



Constructing Optimized Private Equity Programs

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Summary

- For most institutional investors, primary fund commitments form the fundamental component of a well-planned, scalable and diversified private equity program. Opportunistic strategies such as secondaries and co-investments are derived from primaries and now provide a more nuanced approach to construct a private equity program.
- In this work, we highlight the benefits of both secondaries and co-investments in a broader private equity portfolio and perform quantitative analyses to examine how these investment types impact performance, pacing, J-curve mitigation and risk-reward characteristics. We find that a balanced, thoughtfully constructed program of primaries, secondaries and co-investments offers clear synergies and has the potential to deliver superior risk-adjusted returns beyond what each of the three transaction types can achieve in isolation.
- We highlight how using these investment types, combined with different geographic exposures and other investment strategies, can enable investors to consider an efficient frontier in private equity. This frontier is a valuable tool to consider aggregate exposure to private and public equity – allowing investors to take a holistic view of their allocations across the equity spectrum.
- These transaction types are flexible building blocks or modules that allow investors to build a private equity program that is much more nuanced and objective-specific.

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1. Introduction: background and assumptions

After a decade of low interest rates, institutional investors have turned increasingly to private markets to meet their return requirements, while at the same time moving into more cost-efficient investment products such as ETFs^{1,2}.

We believe that as private markets have grown, institutional investors consider such strategies less ‘alternative’ and more ‘core’ to their overall portfolio, as we explained in The Core Role of Private Markets in Modern Portfolios paper³. As a result, there is a growing need to take a more holistic and analytical approach in building private market portfolios, benefitting from the various investment types available and differentiating between more alpha-oriented strategies in private markets.

The transaction types we will discuss in this paper are primary investments, secondary investments, and direct co-investments. We focus on these investment types within the private equity market, although we will also touch on the blurring of lines between private equity and other asset classes, as well as overlaps between these investment types. Additionally, using quantitative analytics, we highlight BlackRock’s data-driven approach to building a private market portfolio based on risk/return preferences. Ultimately, this methodology can be extended to think about investment outcomes. We start by comparing the performance and cash flow development of stand-alone diversified programs investing in primaries, secondaries and co-investments. We then turn to customizing the allocation to these three investment types to assess the impact on risk/return and underlying drivers of economic exposures. Later on, further tilts to region (Americas, Europe, Asia) and strategy/stage (large buyout versus late stage venture) are made to demonstrate that optimal outcomes can be obtained by thoughtfully constructing a private equity program.

2. Three transaction types

For most institutional investors, **primaries** or investing directly in a general partner’s (GP) fund forms the fundamental component of a well-planned, scalable, and diversified private equity program. The fundraising schedule is known well in advance with typical buyout managers coming to market every three to four years, while venture capital managers typically raise in two-year cycles. As a result, commitments per investment strategy, geography and size can be planned in a road map or forward calendar. The primary fund investment universe has seen significant growth (20% per year on average in the last five years), and in 2018 alone \$450bn was raised across closed-end private market funds⁴. Market data shows that more than 3,000 managers are actively investing today and that the average number of managers per vintage is close to 700⁴. Due to the abundance of managers and different tilts of each fund, primary programs can be tailored or customized to a specific focus, for instance, a program only investing in European mid-market buyout funds.

1 EY 2017 Global ETF survey: market share of passive funds across asset classes globally is currently 24% and growing rapidly. Bloomberg/Morningstar December 2018: passive funds now form 48% of total fund universe investing in the US equity market.

2 BlackRock 2019 Global Institutional Rebalancing Survey: 54% and 47% of institutions intend to increase their exposure to real assets and private equity.

3 The Core Role of Private Markets in Modern Portfolios. BlackRock Investment Institute March 2019.

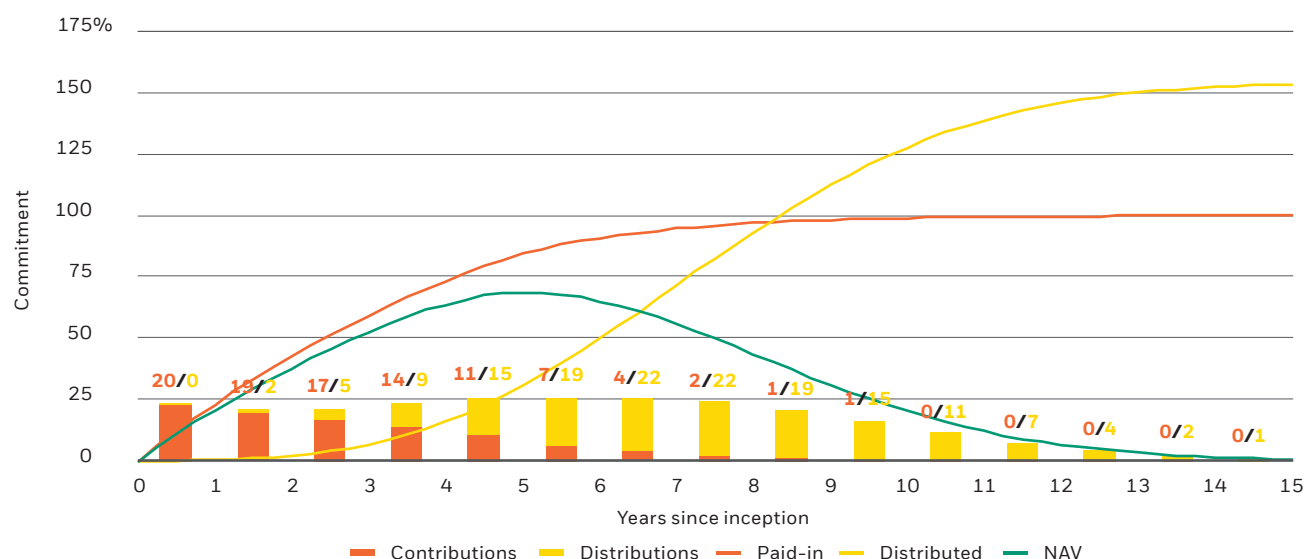
4 Preqin as of 12 February 2019. Vintages 2015–2019. Buyout, mezzanine, distressed, venture, growth, special situations. Minimum fund size \$100m.

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In addition to the predictable fundraising schedule, approximate investment and divestment schedules of primary fund investments can be derived from commercial data providers⁵. Figure 1 shows the typical evolution of a private equity fund from a limited partner's (LP) perspective and allows asset allocators and LPs to describe the life cycle of such a fund. Initially, an LP promises to provide a certain maximum amount of capital, i.e. the commitment amount. Usually, the GP has a certain number of years (typically five to six) to seek high-quality investment opportunities and gradually call a portion of the commitment whenever needed to fund these investments. The amount and timing of these capital calls or contributions are at the GP's full discretion and usually also include management fees; in total the GP cannot call capital in excess of 100% of the commitment. The cumulative capital called is denoted as the paid-in amount. After investment, a GP actively manages a company and seeks to improve its profitability. At any given point in time, the valuations of all these portfolio companies plus a cash balance aggregate to the Net Asset Value (NAV) of the fund. Typically, after four to six years the GP liquidates or sells its stake in the company – typically at a profit – and distributes back the gains and the principal or originally committed amount to its LPs. Distributions cause the NAV to decrease and ultimately reach zero at the point of liquidation of the fund. Using an internal database of 700+ funds and their detailed historical cash flows, we observe the cash flow profiles as shown in Figure 1.

Figure 1: Typical cash flow profile and NAV development of a primary buyout fund

Vertical bars indicate annual cash flows, lines represent cumulative cash flows and NAV. All as a percentage of the commitment amount.



