Tilting the balance: the value of asset allocation in private markets

Dr Andrea Carnelli Dompé, Head of Research

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Introduction

How should an investor in private equity funds split commitments across different stages and geographies? We start from the premise that the performance of a private equity fund portfolio flows from two different sources: its composition in terms of stage and geographic exposures (its asset allocation), and the choice of general partners (GPs) within each portfolio bucket (manager selection). It follows that an investor in private equity funds can use a combination of both levers to create value for investors. In simple terms they would seek to build exposure to the best performing strategies, selecting the best performing funds to build those exposures.

This paper develops a framework to think about asset allocation in the context of private equity fund investment. While much has been said about the critical role of manager selection in private equity – including its potential for value creation and the challenges posed by due diligence and access – the topic of asset allocation has attracted less attention, despite its recognized importance for portfolios of listed securities\(^1\). This article aims to fill this gap by discussing the unique opportunities and challenges that asset allocation can bring for private equity fund investors, and by quantifying the extent to which asset allocation can create value in addition to that achieved through manager selection.

Key takeaways

The performance of a private equity portfolio in a given vintage is driven by both asset allocation (its stage and geography composition) and manager selection (the choice of GPs within each portfolio bucket).

Asset allocation has long been recognized as a key driver of performance in portfolios of listed securities, but there has historically been little analysis of the value it creates in private markets.

We developed a framework to understand the role of asset allocation in private markets and applied it to estimate “neutral” allocations, that is portfolio weightings in the absence of differential views relative to the market consensus.

We also show via historical back-tests that while manager selection remains the key driver of private equity portfolio performance, asset allocation that is effectively differentiated from the consensus view can have a tangible positive impact on performance.

\(^1\) See for instance Kaplan and Ibbotson (2001).
Asset allocation and balanced portfolios

Before developing a framework of asset allocation in private markets, we review the concept in the more traditional setting of managing a balanced portfolio of listed securities. In 1985, Brinson suggested that the differential performance of a portfolio relative to its benchmark, or active return, can be broken down (decomposed) into three effects:

1. **Asset allocation**
   - A portfolio manager can deviate from the asset class mix of the reference benchmark. For instance, in the case of a traditional 60-40 benchmark between equity and fixed income, a portfolio manager having bullish views on equity markets may wish to increase the equity exposure to 70% and dial down the fixed income exposure to 30%.

2. **Security selection**
   - Even when mirroring the asset mix of the reference benchmark, a portfolio manager can deviate from the benchmark by investing in a different selection of securities in each asset class. For instance, relative to the benchmark, the manager may decide to overweight equities towards large-cap U.S. stocks and reduce the level of interest rate risk (duration) and credit risk in the fixed income component.

3. **Interaction effect**
   - Nothing prevents the portfolio manager from simultaneously using both the asset allocation and security selection levers. The interaction effect captures the value created when a manager is overweight both to a well-performing asset class, as well as better performing securities within that asset class.

Exhibit 1 illustrates a hypothetical example of a public markets portfolio manager deciding to deviate from the benchmark by leveraging both asset allocation and security selection. The public markets portfolio outperforms the benchmark by 2.10%.

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**Exhibit 1: Hypothetical performance decomposition**

<table>
<thead>
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<th>Asset class</th>
<th>Weights</th>
<th>Returns</th>
<th>Decomposition</th>
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<tr>
<td></td>
<td></td>
<td>Benchmark</td>
<td>Portfolio</td>
</tr>
<tr>
<td>Equity</td>
<td>60%</td>
<td>5.00%</td>
<td>7.00%</td>
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<tr>
<td></td>
<td>70%</td>
<td></td>
<td></td>
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<tr>
<td>Fixed income</td>
<td>40%</td>
<td>-2.00%</td>
<td>-2.00%</td>
</tr>
<tr>
<td></td>
<td>30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>2.20%</td>
<td>4.30%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
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<td></td>
</tr>
</tbody>
</table>

Source: Pantheon, September 2020. Illustrative example based on hypothetical weights and returns. The asset allocation, security selection, and interaction decompositions are based on the hypothetical weights and returns, and the formulae contained in the “Brinson’s original decomposition” section of the Appendix.

