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On private equity core and satellite allocations

An evaluation of satellite strategies in a diversified portfolio of private equity holdings

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Executive Summary

01 Institutional investors’ private equity programs consist of predominately fund commitments complemented by opportunistic transaction types such as secondaries and co-investments.

02 Within each of these transaction types, different investment strategies can be followed with buyouts being the most well-known. Over the years, many other smaller yet sufficiently large strategies have been established.

03 In this work, we analyze the five main strategies in private equity, and we compare each strategy on a standalone basis, focusing on characteristics such as risk-reward, cash flow profile, value creation and diversification. Furthermore, we show how, on a portfolio level, adding one strategy to the other can increase the risk-adjusted return of the entire private equity portfolio.

04 As such, these strategies can be thought of as flexible building blocks or modules that allow investors to build a private equity program that is more nuanced and objective specific.

1. Introduction

Private equity generally refers to a long-term investment into a private, non-listed company with the aim of bringing about operational or financial change to grow the business. It can take many forms, but most capital is invested via funds operated by private equity managers. In return for their investment, private equity managers receive equity stakes in the business – typically the majority owner – and partner with management teams to support growth plans and make improvements to the business with the aim of increasing its value over an investment horizon. This value is realized through a sale (or exit) of the business, at which point the fund makes a return on its investment and distributes back the proceeds to its investors. The main reasons why investors consider private equity in their portfolio include diversification, lower observed volatility but above all the potential for outperformance over public equity. [1, 2] Private equity managers have an extensive toolkit to achieve higher returns than seen in listed equity markets, these tools include active ownership, better alignment, longer holding periods, and operational value creation, structuring, corporate M&A, and financial engineering.

Within private equity several strategies can be found and have matured over the past 2-3 decades. Typically, the term private equity itself refers to investments, often structured as buyouts, in more mature – usually profitable – companies. At the larger end of the deal spectrum are the well-known global buyout firms often covered in the news. In this work, funds investing in large and mega buyouts deals are denoted as **core buyout funds** as they make up largest part of the overall capitalization of private equity. Yet there are other strategies within private equity, each with its own characteristics, and here we will call these satellite strategies or satellite funds. We distinguish **4 satellite strategies** that we deem most established and relevant for institutional investors:

- **Small and mid-sized (smid) buyout:** investments in smaller companies but typically structured in a similar way as large and mega buyouts
- **Late stage venture capital and growth equity:** investments in younger, high growth businesses that are disrupting traditional economies and industries with a focus on execution and scale. These companies are often being invested in at key inflection points and require additional private funding to fuel growth prior to IPO or acquisition. Throughout the paper, this strategy will be referred to as growth equity.

- **Special situations:** situations triggered by specific circumstances within the company that mean it requires investment and support. Typically, two sub-strategies are considered being distressed and turnaround where the former represents 52%[1] of the market capitalization within special situation funds. Here only distressed investments are considered where capital is used to acquire equity or debt of a company in distress at a discount. As a result of the Covid-19 pandemic, investors are flocking to distressed opportunities as GPs accelerate fundraising and launch new sub-strategies[2].
- **Asia focused:** all buyout, growth equity and distressed investments in companies located in or with significant revenue streams from Asia Pacific – a region characterized by its rapid economic growth and still maturing private equity market thereby differentiating itself from North America and Europe.

This paper focuses on the role of satellite strategies next to an allocation to core buyout funds and discusses how satellite funds can complement core buyout funds. First, core and satellite funds are studied on a standalone basis, discussing risk-reward, cash flows characteristics, diversification and value creation for each of these 5 strategies. Second, we show that adding satellite funds to a portfolio of core buyout funds can improve risk-adjusted returns and tilting to one satellite or another might accelerate reaching the objectives of the investor. All results shown here are objective market data, and no assumptions or amendments were made to the data[3].

Figure 1 shows the universe of primary private equity funds for vintage years ranging from 2001 to 2019 by number and by size. The graphic illustrates that the smid buyout market is characterized by 1,000+ smaller funds (many of which first-time funds or emerging managers), and the largest part of the market opportunity set in capitalization is found in the large-mega buyout funds (56%) as shown in Figure 2. Also notable is the large number of Asia-focused private equity funds and the relatively small number and size of growth equity funds.

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[1] Source: Preqin (June 2020). Universe consists of current dry powder figures for Distressed Debt, Special Situations, and Turnaround funds.
[2] Source: Preqin (June 2020). Currently 70 distressed debt funds are raising capital with an aggregate target size of US$72b.
[3] All returns are net of management and performance fees. Source: Burgiss, vintages 2001-2019, 2,614 funds, USD 3.2 trillion in market capitalization as of 30 June 2020. Breakpoint between smid and large/mega buyouts adjusts as fund sizes have grown over time: 2001-2005: USD 750m, 2006-2009: 1,250m, 2011-2019: 2,000b. Across all strategies a minimum fund size of USD 25 million was applied.