5 Burgiss Private iQ as of 30 September 2018. Vintages 2000-2016, globally diversified buyouts.

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Typical characteristics of cash flow profiles of primary fund investments include:

- The sum of both contributions and distributions is 20-25% of the commitment during years one to nine.
- NAV reaches a maximum at ca. 70% during year five and ultimately reaches zero in years 14 to 15.
- The net out-of-pocket exposure or the minimum of the cumulative net cash flow curve, i.e. distributed capital minus paid-in capital, is ca. 55-60% during year four.
- The first significant distributions can be seen in years four to five; cumulative distributed capital exceeds paid-in capital by year nine, and the cumulative distributions curve flattens at years 12 to 13.
- Initially, the NAV curve is slightly below the paid-in curve, these smaller differences are explained by initial conservative valuations of the underlying portfolio companies and by management fees which are relatively high compared to the paid-in amount during the investment period. These smaller differences ultimately cause the performance of the fund to be negative during the first years, which is referred to as the fund's J-curve.

Private equity **secondaries** involve the sale and purchase of investors' existing interests in buyout, venture and other alternative investment funds, and in portfolios of direct investments in companies. Purchasers (secondary funds or other buyers) typically acquire interests in a fund's remaining assets (interests in portfolio companies) and assume the seller's commitments to meet capital calls in the future. Historically, secondary transactions involved the sale of LP interests in individual funds or portfolios of funds (single fund or multi-fund secondaries). The secondary market has since evolved to include portfolios of direct investments in companies or assets not held in typical fund structures (direct secondaries), always involving private equity specialists that manage and monitor the investments.

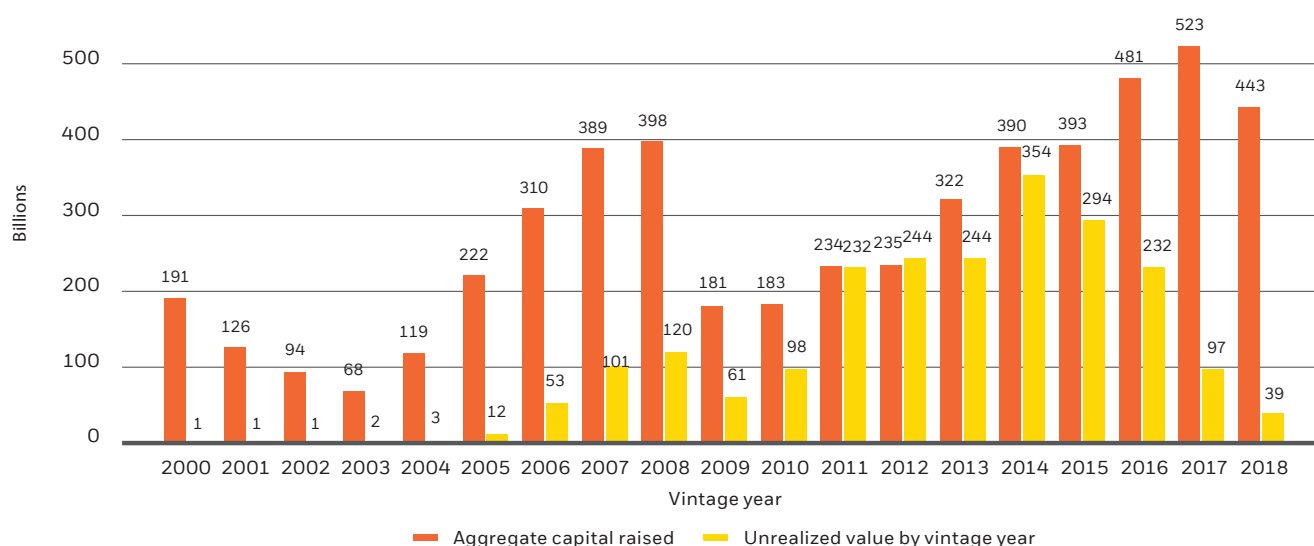
The private equity secondary market exists principally to provide liquidity in an illiquid asset class: it is the only way for LPs to exit early or opportunistically from their investments in what is typically at least a 10-year vehicle structure. Private equity investors seek liquidity in the secondary market generally as a matter of portfolio management, much as public securities investors sell parts of their exposure to rebalance overall portfolios. The secondary market has tracked the rapid expansion of the primary private equity market and allows private equity investors to achieve early liquidity from their private equity assets, manage their portfolios more proactively to their overall investment objectives, and/or modify their business models in response to regulatory or strategic change. The secondary market has experienced rapid growth over the past two decades, as the private equity asset class has grown and matured. Transaction volume globally in the secondaries market reached a record high of over \$72 billion in 2018 (and by other estimates close to \$80 billion), almost four times the levels seen a decade ago⁶.

6 Source: BlackRock; Evercore Private Capital Advisory YE 2018 Secondary Market, January 2019; Setter Capital.

Secondaries have evolved into a ‘legitimate’ dimension of the private markets landscape from the GP, LP, seller and buyer perspectives. Long-term data suggests that annual secondary market volume has historically averaged approximately 2.5-3.0% of total PE NAV. With more than \$2.2 trillion of global NAV today⁷, annual secondary closed transaction volume of over \$80 billion over the next couple of years would not be unexpected. In addition, emerging transaction types, most notably GP-led liquidity options (fund restructurings and tender offers) could serve as a key catalyst to drive incremental market growth.

While in the past investors seeking liquidity during times of stress and dislocation have been a key driver in secondary market selling, the private equity landscape has evolved with secondaries a more commonly utilized portfolio management tool for private equity investors of all types. Even in a benign market environment, there are continued drivers of activity for secondaries, and any broader market volatility should drive further secondary supply as investors may perceive themselves to be over-allocated to the asset class (given mark-downs in other parts of their portfolio) or in need of liquidity.

Figure 2: Historical fundraising figures including the unrealized value in each vintage year



In 2018, 59% of secondary transaction volume was attributed to selling from active portfolio management (either due to rebalancing, or idiosyncratic and opportunistic factors), 28% from GP liquidity solution-driven situations, 7% from tail-end fund wind downs, and 6% for other reasons.⁸ Sellers tapping the secondary market were also very diverse and reflective of the broader composition of global LPs, with meaningful engagement from public and private pension plans, asset managers and financial institutions, endowments and foundations, sovereign wealth funds and family offices across mostly North America and Europe (86% of seller activity).

Over the last several years, a bifurcation has begun to take place in the secondary market in terms of transaction types. We believe noting this market shift is important because it may have implications for how investors think about the risk-reward framework for secondaries and, therefore, about the role that secondaries play in a portfolio.

⁷ Source: BlackRock; Preqin Historical Fundraising and Assets Under Management as derived on 21 August 2018; Evercore Private Capital Advisory YE 2018 Secondary Market, January 2019

⁸ Source: BlackRock; Evercore Private Capital Advisory YE 2018 Secondary Market, January 2019.

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One generally accepted framework is to divide secondary transactions into two broad categories: traditional and non-traditional, as outlined in our recent article⁹. Traditional secondaries are transactions in which a secondary investor purchases either a single limited partnership interest or a portfolio of more than one – and sometimes many – partnership interests from a limited partner who desires early liquidity. These transactions are characterized by buyer-seller bilateral price negotiation with minimal involvement by the manager(s) of the fund(s) being traded, other than to approve the transfer once terms are agreed. Traditional transactions are how the secondary market started and today still account for a majority of secondary market volume. A diversified secondary portfolio constructed by executing 15 transactions each involving the acquisition of 10 funds with 10 companies each can easily result in a highly diversified portfolio of more than 1,500 underlying portfolio companies.