2 See Appendix for a mathematical definition.
The asset allocation effect amounts to 0.70%: the manager had 10% more of the portfolio in equities (whose benchmark returned 5% over the period) and 10% less in fixed income (which lost 2%). The contribution of security selection amounts to 1.20%: this is simply the additional return of the securities selected by the manager compared to the equity index (7% vs 5%), as the fixed income performance is in line with the benchmark. Finally, the interaction effect of 0.20% picks up the additional return generated by the simultaneous effects of overallocation and outperformance of the equity selection. While all effects in this example have a positive sign, it is of course also possible for managers to destroy value via any (or all) of these channels. This analysis can be generalized to portfolios with an arbitrary number of underlying asset classes, and can be repeated at different time points to track the contributions to performance over time.

Is asset allocation worth the effort? There has been intense debate around the merits of asset allocation vis-à-vis security selection. In a much-cited report, Ibbotson and Kaplan (2001) analyze the role of asset allocation policies in the performance of U.S. mutual and pension funds. They reach three conclusions:

1. An asset allocation benchmark explains on average 90% of a portfolio’s positive or negative trend over time.

2. Differences in asset allocation policies across different funds account for 40% of the dispersion in their performance.

3. A fund’s cumulative return over time tends to coincide with that of its asset allocation policy, suggesting that asset allocation has a first-order effect on performance levels.

All these findings provide strong support to the notion that asset allocation is a key activity that portfolio managers should focus on. However, while the empirical evidence in favour of asset allocation for balanced portfolios is strong, it is not clear what asset allocation framework should be used in private markets and what benefits it could bring. We turn to these questions in the next section.

Asset allocation in private equity

The framework discussed in the previous section can be adapted to the case of private equity, and specifically for the purposes of this analysis, to the construction of a private equity fund portfolio. Both asset allocation and manager selection could be harnessed to drive performance: investors in private equity funds can create value via asset allocation by tilting their portfolios towards stages and geographies that they expect to outperform, as well as through manager selection by identifying and accessing GPs they believe will deliver top quartile performance.

Exhibit 2 illustrates a hypothetical example of how these channels could be used in practice. The “investment pool” includes all private equity funds available for investment in a vintage of interest. This investment pool is split across buyout (60% of total capacity), growth equity (10%), venture capital (20%), and special situations (10%).

Based on proprietary views on the relative opportunities of each market, the investor decides to tilt their exposure towards buyouts (+15%) and growth equity (+5%), at the expense of venture capital (-15%) and special situations (-5%). Furthermore, by committing only to those GPs that are expected to deliver top quartile performance, the portfolio performance also deviates from that of the investment pool within each allocation bucket – specifically, the manager creates value via manager selection in buyouts (+0.36x) and growth equity (+0.11x), but underperforms in venture capital (-0.23x) and special situations (-0.07x).
Overall, the manager selection and asset allocation choices in this example are rewarded by improved performance. The TVPI on the portfolio is 1.91x, 0.17x higher than the 1.74x delivered by the investment pool portfolio. The outperformance is driven by both manager selection and asset allocation. The contribution from asset allocation accounts for 0.07x of the outperformance, driven by the overweighting of buyouts and growth equity that more than offset losses from underweighting venture capital and special situations. Manager selection contributes 0.06x to the outperformance, with better-than-average manager selections in buyouts and growth equity again more than offsetting relatively poor selection of venture capital managers\(^6\).

Before we continue, it is important to emphasize four areas where the roles of manager selection and asset allocation are distinctively different between private and public markets.

