Private Equity Portfolio
Cash Flow Forecast

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## The Necessity for a Probabilistic Approach

Timing of realization is certain in the public market because it is at the choosing of the investor.

Private equity has no certainty at all.

<table>
<thead>
<tr>
<th></th>
<th>Timing</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonds (held to maturity)</td>
<td>Certain</td>
<td>Certain</td>
</tr>
<tr>
<td>Bonds (not held to maturity)</td>
<td>Certain</td>
<td>Uncertain</td>
</tr>
<tr>
<td>Stocks</td>
<td>Certain</td>
<td>Uncertain</td>
</tr>
<tr>
<td>Private Equity</td>
<td>Uncertain</td>
<td>Uncertain</td>
</tr>
</tbody>
</table>
The Necessity for a Probabilistic Approach

Because of the uncertain nature of cash flows in the private markets, our entire career as a team has been built around understanding the relative likelihood of a specific investment outcome or set of investment outcomes, whether in determining the amount and timing of the investment or the amount and timing of the return of the investment. We therefore express risk in terms of the likelihood of a specific outcome or set of outcomes. Everything we do is an attempt to quantify how much we do know versus how much we don't know about the cash flows related to private investments. We believe that we are one of the very few firms in the business that can provide a principled, coherent analytical tool set for that purpose.
ACG’s quantitative tools make it possible to match a portfolio’s risk and return characteristics against the industry to arrive at an accurate cash flow forecast.
**Quantitative Characteristics**

**Return (Benchmark)**

- **Index comparison method (ICM) – return over a public market benchmark**

(Using an end of period assumption)

<table>
<thead>
<tr>
<th>Period</th>
<th>Cash flow</th>
<th>Cumulative S&amp;P</th>
<th>Cumulative S&amp;P</th>
<th>Index Comparison Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>($100)</td>
<td>1.000000</td>
<td>1.000000</td>
<td>($100)</td>
</tr>
<tr>
<td>1</td>
<td>$0</td>
<td>1.050000</td>
<td>1.050000</td>
<td>$0</td>
</tr>
<tr>
<td>2</td>
<td>($300)</td>
<td>0.945000</td>
<td>0.945000</td>
<td>($300)</td>
</tr>
<tr>
<td>3</td>
<td>$0</td>
<td>0.803250</td>
<td>0.803250</td>
<td>$0</td>
</tr>
<tr>
<td>4</td>
<td>$0</td>
<td>0.963900</td>
<td>0.963900</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td>$405</td>
<td>0.867510</td>
<td>0.867510</td>
<td>$405</td>
</tr>
<tr>
<td>6</td>
<td>$0</td>
<td>0.910886</td>
<td>0.910886</td>
<td>$0</td>
</tr>
<tr>
<td>7</td>
<td>$0</td>
<td>1.047518</td>
<td>1.047518</td>
<td>$0</td>
</tr>
<tr>
<td>8</td>
<td>$0</td>
<td>1.309398</td>
<td>1.309398</td>
<td>$0</td>
</tr>
<tr>
<td>9</td>
<td>$200</td>
<td>1.636747</td>
<td>1.636747</td>
<td>($81)</td>
</tr>
</tbody>
</table>

| Cash flow | Cumulative S&P | Cumulative S&P | IRR | Compound | 9.19% | 5.63% | -9.24% |

Invented by the Alignment principals, now in general use.
Risk/Return Profile

- OCOM Methodology*
  - Determine regression line of outcomes

\[ y = 0.7839x + 0.0105 \]

\[ R^2 = 0.4282 \]

Each dot is an ICM outcome

\[ \sqrt{1 - R^2} = 0.65 \text{ (about 65\% of the private investment outcome is explained by the index outcome)} \]

- Beta = 0.78 (portfolio has 78\% of the variability of the index outcome)
- Alpha = 0.01 (excess return of 1\% if the index outcome were zero)

* Patent pending
Risk/Return Profile

Quantitative Characteristics

• OCOM Methodology* (cont.)
  – Calculate risk of private equity using knowns from public market

\[
\frac{\beta_{vc} \sigma^2_{S&P}}{r_{VC,S&P} \sigma_{S&P}} = \sigma_{VC}
\]

Here, \( \beta \) is the slope and \( r \) is the coefficient of correlation of the OCOM plot and \( \sigma \) is the risk of the S&P 500 index over a particular time period.