Figure 1: Private equity fund universe

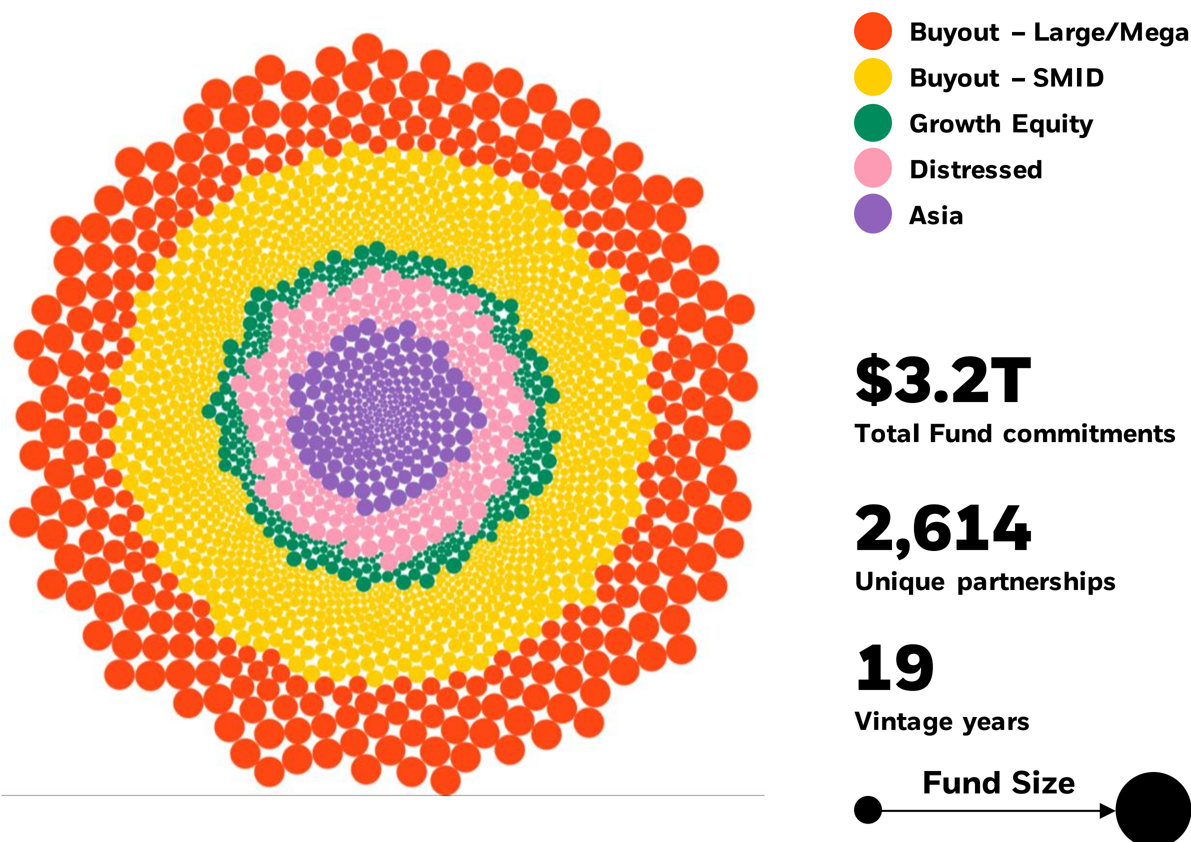

Figure 1: Private equity fund universe covering vintages 2001-2019 and total capitalization of USD $3.2T. Circle diameter represents fund size. Source: Burgiss Private iQ as of 30 June 2020. Strategies include Buyout Large/Mega and Smid with cutoffs dynamically changing over time (<=2005: 750m, >2005 and <=2010: 1,250m, >2010: 2,000m), Late Stage VC and Expansion Capital, Distressed, and Buyout, Distressed, Late Stage VC/Expansion Capital specific to the Asia-Pacific region. All dollar figures are USD. Indexes are unmanaged and one cannot invest directly in an index.

Figure 2: Private equity fund universe across capitalization and number

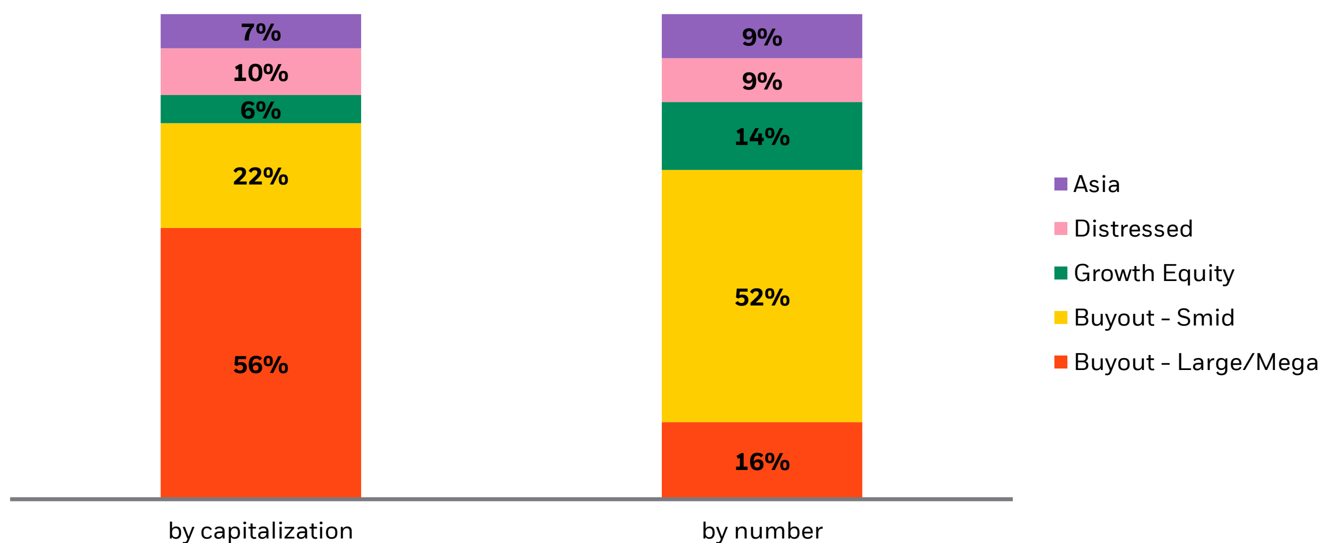

Figure 2: Private equity fund universe covering vintages 2001-2019 by number of funds and by capitalization. Source: Burgiss Private iQ as of 30 June 2020. Strategies include Buyout Large/Mega and Smid with cutoffs dynamically changing over time (<=2005: 750m, >2005 and <=2010: 1,250m, >2010: 2,000m), Late Stage VC and Expansion Capital, Distressed, and Buyout, Distressed, Late Stage VC/Expansion Capital specific to the Asia-Pacific region. Total capitalization of USD $3.2T. All dollar figures are USD. Indexes are unmanaged and one cannot invest directly in an index.

2. Standalone comparison between core buyout funds to satellite funds

Risk-reward characteristics

The first question that comes to mind is "how do these strategies compare on a risk-reward or risk-adjusted returns basis" - in other words how does the return compare to the amount of risk the investor takes when allocating to such strategy. This work studies the absolute return of private equity only - on a relative basis, private equity funds have outperformed public equities markets even during one of the longest-ever bull markets [2]. Table 1 shows the aggregate IRR (pooled, mean and median) and the dispersion of returns for the 5 strategies. These aggregate returns can be interpreted as a passive investment in a private equity index, having exposure to all private equity funds. Clearly, such passive strategy is not feasible for most investors – at least not at present. Investors must select managers and size the commitment to their funds and hence the choice of manager and commitment size is the biggest and most important investment decision to achieve incremental returns and manage risk when investing in private equity, especially knowing that persistence of performance by managers has declined considerably [5].

Both components of the buyout universe show similar aggregate returns, however the dispersion of returns is inversely correlated with fund size and the smaller end of the capitalization spectrum shows noticeably larger variance. Simply put, smaller funds have higher highs and lower lows which also gives manager selection more importance. Assuming allocators can consistently select upper median managers (a hard-to-prove assumption), the smaller part of buyout market provides an incremental return over the larger core buyout market. Interestingly, the smid funds shows the highest pooled IRR of all strategies, yet its Sortino ratio shows an intermediate value. This is consistent with the previous statement that the dispersion of returns is inversely correlated with fund size and indicates that the downside volatility is driven by the smallest funds, an effect that is dampened in a capital weighted pooled IRR.

Growth equity shows very similar risk-reward as smid buyout funds, yet this strategy has a more attractive risk-adjusted return as indicated by the higher Sortino ratio. Distressed funds are known to have a lower return expectation as demonstrated in both lower return and lower risk. Asia-focused funds show a slightly lower return and slightly higher dispersion which explains a defensive Sortino ratio compared to the other

strategies. That being said, Asia focused private equity funds are still relatively young compared to the other strategies which might bias these estimates.