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\(^6\) Quantifying value created via manager selection in terms of incremental TVPIs instead of the more customary quartile ranks may seem at first sight a peculiar choice, but is a necessary step to understand the relative contribution of asset allocation and manager selection. In fact, a comparison of the two value creation channels requires a common unit to quantify outcomes, and while quartiles are a meaningful unit for manager quality, there is no equivalent concept for asset allocation choices. Assessing value creation in terms of incremental TVPIs provides a common yardstick to compare asset allocation and manager selection choices.
First, manager selection is more important for private equity fund investors than it is for their public market counterparts for a number of reasons. To begin with, the dispersion in returns across managers is considerably higher in private markets than it is in public markets, so selecting top quartile GPs creates more value than selecting top quartile managers of liquid portfolios. For instance, looking at performance between 2010 and 2020, the dispersion in returns among private equity managers was 1150 basis points - a staggering spread relative to the 182-300 basis points dispersion of listed equity funds. Furthermore, due to the issues and complexities involved in identifying, carrying out due diligence and gaining access to the highest performing and most in-demand private equity funds, manager selection in private equity is also considerably more challenging than in public markets. Also, there are no investible benchmarks in private equity and therefore there is no “private equity index” that can be replicated. Instead private equity investors build relatively concentrated portfolios, often reinvesting with the same managers in multiple generations of funds. This is in stark contrast to liquid strategies, which can easily replicate reference benchmarks containing large numbers of underlying securities. The high dispersion in returns across managers, the challenges of accessing top managers, the difficulty in benchmarking, and the lack of an investible or reference index create a basis for manager selection to be a key driver of private equity fund portfolio performance.

Second, private equity investors are unable to rebalance their exposures once fully committed, owing to the close-ended and illiquid nature of the underlying GP funds. This is in stark contrast to managers of portfolios of listed securities, who can rebalance their holdings at any desired frequency. A key implication is that the performance decomposition analysis should be interpreted as measuring the contribution of one-off allocation and manager selection choices made at the beginning of the private equity program, rather than the cumulative effect of continuous adjustments made throughout the vehicle’s life. Any analysis prior to a private equity fund portfolio’s liquidation will provide a sense of how the decomposition is shaping up based on interim performance, but should not be interpreted as capturing the effect of interim rebalancing decisions, since this cannot be easily achieved other than using the private equity secondary market to sell certain unwanted fund positions.

Third, it is harder for managers of private equity fund portfolios to hit geographic, stage and industry sector allocation targets than it is for managers of liquid portfolios. A key reason is that commitments to private equity funds are made on a blind-pool basis and GPs’ mandates are generally flexible in terms of geography, sector and stage. In these cases, the asset allocation choice is effectively delegated to GPs after the commitment is made. Another reason is that the supply of GP funds can fluctuate by vintage; deliberate portfolio construction allocation targets can become hard to implement due to lack of high-quality opportunities in the desired stage and geography buckets.

Finally, a private equity investor may be unable to deliver value through asset allocation choices, due to lack of access to high-quality funds in the desired geographies, stages or sectors. This creates a tight link between asset allocation and manager selection: an investor may be tempted to skew allocations towards those stages where they can gain easy access.

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6 Dispersion in returns across private equity managers is calculated as the difference between the first and fourth quartile of net IRRs of 2010 vintage funds, based on Preqin data as of 31/12/2019. Dispersion in returns across managers of listed equity funds is calculated as the difference between the first and fourth quartile of annualized 10-year returns, based on S&P Dow Jones Indices 2019 SPIVA® scorecard, which is equal to 267, 300, and 182 basis points for U.S., global, and internal equity funds, respectively.

7 NAV exposures will naturally fluctuate based on drawdown and distribution activity but the commitment schedule will remain fixed once the private equity portfolio is fully committed. Rebalancing can be achieved via secondary transactions, but for simplicity we focus on primary private equity portfolio that do not engage in active portfolio management.