Non-traditional secondaries are more complicated to define precisely because there are a wide variety of sub-strategies, but generally have two defining characteristics: 1) the manager of the fund has a more active role in the secondary transaction and 2) the portfolios in question tend to be more concentrated. Regarding the fund manager's role in the transaction, often it is the manager itself initiating the transaction. Consider, for example, a fund manager who wishes to offer an early liquidity option to all existing limited partners in a particular fund and partners with a secondary investor who extends a tender offer for any and all interests in that fund. Another example could involve a fund manager who comes to realize that one or more companies in the portfolio will likely need more time and/or more capital than available in the current fund and partners with a secondary investor to purchase the companies and put them into a new partnership with longer duration and/or additional capital to execute the value creation plan. In either case, the fund manager is much more involved in the transaction compared with a traditional secondary; negotiations, pricing and structuring is much more complex as there are often more stakeholders than just buyer and seller involved; and the portfolios are more concentrated with each transaction often involving one to 10 companies. Therefore, a secondary portfolio constructed entirely of non-traditional transactions may have fewer than 100 underlying companies once the secondary investor has completed its investment period.

The requirements for successfully executing each of these two broad types of secondary strategies have, in our view, become increasingly distinct. For example, the requirements for strong performance on the traditional side of the secondary market involve a robust primary business including access to information on a large number of private market funds (a funds' database) to allow for rapid and/or 'off the shelf' pricing and points of view on manager quality and likely performance of unfunded capital. Additionally, strong relationships with a broad network of private equity managers, with whom one is not currently invested in order to be confident of securing general partner approval for the transfer of the interest once price is agreed. Strong analytical capabilities and technology is also an advantage in efficiently evaluating and executing on traditional secondaries.

Conversely, skills required for successful execution of non-traditional secondary transactions include a solutions mindset to create and execute a liquidity solution that meets the needs of both the fund manager and the limited partners; experience and expertise structuring complex multi-party transactions is of paramount importance to the fund manager for whom the secondary transaction is often strategically important to the franchise. In addition, the ability to customize the transaction in terms of including/excluding certain assets or exerting influence on portfolio company governance provides more value creation tools for the secondary investor relative to traditional secondaries.

9 The Case for Secondary Allocations in a Well-diversified Private Markets Program. BlackRock, June 2019.

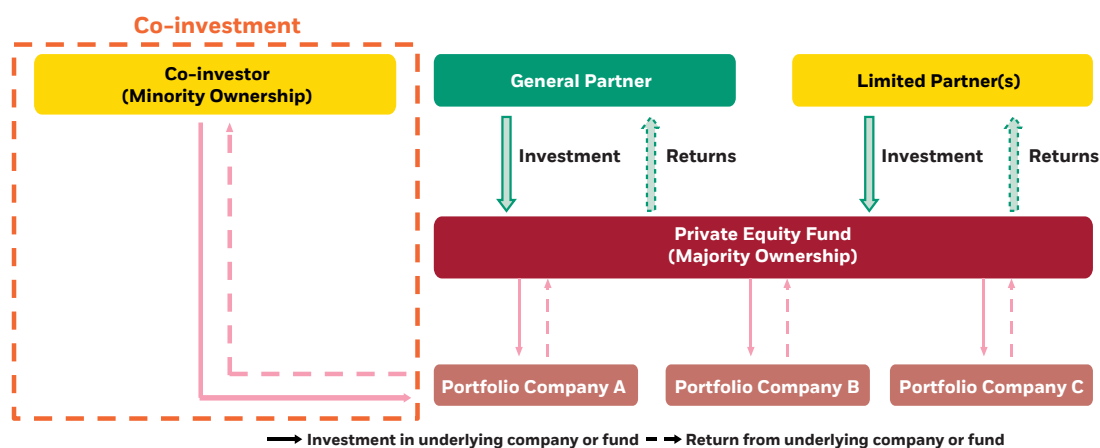
Finally, the ability to conduct direct private equity-style investment diligence of the underlying companies is critical. Given these key differences between traditional and non-traditional secondary strategies, we suggest it is likely that there is a corresponding difference in the expected risk-reward profile of each. The larger number of value creation tools in non-traditional secondaries, the more bespoke and less competitive nature of such transactions, and the explicit ability for alignment of interest with the sponsor involved suggests that skilled managers have greater ability to deliver higher returns, albeit with higher volatility of returns given the more concentrated nature of non-traditional secondaries. Therefore, we intuitively suggest that a purely non-traditional secondary strategy should fall between traditional secondaries and co-investments in most risk-reward frameworks.

Increasingly, larger and more sophisticated LPs are presented with the opportunity to invest in select investments alongside private equity funds in transactions known as direct **co-investments**. These co-investments, typically alongside PE sponsors, allow the LP to gain economic exposure immediately upon investment (versus a fund which will draw capital over time to invest), and to influence more actively the construction of a private equity portfolio. In addition to the ability to manage exposures, many institutional investors seek to gain exposure to direct co-investments as a strategy to add incremental alpha to their PE portfolio as well as to gain cost savings.

While some studies tout the benefits of co-investing, others claim that co-investments underperform their fund counterparts due to deliberate adverse selection by the GP. In our opinion, the claim of consistent negative selection bias doesn't quite add up: GPs often use co-investments to strengthen relationships with LPs – thus, it seems unlikely that a GP would explicitly select investments which would perform poorly. These studies appear to be based on small and unrepresentative samples. However, a well-known academic study with, in our view, a more robust methodology finds that co-investments substantially outperform traditional private equity funds¹⁰.

Figure 3: Illustrative co-investment transaction structure

The co-investor invests directly in portfolio company A alongside the fund.



¹⁰ Reiner Braun, Tim Jenkinson, Christoph Schemmerl – Adverse Selection and the Performance of Private Equity Co-Investments. Journal of Financial Economics, available online 12 September 2019.

The post-crisis evolution of the private equity industry has seen demand for co-investment capital gain significant momentum. Some would argue that GPs were hard-pressed to meet fundraising goals post the global financial crisis (GFC) and turned to co-investment as a fundraising tactic to offer to their more sophisticated LPs. However, given the growth in private markets, it would be odd for this trend to continue given that GPs are no longer struggling to raise capital. Rather, in our survey of GPs and in discussions with market participants, GPs consistently refer to the need for friendly strategic capital to avoid the club deals which were common from 2005 to 2007 before the GFC. In a club deal, private equity sponsors would team up with other private equity sponsors for a transaction.

The potential for higher returns, partially attributable due to fee savings, drove the popularity of co-investments over the past decade. From a qualitative perspective, co-investing provides LPs a 'peek behind the curtain,' allowing a better understanding of a GP's sourcing capability and operational skill, thereby providing enhanced primary fund intelligence. In an industry where transparency is scarce, LPs capable of transacting in co-investments enjoy this access into a GP's inner workings together with the opportunity to generate better returns.

Due to increased concentration and hence a different risk-reward profile, co-investing requires a deeper skillset focused on corporate finance, deep sector knowledge, and, if done correctly, deep resources, i.e. larger investments teams with strong technical underwriting skills. Investment opportunities are often presented with tight timeframes, sometimes just weeks before a final decision where getting up to speed on an industry or geography may not be feasible. In addition to the investment side, once a decision is made to invest, an experienced legal team that has experience working side-by-side with the investment team is essential. The investment team will work hand-in-hand with legal reviewing and negotiating the terms of the transaction to ensure appropriate governance, alignment of interests and legal protections.