Table 1: Risk-return characteristics

Characteristic	Buyout - Large Mega	Buyout - SMID	Growth Equity	Distressed	Asia
Pooled IRR	11.2%	13.3%	12.5%	8.8%	10.8%
Mean	10.6%	11.3%	12.3%	6.7%	8.9%
Median	10.8%	10.7%	10.4%	7.7%	8.6%
IQR	10.8%	15.6%	16.0%	9.1%	12.9%
5th	-9.9%	-12.4%	-11.3%	-10.1%	-14.0%
25th	6.2%	3.5%	3.7%	2.8%	1.7%
75th	17.0%	19.1%	19.7%	11.9%	14.6%
95th	33.0%	37.0%	36.3%	20.9%	33.6%
Sortino Ratio	1.0	1.4	1.9	1.0	1.1

Table 1: Risk-reward characteristics of each of the five strategies. Sortino ratio is calculated using a threshold IRR of 0%. Source: Burgiss Private iQ as of 30 June 2020. Vintages 2018 & 2019 excluded for this analysis as they are still in the J-curve. Dataset covers 2,199 funds, representing USD 2,498b. ***The figures shown relate to past performance. Past performance is not a reliable indicator of current or future results. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.***

Figure 3 visually depicts the data points shown in Table 1.

Figure 3: Risk-return characteristics

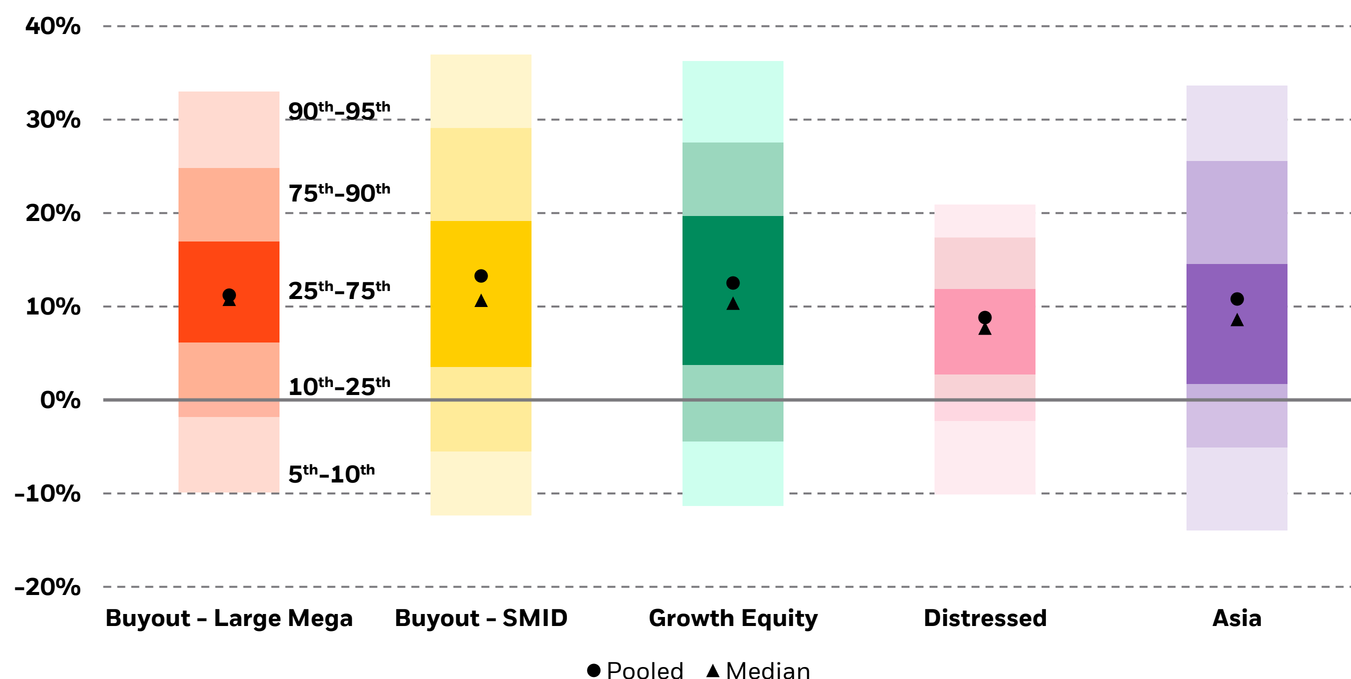

Figure 3: Graphical representation of risk-reward statistics shown in Table 1. Source: Burgiss Private iQ as of 30 June 2020. Dataset covers 2,199 funds, representing USD 2,498b. Buyout – Large Mega covers Buyout funds defined by Burgiss to be greater than USD 2.0b in total fund size. Buyout – SMID covers Buyout funds defined by Burgiss to be between USD 25m and USD 2,000m in total fund size. Growth Equity covers Late Stage Venture Capital and Expansion Capital funds greater than USD 25m. Distressed covers Distressed funds defined by Burgiss greater than USD 25m in total fund size. Asia covers Buyout, Late VC/Growth, and Distressed strategies greater than USD 25m. ***The figures shown relate to past performance. Past performance is not a reliable indicator of current or future results. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.***

All risk-reward figures discussed above represent estimates for each strategy since inception until 30/06/2020, yet it is expected that each strategy benefits from the current market variables in a different manner and perform at various time during macro-economic cycles. Figure 4 shows that different strategies perform at different times, for instance distressed funds show, as expected, strong return during periods of financial duress (early 2000s and 2008-2009). Buyout returns are generally more consistent and only show single digit IRRs during the GFC in 2005-2007. Asia focused funds show larger dispersion especially in the early 2000s driven be the fact that only very few Asia funds were in the market then. This illustrates why trying to time the commitments to the various private equity strategies is problematic and that consistent vintage year allocation across strategies is likely to ensure adequate diversification and the best outcome for investors.

Figure 4: Pooled, median and inter-quartile range IRRs across strategies and vintage years