8 For example, a large investor may have to allocate a disproportionate amount of capital to large and mega buyouts to the detriment of small and mid buyouts and other stages for efficiency reasons.
Neutral allocations vs tilts

What is the neutral baseline that a private equity investor should reference to determine the desired degree of asset allocation tilts? Without a baseline it is meaningless to think about tilts, but it is not clear based on existing evidence how such a reference point could be constructed in private markets.

In listed markets, the investment universe is typically represented via capitalization-weighted baskets: the weight of each asset reflects its valuation relative to the entire universe. Since valuations are assigned by market participants via daily trading, capitalization-weighted indices reflect the market consensus on the distribution of investment opportunities, and thus provide a valuable reference for investors who do not possess differential views.

Similarly, in private markets the investment universe can be represented via size-weighted indices. For instance, the investment opportunity set for a 2020 vintage managed private equity portfolio targeting a three-year commitment period could be constructed by aggregating all GP funds raised between 2020 and 2022, proportionate to their size. Since fundraising is the equilibrium outcome of demand and supply forces driven by private market participants, size-weighted indices reflect the market consensus on the distribution of primary investment opportunities and can provide a baseline for neutral allocations.

While there is an analogy between capitalization-weighted indices in listed markets and size-weighted indices in private markets, there are important differences as well. First, the investment universe may have access constraints in private markets, unlike in public markets where all securities are accessible and tradeable. Second, capitalization weights are both measurable without delay and actionable: an investor can, at any point in time, both calculate the weights and rebalance a portfolio accordingly. This is not the case in private markets. A private equity investor can determine size weights only after a full cohort of vintage funds has reached final close, and must commit to funds before having full visibility on that cohort and on their size weights. In other words, passive weights for a specific vintage can be measured with precision only after all funds in the vintage have reached final close, which is too late for a private equity investor wishing to make commitments in that vintage. Despite these challenges, it is possible for forward-looking neutral allocations to be estimated based on historical fundraising data.

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9 Investors should deviate from indices only when they believe they have differential views relative to consensus. “Passive” investors fundamentally believe that deviating from consensus is unlikely to be profitable; this is consistent with the Efficient Market Hypothesis, that maintains that it is not possible to beat the market because at any point in time prices reflect all available information. “Active” investors, on the other hand, believe that they can profit from their unique insights by tilting away from market consensus. Whatever the investment philosophy, capitalization-weighted indices provide a useful reference to map out the investment universe and consensus weightings.

10 Size-weighting is appropriate to capture the investment opportunity set of primary investors. For secondary investors, a more appropriate metric of the investment opportunity set should be based on NAVs and unfunded commitments (rather than raw commitments) and should be adjusted for trading volume – similar to “free float” adjustments that are typically applied to listed equities.
Tilting the balance: the value of asset allocation in private markets

How much value can asset allocation create in private markets?

Exhibit 3 illustrates estimates for neutral weightings using historical data from Preqin\textsuperscript{11}. Focusing on the geographic splits, we estimate neutral allocations across North America, Europe, and the rest of the world (ROW) to be 58%, 24%, and 18%, respectively. Given the variation in geographic capacity across vintages, these estimates are subject to error (as quantified by the boxes in the Exhibit). For instance, we estimate neutral allocations for North America to fluctuate around their 58% mean, ranging between 54% and 61%. The other panel in the Exhibit show the same analysis splitting by stages.\textsuperscript{12,13}

The investment strategy implications are straightforward. The neutral weightings reflect the distribution of opportunities across available private markets strategies and, in the absence of differential views about the relative appeal of each strategy, they offer an allocation baseline for private equity portfolio managers. In principle, investors should depart from these weights only to the extent that such tilts reflect their differential view on expected returns and diversification benefits\textsuperscript{14}.

How much value can asset allocation create in private markets?

Having defined neutral allocations in the context of private markets, it is fair to ask whether private equity investors should indeed devote resources to create value via asset allocation, or rather minimize stage and geography tilts and focus on manager selection. Hypothetical examples may show the theoretical benefits of asset allocation and a number of studies have emphasized the value in the context of listed markets, but there has been little research into practical outcomes for private markets portfolios.

