionable advice for forecasting future market movements. Naturally, the results prompt a critical question: can the CISS index be used not only as a coincident but also as a predictive metric that can inform investment decisions ahead of market shifts? We attempt to answer this question in the final step of our analysis.

3.3 Return predictability?

We analyze whether the CISS index could serve as a leading indicator of LPE market returns. For this purpose, we analyze correlations between lagged CISS changes and the index returns. Tables 5 and 6 report correlations between absolute changes in the CISS index and the later compound returns of the LPX50, LPXBO, and MSCI, respectively.

The correlations between monthly variations in the CISS index and the subsequent monthly returns of the three indices, as presented in Table 5's first column, align with the contemporaneous values outlined in the right column of Table 3. Changes in macro-financial stress levels are negatively correlated with the returns of all three indices in the following three months. This relationship fades over extended periods – 12 and 24 months – progressively nearing zero. This pattern indicates that the influence of macro-financial stress on compound index returns diminishes over time. Furthermore, the correlations documented in Table 6, between six-month lagged fluctuations in the CISS index and subsequent three-months returns, exhibit a comparable behavior as those observed in the first column of Table 5. For extended periods, they exhibit a similar diminishing trend. Interestingly, the correlation for the two-year compound returns of the LPE indices shows a reversal in sign, becoming positive (but is statistically insignificant). While the first three columns of the bottom half of Table 6 (correlations between lagged CISS 12-month changes and compound returns) show a similar pattern to those in the top half (correlations between

Table 5: Correlations between lagged CISS one-month changes and compound returns

	3M RETURNS	6M RETURNS	12M RETURNS	24M RETURNS
LPX50	-0.160	-0.148	-0.119	-0.062
LPXBO	-0.182	-0.159	-0.111	-0.072
MSCI	-0.100	-0.114	-0.078	-0.030

The table reports the correlations between the absolute change of the CISS index in a month and the compound returns in the following 3, 6, 12, and 24 months for the three indices.

Table 6: Correlations between lagged CISS six-month changes and compound returns

	3M RETURNS	6M RETURNS	12M RETURNS	24M RETURNS
LPX50	-0.205	-0.148	-0.138	0.069
LPXBO	-0.202	-0.103	-0.075	0.107
MSCI	-0.202	-0.173	-0.165	0.003
CORRELATIONS BETWEEN LAGGED CISS 12-MONTH CHANGES AND COMPOUND RETURNS				
LPX50	-0.210	-0.183	-0.088	0.111
LPXBO	-0.175	-0.118	-0.048	0.156
MSCI	-0.186	-0.203	-0.132	-0.017

The table reports the correlations between the absolute change of the CISS index during 6/12 months and the compound returns in the subsequent 3, 6, 12, and 24 months for the three indices.

lagged CISS six-month changes and compound returns), the rightmost column shows a further reversal of the correlations for the two LPE indices.

To determine whether the observed reversal constitutes mere statistical noise, we adjust the time lag between changes in the CISS index and the compound returns of the indices. Previously, the analysis for Tables 5 and 6 used a one-month lag. We now extend this to consider a 12-month lag. For example, we examine the CISS index's change over a three-month period and relate it to the annual return of an index during the second year. Put differently, we are correlating fluctuations in the CISS index from a three-month period with the compound returns of the second year following these fluctuations. Table 7 reports the results for three-, six-, and 12-month CISS changes to the compound returns of LPX50, LPXBO, and MSCI, respectively.

While the annual return of MSCI in year 2 appears to be only weakly correlated to CISS changes over 3, 6, or 12 months, this is not true for LPX50 and LPXBO. Both indices demonstrate a positive correlation, statistically significant, between macro-financial stress over periods of six or 12 months and the annual return in the subsequent second year. These results suggest that larger macro-financial stress leads to larger annual compound returns in the second year following these fluctuations.

The analysis presented in this section offers insights into the finding from the opinion poll of institutional investors cited in this article's introduction, where 72% of respondents indicated plans to increase their allocation to private markets over the next five years. Following the macro-financial stress induced by the onset of the COVID-19 pandemic and the Russia–Ukraine conflict, investors might anticipate a rebound in LPE price-to-book ratios and robust positive returns – until the advent of the next economic downturn. Ideally, we would bolster these indicative claims with an event study to provide more compelling evidence that low price-to-book ratios following periods of macro-financial stress are precursors to significant outperformance by LPE indices. (Un)fortunately, our dataset lacks sufficient crisis periods to permit a thorough analysis.

4. CONCLUSION

We have analyzed 30 years of return data from two well-known LPE indices, LPX50 and LPXBO. Over the entire time span, the two indices generated higher average returns than MSCI, in line with their higher volatility. Yet in the last decade, this global equity index surpassed the LPE indices in terms of risk-adjusted performance. Our investigation has also shown that post-the Great Financial Crisis LPE companies have, on average, been valued at a discount relative to their book values. This discount exhibits a strong negative correlation with the ECB's CISS indicator of macro-financial stress. In addition, the returns of the LPE indices are negatively correlated with the CISS. By employing the CISS as a predictive tool, our findings highlight that short-term fluctuations in the CISS negatively impact LPE returns in the near term. However, with a one-year lag, an uptick in the CISS metric interestingly seems to forecast a rebound in LPE performance, suggesting a complex interplay between macro-financial stress and the cyclical nature of LPE market reactions.

Table 7: Correlations between lagged CISS changes and annual returns in the second year

	Δ3M CISS	Δ6M CISS	Δ12M CISS
LPX50	0.049	0.212	0.264
LPXBO	0.048	0.224	0.302
MSCI	0.024	0.160	0.128

The table displays the correlations between the absolute changes in the CISS index over periods of 3, 6, or 12 months and the annual returns of the three indices in the second year following those changes.

ABOUT CAPCO

Capco, a Wipro company, is a global technology and management consultancy focused in the financial services industry. Capco operates at the intersection of business and technology by combining innovative thinking with unrivalled industry knowledge to fast-track digital initiatives for banking and payments, capital markets, wealth and asset management, insurance, and the energy sector. Capco's cutting-edge ingenuity is brought to life through its award-winning Be Yourself At Work culture and diverse talent.

To learn more, visit www.capco.com or follow us on Facebook, YouTube, LinkedIn and Instagram.

WORLDWIDE OFFICES

APAC
Bengaluru – Electronic City
Bengaluru – Sarjapur Road
Bangkok
Chennai
Gurugram
Hong Kong
Hyderabad
Kuala Lumpur
Mumbai
Pune
Singapore

MIDDLE EAST
Dubai

EUROPE
Berlin
Bratislava
Brussels
Dusseldorf
Edinburgh
Frankfurt
Geneva
Glasgow
London
Milan
Paris
Vienna
Warsaw
Zurich

NORTH AMERICA
Charlotte
Chicago
Dallas
Hartford
Houston
New York
Orlando
Toronto

SOUTH AMERICA
São Paulo

WWW.CAPCO.COM

CAPCO
a wipro company