Investing in Private Equity
Capital Commitment Considerations

This paper explores capital commitment issues and cash-flow management issues in private equity fund investing. We find that achieving a targeted level of allocation to private equity is a function of the pace of capital deployment as well as dependent upon the desired amount of targeted exposure. It is also dependent on the spread of realized returns in private equity versus other asset classes, as well as on timing and realization periods for capital already invested.

It provides a theoretical framework to structure private equity capital commitment issues in a formal manner, defines variables, inter-relationships and boundaries in such a way that the problem can be worked upon. We will be building on this foundation to create an implementable practical methodology in a subsequent report.

Key Takeaways

- Higher targeted levels of private equity allocations require higher upfront commitment levels.
- Faster growth in private equity returns reduces required commitments, since the investor can reach the same steady state allocation as a percentage of the overall portfolio, with less capital.
- Faster overall portfolio growth increases required upfront commitments, since the desired allocation in dollar terms increases as the portfolio growth increases.
- Longer drawdown periods require higher initial commitment levels to reach steady state allocations, since the capital accumulation rate is slower.
- Longer liquidation periods reduce initial commitment levels, since the capital liquidation rate is slower.

Commitment Issues

As described in greater detail in editions of the UBS Private Equity Education Series, private equity fundraising and deployment is referred to as making "commitments" because not all funding is made available immediately to the fund vehicle. Rather, funds are called up as projects covered by the private equity vehicle's mandate become available. When committing to a private equity fund, the commitment is typically to provide cash to the fund on short notice from the General Partner. General Partners of a fund draw down capital from the Limited Partners as and when they make investments. General Partners call down capital only as they require it, rather than in pre-set amounts according to a rigid timetable. If an investor fails to fund a capital call from a fund when due, the fund may exercise various remedies with respect to such investors to forfeit, or sell, all or a portion, of its interest in the fund or requiring that the investor immediately pay up the full amount of their remaining capital commitment.

Investors are typically required to fund only a small percentage of their total capital commitment at the outset. This initial funding is followed by subsequent capital draw-downs (the timing and size of which are generally made known to the investor a few days in advance), as needed by the fund to make new investments. Just-in-time draw-downs are used to minimize the amount of time that a fund holds uninvested cash, which is a drag on fund performance,

All of this introduces uncertainty in the cash flows of private equity investments. The unpredictability of cash flows applies to both capital calls, which the investor must fulfill at earlier stages, and distributions to the investor at later stages. In both cases the amount and timing of cash flows is at the discretion of the fund manager. Hence, the importance of carefully considering cash flow needs in portfolios and planning for commitments that have already been made.

Complications

Uncertain Cash-flows Lead to Uncertain Commitment Strategies – It gives rise to questions of what is an appropriate commitment strategy given: (1) Uncertainty about capital draw-downs, (2) Uncertainty about capital distributions, (3) Meeting target allocations to portfolio allocation over long time periods.

Other questions arise such as what does one do with undrawn, committed investments? Investors are required to make a range of decisions: keep it in cash (riskless), allocate it proportionately to the rest of the portfolio and so on. Naturally this depends a lot on the investment objectives and the characteristics of the existing portfolio. Added risks (e.g., what happens if one puts the uninvested, but committed capital into a public proxy and markets are depressed at the precise time capital is being called?) are considerations worth investigating.

Rebalancing – Rebalancing is a related issue; clearly there is an asymmetry in the ability to rebalance a portfolio that consists of illiquid investments in private equity and liquid traditional investments such as publicly traded stocks. If private equity, for example, grows faster than other asset classes, then one cannot easily rebalance the risks in one's portfolio necessarily; if it grows more slowly, then there is no issue. What does this mean for the portfolio over the long term? Clearly, one approach is to account for this before it happens and moderate one's investments. But, when it does, should one rebalance into more fixed income while one is over-allocated? Ignore it? This is particularly interesting when one considers that there might be tactical implications about timing of entry into the private space which also must be thoughtfully addressed.

Transitional Planning – A related issue is transition planning in the sense that the commitment strategy will differ between an investor starting at a zero allocation and ramping up to a target allocation versus one who is replacing a piece of a regular program every year. The reason here is that cash outflows from a "ramping up" program are not the same from a regular, vintage-year diversified program.