Given the popularity of co-investing, a deeper bifurcation in the market has occurred between syndication processes for co-investments versus co-sponsor or pre-bid transactions. In a syndication process, a GP has already closed or is in the process of closing an investment and provides Limited Partners with the ability to co-invest. Syndication processes are typically expedited since the GP has already negotiated the final terms of the transaction and the investment opportunity is 'take it or leave it' from the co-investor perspective. For this reason, syndicated co-investments may be available to small investors who can react quickly. However, even for those investors who can move quickly, the information received in terms of due diligence materials are standardized with limited ability by the LP to shape diligence or change or challenge assumptions in the investment model or the transaction terms.

Co-sponsor transactions are completely different than a syndicated process. Typically, a GP may approach a sophisticated LP to go after an asset together where deal dynamics are uncertain and the asset may not be won – a term that is referred to as ‘pre-bid transactions’. In these cases, the LP needs to meet a number of criteria including having a team with direct transaction experience who have the ability to sign equity commitment letters in pre-bid situations and often speak for significant size. In these cases, the LP acts as a capital solution to the GP. The GP, seeking to avoid a club deal, looks for an LP who is respectful of timelines, has an experienced team with sector knowledge and deep domain expertise, with the ability to shape diligence in a positive manner. From the LP perspective, coming in pre-bid as a co-sponsor allows the LP to have much stronger influence on the transaction structure, pricing and terms, as well as deeper insights into the transaction given the longer period of due diligence. As a result, we would argue these opportunities allow for differentiated and unique exposures which we believe are more attractive on a risk-adjusted basis. Additionally, given the co-sponsor nature of these transactions, the ability to secure allocation in greater size increases for the co-investor given their early participation in the transaction and familiarity with the asset.

Role and source of co-investments and secondaries

Along with the growth of private equity, tactical transaction types such as secondaries and co-investments have shown phenomenal expansion and have become fully institutionalized. These transaction types are closely related and both secondaries and co-investments are derived in their own way from primaries. LPs with a diversified program of primary fund commitments have a large network of relationships with GPs and this undoubtedly facilitates being offered investment opportunities in both secondaries and co-investments. Being invested in one or more primary funds managed by a GP can help in making more informed investment decisions on both buying stakes in those funds in the traditional secondary market and participating in syndicated co-investments offered by that GP. While the fundraising timeline for primaries is known in advance, secondaries and co-investments are more opportunistic. Skilled managers look for relative value across a very broad universe of investments in an effort to take advantage of market inefficiencies or opportunities with limited competition.

Benefits of both secondaries and co-investments include mitigation of the J-curve, uplift in performance, quicker pacing, active portfolio construction and portfolio management and reduction of overall fee load to name just a few. Along with these benefits comes the need for deeper and different investment due diligence and the need for more and better resources. Recent studies^{10,11}, have shown that in addition to security selection, top-down portfolio construction is crucial to fully extract all advantages of these non-primary tactical transaction types. We believe a balanced, thoughtfully constructed, program of primaries, secondaries and co-investments has clear synergies and has the potential to deliver superior risk-adjusted returns over each of the three transaction types in isolation.

10 Reiner Braun, Tim Jenkinson, Christoph Schemmerl – Adverse Selection and the Performance of Private Equity Co-Investments. *Journal of Financial Economics*, available online 12 September 2019.

11 The Advantages of Co-investments, BlackRock February 2019.

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3. Trade-offs amongst the three transaction types

Prior to discussing the quantitative trade-offs amongst primaries, secondaries and co-investments, Table 1 shows differences between these investment types in a more qualitative manner and this section discusses many of these attributes in further detail.

Table 1: Qualitative comparison of the major characteristics of primaries, secondaries (traditional component only) and co-investments

Attribute	Primaries	Secondaries	Co-investments
Ability to plan ahead	High	Opportunistic	Opportunistic
Macroeconomic risk and cycle sensitivity	Low	Medium	Medium
Blind pool investment	Yes	No	No
Diversification of underlying companies in a portfolio	Hundreds	Thousands	Dozens
J-curve	Long	Short	Short
IRR	Medium	High	High
MOIC	Medium	Medium	High

Whereas there are many reasons to allocate to secondaries and co-investments, J-curve mitigation and accelerated investment pacing, as observed in the cumulative net cash flow experience, are frequently highlighted as the main motivation¹². Both the J-curve and the cumulative net cash flow curve can be used to illustrate the benefits of secondaries and co-investments as it is done in this section.

It should be noted that the results discussed here are based on broad industry data, any additional upside due to intentional tilts in the constructed programs or due to selection of individual investments is not considered. Selection is especially important because 1) the gap between top- and bottom-performing private equity investments is large (15% IRR or more for buyout funds¹³) and 2) persistency in performance has largely dissipated since the mid-2000 vintages (28% probability of repeating a top quartile buyout fund since 2003¹⁴).

12 Often the J-curve and cumulative net cash flow curve are mixed up and confused with one another. In this work, as discussed in section 2, the J-curve represents the period during which the performance of a private equity fund is negative. This performance is calculated based on historical cash flows and the latest NAV of the investment. The cumulative net cash flow curve represents only the cash flow experience of the investor and does not consider the unrealized portion or NAV.

13 BlackRock Investment Institute – Extracting Returns in Private Markets – December 2017.

14 Jenkinson – Private Markets Research Conference 6 July 2018, Lausanne, Switzerland. Source: Burgiss Private iQ, globally diversified buyout funds vintages 2003 – 2012 as of 30 September 2016.

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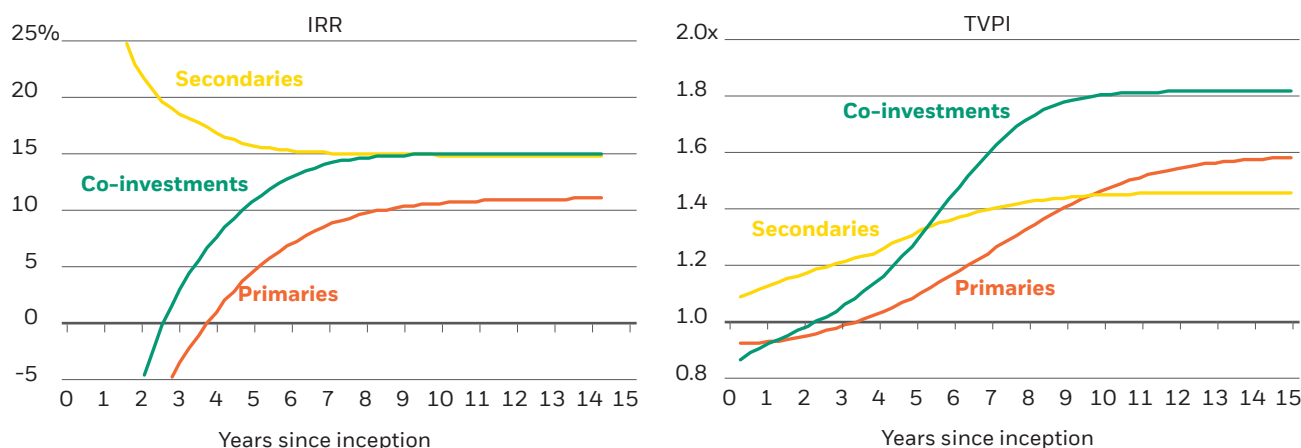
J-curve

The principal cause of the J-curve is management fees paid early in the investment period when capital contributions are relatively low. Typically, and for a primary fund, the management fee rate is 2.0% of LP commitments while historical analysis shows that typical capital contributions during the first year of a fund total approximately 20.0%. Putting the two together implies that the multiple after one year is about 0.9x and IRR -20.0% or even lower depending on the timing of the cash flows¹⁵. Value creation and resulting uplifts in valuations or early distributions cause the performance to increase rapidly – industry data shows that it takes on average three years to show positive performance, indicating the average J-curve of a buyout fund is about three years¹⁵.