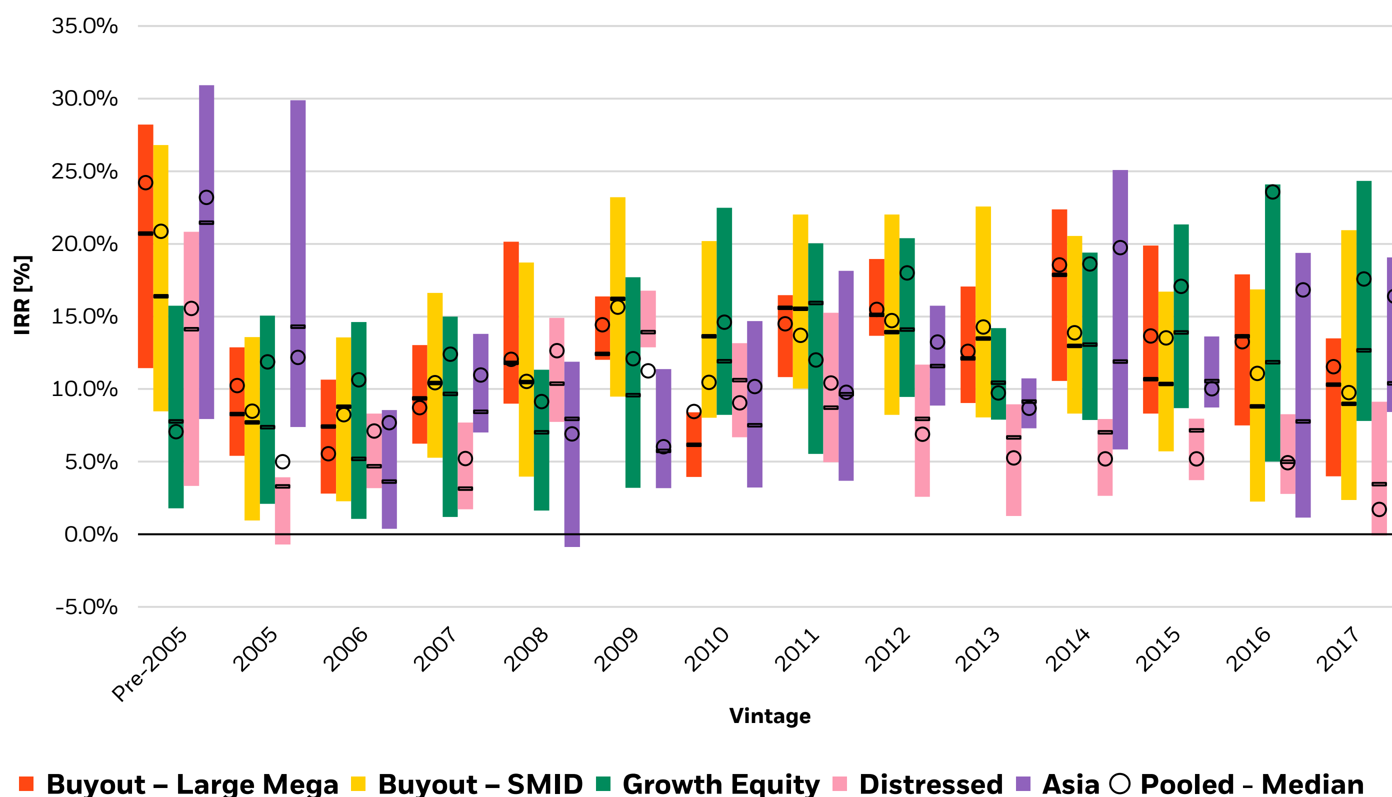

Figure 4: risk-reward on an IRR basis per strategy and per vintage year. Source: Burgiss Private iQ as of 30 June 2020. Vintages 2001-2017 are included in this analysis. Dataset covers 2,199 funds, representing USD 2,498b. ***The figures shown relate to past performance. Past performance is not a reliable indicator of current or future results. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.***

Cash flow profiles

Whereas risk and reward are important characteristics of these various strategies, cash flow profiles may also differ and should be considered when weighing the objectives of the investor. The table below summarizes various metrics that are directly derived from the cash flow profiles of each strategy. *J-curve* and *cash positive* represent the year in which the median IRR of each strategy turns positive and distributions exceed paid-in capital (DPI > 1), respectively. *Duration* represents the capital-weighted average duration, i.e. average timing of distributions minus average timing of contributions. *Max out-of-pocket (OOP)* is the median depth of the cumulative net cash flows curve and represents the maximum net cash exposure for each strategy.

Characteristic	Large mega buyouts	Smid buyouts	Growth Equity	Distressed	Asia
J-curve	2y	3y	2y	1y	3y
Cash positive	9y	9y	11y	7y	9y
Duration	5.4y	5.0y	6.3y	4.6y	5.1y
Max OOP.	62%	57%	69%	65%	65%

Table 2: Cash flows properties of each strategy based on median cash flow profiles. Source: Burgiss Private iQ as of 30 June 2020. Dataset covers 2,199 funds, representing USD 2,498b. ***The figures shown relate to past performance. Past performance is not a reliable indicator of current or future results. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.***

As it can be seen, both the smaller and larger end of the buyout space have comparable cash flow characteristics. It is often claimed that large and mega investments have shorter holding periods and tend to be more liquid due to more available exit options, yet the data analyzed here does not support that.

Growth equity seems to have a slightly longer time horizon, most likely due to limited exit channels besides the preferred IPO-route, which would translate into higher multiples.

Special situation funds show the shortest horizon across all metrics, which is expected given companies in distress are transformed quickly and exited. An example in which this is relevant is if the objective of the investor is to be invested quicker, and an allocation to distressed funds can help accelerate building up that exposure.

Asia-focused private equity funds have similar cash flow characteristics as core buyout funds on the larger end of the size spectrum which is expected given that is the largest component of the overall private equity market, also in Asia.

Value creation

Each of these strategies has its own distinctive value creation levers. Typically, investment-level leverage increases with transaction size as larger companies have a higher lender capacity. For this reason, in the smaller end of the buyout market the operational factor, revenue and margin growth, is expected to be more important and financial engineering to a lesser extent. Previous research [4, 8] confirmed this effect empirically and hinted that the operational component is more important for smaller companies also indicating they are less efficient and well run compared to larger companies.

Less leverage in companies in the smid buyout market also results in dampened peak-to-trough declines in times of financial duress. Figure 5 also shows that growth equity saw an even smaller decline, as expected as company-level leverage is typically not present.

Figure 5: Peak-to-trough declines during the global financial crisis (September 2007-March 2009)