Contracting Costs – Finally, there are other issues which are clearly important: tax, transaction costs, etc.

Framework for Determining Commitments and Cash-Flows

In order to bring rigor to an approach that may help elucidate important considerations in making private equity commitments, within the larger context of a portfolio allocation, we propose a theoretical model here. Unfortunately there is no escaping the algebra behind this model, but we do hope that our conclusions follow logically from it.

We assume a model in which each asset class grows at a deterministic rate, and the timing of private equity drawdown and liquidations is certain. We further assume that an investor would like to maintain a constant percentage allocation to private equity, and needs to choose a commitment strategy to obtain this desired allocation.

Model

We can model the investor's portfolio as follows:

IC – Initial value of investor's capital (i.e., total starting portfolio value)

TPE – Investor's target private equity allocation, in percent

G – Growth factor of private equity investments

R – Growth factor of optimal portfolio

C_0 – Initial commitment at t = 0

D – Years to invest commitment (i.e., 1 / Draw Down Rate)

H – Investment holding period

I_t – New amount invested, or drawn down, at end of period t

L_t – Liquidations at time period t. This amount may be reinvested in the fund or returned to investors.

P_t – Total private equity dollars invested at end of period t

Intuitively, in order to maintain a constant steady state allocation to private equity, the growth in commitments over time must equal the growth in the optimal portfolio.

This implies that $C_t = C_0 R^t$.

Furthermore, the disbursements at any time t will equal the new amount invested at time t – H, multiplied by the growth factor in private equity. In other words,

$L_t = I_{t-H} G^H$.

Using this terminology, we can model the private equity dollars invested at any point in time as:

$$P_t = GP_{t-1} + I_t - L_t \qquad (1)$$

Each commitment, C_t, is invested uniformly at the end of each year for D years. Therefore, if an investor commits C_t in year t, C_t/D is invested each year between years t and t + D – 1. Based on this, we can define I_t as:

$$I_t = \sum_{i=0}^{D-1} \frac{C_{t-i}}{D} \qquad (2)$$

Since $C_{t-(D-1)}$ is equal to $C_0 R^{t-(D-1)}$, we can re-write (2) as:

$$I_t = \frac{C_0 R^{t-(D-1)}}{D} \sum_{i=0}^{D-1} R^i \qquad (3)$$

Similarly, we can define L_t as:

$$L_t = G^H I_{t-H} = \frac{G^H C_0 R^{t-H-(D-1)}}{D} \sum_{i=0}^{D-1} R^i \qquad (4)$$

which may be either reinvested or returned to investors.

Substituting (3) and (4) into (1) provides:

$$P_t = GP_{t-1} + \frac{C_0 R^{t-(D-1)} \sum_{i=0}^{D-1} R^i}{D} - \frac{G^H C_0 R^{t-H-(D-1)} \sum_{i=0}^{D-1} R^i}{D} \qquad (5)$$

This can be simplified as:

$$P_t = GP_{t-1} + \frac{1}{D}\left(R^H - G^H\right) C_0 R^{t-H-(D-1)} \sum_{i=0}^{D-1} R^i \qquad (6)$$

Given (6), how should the investor manage his commitments in order to reach his desired private equity allocation? Assume that the investor wants to achieve a

target private equity allocation, TPE, of his portfolio value. If the portfolio is compounding at a factor R, then the investor's desired dollar investment in private equity at time t is:

$$P_t = TPE \times IC \times R^t = P_0 R^t \qquad (7)$$

Substituting (7) into (6) and rearranging the terms yields:

$$P_0 R^t - G P_0 R^{t-1} = \frac{C_0}{D} \frac{R^t \left(R^H - G^H\right) \sum_{i=0}^{D-1} R^i}{R^{H+D-1}} \qquad (8)$$

$$\frac{P_0 R^t}{R^t}\left[1 - \frac{G}{R}\right] = \frac{C_0}{D} \frac{\left(R^H - G^H\right) \sum_{i=0}^{D-1} R^i}{R^{H+D-1}} \qquad (9)$$

$$C_0 = P_0 \left[\frac{G}{R} - 1\right] \frac{D R^{H+D-1}}{\left(G^H - R^H\right) \sum_{i=0}^{D-1} R^i} \qquad (10)$$

Equation (10) establishes the initial level of commitment an investor ought to make to private equity assuming that a variety of variables are perfectly predictable (as we have made simplifying assumptions). Despite the constraints we have imposed this is a powerful equation for it provides interesting insights.