Exhibit 4 provides a preliminary perspective into the question by showing, by vintage, the dispersion of median returns across strategies vs the dispersion in returns across manager quartiles within each strategy. The dispersion in returns across strategies and managers suggests that, in theory, skilled investors could create value through both channels by tilting, in each vintage, towards better performing strategies and managers.

Exhibit 3: Neutral allocations for private equity portfolios

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{neutral_allocations.png}
\caption{Neutral allocations for private equity portfolios}
\end{figure}


\textsuperscript{11} See Appendix for details on data and methodology.
\textsuperscript{12} The accuracy of neutral weights estimates depends on the representativeness of the dataset used: biases may emerge for geographies or stages that are under- or over-represented in terms of cumulative fund sizes. We use Preqin data for illustration purposes but the same methodology could be applied to other datasets. We leave to future research an assessment of the coverage biases that Preqin may have.
\textsuperscript{13} We split the investment universe by geographies and stages because these are common and actionable categorizations of GP funds for private equity managers running global multi-stage portfolios. Asset classes can be further refined in terms of sub-stages (e.g. a VC-focussed mandate would likely split its investible universe by VC sub-stages) and additional categories (e.g. sector for sector-focussed GPs), or should be aggregated if underlying GPs have flexible mandates (e.g. the geographic split should be dropped in case the GPs in the investment universe do not have a geographic focus).
\textsuperscript{14} For instance, the Black-Litterman model can be used as a framework to blend proprietary views with neutral weights to generate tilts that are optimal from a portfolio construction perspective.
Tilting the balance: the value of asset allocation in private markets

How much value can asset allocation create in private markets?

Exhibit 4: Dispersion in TVPI returns

Panel A – Dispersion across strategies

<table>
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</tbody>
</table>

Panel B – Dispersion across managers

Tilting the balance: the value of asset allocation in private markets
How much value can asset allocation create in private markets?

To estimate the actual benefits that can be potentially achieved via asset allocation and manager selection channels, we turn to real historical data and simulate the performance that could have been achieved by private equity investors with different levels of manager selection and asset allocation skill. We define manager selection skill as the ability to tilt portfolios by 10%, relative to allocations in the investment pool, in the direction of the best funds in a strategy bucket. Similarly, we define asset allocation skill as the ability to tilt the portfolios by 10%, relative to the allocations in the investment pool, in the direction of the better performing strategy buckets.

By back-testing in historical data the relative outperformance of portfolios with different combinations of manager selection and asset allocation skill, we are able to measure the relative contribution of each value creation channel. It is important to note that the implicit assumption for the comparison to make sense is that marginal tilts in manager selection and asset allocation require a similar level of skill. This would not be the case, for instance, if predicting individual manager performance were easier or harder than predicting the aggregate performance of a private equity strategy.

Exhibit 5 shows the results by private equity fund portfolio vintage, expressed as the delta in performance relative to a neutral allocation with no manager selection (i.e. funds that perform at the median for that vintage) or asset allocation skill. We only report vintages up until 2010 to ensure results reflect realized performance as much as possible.

Three key observations stand out. First, the data shows that manager selection represents the lion’s share of the value creation opportunity. Second, asset allocation appears to be a significant contributor to active returns, ranging between 30% and 50% of the outperformance relative to neutral allocations, depending on the vintage. Third, there is a large variation across vintages in the relative contribution of each of the value creation channels. Ultimately, asset allocation thrives in macroeconomic environments with a high dispersion of returns across strategies, while manager selection thrives when there is a large dispersion in returns within strategies and across managers. In practice the dispersion quanta appear to be highly dependent on vintage.

Exhibit 5: Contribution of management selection vs asset allocation skill


See the appendix for technical details.
Conclusion

This paper aims to define an asset allocation framework for private markets. In particular, it discusses the value creation opportunities and challenges that are specific to private markets. We find that manager selection is the key driver of private equity performance, but that asset allocation can be a valuable complementary source of active returns.