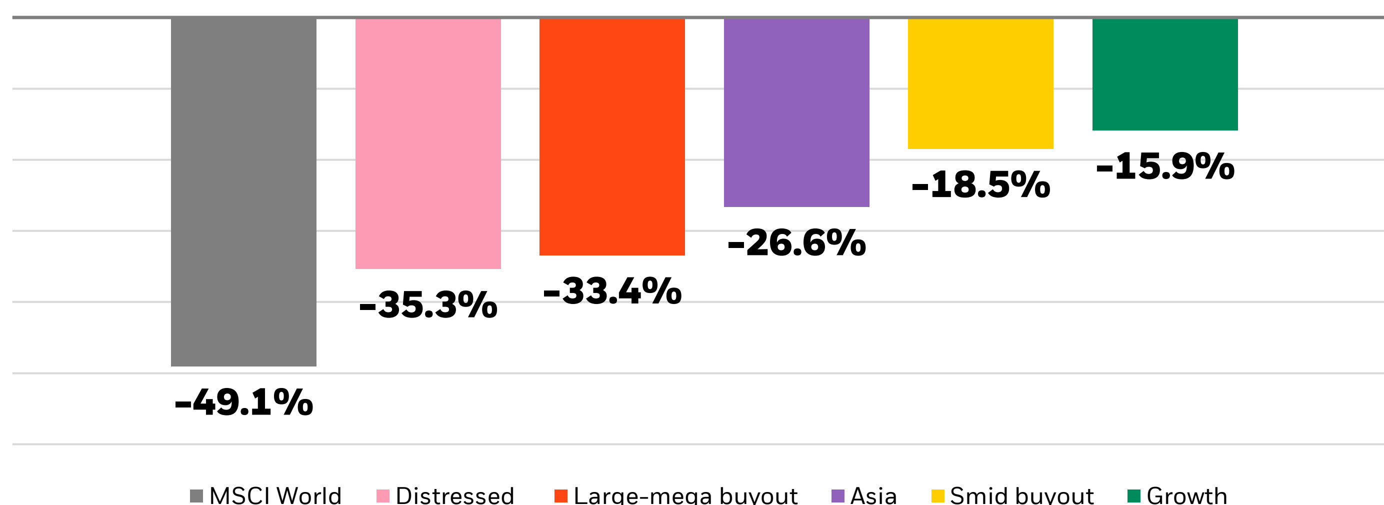

Figure 5: peak-to-trough declines during global financial crisis. Source: Burgiss Private iQ as of 30 June 2020. Dataset covers 2,199 funds, representing USD 2,498b. ***The figures shown relate to past performance. Past performance is not a reliable indicator of current or future results. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.***

Recently, valuations took a major hit across private capital, with the total universe set forth in this analysis decreasing by 8% in the aggregate, compared to the MSCI World at 21% during the first quarter of 2020. Growth equity performed the best, falling by 2.4% compared to an 8.8% reduction in time weighted returns for large-mega buyouts and distressed strategies.

Correlation and diversification

In addition to the aforementioned characteristics, further elements such as correlation have to be considered when building a portfolio consisting of each of these five strategies. It is well-known that the larger end of the buyout spectrum is more correlated and hence it is expected that fewer funds are necessary to obtain an optimally diversified portfolio or program. This can be studied using simulations where randomly constructed programs consisting of an increasing number of funds are analyzed. In these Monte Carlo simulations, the investment period is 4 years, commitments are equally and evenly paced, and the number of simulation runs was 100,000. A typical result for smid buyout funds is shown in Figure 6 which illustrates that the dispersion of outcomes, as indicated by the height of the stacked yellow bars, is decreasing rapidly when diversifying capital over more underlying funds. This chart illustrates that 15-20 smid funds are necessary to be optimally diversified - adding more funds would not materially impact the risk-adjusted return of the aggregated program.

Figure 6: Diversification effect for smid funds

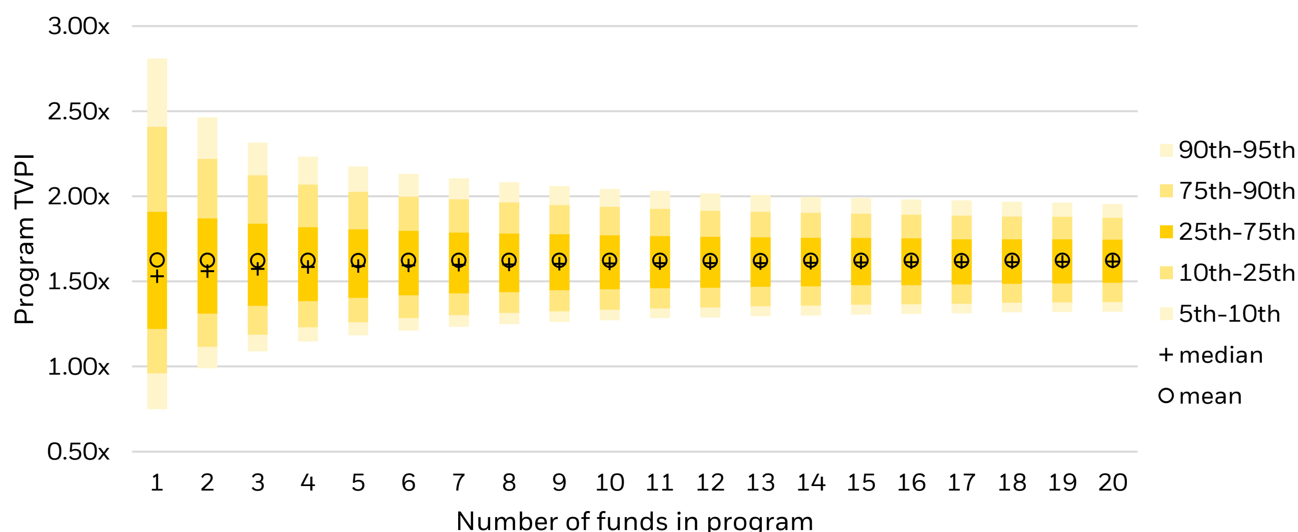

Figure 6: diversification effect as a function of number of funds for small-mid buyout funds. Source: internal and Burgiss Private iQ as of 30 June 2020. Dataset covers 2,199 funds, representing USD 2,498b. Vintages 2001-2017 are included in this analysis. ***The figures shown relate to past performance. Past performance is not a reliable indicator of current or future results. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.***

The marginal diversification benefit quantifies diversification and is estimated as median return divided by the standard deviation of returns, relative to 1 fund investment, within each simulation. This marginal diversification benefit is shown as a line for each strategy in Figure 7.

Figure 7: Marginal diversification benefit as a function of number of funds

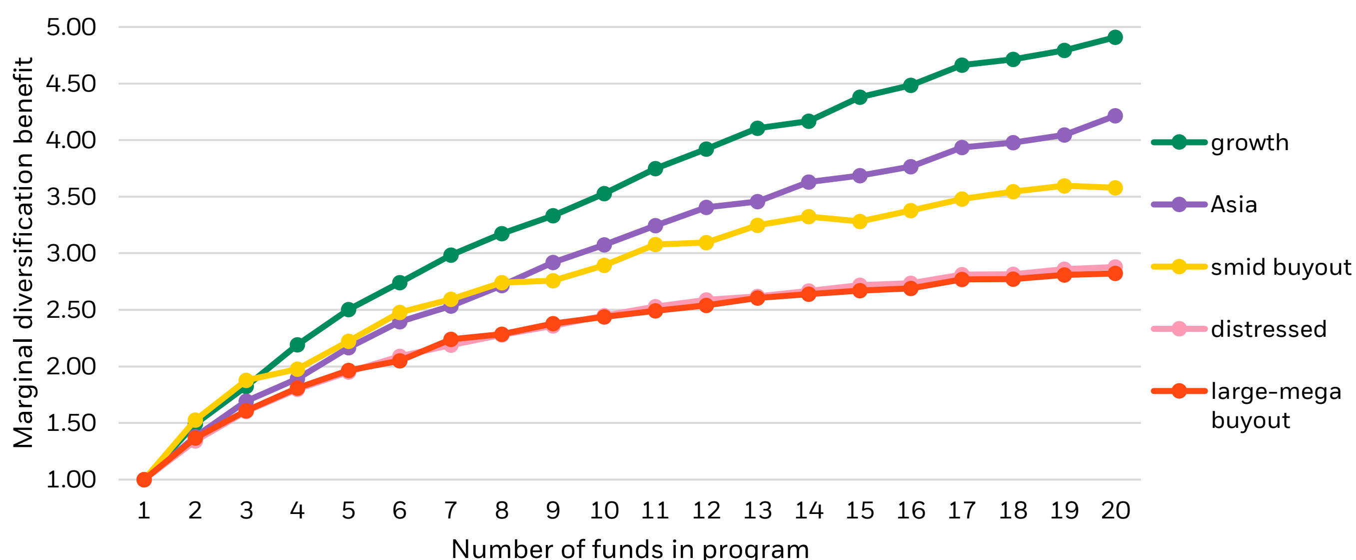

Figure 7: marginal diversification benefit as a function of number of funds for each of the five strategies Source: internal and Burgiss Private iQ as of 30 June 2020. Dataset covers 2,199 funds, representing USD 2,498b. Vintages 2001-2017 are included in this analysis. ***The figures shown relate to past performance. Past performance is not a reliable indicator of current or future results. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.***