Commitment Strategy Insights[1]

Equation (10) illustrates that the private equity commitment level depends on five factors:

Assumptions: $G > R > 1,\ H > 1,\ D > 1$

1. ***Target Private Equity Investment, P – Higher levels of private equity allocations require higher commitment levels.***

We distinguish the sign of the first partial derivative by contemplating equation 10 and find it to be positive.

$$C = P\left[\frac{G}{R} - 1\right] \frac{D R^{H+D-1}}{\left(G^H - R^H\right) \sum_{i=0}^{D-1} R^i} = P \times D \times \frac{G - R}{G^H - R^H} \times \frac{R^{H+D-1} - R^{H+D-2}}{R^D - 1}$$

$$\frac{dC}{dP} = D \times \frac{G - R}{G^H - R^H} \times \frac{R^{H+D-1} - R^{H+D-2}}{R^D - 1} > 0$$

2. ***Private Equity Growth Rate, G – Faster growth in private equity reduces required commitments, since the investor can reach the same steady state allocation with less capital.***

We distinguish the sign of the first partial derivative by contemplating equation 10 and find it to be negative.

For $\frac{dC}{dG}$, let $K = P \times D \times \frac{R^{H+D-1} - R^{H+D-2}}{R^D - 1} > 0$

$$G^H - R^H = \left(G - R\right)\left(G^{H-1} + G^{H-1}R + \cdots + R^{H-1}\right)$$

$$\frac{d\left(\frac{G-R}{G^H - R^H}\right)}{dG} = \frac{d\left(\frac{1}{G^{H-1} + G^{H-2}R + \cdots + R^{H-1}}\right)}{dG}$$

$$= -\frac{(H-1)G^{H-2} + R(H-2)G^{H-3} + \cdots + R^{H-2}}{\left(G^{H-1} + G^{H-2}R + \cdots + R^{H-1}\right)^2} < 0$$

$$\frac{dC}{dG} = K \times \frac{d\left(\frac{G-R}{G^H - R^H}\right)}{dG} < 0$$

Alternatively, we may also use intuition.

$$\frac{G-R}{G^H - R^H} = \frac{1}{G^{H-1} + G^{H-2}R + \cdots + R^{H-1}}.$$

1. We intend to explore the effect of these variables, acting severally as well as jointly on optimal commitment strategy, further in a future research paper.

As G increases, each term in the denominator increases, so $\frac{1}{G^{H-1}+G^{H-2}R+\cdots+R^{H-1}}$ decreases and C decreases as well.

$\frac{dC}{dG}$, <0

3. ***Portfolio Growth Rate, R – Faster portfolio growth increases required commitments, since the desired allocation in dollar terms increases as the portfolio growth increases.***

$\frac{dC}{dR}$ is extremely complex in its analytical form so it is helpful to examine this intuitively

$$C = P\left[\frac{G}{R}-1\right]\frac{DR^{H+D-1}}{\left(G^H-R^H\right)\sum_{i=0}^{D-1}R^i}$$

$$= P\times D\times\frac{R^{H-1}}{G^{H-1}+G^{H-2}R+\cdots+R^{H-1}}\times\frac{R^{D-1}}{1+R+\cdots+R^{D-1}}$$

$$= P\times D\times\frac{1}{G^{H-1}/R^{H-1}+G^{H-2}/R^{H-2}+\cdots+1}\times\frac{1}{1/R^{D-1}+1/R^{D-2}+\cdots+1}$$

As R increases, every term in the denominator decreases, which means that the denominator decreases and C increases.

i.e. $\frac{dC}{dR} > 0$

4. ***Drawdown Cycle, D – Longer drawdown periods require higher initial commitment levels to reach steady state allocations, since the capital accumulation rate is slower.***

We distinguish the sign of the first partial derivative by contemplating equation 10 and find it to be positive.

