Unambiguous Numbers Speak Louder Than Words

Insights into the risk and return profile of Asian and Global Private Equity

Prof. Oliver Gottschalg of HEC Paris
Founder and Head of Research,
PERACS Independent PE Track Record Analytics and Certification
Agenda

• The Problem we are solving
• The performance of institutional buyout funds
• Why worry about measures: The truth about persistence
• How to integrate Risk into the Analysis?
• Practical Implications
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• The Problem we are solving

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• Practical Implications
The traditional look at Asian PE Performance ...
The traditional look at Asian PE Performance...

Does not compare favorably to North America...

Source: Preqin
The traditional look at Asian PE Performance ...

... or Europe. But this comparison does not capture key differences between the regions.

Source: Preqin
The HEC PE Observatory

Dedicated Research Center at HEC Paris, established 2011, aimed at strengthening HEC's research resources, producing top-level research, teaching and publications in the field of private equity. It will be an independent focal point for debate and exchange of ideas between different members of the private equity universe, including GPs, LPs and advisors.

Founding Sponsors: Abenex Capital ■ Astorg ■ Chevrillon & Associés ■ IDI groupe ■ Messier Maris ■ Roland Berger ■ Rothschild ■ SJ Berwin ■ Weil

Access to unique data made possible through partnership with buy-out firms, institutional investors, database vendors and industry associations during >10-year research effort.

For more information, please visit www.buyoutresearch.org
Bigger Picture: Challenges with Data and Measures in PE: What GPs frequently say about themselves ...

"We are a Top Quartile Performer."

"Our value creation is based on operational expertise."

"We proactively generate proprietary dealflow."

"Our unique investment strategy differentiates us from our competitors."
... makes LPs wonder how to spot true future outperformers in a group of GP
"The breakdown of our PERACS Alpha shows that our outperformance over the public markets is largely due to fundamental value creation and not to sector choice or leverage."

"PERACS identified our closest competitors based on an analysis of the similarity in the acquired entities. The strong aggregate performance of these "relevant peers" demonstrates the attractiveness of the type of deals we make – and we are proud to outperform that benchmark of the aggregate "relevant competitor" for all of our funds."

"Our unique deal making approach translates into an ability to time deals independently from deal volume for other PE investors, including our closest competitors."

"As you can see from the PERACS Risk Curve, our returns are much more balanced than the industry benchmark."

Further Examples from Actual PERACS clients available upon request
Milestones of the establishment of PERACS as the World Standard for Advanced PE Track Record Analytics

- **February 2014**: "LP Champion" projects set up with LPs of all types, from fund-of-funds, over Sovereign Wealth investors to insurance companies, public and private pension funds, university endowments and family offices from basically all relevant parts of the world
- **January 2014**: PERACS Client-announced Fund Closings exceed USD 55B
- **Winter 2012/2013**: Research Project ILPA-CA-HEC, leveraging PERACS methods
- **Spring 2013**: "LP Champion" Initiative launched
- **January 2013**: 20% of Fundraising GPs (buyouts in EU and US, by volume target fund size) use PERACS numbers
- **Summer 2012**: First PERACS Client Work Performed
- **Spring 2012**: Exploratory Conversations with leading GP and LPs
- **Winter 2011/12**: Design of Standardized Metrics, Value Proposition and Business Model
- **2011**: Exploratory Consulting Engagements with three of the World's 50 Largest GPs
- **Pre 2011**: 10 years of academic research, published in leading academic journals; various consulting engagements; PE Rankings in WallStreetJournal; Joint Project with BVCA
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• The Problem we are solving

• **The performance of institutional buyout funds**

• Why worry about measures: The truth about persistence

• How to integrate Risk into the Analysis?

• Practical Implications
Milestone Project in Understanding of Risk & Return of Institutional PE Asset Class

- Leveraging Cambridge Associates' unique dataset of detailed cash flows and NAVs of 1,215 worldwide Buyouts funds
- Identification of those 819 Buyout Funds (615 from mature markets North America and Developed Europe) which received commitments from ILPA members (i.e. "institutional buyout funds") via the joint ILPA-Cambridge Associates Benchmarking Initiative
- Assessment of the Risk and Return Profile of these funds based on
  - Traditional Indicators (TVPI/MOIC and IRR)
  - Investment Duration
  - Advanced Aggregate Performance Measures (Multiple)
  - Advanced Annual Performance Measures (PERACS Rate of Return, PERACS Alpha)
  - Risk Measures (Loss Ratio, PERACS Portfolio Risk Coefficient)

Combination of unique data and advanced methodology
Measuring Absolute and Relative Aggregate Returns: From TVPI to « PERACS Multiple »

Consideration of opportunity cost of capital

"Opportunity Costs" turn negative in downcycle

PERACS Multiple of each investment is calculated as a variable-rate Profitability Index, i.e. the ratio of Present Value of Distributions (or NAVs) over Present Value of Takedowns, using the MSCI Global Index as discount rate.