For core buyout funds the line flattens quicker meaning fewer funds are necessary to be optimally diversified, say 12-15 funds. The same is true for distressed funds. For smid buyout funds an optimal program is achieved by allocating capital to 15-20 funds. For Asia and growth funds these lines are still sloping upwards and more than 20 funds seem necessary to achieve optimal diversification, indicating that funds in these strategies have a lower pair-wise correlation.

3. Satellite funds in a portfolio of large-mega funds

The analyses so far highlight various characteristics of five strategies on a standalone basis. However, most private equity programs consist of a mix of each of these strategies and hence it is important to understand the role of each strategy in the aggregate program, and in particular how these strategies affect the risk-reward of the total program. This can be studied using simulations where randomly constructed programs consisting of a mix of strategies are analyzed. For a detailed description of the simulation methodology please refer to the appendix.

A result for a program investing in core large-mega buyout funds and smid buyout funds is shown in Figure 8. To clarify, a portfolio consisting of 20 core large-mega buyout funds shows an IRR of 12.4% and a standard deviation around this expected IRR of 2.9%. When gradually (5% increments) replacing core buyout with a smid buyout allocation, the uncertainty but also the expected return increases. Ultimately, the portfolio consists 100% of smid buyouts and shows an expected IRR of 12.9% and standard deviation of 3.6%. As seen in Table 1, the aggregate risk-reward characteristics of both components are very similar and hence there is little diversification benefit from a risk-reward perspective and the portfolio moves pretty much along a straight line from corner to the other corner portfolio.

Figure 8: Simulated mean and dispersion of IRR

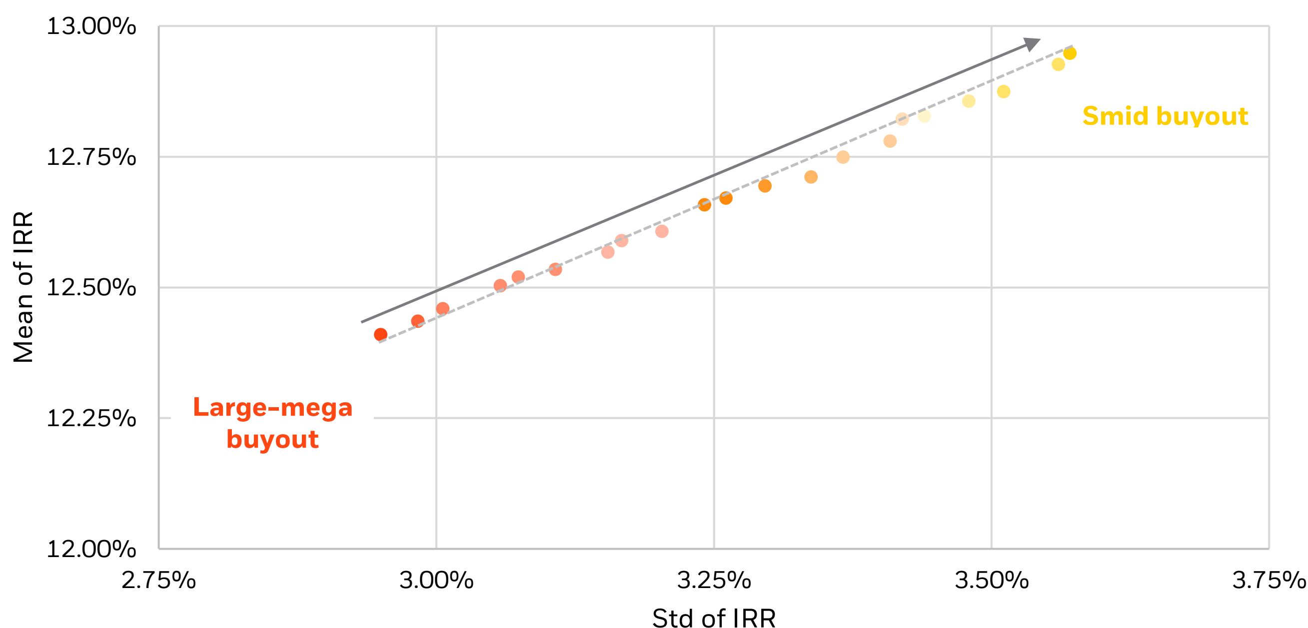

Figure 8: Simulated mean and dispersion of IRR for 21 portfolios consisting of large-mega and smid buyouts Source: internal and Burgiss Private iQ as of 30 June 2020 (1,665 funds). Vintages 2001-2017 are included in this analysis. ***The figures shown***

relate to past performance. Past performance is not a reliable indicator of current or future results. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.

However, when more dissimilarities between both strategies are introduced by for instance removing all below median funds from both datasets, a benefit becomes visible and a curvature becomes apparent, i.e. the simulated portfolios consisting of both large-mega and smid buyouts move away from the straight line connecting both corner portfolios as shown in Figure 9.[4]

Figure 9: Simulated mean and dispersion of IRR (upper median)