* Patent pending
Quantitative Characteristics

Risk/Return Profile

By Strategy

<table>
<thead>
<tr>
<th></th>
<th>S&amp;P 500 arithmetic mean</th>
<th>S&amp;P 500 sigma</th>
<th>Sharpe ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.1200</td>
<td>0.2110</td>
<td>0.5687</td>
</tr>
<tr>
<td></td>
<td>0.1298</td>
<td>0.2017</td>
<td>0.6433</td>
</tr>
<tr>
<td></td>
<td>0.1759</td>
<td>0.1508</td>
<td>1.1662</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P 500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beta</td>
<td>0.7839</td>
<td>0.6385</td>
<td>0.0939</td>
</tr>
<tr>
<td>Alpha</td>
<td>0.0105</td>
<td>0.0137</td>
<td>0.1154</td>
</tr>
<tr>
<td>R squared</td>
<td>0.4282</td>
<td>0.3625</td>
<td>0.7286</td>
</tr>
<tr>
<td>**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>**</td>
<td>0.2528</td>
<td>0.2238</td>
<td>0.1643</td>
</tr>
<tr>
<td>Sharpe</td>
<td>0.4137</td>
<td>0.4036</td>
<td>0.5558</td>
</tr>
<tr>
<td>**</td>
<td>0.2416</td>
<td>0.2139</td>
<td>0.1570</td>
</tr>
<tr>
<td>Sharpe</td>
<td>0.4644</td>
<td>0.4514</td>
<td>0.5678</td>
</tr>
<tr>
<td>**</td>
<td>0.1807</td>
<td>0.1599</td>
<td>0.1174</td>
</tr>
<tr>
<td>Sharpe</td>
<td>0.8213</td>
<td>0.7878</td>
<td>0.6735</td>
</tr>
</tbody>
</table>

Significantly out of line with industry history
Quantitative Characteristics

Risk/Return Profile

By Vintage

Unusually consistent positive risk-adjusted performance
Quantitative Characteristics

Portfolio Maturity

Duration by Vintage

\[ Z - CED = \frac{\ln(TME)}{\ln(1 + IRR)} \]

Size of bubble is scaled to amount committed

Vintages 1998 and earlier have zero-coupon equivalent durations over 2.0
**Quantitative Characteristics**

**Portfolio Maturity**

Duration by Asset Class

\[ Z - CED = \frac{\ln(TME)}{\ln(1 + IRR)} \]

- Balanced: 1.5
- Large LBO: 2.1
- Med LBO: 2.1
- Mezz: 2.2
- Real Estate: 2.2
- Early Venture: 1.5

Bubble size is proportional to commitments.
Quantitative Characteristics

Portfolio Composition

Portfolio Composition Over Time
(based on commitments)

Year

Percent of Portfolio

0% 20% 40% 60% 80% 100%

Balanced Large LBO Medium LBO Mezzanine Real Estate Venture Capital
## Performance Attribution*

* Patent pending

### Quantitative Characteristics

<table>
<thead>
<tr>
<th>Money</th>
<th>Time</th>
<th>Type by Fund Name</th>
<th>Total</th>
<th>Balanced</th>
<th>Large LBO</th>
<th>Medium LBO</th>
<th>Mezzanine</th>
<th>Venture Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Neutral Weight</td>
<td>Zero-based Portfolio index, common start date</td>
<td>7.47%</td>
<td>12.85%</td>
<td>2.00%</td>
<td>9.22%</td>
<td>14.01%</td>
<td>-12.53%</td>
</tr>
<tr>
<td>II</td>
<td>Actual</td>
<td>Zero-based Actual weights, common start date</td>
<td>8.44%</td>
<td>-1.33%</td>
<td>5.49%</td>
<td>8.77%</td>
<td>10.63%</td>
<td>-12.66%</td>
</tr>
<tr>
<td>III</td>
<td>Neutral Weight</td>
<td>Actual Neutral-weight portfolio, actual start dates (timing)</td>
<td>10.09%</td>
<td>18.61%</td>
<td>2.66%</td>
<td>13.63%</td>
<td>14.88%</td>
<td>-18.35%</td>
</tr>
<tr>
<td>IV</td>
<td>Actual</td>
<td>Actual Actual weights, actual timing</td>
<td>10.97%</td>
<td>-1.98%</td>
<td>6.58%</td>
<td>11.53%</td>
<td>11.88%</td>
<td>-17.35%</td>
</tr>
</tbody>
</table>