A number of questions remain unanswered. First, what are the risk diversification benefits of asset allocation? Second, how can neutral weights be combined with proprietary views on expected returns to deliver optimal portfolios? Finally, is there more predictability in performance across strategies or funds within the same strategy? We leave these important questions to future research.
Appendix

Brinson’s original decomposition

Consider a strategy $S$ that can depart from a benchmark $B$ in terms of its exposure across $N$ asset classes and/or securities within each asset class. For a given time interval, Brinson’s approach decomposes the active return from a strategy as follows:

\[
    r^S - r^B = \sum_{i=1}^{N} w_i^S r_i^S - \sum_{i=1}^{N} w_i^B r_i^B \\
    = \sum_{i=1}^{N} (w_i^S - w_i^B) r_i^B + \sum_{i=1}^{N} w_i^B (r_i^S - r_i^B) \\
    + \sum_{i=1}^{N} (w_i^S - w_i^B)(r_i^S - r_i^B)
\]

where $w$ denote weights at the beginning of the investment period; $r$ denote returns over the period of interest; superscripts $S$ and $B$ refer to strategy and benchmark, respectively; and $i$ subscripts refer to the asset class. For instance, $w_i^S$ and $r_i^S$ refer to the weighting and performance of the strategy in asset class $i$.

Private equity portfolio decomposition

Assuming that the commitments are fully called by all underlying investments, the spread in gross TVPI between a private equity portfolio $P$ and the investment universe $B$ can be decomposed as follows:

\[
    TVPI^P - TVPI^B = \sum_{i=1}^{N} w_i^P TVPI_i^P - \sum_{i=1}^{N} w_i^B TVPI_i^B \\
    = \sum_{i=1}^{N} (w_i^P - w_i^B)TVPI_i^B + \sum_{i=1}^{N} w_i^B (TVPI_i^P - TVPI_i^B) \\
    + \sum_{i=1}^{N} (w_i^P - w_i^B)(TVPI_i^P - TVPI_i^B)
\]

Where $w$ denote weights in terms of commitments; $TVPI$ denote money multiples over the duration of the portfolio program; superscripts $P$ and $B$ refer to the portfolio and investment universe, respectively; and $i$ subscripts refer to strategies. For instance, $w_i^P$ and $TVPI_i^P$ refer to the weighting and performance of the strategy in strategy $i$. Note that the decomposition holds only approximately when commitments are not fully drawn.
2020 neutral weightings: data and methodology

We construct forward looking neutral weightings in two steps. First, for each vintage, we estimate the size-weighted share of primary investment opportunities (PIOs) by strategy; this yields the distribution of PIOs by strategy for a given vintage. Second, we take the average of PIOs across vintages and use it as an estimate of forward-looking neutral weightings. The study uses fund data from Preqin as of June 2020. The investment universe and mappings from Preqin’s geographic and stage definitions are summarized in Exhibit 6. Funds that are not close-ended and commingled are excluded from the analysis. Fund vintages span the 2000 – 2018 range. Buyout funds are classified as small-mid (SMBO) if their USD size at final close is below $750m until the 2004 vintage, and below $1500m thereafter. Buyout funds exceeding these thresholds are classified as large-mega (LMBO).

Exhibit 6: Preqin universe and stage / geography definitions

<table>
<thead>
<tr>
<th>Panel A: stage definitions</th>
<th>Panel B: geography definitions</th>
</tr>
</thead>
<tbody>
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<td><strong>Pantheon definition</strong></td>
<td><strong>Pantheon definition</strong></td>
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<td>Buyout</td>
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<tr>
<td>ROW</td>
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</table>

Contribution of manager selection vs asset allocation skill

We would like to compare the performance gains that are respectively achievable via asset allocation and manager selection in a given vintage. We consider a simplified scenario where managers first make first allocate between “winning” and “losing” strategies based on their asset allocation skills, and then commit to “top” and “bottom” managers based on their manager selection skills. We define ”winning” and “losing” strategies based on the performance of strategies relative to the size-weighted TVPI across all strategies in a given vintage; similarly, “top” and “bottom” managers as those that outperform and underperform, respectively, the size weighted TVPI for their strategy and vintage.