Figure 4 shows the time-evolution of IRR (left) and TVPI (right) for three diversified programs that invest, evenly and equally during four years, in primaries (orange), secondaries (yellow) and co-investments (green). It should be noted that for primaries and co-investments internal historical data was used and the performance of secondaries (the traditional component only) was simulated using market pricing. Further details about the data and methodology used to generate these results can be found in the appendix.

Figure 4: Time-evolution of performance

Three diversified programs that invest, evenly and equally during four years, in primaries (orange), secondaries (yellow) and co-investments (green). Left-hand side shows IRR and right-hand side shows TVPI.



The primaries curve represents a portfolio of primary funds, i.e. a simulated program of primaries, and performance turns positive after three-and-a-half years, slightly longer than a single primary fund because commitments are made over four years which elongates the entire pacing of cash flows¹⁶. One can rapidly see the apparent differences in performance development of secondary and co-investment programs compared to a pure primary program. Co-investments show a positive performance after the second year and the final IRR and TVPI are both much larger than primaries, which is to be expected because co-investments allow for incremental alpha due to investment selection and typically come without economics for the GP. Secondaries, which can either consist of a pool of seasoned primaries, an individual seasoned primary, or a direct-secondary may not exhibit a J-curve at all and the initial IRR is higher than a typical primary fund as economic exposure is achieved on day one and, additionally, secondaries might be purchased at a discount to the current NAV. Using the available data set and simulation approach as further explained in the appendix, the final IRR of secondaries is comparable to co-investments, however, the final TVPI is lower than co-investments. It should be emphasized that this analysis represents only the traditional (unlevered) component of secondaries using the available internal data set and excludes the GP-led or non-traditional part of the market that might provide incremental alpha.

15 Figures are confirmed by industry data (Burgiss Private iQ) and historical performance of internal fund investments.

16 All simulations are net, meaning underlying and providers' management and performance fees are included. Credit facilities and recycling mechanisms are excluded from these analyses.

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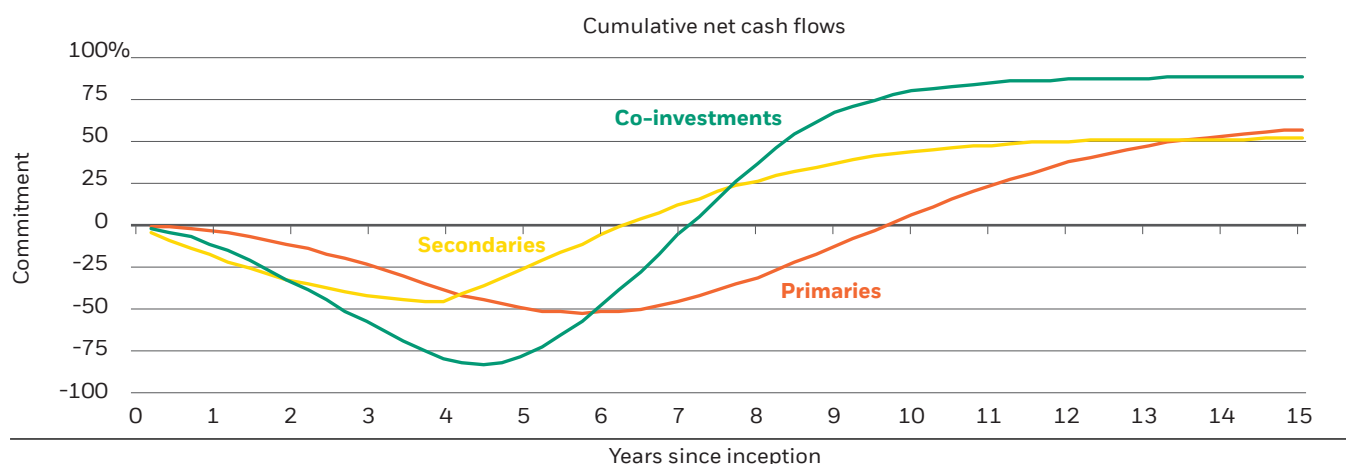
An investor in a diversified program allocating to each transaction type would see a performance in between these curves and a diversified program with conservative allocations (70% primaries, 15% secondaries and 15% co-investments) would show a shorter J-curve by one to two years and an uplift in IRR by 1.0-2.0% compared to a pure primaries program.

Cumulative net cash flows

The cumulative net cash flow curve shows the cash flow experience of the investor and does not consider NAV. Figure 5 shows these cumulative net cash flow curves for three diversified programs that invest, evenly and equally during four years, in primaries (orange), secondaries (yellow) and co-investments (green)^{15,16}. For a typical primary program, it takes 10 to 11 years to become cash flow positive and show a realized multiple larger than one. This breakeven point for secondary and co-investment programs is seen much earlier, after six to seven years for secondaries and after seven to eight years for co-investments. The minimum of these curves indicates the maximum cash flow exposure or net 'out-of-pocket' exposure. Co-investments are typically fully funded at the time of investment and distributions arise mainly from realizations and hence a co-investment program shows the largest net out-of-pocket exposure of about 80-85%. Secondaries are typically slower funded than co-investments and distributions arise earlier from underlying funds and hence a secondary program shows a much lower net out-of-pocket exposure of about 45-50%. A primary program's net out-of-pocket exposure is roughly 50-55% and lies between secondaries and co-investments. Also, the time of this minimum shows that the holding period of co-investments and secondaries is much shorter than that of primaries.

Figure 5: Cumulative net cash flow experience

Three diversified programs that invest, evenly and equally during four years, in primaries (orange), secondaries (yellow) and co-investments (green).



Return and dispersion characteristics

Figures 4 and 5 represent average results of the simulations over the life of a program and provide an idea of performance and cash flow experience at different points in time. To give a sense of the uncertainty of outcomes when investing in primaries, secondaries and co-investments, Table 2 shows dispersion metrics at the end of a program. The mean and median IRR of 10,000 randomly structured primary programs is 13.0% and 12.9%, respectively. The difference between the 75th and 25th percentiles (the inter-quartile range) is 6.4% and the worst 5th percentile is estimated to be 7.1%. The lower inter-quartile ranges (IQR) and the higher 5th percentiles for secondaries can be interpreted as a manifestation of the reduced blind pool risk when investing in secondaries compared to primaries. This also hints that secondaries show favorable risk-adjusted returns. The larger IQR and lower 5th percentiles for co-investments indicate larger dispersion of outcomes, i.e., the potential for significantly higher returns in co-investments versus primaries and secondaries, but also the potential for lower returns, pointing to the need for stringent selection criteria. The larger difference between mean and median hint, that the probability distribution of returns of co-investments has a longer tail on the right, which emphasizes the potential for very strong, outsized positive returns for a co-investment program due to investment selection.

Table 2: Expected returns and dispersion

Obtained through Monte-Carlo simulation as explained in the appendix.

Characteristic	IRR			TVPI		
	Primaries	Secondaries	Co-investments	Primaries	Secondaries	Co-investments
Mean	13.0%	15.5%	19.1%	1.59x	1.50x	1.84x
Median	12.9%	15.4%	15.8%	1.58x	1.49x	1.79x
Inter-quartile range	6.4%	5.3%	17.8%	0.18x	0.16x	0.50x
5% VaR	7.1%	9.8%	5.6%	1.39x	1.30x	1.31x

4. Bringing the three transaction types together

The previous section discussed the trade-offs of programs investing exclusively in primaries, secondaries and co-investments. This section discusses outcomes of different mixes of these three transaction types and analyzes implications for final return (IRR and TVPI) of a predominantly primary program as well as investor experience during the life of that program (J-curve and maximum out-of-pocket exposure).