TVPI (MOIC) PERACs Multiple TVPI (MOIC) PERACs Multiple
2.6x 2.1x 2.6x 2.9x

Seen from the LP-Perspective, each Capital Call has an "opportunity cost" as the money is not available to be invested elsewhere until the corresponding distribution. The PERACs Multiple explicitly considers this opportunity cost, approximated by the returns to the MSCI Global index.
ILPA Data: Absolute and Relative Aggregate Performance Account of Institutional PE
(Aggregate ILPA Returns-Mature Markets)

The 685 institutional buyout funds in mature markets generate a total multiple of approx. 1.5x and over 70% of this value creation is in excess of the "opportunity cost of PE investment".

Source: ILPA Private Markets Benchmarks, Cambridge Associates Private Investments Database, HEC Analysis, PERACS Methodology
Measuring Absolute and Relative Annual Returns

From Total Return Multiple to PERACS Rate of Return

Annualizing returns based on duration: 4.4 yrs

<table>
<thead>
<tr>
<th>TVPI (MOIC)</th>
<th>PERACS Rate of Return*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.6x</td>
<td>26%</td>
</tr>
</tbody>
</table>

The "PERACS Rate of Return" is an annualized measure of investment returns that avoids the biases of IRR (and related measures) based on the explicit consideration of the investment duration, i.e. the time between the (capital weighted) average cash outflow and the (capital weighted) average inflow.

From Total Return Multiple to PERACS Alpha

Annualizing returns based on duration: 4.4 yrs

<table>
<thead>
<tr>
<th>PERACS Multiple</th>
<th>PERACS Alpha**</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1x</td>
<td>18%</td>
</tr>
</tbody>
</table>

The "PERACS Alpha" is the corresponding measure of annual value creation relative to the 'opportunity cost' of not investing in the public market.

* PERACS Rate of Return = (TVPI^(1/Duration in years))-1

** PERACS Alpha = (PERACS Multiple^(1/Duration in years))-1
## Alternative Measures of annual returns

<table>
<thead>
<tr>
<th></th>
<th>Subject to inherent bias of IRR method</th>
<th>Avoids &quot;Reinvestment assumption bias&quot; of IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute Performance Measure</td>
<td>IRR</td>
<td>PERACS Rate of Return</td>
</tr>
<tr>
<td>Performance Measurement relative to public markets</td>
<td>PME-IRR and its variations</td>
<td>PERACS Alpha</td>
</tr>
</tbody>
</table>
ILPA Data: Absolute and Relative Annual Performance Account of Institutional PE
(Aggregate ILPA Returns-Mature Markets)

The 685 PE institutional funds in mature markets generate a bias-adjusted annual performance of 12% in North America and 15.6% in Developed Europe, and an annual performance relative to the "opportunity cost" of PE investing of 8.9% and 11.8% respectively.

Source: ILPA Private Markets Benchmarks, Cambridge Associates Private Investments Database, HEC Analysis, PERACS Methodology
We document an IRR bias in the average absolute performance that varies dramatically across vintage years and ranges in North America from -9% to +27%.

Source: ILPA Private Markets Benchmarks, Cambridge Associates Private Investments Database, HEC Analysis, PERACS Methodology
We document an IRR bias in the average absolute performance that varies dramatically across vintage years and ranges in Asia from -7% to +57%.

Source: Preqin data, HEC Analysis, PERACS Methodology
ILPA Data: Quartile Cut-Offs are subject to IRR Bias and impact of market returns – North America

Source: ILPA Private Markets Benchmarks, Cambridge Associates Private Investments Database, HEC Analysis, PERACS Methodology
Prequin Data: Quartile Cut-Offs are subject to IRR Bias – Asia – The Good

Source: Prequin data, HEC Analysis, PERACS Methodology
Preqin Data: Quartile Cut-Offs are subject to IRR Bias – Asia – The Average

Source: Preqin data, HEC Analysis, PERACS Methodology
Preqin Data: Quartile Cut-Offs are subject to IRR Bias – Asia – The "Ugly"

Source: Preqin data, HEC Analysis, PERACS Methodology
Prequin Data: Quartile Cut-Offs are subject to IRR Bias – Asia – Putting it all together