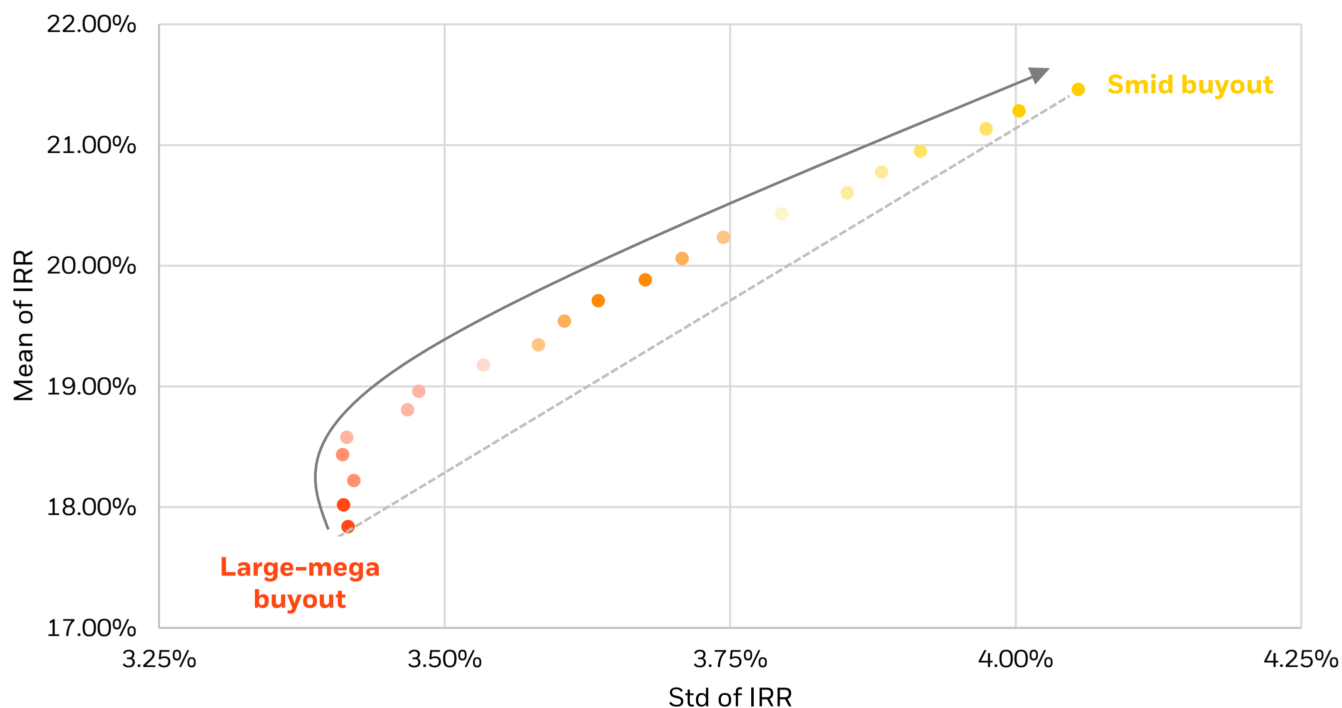

Figure 9: Simulated mean and dispersion of IRR for 21 portfolios consisting of upper median large-mega and smid buyouts. Source: internal and Burgiss Private iQ as of 30 June 2020 (802 funds). Vintages 2001-2017 are included in this analysis. ***The figures shown relate to past performance. Past performance is not a reliable indicator of current or future results. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.***

An even stronger effect can be seen when adding growth funds to core buyout funds as it can be seen in Figure 10. Here the curvature is more pronounced even when only removing the bottom quartile funds from both datasets. This implies that the correlation of growth equity with core buyouts is lower than the correlation of smid buyouts with core buyouts which is in-line with intuition given the nature of the underlying companies.

[4] It should be noted that these simulated returns slightly differ from those in Table 1 because 1) simulations are equally weighting both by vintage year and fund size and 2) represent performance of a diversified program of private equity funds instead of single funds.

Figure 10: Simulated mean and dispersion of IRR (excluding bottom quartiles)

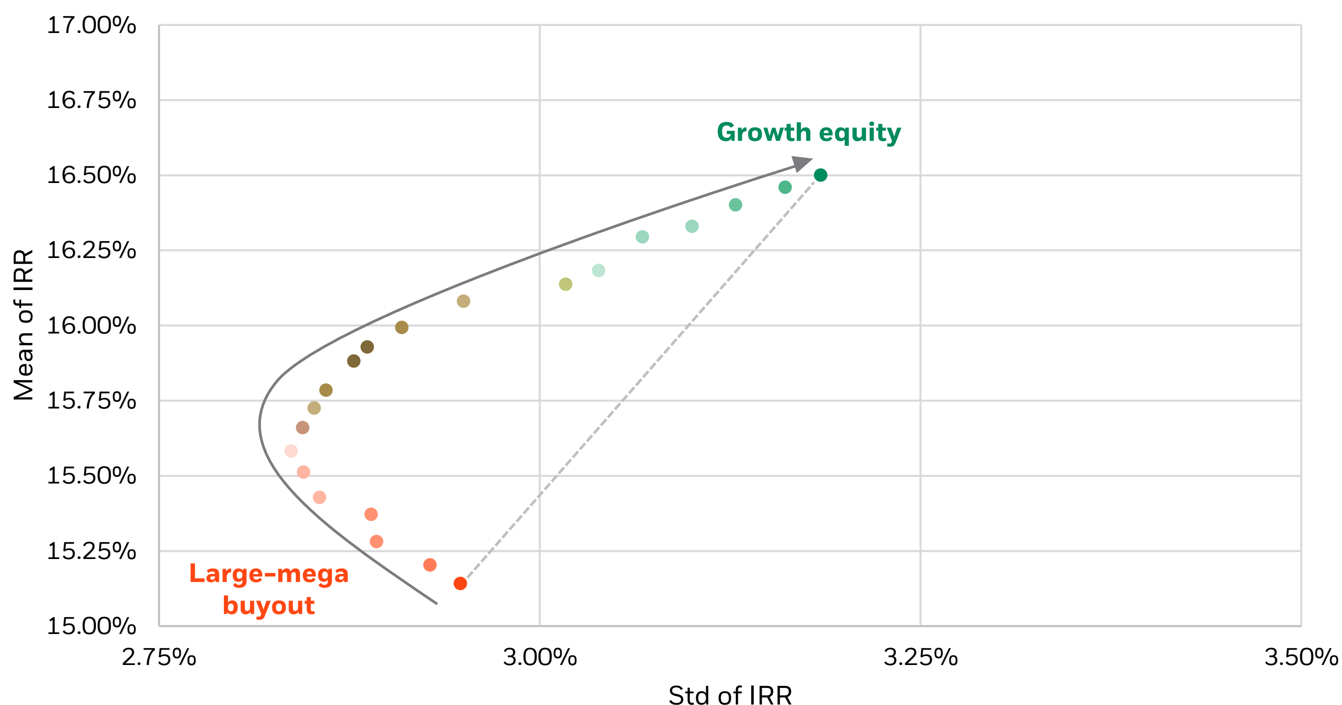

Figure 10: Simulated mean and dispersion of IRR for 21 portfolios consisting of large-mega and growth buyouts excluding the bottom quartiles. Source: internal and Burgiss Private iQ as of 30 June 2020 (515 funds). Vintages 2001-2017 are included in this analysis. ***The figures shown relate to past performance. Past performance is not a reliable indicator of current or future results. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.***

Figure 11 plots both Sharpe and Sortino ratios as a function of the allocation to growth equity for the simulation results shown in Figure 10. An optimum can be seen at 30-40% allocation to growth equity at which point both risk-adjusted ratios show their maximum value.