| I        | Portfolio index       | 7.47% | 12.85% | 2.00% | 9.22% | 14.01% | -12.53% |
| II-I     | Selection (relative weighting) against portfolio index | **0.96%** | **-14.18%** | **3.48%** | **-0.45%** | **-3.39%** | **-0.13%** |
| IV-II    | Timing                 | 2.53% | -0.66% | 1.09% | 2.76% | 1.25% | -4.69% |
| IV       | Manager's return       | 10.97%| -1.98% | 6.58% | 11.53% | 11.88% | -17.35% |
| IV-I     | Manager's contribution | 3.50% | -14.83% | 4.57% | 2.31% | -2.13% | -4.82% |
| IV-III   | Selection (relative weighting) against actual outcome | 0.88% | -20.59% | 3.92% | -2.10% | -3.00% | 1.01% |

Overall selection return is positive, indicating a high-quality portfolio.
Portfolio Projection

• Note:
  – In the graphs on the following pages,
    • The gray banded areas represent typical industry performance over very long periods of time;
    • The red line in each graph represents portfolio performance through 2002;
    • The gold line is the base case, which takes the prior performance of the portfolio and current market conditions into account;
    • And the black and green lines are the worst and optimistic cases, respectively.
Portfolio Projection

• A word about the cases
  – Assumptions common to all cases
    • Capital drawn in the future will not exceed remaining undrawn capital (i.e., capital commitments less capital already drawn).
    • The stochastic distributions used were derived from data in the Venture Economics database.
    • Except for the Base case, the stochastic distributions were derived from all data points of all vintages in the database.
      – Thus, funds with complete write-offs and funds not returning capital were considered, in addition to better-performing funds.
Portfolio Projection

• A word about the cases
  – Base case
    • Probabilities of cash flows were extracted from vintages representing prior recoveries from industry troughs.
    • Within these vintages, all funds were considered (including those with distinctly substandard returns)
Portfolio Projection

• A word about the cases
  – Optimistic case
  • All vintages that have drawn capital at a faster than usual rate will slow down
  • All vintages that have drawn capital at a slow rate will continue to do so
  • All vintages that have returned capital more slowly than usual will speed up
  • All vintages that have returned capital quickly will continue to do so
Portfolio Projection

• A word about the cases
  – Worst case
    • All vintages drawing capital at a rapid rate will continue to do so
    • Vintages drawing at a slower rate will speed up
    • All vintages returning capital faster than normal will slow down
    • All vintages returning capital at a slow rate will continue to do so.
Summary of Cases

• The base case assumes that the industry will recover from its current trough in about the same fashion as it has recovered from the prior two troughs.

• The optimistic case assumes an immediate return to the mean for the industry and portfolio as a whole.

• The worst case assumes that there will be no return to the mean and requires a global macroeconomic upheaval – possible, but in our view extremely unlikely.
Portfolio Projection

• Although capital drawn in the portfolio accelerated in 2000…

…cumulative actual draws are about on track, with the base and optimistic cases spot on.
Portfolio Projection

- Actual return of capital, on the other hand, is badly off track...

- ...although an adequate return is still highly probable.
Portfolio Projection

• Positive net cash flow is anticipated to be later, and probably less than usual, for this portfolio…

• …but cumulatively it is very highly probable that the portfolio will recover invested capital.
Return of Capital
Portfolio Base Case (the gold line in the previous graphs)

Note that there is no measurable risk of returning < $500 million.
Return of Capital
Portfolio Optimistic Case (the green line in the prior graphs)

There is no measurable likelihood of failing to deliver $500 million in the optimistic case.
Return of Capital

Portfolio Worst Case (the black line in the previous graphs)

Even in the worst case, the probability of < $500 million return of capital is under 1%, with the minimum observed of $382.3 million.
Conclusion

- Our stochastic analysis suggests that the example portfolio has a very high probability of returning $500 million or more between now and 2011 (worst case probability of 98 bps of not doing so).
- Our qualitative and quantitative review of the portfolio indicates that this is a well chosen, well diversified portfolio of fund managers. In light of these factors and the industry’s demonstrated ability to recover from prior troughs, we believe that the worst case scenario should have no more than a 5% probability. Therefore we believe that in the worst case there is no more than a 5 bps probability of not returning $500 million.