Source: Preqin data, HEC Analysis, PERACS Methodology
## Comparing Asian PE to PE Worldwide

<table>
<thead>
<tr>
<th>Performance relevant measure in terms of ...</th>
<th>Leads to a statistically significant difference (simple t-test, &gt;95%)</th>
<th>Direction of Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>TVPI</td>
<td>YES</td>
<td>Asia underperforms</td>
</tr>
<tr>
<td>PERACS Multiple</td>
<td>YES</td>
<td>Asia underperforms</td>
</tr>
<tr>
<td>Duration</td>
<td>YES</td>
<td>Asia has shorter duration</td>
</tr>
<tr>
<td>Market Return</td>
<td>YES</td>
<td>Greater Impact on Returns in Asia</td>
</tr>
<tr>
<td>IRR</td>
<td>NO</td>
<td>-</td>
</tr>
<tr>
<td>PERACS Rate of Return</td>
<td>NO</td>
<td>-</td>
</tr>
<tr>
<td>Alpha</td>
<td>NO</td>
<td>-</td>
</tr>
</tbody>
</table>

Performance differences in TVPI attributable to greater impact of broad market trends AND shorter duration – no significant difference in more accurate performance measures.
## Comparing Asian PE to PE Worldwide

<table>
<thead>
<tr>
<th>Performance Measures in terms of ...</th>
<th>Leads to a statistically significant difference when controlling for Sample Characteristics (e.g. vintage distribution, proportion of fund types)</th>
<th>Direction of Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRR</td>
<td>NONE</td>
<td>-</td>
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<tr>
<td>TVPI</td>
<td>NONE</td>
<td>-</td>
</tr>
<tr>
<td>PERACS Rate of Return</td>
<td>NONE</td>
<td>-</td>
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<td>NONE</td>
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When controlling for differences in Sample Characteristics (e.g. vintage distribution, proportion of fund types), significance of differences in performance disappears. Asian PE has same fundamental value creation logic as PE in N-America and Europe.
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IRR versus PERACS Alpha – Important Differences and their Implications

**IRR:**
- Measures absolute annual returns (partly influenced by market environment)
- Subject to Substantial Methodological Bias (>10% distortion for 1/3 of all funds)

**PERACS Alpha:**
- Measures annual returns relative to broad stock market (= opportunity cost to LP)
- Avoids IRRA Bias

Consequence: Some Funds look better than others on IRR because they
1. Got lucky with the market trend and/or
2. Have an upward biased IRR due to methodological bias

**Question:** What does this imply for "being top quartile"?
Sample of Data on Primary PE Funds worldwide

- Utilization of large sample of primary PE funds available from Preqin
  - 2236 observations,
  - All fund types,
  - Asia, EU and US,
  - Vintages 1980 – 2013
  - detailed data on CFs and NAVs over time

- Assessment of the Risk and Return Profile of these funds based on
  - Traditional Indicators (TVPI/MOIC and IRR)
  - Investment Duration
  - Advanced Aggregate Performance Measures (Multiple)
  - Advanced Annual Performance Measures (PERACS Rate of Return, PERACS Alpha)
  - Risk Measures (Loss Ratio, PERACS Portfolio Risk Coefficient)
26% of all buyout funds misclassified by IRR

<table>
<thead>
<tr>
<th>Primary Buyout Funds</th>
<th>PERACS Alpha Quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1</td>
</tr>
<tr>
<td>IRR Quartile</td>
<td></td>
</tr>
<tr>
<td>Q1</td>
<td>79%</td>
</tr>
<tr>
<td>Q2</td>
<td>17%</td>
</tr>
<tr>
<td>Q3</td>
<td>3%</td>
</tr>
<tr>
<td>Q4</td>
<td>2%</td>
</tr>
</tbody>
</table>

Example: Of all Funds that fall into the top IRR quartile, 79% are also in the top PERACS Alpha quartile, while 15% of them only make the second PERACS Alpha quartile, etc.

Quartile Categories based on IRR do not reflect true performance.