Figure 4 showed that secondaries and co-investments have a comparable final IRR and hence the impacts of increasing both transaction types have a comparable effect on the final IRR of the diversified program. This is not the case for final TVPI, as it can be seen in Table 3, with co-investments improving TVPI and secondaries lowering the final TVPI of the program.

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Table 3: Impact of secondaries and co-investments on TVPI (top) and maximum out-of-pocket exposure (bottom)

		TVPI					
		Secondaries					
Co-investments		0.0%	5.0%	10.0%	15.0%	20.0%	25.0%
	0.0%	1.60x	1.60x	1.59x	1.58x	1.57x	1.57x
	5.0%	1.62x	1.61x	1.60x	1.59x	1.59x	1.58x
	10.0%	1.63x	1.62x	1.61x	1.60x	1.60x	1.59x
	15.0%	1.64x	1.63x	1.62x	1.62x	1.61x	1.60x
	20.0%	1.65x	1.64x	1.63x	1.63x	1.62x	1.61x
	25.0%	1.66x	1.65x	1.65x	1.64x	1.63x	1.62x

		Maximum out-of-pocket					
		Secondaries					
Co-investments		0.0%	5.0%	10.0%	15.0%	20.0%	25.0%
	0.0%	51.2%	49.1%	47.3%	45.6%	44.1%	42.8%
	5.0%	51.6%	49.8%	48.1%	46.7%	45.4%	44.2%
	10.0%	52.3%	50.7%	49.2%	48.0%	46.8%	45.9%
	15.0%	53.3%	51.8%	50.6%	49.4%	48.5%	47.6%
	20.0%	54.4%	53.2%	52.0%	51.0%	50.2%	49.5%
	25.0%	55.8%	54.6%	53.5%	52.7%	51.9%	51.4%

Figure 4 (on page 12) also showed that both secondaries and co-investments are mitigating the J-curve, however, secondaries' ability to mitigate the J-curve is more pronounced to the extent that even a moderate allocation to secondaries might eliminate the J-curve altogether. For this reason, increasing the allocation to secondaries has a much stronger effect on shortening the J-curve of the diversified program. As discussed before, the maximum out-of-pocket is the minimum of the cumulative net cash flow curve and Table 3 shows that co-investments increase this maximum exposure slightly, while secondaries reduce the maximum exposure. This result also demonstrates an important advantage of an optimal allocation to the three transaction types: Figure 5 showed that the out-of-pocket for primaries and secondaries was 50–55% and 45–50%, respectively. Yet the sensitivity table shows that for a 75%/25% (primaries/secondaries) program the out-of-pocket is approximately 43%, i.e. lower than each of the transaction types individually. This is caused by the timing of the cash flows and demonstrates in a practical sense the synergies between primaries, secondaries and co-investments.

Risk factor decomposition of a primary, secondary and co-investment

Now that we understand the characteristics of primaries, secondaries and co-investments from a cash flow perspective, we leverage the Risk Factor Model to assess the underlying factor exposures of these investment types. The private equity risk model estimates the risk profile of private equity from the perspective of a multi-asset investor. Emphasis is placed on economic risk rather than the accounting risk reflected in periodic valuations. The private equity risk model is fully integrated within the multi-asset risk framework. That is, this model's approach permits the calculation of a covariance matrix with other asset classes. The model employs a comprehensive set of public equity-derived risk factors adjusted for the uniqueness of private equity. Exposures to these factors are constructed from investment attributes that capture the economic features of private equity. In terms of investment types, in the example below, we model a primary fund with a vintage year of 2015, an individual leveraged buyout transaction from 2018, and we took a primary fund from 2010 and assumed we purchased it in the secondary market in 2019.

Looking at the economic risk decomposition in Figure 6, we can see that a primary fund's largest risk drivers include market risk, idiosyncratic risk, followed by capitalization risk. Market risk, highlighted in green, refers to the exposure and risk contribution related to equity exposure. You'll notice the market risk contribution is higher in the primary example than in the secondary example. The reason for this is that the market risk contribution accounts for the amount of leverage in the underlying portfolio companies to derive a leverage, adjusted equity beta. The leverage-adjusted equity beta depends upon the market environment when a given deal is initiated – or said another way, the amount of debt available to companies is a function of the market environment that exists at the time of a particular transaction. Leverage or implied equity beta is generally expected to decrease over the life of an investment as free cash flow is used to pay down debt. In our example below, taking a primary fund from 2018 would result in a greater risk contribution from the market factor given the higher implied equity beta, versus a secondary fund which includes more seasoned portfolio companies which have already started to pay down their debt.

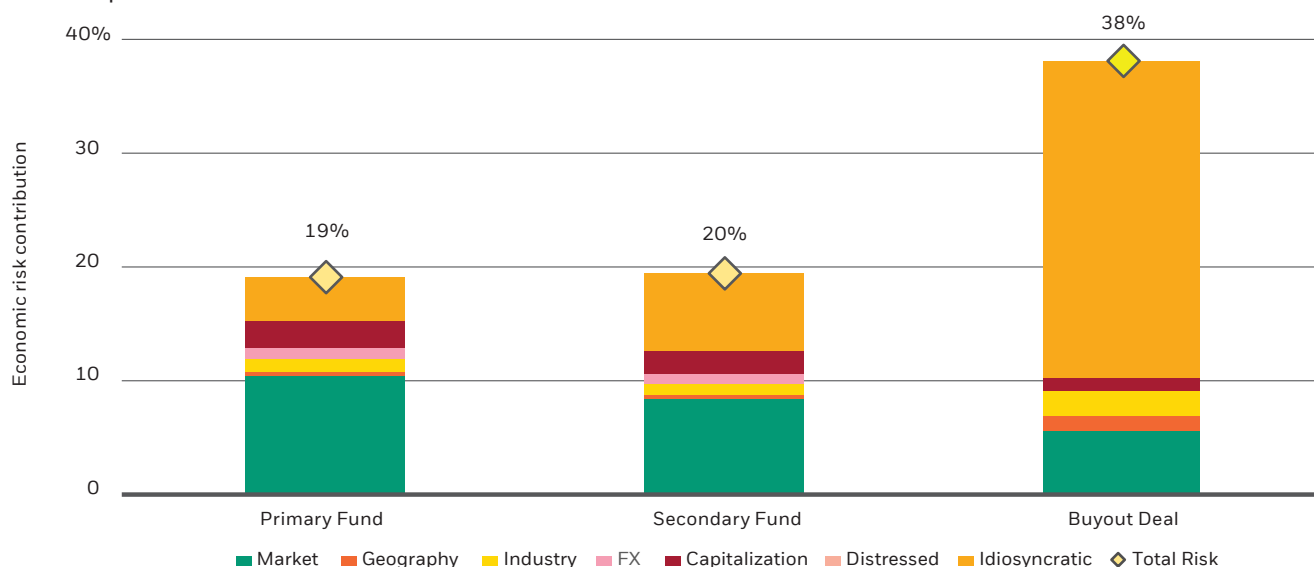
The next risk factor we focus on is idiosyncratic risk, which can be thought of as the risk attributes that are endemic to an individual asset and cannot be eliminated through diversification. Idiosyncratic risk also scales with concentration. As a result, a secondary investment, which as we described in section 3 was a primary that has seasoned, i.e. some portfolio companies were exited, and whose interests in the remaining assets were acquired. As a result, idiosyncratic risk in the secondary fund is greater than the primary fund as a result of the higher degree of portfolio concentration (note that our secondary fund example is an individual fund interest, not a portfolio of funds).