For $\frac{dC}{dD}$, let $M = P\times\frac{G-R}{G^H-R^H} > 0$

$$\frac{d\left(D\times\frac{R^{H+D-1}-R^{H+D-2}}{R^D-1}\right)}{dD} = -\frac{R^D R^H(R-1)(D\times\ln R-R^D+1)}{R^2\left(R^D-1\right)^2}$$

$\frac{R^D R^H(R-1)}{R^2\left(R^D-1\right)^2} > 0$ and $D\times\ln R-R^D+1<0$, so

$$\frac{d\left(D\times\frac{R^{H+D-1}-R^{H+D-2}}{R^D-1}\right)}{dD} > 0$$

For the latter, we use $e^x > 1+x$ for all $x>0$ and set $x = D\times\ln R$ which shows that

$\frac{dC}{dD} > 0$

5. ***Liquidation Period, L – Longer liquidation periods reduce initial commitment levels, since the capital liquidation rate is slower.***

This is self evident from our definition: $L_t = I_{t-H}G^H$ when combined with Insight #2 ie. $\frac{dC}{dG}$, < 0

Steady State Investment and Liquidation Rates

Using the above model, we can compute the steady state investment and liquidation rates as a function of unfunded commitments and total investments, respectively. More formally, we would like formulas for R_{IN} and R_{DI}, where:

$I_t = R_{IN} \times C_{t-1}$, and (11)

$$L_t = R_{DI} \times P_{t-1}G \quad (12)$$

We know that in period t, a portion of the new commitments from t-1, t-2, …, t-D will be invested. Therefore, we can restate I_t as:

$$I_t = \sum_{i=1}^{D} \frac{C_{t-i}}{D} \quad (13)$$

Recognizing that the commitments grow each year at the same rate as the portfolio, we can rewrite (13) as:

$$I_t = \frac{C_{t-D}}{D} \sum_{i=1}^{D} R^{i-1} \quad (14)$$

Equation 14 identifies the new amount invested, or drawn down, at end of period t to compute the steady state investment rate for maintaining dynamic equilibrium.

Limitations of This Framework

The model we have described here, whilst useful to frame issues deterministically suffers naturally from shortfalls; in the real world investors face many types of uncertainty that impact their private equity allocations such as :

- Returns – The returns for both the portfolio and the private equity allocation are uncertain.
- Cash Flows – The drawdown schedule and the investment horizon/ realization timings are uncertain.
- Valuation – Investors do not observe true private equity valuations; the observed valuations contain some error, since the prices are not marked-to-market.

These forms of uncertainty have two implications for investors. First, they change the target private equity allocation for most investors. Second, they may change the optimal commitment strategy. There are no easy solutions to addressing these issues. Answers range from assuming that expected returns, draw-downs/ cash-flows and valuations are (i) Historically arrived at, or (ii) Monte Carlo simulated under simplifying distributional assumptions.

Also, in the real world one needs to make accommodations for exogenous factors. For instance, cyclical factors such as periods of under commitment and over commitment influence capital deployment rates. In general drawdown rates are lower when commitment rates are high. The effect is more pronounced in first-year investment rates. This phenomenon may partially be explained by the following hypothesis:

- Demand for private equity funds is cyclical and is a function of the business cycle.
- Supply of private equity funds is sticky in the short run and responds to demand with a lag.
- Increases in the supply of private equity imply tougher competition for capital deployment in subsequent periods (“money chasing deals”). Thus, we often observe anecdotally reduced capital deployment in the first three years

The implications of this observation are that investors may expect their money to be invested at lower rates after strong fundraising periods. Consequent returns, as measured by IRRs, may be lower because distributions are also likely to take longer. Does this means that investors should stay away from private equity when fund raising is strong? Probably not. Does this means that investors should gravitate to private equity when fund raising is weak? Probably not, once again.

Conclusion

Investors in a private equity fund commit to providing a pre-agreed sum of capital to the fund over a specified period of time. This is called the Limited Partners “Capital Commitment.” However, the entire funding may not be needed immediately. The General Partner draws down or calls the capital over a period of time when investment opportunities arise. Drawdown usually occurs over a four to five year investment period, though this can be sooner as seen in some recent vintages. The flexibility to call capital on an as needed basis, with a few weeks notice, reduces cash drag on overall fund returns. Some investors monitor for timing issues between drawdown and deployment when they qualitatively evaluate performance. Given uncertainty in capital calls investors need to plan their cash flows as well as develop investing strategies to meet desired exposure levels to private equity over a long period of time. This paper provides a framework to explore these issues still further.

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