Source: Preqin data, PERACS analysis, buyout funds only
The degree of "false top quartile players" varies by vintage year

Percentage of "false Top Quartile Players"

Source: Preqin data, PERACS analysis, buyout funds only
When and how you can count on performance persistence: THE BAD NEWS

Increase in likelihood of hitting the Top Quartile based on past IRR

- In terms of IRR, past top performers are somewhat more likely to be again in the top quartile
- The relationship decreases for recent vintages, likely due to strong recent market swings
- In no time period, this slightly increased likelihood of finding another top quartile fund by looking at past IRR quartiles translated into a statistically significant performance increase

Approach:
- Assessment of 808 buyout funds from Preqin with detailed CF data
- Identification of fund-pairs (same GP, same strategy, same geography)
- Comparison of performance of each pair of funds: IRR, PRR, Alpha – in actual return % and in Quartiles

Source: Preqin data, PERACS analysis, buyout funds only
When and how you can count on performance persistence: THE GOOD NEWS

Increase in likelihood of hitting the Top Quartile based on past performance by performance measure

2000-2004 vintages

- Alpha: 33%
- IRR: 12%

Outperformance of portfolio selected based on past top quartile status

All vintages, IRR

- Alpha-Based Selection: 14%
- Remaining Portfolio: 9.5%

- Unlike for IRR, PERACS Alpha persistence remains also in more recent vintages
- Predictive power of Alpha is greater to or equal to predictive power of IRR for all time periods
- Fund Selection based on PERACS Alpha leads to a statistically significant (95% level) increase in performance – (14% PRR vs. 9.5% PRR)

Source: Preqin data, PERACS analysis, buyout funds only
When and how you can count on performance persistence: MORE GOOD NEWS

Hypothetical LPs who only backed "Alpha Top Q" funds, would have had an annual return outperformance of 140BP PERACS Rate of Return on the average funds in their portfolio, 130 BP of which are PERACS Alpha.

Source: Preqin data, PERACS analysis, buyout funds only
**Improvement of Portfolio Performance:**
When and how quartile persistence translates into outperformance

<table>
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<th>Scenario: Investing only in GPs who are in the Best Quartile with their prior fund in terms of ...</th>
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<tr>
<td>TVPI</td>
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<td>PERACS Multiple</td>
<td>Higher PERACS Alpha, Higher PERACS Rate of Return</td>
<td>PRR: 5.1% Alpha: 4.5%</td>
</tr>
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<td>PERACS Alpha</td>
<td>Higher PERACS Alpha, Higher PERACS Rate of Return, Higher IRR</td>
<td>PRR: 4.5% Alpha: 3.8%</td>
</tr>
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*Increased likelihood of hitting the Top Quartile (1/3) for IRR fails to translate into significant improvement of portfolio performance, as backing past Top Quartile GPs also increases likelihood of ending up in the worst quartile (by 1/5).*
Improvement of Portfolio Performance:
When and how quartile persistence translates into outperformance

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Selecting GPs based on accurate measures of relative past performance can lead to statistically significant outperformance of 450bp to 510bp.
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A Concept for Measuring Risk: The PERACS Portfolio Risk Curve
Inspired by Lorenz curve in Macroeconomics

Approach used to assess Income Inequality across countries

Similar to the 'Gini Coefficient' for wealth distribution, we capture the distribution of performance in a single measure, the 'PERACS Risk Coefficient', which makes it possible to compare and benchmark the risk of different PE portfolios in a measure that is independent of the performance of these portfolios. The 'PERACS Risk Coefficient' measures the area underneath a given risk curve relative to the area underneath the diagonal line at a 45 degree angle.
The "PERACS Portfolio Risk Curve" of a Typical PE Portfolio

Insight
Overall assessment of the distribution (uniform vs. exponential) of returns in the portfolio as a new risk measure for PE portfolios.

Benchmarking
Comparison with average performance distribution based on different portfolio characteristics.
Benchmark Application:
PERACS Portfolio Risk Curve for US / Buyouts / 1997-1999 vintages, Comparing an anonymous LP to the Benchmark

Benchmark Portfolio Risk Coefficient: 0.25
LP Portfolio Risk Coefficient: 0.78

Interpretation:
"The performance dispersion of the US Buyout (97-99 vintages) of this Anonymous LP show a substantially greater performance dispersion than the benchmark for this segment. The worst 70% of funds of this LP generated less than 20% of overall returns (compared to approx. 50% for the benchmark), while the best 20% of the funds generate almost 80% of the returns (compared to less than 40% for the benchmark)"
Cambridge Data: The "PERACS Portfolio Risk Curve" of all Buyout Funds Combined

% of Total Value Creation in excess of Opportunity Cost (PERACS Alpha)

The PERACS Risk Curve illustrates the portion of the cumulative PERACS Alpha generated by the poorest-performing x% of the portfolio (as measured by % of deals). The PERACS Risk Coefficient expresses the skewedness of returns from 0 (perfectly uniform) to 1 (perfectly concentrated Alpha).