In this setting, the performance of a portfolio $P$ is equal to a weighted average of performance on winning $W$ and losing $L$ strategies:

$$TVPI^P = \sum_{i=W,L} w_i^P TVPI_i^P = w_W^P TVPI_W^P + (1 - w_W^P) TVPI_L^P$$
where the performance of each strategy depends in turn on the quality mix of good \( G \) and bad \( B \) managers and their corresponding benchmarks:

\[
TVPI_i^P = w_{i,G}^P TVPI_{i,G} + (1 - w_{i,G}^P)TVPI_{i,B}, \quad i = \{W, L\}
\]

The benefits from asset allocation are captured by \( w_{i,W}^P \) (the higher the value, the larger the allocation to winning strategies) and the value creation from manager selection is captured by \( w_{i,W,G}^P \) and \( w_{i,L,G}^P \) (the higher the values, the larger the allocation to good managers in winning and losing strategies, respectively).

Using this decomposition of performance, the active performance of the private equity portfolio \( P \) relative to its benchmark \( B \) is equal to:

\[
TVPI^P - TVPI^B = \sum_{i=W,L} w_i^P TVPI_i^P - \sum_{i=W,L} w_i^B TVPI_i^B
= \sum_{i=W,L} (w_i^P - w_i^B)TVPI_i^B + \sum_{i=W,L} w_i^B (TVPI_i^P - TVPI_i^B)
= \sum_{i=W,L} (w_i^P - w_i^B) TVPI_i^B
\]

Which can be further simplified to:

\[
TVPI^P - TVPI^B = \Delta_W (TVPI_{i,W}^B - TVPI_{i,B}^B)
+ w_{i,W}^B \Delta_{WG} (TVPI_{i,W,G} - TVPI_{i,W,B})
+ (1 - w_{i,W}^B) \Delta_{LG} (TVPI_{i,L,G} - TVPI_{i,L,B})
\]

Where \( \Delta_W = w_{i,W}^P - w_{i,W}^B \), \( \Delta_{WG} = w_{i,W,G}^P - w_{i,W,G}^B \), \( \Delta_{LG} = w_{i,L,G}^P - w_{i,L,G}^B \) capture the asset allocation and manager selection skills of managers: the higher these values, the higher the tilts towards the better performing segments of the investment universe relative to the benchmark.

The decomposition has an intuitive interpretation. The benefits of asset allocation are the product of two terms: the tilt by the portfolio, relative to the benchmark, to winning strategies \( \Delta_W \), and the differential performance between winning and losing strategy benchmarks \( (TVPI_{i,W}^B - TVPI_{i,B}^B) \). Manager selection, on the other hand, can create value by tilting towards good managers both in winning and losing strategies, as reflected by the two terms in the decomposition. Starting with winning strategies, manager selection drives outperformance via three factors: the relative weight of the winning strategy in the benchmark portfolio \( w_{i,W}^B \); the ability of the manager to tilt towards the better managers in the winning strategy \( \Delta_{WG} \); and the spread in performance between good and bad managers in winning strategies \( (TVPI_{i,W,G} - TVPI_{i,W,B}) \). The attribution to manager selection in losing strategies follows a similar structure and intuition after making the appropriate replacements of variables. The interaction effect combines the joint effect of tilts towards better performing strategies and managers.

By making assumptions on the asset allocation ability \( \Delta_W \) and manager selection skills \( \Delta_{WG} \) and \( \Delta_{LG} \) of managers, the decomposition can be exploited to measure the potential of value creation via these channels based on benchmark data. In the empirical section, we set \( \Delta_W = \Delta_{WG} = \Delta_{LG} = 10\% \) and run the analysis by vintage.
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