Figure 11: Sharpe and Sortino ratios for simulation results in Figure 10

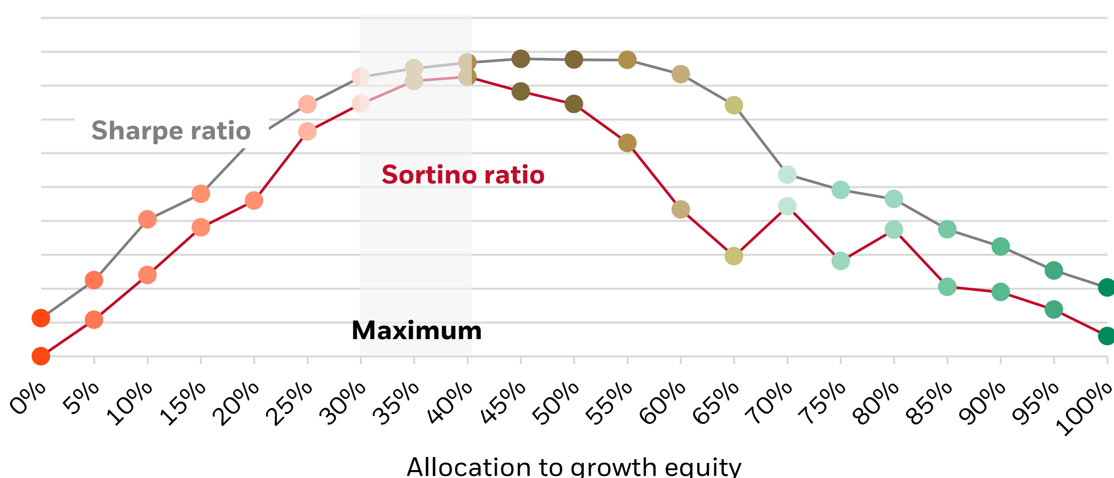

Figure 11: Sharpe and Sortino ratios for the simulation results shown in Figure 10. Source: internal and Burgiss Private iQ as of 30 June 2020 (515 funds). Vintages 2001-2017 are included in this analysis. ***The figures shown relate to past performance. Past performance is not a reliable indicator of current or future results. Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.***

4. Optimal portfolio construction

Even though important trends can be observed when applying this simulation methodology on two strategies in isolation, such theoretical constructs are not used abundantly by private equity practitioners to derive an optimal allocation to each of these strategies for several reasons. First, each investor has a different objective to solve for when constructing their private equity program. Some investors favor IRR and others TVPI or others put more emphasis on elements away from performance expectations, e.g. J-curve experience, duration and out-of-pocket experience. As such, portfolio construction in private equity is multi-dimensional and is more nuanced and complex than a 2-dimensional plane. Second, such simulations do not consider the depth or opportunity set of each strategy which is crucial in private equity investing as it enables to select only the highly attractive investments through rigorous underwriting. Third, such simulations are entirely backward looking and do not allow for adjusted tilts due to anticipated market developments, for instance tactical over-weight to distressed funds in times of financial uncertainty.

Portfolio construction relies on bottom-up analyses complemented by quantitative analysis as presented throughout this article and a standard portfolio could look like Figure 12 which combines both the opportunity set and diversification considerations. It should be noted that these commitments typically occur over a period of 3 to 4 years and that a minimum commitment size should be implemented to avoid sub-scale commitments.

Figure 12: Optimal portfolio consisting of the five strategies

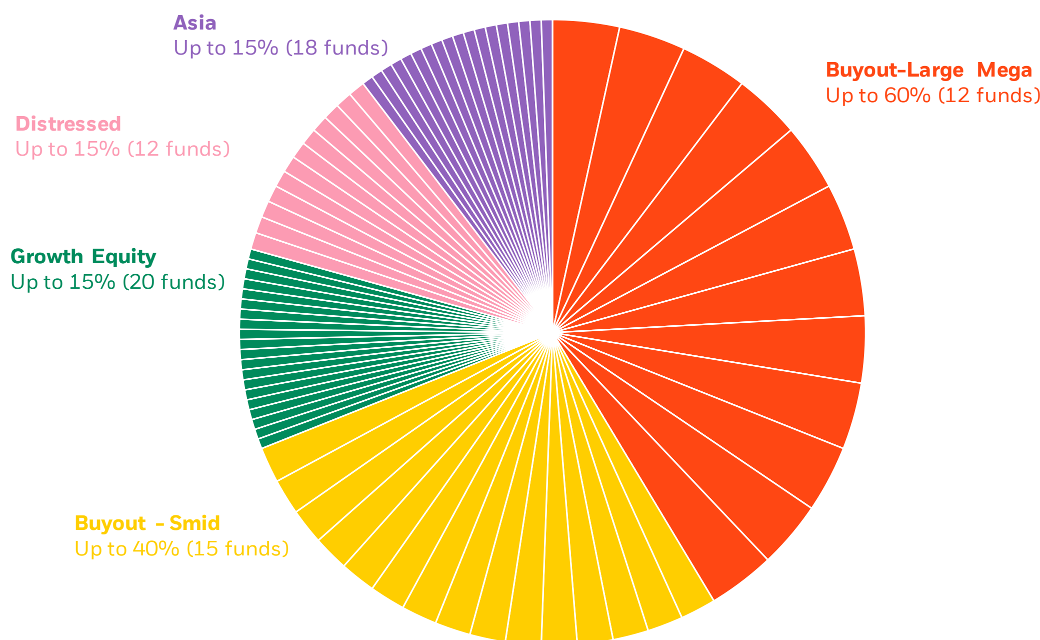

Figure 12: Optimal portfolio consisting of each of the five strategies

5. Conclusion

1

This paper lays out the characteristics of the five main private equity strategies: core mega-large buyout funds and four satellite strategies being small-mid buyout funds, growth equity, distressed and Asia-focused funds.

2

On a standalone basis, it is shown that these strategies differ not only in their risk-reward characteristics but also in cash flow profiles, value creation levers and diversification properties.

3

From a total portfolio perspective, it is shown that adding satellite strategies to a collection of core buyout funds can improve the risk-adjusted return of the total portfolio beyond what could be achieved by both strategies in isolation hence demonstrating the complementary nature of these satellite strategies.

Appendix

In these Monte Carlo simulations, diversified private equity programs were constructed in a random manner by sampling, without replacement, from a large universe of existing fund investments available through Burgiss Private iQ. The investment period was 4 years, during which 20 equally and evenly paced commitments are made, and the number of simulation runs was 100,000. Cash flows were reconstructed from IRR and TVPI values following the methodology described in [6, 7]. After reconstruction, cash flows were aggregated to a program level and subsequently the IRR and TVPI of the program were calculated. Results are representative for investors in these diversified programs, not in individual fund investments. All simulation results are net of GP economics.

By constructing such simulated diversified programs, one can calculate more insightful risk metrics such as dispersion, interquartile ranges and extreme scenarios. Also, risk-adjusted return metrics considering fat-tailed characteristics, such as the Sortino ratio, can be derived.

This analysis does not represent any BlackRock fund or strategy and is provided solely for illustrative and educational purposes only.

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Risks

Capital at risk. The value of investments and the income from them can fall as well as rise and are not guaranteed.

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