Source: Data for the total CA Global Buyout Funds in mature PE markets, approximated industry distribution, HEC Analysis, PERACS Methodology
Asian PE have the latest break even point, but compare favorably to European PE in terms of the cumulative negative Alpha generated by all Alpha-negative funds.
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Summary and Practical Implications

• Performance differences between Asian PE and worldwide PE are attributable to greater impact of broad market trends AND shorter duration in Asia, as well as to difference is fund types and vintage distribution.

• There is no statistically significant difference in performance of Asian PE based on more accurate performance measures, and controlling for differences in sample characteristics.

• If you search for performance persistence ... look at PERACS Alpha, rather than at IRR!

• The risk profile (in terms of fund return dispersion) of Asian PE lies between the risk profile of North American and European PE.

For further information, please visit PERACS.com
Thank you for your attention!
About Professor Oliver Gottschalg

Current Positions
• Director of the HEC PE Observatory
• Academic Dean of the TRIUM Global Executive MBA Program
• Founder and Head of Research, PERACS PE Track Record Analytics

Education
• Dipl. Wirtschaftsingenieur (TU Karlsruhe)
• MBA (Georgia State University)
• MSc. of Management (INSEAD)
• Ph.D. (INSEAD)

Work Experience
• Federal Reserve Bank, US
• Bain & Company – Private Equity Practice

Research
• Featured over 100 times in the business media (press, radio, TV and online) in the past 2 years, including The Economist, Financial Times, Wall Street Journal, Financial News, Les Echos, etc.

Consulting
• Tailored projects for leading sponsors, institutional investors and advisors. Repeatedly served as advisor to policy makers at the national and European level in questions related to the possible regulation of private equity.

Teaching
• HEC Grande Ecole Program
• HEC Executive Education
• Harvard Executive Education
• TRIUM Global EMBA Program
• INSEAD Executive Education
• LBS Executive Education
• Tsinghua University Executive Education
• Company-Specific Executive Programs
About PERACS

• PERACS is not just another performance benchmark, but it provides customized and insightful metrics to quantify relevant elements of past performance, risk attributes and strategic differentiators
• Independent, credible, trustworthy, global, conflict-free, and singularly focused
• Granular analysis built up from company by company portfolio analysis
• Formulaic and transparent. Trusted standardized comparisons
• Dynamic quarterly updates and annual reviews
• Methodology of leading industry academics and investors
• Value added service provided by GPs to their LPs
• Used in GP marketing materials with success
PERACS: TOWARDS A WORLD STANDARD
PE TRACK RECORD
ANALYTICS & CERTIFICATION

PERACS: IN THE ILPA NEWSLETTER

In addition to the enormous efficiency gains in GP-LP information exchange thanks to the standardization of relevant metrics, PERACS is also bringing tangible advantages to all parties of the PE industry:
- GPs provide ready-made advanced analytics to LPS, who will be able to consider them early on in the due diligence process, independent of the availability of in-house resources to perform such analyses, which increases efficiency in their fund selection process.
- LPS are able to discern and support documentation for investment recommendations.
- The use of PERACS metrics is consistent with ILPA Principles on Alignment, Governance and Performance Reporting Transparancy.
- LPS and GPs can use PERACS analytics both for internal assessments of the quality of different parts of their portfolio, as well as for external communication about the risk and return of their portfolios.
- LPS and GPs receive authoritative back-up of marketing statements acceptable to regulators.

PERACS metrics enable users to (a) identify portfolio trends based on quarterly updates. To perform what-if analyses on how assets under management (AUM) translates into performance and liquidity, (b) stress and tailor portfolio to exclude obscure sectors/geographies/derogated professionals etc. and (c) provide data driven explanation of performance variation across portfolio.

Finally, and perhaps most significantly, the application of standardized advanced analytics to assess the cash flow of fund managers will raise the bar in terms of the overall sophistication of this asset class. In doing so, it will be helping to create the case for private equity in the current political debate about its merits and the need to make it more attractive to outside investors.

ABOUT PERACS: PERACS has been providing advanced PE fund analytics and due diligence services to GPs and LPS for seven years. Founded in 2005 by Professor Oliver Gottschalg from HEC Paris, its work draws heavily on his academic research on PE performance measurement and benchmarking and on the practical PE investment experience of his partners, along with input from some of the largest and most sophisticated LPS and GPs in world to develop a benchmark in class group of Metrics. Since early last year, GPs who have solicited PE track record analytics services from PERACS and/or Professor Gottschalg amount to almost 10% of the PE industry, measured by worldwide buyout fundraising activity since 2000.