Turning now to the co-investment, we see a single asset example – not surprisingly, from a risk decomposition perspective, a single asset would have more economic risk than a primary fund (which for buyout funds consists of anywhere from 10 to 25 underlying portfolio companies) or a secondary fund which is a more seasoned version of the same primary fund. Additionally, the risk of a single asset is dominated by idiosyncratic risk – or the risk endemic to that particular asset versus any common market factor.

These risk factors help us think about the underlying drivers of economic risk of individual transactions or investments in a framework that is typically used by multi-asset investors. Combined with the Monte Carlo simulations using cash flows, we can marry these analytics together to help clients think about risk and return outcomes.

Figure 6: Risk decomposition of a primary fund, a traditional secondary transaction and a co-investment

Obtained from the Risk Factor Model. As a comparison, economic risk of the S&P 500 index estimated by the same model equaled 12%.



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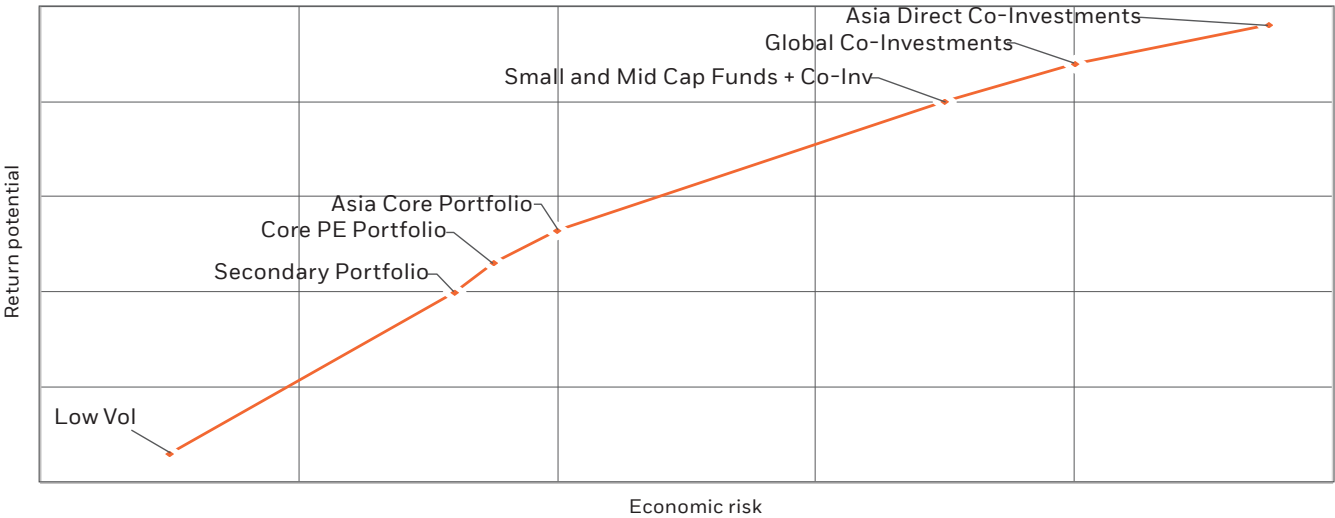
5. Holistic construction of a private equity program

Now that we understand how the building blocks of private equity – primaries, secondaries, and co-investments – differ in terms of their attributes, cash flow curves, and with regards to their individual risk contributions, the question most investors ask is how to build a private equity program.

We believe that private equity, similar to other asset classes, has an efficient frontier – or said another way – by varying the investment types (primaries, secondaries, and co-investments) as well as geographic exposure and investment strategies (large buyouts versus small buyouts versus venture versus distressed-for-control, etc.), one can build portfolios with different characteristics across risk target, return target, duration, and economic exposures.

These components, in our view, can be thought of as modules – essentially, focused strategies that can be used as building blocks to customize a private equity program and achieve an investment target. The chart below shows a theoretical construct of different portfolio types using the modules, to achieve different risk and returns across an efficient frontier.

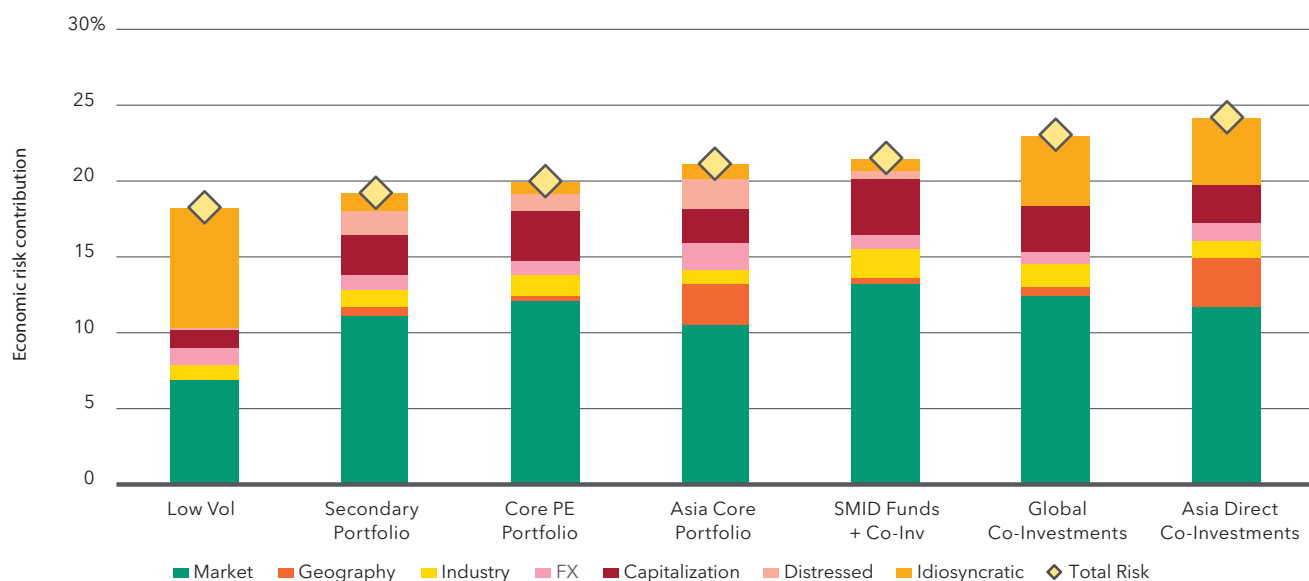
Figure 7: Risk and return outcomes of seven different model portfolios, each one with different tilts to transactions type, region, and capitalization



Using the Private Equity Risk Model as described in the previous section and our cash flow analytics, we show how to move beyond the theoretical and into live examples. The risk figures as shown on the horizontal axis of Figure 8 were derived from the Private Equity Risk model. Note that the Private Equity Risk model is not focused on valuation risk but rather is a forward-looking tool used to measure economic risk on an ex-ante basis via a factor model approach. It should be emphasized that the risk factor approach applied in this section is different than the cash flow approach used in sections 3 and 4 which was purely based on internal historical cash flows and quarterly valuations. The Private Equity risk factor model has the additional advantage that it provides decomposition of the aggregated risk figures and allows for a consistent analysis across asset classes including private markets. The model is designed for top-down portfolio allocation rather than bottom-up investment selection. The model’s approach is based on the assertion that private and public equity are subject to the same underlying drivers of risk and return. Supporting arguments are well known, for example:

- The industry regularly uses public markets to mark private equity assets through either public comparables, or precedent transactions, thus creating an inherent link between public and private valuations.
- Companies are exposed to the same macroeconomic variables regardless of ownership structure (i.e. privately or publicly owned).
- Private equity investors purchase assets from the public market in some cases, and sell companies back onto the public market via an IPO in others, generating a fundamental relationship.

Figure 8: The risk decomposition of the seven different model portfolios shown in Figure 7



In line with the theoretical efficient frontier chart, the Private Equity Risk model substantiates that a strategy that is more concentrated and focused on more opportunistic investments has higher economic risk than a more diversified strategy. For example, the 'Asia Direct Co-Investments' model portfolio exhibits a significant amount of idiosyncratic risk (in dark yellow) as a result of its concentrated portfolio in approximately 20 to 30 direct co-investments. Additionally, the 'Asia Direct Co-Investments' model portfolio exhibits a larger source of risk attributed to geographic factors (in orange), which is due to the tilt towards Asia. Conversely, the 'Low Vol' portfolio consists of allocations to Large and Mid-Market Buyout Funds, Special Situations/Distressed Funds and Infrastructure. As a result, the portfolio's risk budget is dominated by special situations/credit-related factors and has less exposure to equity beta. Looking at the 'Core PE Portfolio,' this consists of a 30% allocation to direct co-investments, a 20% allocation to secondaries, and a concentrated allocation to primary funds. As a result, the economic risk factors are driven by systematic factors such as the exposure to equity markets, industry tilts, capitalization risk in addition to a smaller exposure to idiosyncratic risk as a result of the diversification in the aggregate portfolio. The 'Secondary portfolios' consists of an allocation to broad LP stakes, some more concentrated alpha-oriented secondaries, in addition to more concentrated manager-led GP solutions – note this differs from the secondary fund example in the previous section which focused on a single line item classified as a traditional secondary transaction. The economic risk profile of the 'Secondary Portfolio' is very similar to the 'Core PE Portfolio' given the diversification in both of these strategies. As a result, one should weigh other considerations such as J-curve mitigation, investment duration, and outcome orientation when choosing a model portfolio.

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6. Conclusions

This paper lays out the differences between diversified private equity programs investing in primaries, secondaries and co-investments and analyses important investor outcomes such as J-curve, pacing, out-of-pocket exposure and incremental alpha. We show that by varying transaction types, geographic exposure and investment strategies one can build portfolios with different characteristics across risk target, return target, duration, and economic risk factor exposures.

Importantly, and perhaps somewhat counter-intuitively, the growth and maturation of the private equity market has resulted in a larger toolkit for investors to achieve their objectives. Years ago, secondaries were seen as a negative ding on a relationship with a General Partner, whereas today, one could argue that some of the most attractive secondaries are those that are General Partner-led. Similarly, while some pundits have argued that co-investing is effectively a risk-transfer mechanism, institutional investors are seeing potential alpha accretion as a result of the ability to cherry pick the best transactions from General Partners or act as strategic capital as part of a limited consortium.

Ultimately, each investor has their own objectives – a large public pension scheme will likely have different objectives than a re-insurance firm. Hence the optimal mix across transaction types, strategies and geographies will depend on those objectives and this work attempts to provide insights into how these components can work together. At BlackRock's Private Equity Partners team, we are seeking to build portfolios that meet the unique needs of our clients – by using our quantitative tool kit, we can customize portfolios to meet these needs.

Appendix

Monte Carlo Simulation

All analyses are based on diversified private equity programs investing evenly and equally during four years in primaries, secondaries and co-investments. All programs are constructed in a random manner by sampling, without replacement, from a large universe of existing investments of which the full cash flow and historical valuations were available. Cash flows of underlying investments are aggregated to a program level and then aggregated to calculate the program IRR and TVPI, net of all management fees and carried interest at underlying and at provider level. In total, 10,000 simulation runs were performed. Results are representative for investors in these programs, not in individual investments or transactions.

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

Dataset (as of 30 September 2018):

- Primaries: internal data since 1997, 271 buyouts funds with at least five years of data.
- Secondaries: same data as primaries but simulate a secondary transaction by purchasing a stake in a random primary during year 4, 5 or 6 at market pricing. A threshold of 50% funded and a 0.8x TVPI at the transaction date was applied. As such, the secondaries programs in this work represent only the traditional component of secondaries and not the GP-led or non-traditional part of the market that might provide incremental alpha.
- Co-investments: internal data since 2001, 96 fully or partially realized buyout co-investments with at least five years of data.
- Complemented with industry data from Burgiss Private iQ and Preqin.

Private Equity Risk Model

The private equity risk model estimates the risk profile of private equity from the perspective of a multi-asset investor. Emphasis is placed on economic risk rather than the accounting risk reflected in periodic valuations. The model employs a comprehensive set of public equity-derived risk factors. Exposures to these factors are constructed from investment attributes that capture the economic features of private equity.

At a high-level, the model constructs private equity returns R_{priv} as a linear combination of return premiums.

$R_{priv} = \beta (Market + Geography + Capitalization + Sector + Idiosyncratic_{priv}) + FX(1.1)$ where $\beta \geq 1$ is a leverage-adjusted beta to public equity markets.

On an unlevered basis, all private equity investments have a unit exposure to the market, with all other exposures derived based on the known investment attributes.

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Key attributes in the Private Equity Risk Model include:

Vintage year The vintage year of a private equity investment is used to determine the investment's beta (leverage) relative to public equities. However, in the case of individual deals or if the 'Equity/Total Assets' multiple is known, the leverage is derived directly. This model uses the option-based approach to corporate valuation described in Schonbucher (2003). Also known as the Merton model, equity is valued as a call option on a company's enterprise value, struck at the future value of the debt obligation. Leverage-adjusted equity beta can be derived by comparing the beta of equity-to-enterprise value before and after applying leverage.

Idiosyncratic risk refers to the component of risk-specific to private equity deals that's not captured by the other factors. This risk is theoretically uncorrelated between deals, so a fund that holds many deals will have less idiosyncratic risk than that of a single deal due to the diversification effect. Similarly, a fund-of-funds will hold more deals (on look-through) than a stand-alone fund, yielding an additional pick-up in diversification.

At the individual deal level, venture capital investments are assumed to have more idiosyncratic risk than buyouts. This assumption is made as performance dispersion amongst venture capital investments is far greater than that of buyout investments. An analysis of public equities is used to derive a first estimate of private equity deal idiosyncratic risk. Monthly returns for all S&P 500 index constituents are regressed against their relative S&P 500 sector indices. A similar regression analysis of the Russell 2000 index is performed. Idiosyncratic risk is calculated as the volatility of the time series of residual returns (that is, the component of return unexplained in the regressions) and is estimated at market position sizing (before considering leverage).

A pure public equity-based approach understates the idiosyncratic risk of venture capital. A stock in a listed micro-cap index had to be successful enough to launch an IPO, leading to a marked survivorship bias with respect to venture capital. A stratification of the universe by average market cap since index inception finds that public stocks with a market cap of less than \$50 million have 40% greater residual volatility than those in the broad universe.

An evaluation of the dispersion amongst partnerships is performed as an alternative method of measuring the idiosyncratic risk of venture capital. Dispersion not only originates from idiosyncratic sources, but also from differences in attributes (geography, currency, sector), as well as cash flow profiles. An estimate of cross-sectional standard deviation is arrived at by comparing the inter-decile and inter-quartile range to those implied by a normal distribution. Blending the dispersion-based approach with the public market equity approach provides a less downwardly biased idiosyncratic risk estimate.

Leverage This model uses the option-based approach to corporate valuation described in Schonbucher (2003). Also known as the Merton model, equity is valued as a call option on a company's enterprise value, struck at the future value of the debt obligation. Leverage-adjusted equity beta can be derived by comparing the beta of equity to enterprise value before and after applying leverage. The leverage-adjusted equity beta depends upon the market environment when a given deal is initiated. Variables include buyout deal leverage, debt usage amongst public companies, implied volatility, and interest rates.

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