GS-QUANT CASE STUDY

MANAGER SELECTION IN ALTERNATE INVESTMENTS

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INTRODUCTION

Manager selection refers to the process of evaluating and researching investment manager strategies and/or creating a portfolio of investment manager strategies.

The activity of identifying, completing and realizing attractive investments is highly competitive, and involves a high degree of uncertainty. There can be no assurance that a fund will be able to locate, consummate and exit investments that satisfy its objectives or realize upon their values or that a fund will be able to fully invest its committed capital.

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PROBLEM STATEMENT

PROPOSE A QUANTITATIVE FRAMEWORK TO SELECT FUNDS FROM A UNIVERSE, AND MONITOR THEM ON AN ONGOING BASIS, WITH CRITERIA FOR REMOVAL FROM THE AIMS PLATFORM.

QUANTITATIVE FRAMEWORK

A **quantitative framework** is a set of rules and/or criteria that you use to select or monitor mutual funds. It is important to have a quantitative framework because it can help you stay disciplined in your decision-making process and make sure that you are only investing in the best mutual funds.

***Qualitative factors are as important or more important than quantitative factors in alternative manager due diligence.*

AIMS

AIMS group manages globally diversified programs, targeted sector-specific strategies, customized portfolios, and a range of advisory services. The company's investors access opportunities through new fund commitments, fund-of-fund investments, strategic partnerships, secondary-market investments, co-investments, and seed-capital investments.

Aims group sources, evaluates, and invests in managers across

- traditional long-only
- hedge fund
- real estate
- private equity

ALTERNATIVE INVESTMENTS

1. HEDGE FUNDS
2. PRIVATE EQUITY
3. REAL ASSETS
4. STRUCTURED PRODUCTS

PARAMETERS FOR MANAGER SELECTION AND MONITORING

The indicators of investment risk that apply to the analysis of stocks, bonds, and mutual fund portfolios are listed below. These statistical measures are historical predictors of investment risk/volatility and they are all major components of modern portfolio theory(mpt).

1. Alpha is a measure of an investment's performance on a risk-adjusted basis. It takes the volatility (price risk) of a security or fund portfolio and compares its risk-adjusted performance to a benchmark index.

$$\text{Alpha} = R - R_f - \text{beta}\,(R_m - R_f)$$

R → *the portfolio return*
R_f → *risk-free rate of return*
Beta → *systematic risk of a portfolio*

An alpha of 1.0 means the fund has outperformed its benchmark index by 1%. Correspondingly, an alpha of -1.0 would indicate an underperformance of 1%. Higher the alpha of the manager, the better.

2. Beta, also known as the beta coefficient, is a measure of the volatility, or systematic risk, of a security or a portfolio, compared to the market as a whole. Beta is calculated using regression analysis and it represents the tendency of an investment's return to respond to movements in the market. By definition, the market has a beta of 1.0.

Beta=variance/covariance

covariance ➔measure of a stock's return relative to that of the market

Variance ➔measure of how the market moves relative to it's mean

For example, if a fund portfolio's beta is 1.2, it is theoretically 20% more volatile than the market.

3. R-squared is a statistical measure that represents the percentage of a fund portfolio or a security's movements that can be explained by the movements in the benchmark.

$$\textbf{Correlation coefficient} = \Sigma [(X - X_m) * (Y - Y_m)] / \sqrt{} [\Sigma (X - X_m)^2 * \Sigma (Y - Y_m)^2]$$

Where:

X → data points in data set X

Y → data points in data set Y

X_m → mean of data set X

Y_m →mean of data set Y

4. Expense ratio (ER), also sometimes known as the management expense ratio (MER), measures how much of a fund's assets are used for administrative and other operating expenses. An expense ratio is determined by dividing a fund's operating expenses by the average dollar value of its assets under management(aum). Operating expenses reduce the fund's assets, thereby reducing the return to investors.

Er=total fund assets/total fund costs

5. Information ratio (IR), is a measurement of portfolio returns beyond the returns of a benchmark, usually an index, compared to the volatility of those returns.

The **benchmark** used is typically an index that represents the market or a particular sector or industry.

6. Sharpe ratio-The Sharpe ratio adjusts a portfolio's past performance—or expected future performance—for the excess risk that was taken by the investor.

A high Sharpe ratio is good when compared to similar portfolios or funds with lower returns.

The Sharpe ratio has several weaknesses, including an assumption that investment returns are normally distributed.

$$Sharpe\ Ratio = \frac{R_p - R_f}{\sigma_p}$$

where:

R_p = return of portfolio

R_f = risk-free rate

σ_p = standard deviation of the portfolio's excess return

7. Standard deviation- The standard deviation is a statistic that measures the dispersion of a dataset relative to its mean and is calculated as the square root of the variance. The standard deviation is calculated as the square root of variance by determining each data point's deviation relative to the mean. Standard deviation gives a measure of volatility

8. Downside deviation is a measure of downside risk that focuses on returns that fall below a minimum threshold or minimum acceptable return (MAR). It is used in the calculation of the Sortino ratio, a measure of risk-adjusted return. Downside deviation can also tell you when a "risky" investment with a high standard deviation is likely safer than it looks.

9. Maximum drawdown (MDD) is the maximum observed loss from a peak to a trough of a portfolio, before a new peak is attained. Maximum drawdown is an indicator of downside risk over a specified time period.

$$MDD = (Trough\ Value - Peak\ Value) / Peak\ Value$$

9. Sortino Ratio- Sortino ratio calculation is done by subtracting the investment portfolio's total earnings from the risk-free rate of return and is then divided by the standard deviation of negative earnings.

$$\text{Sortino Ratio} = \frac{R_p - r_f}{\sigma_d}$$

where:

R_p = Actual or expected portfolio return

r_f = Risk-free rate

σ_d = Standard deviation of the downside

10. Treynor Ratio- Treynor ratio, also known as the reward-to-volatility ratio, is a performance metric for determining how much excess return was generated for each unit of risk taken on by a portfolio.

$$\text{Treynor Ratio} = \frac{r_p - r_f}{\beta_p}$$

where:

r_p = Portfolio return

r_f = Risk-free rate

β_p = Beta of the portfolio

11. Calmar ratio- The Calmar ratio is a gauge of the performance of investment funds such as hedge funds and commodity trading advisors (ctas). It is a function of the fund's average compounded annual rate of return versus its maximum drawdown. The higher the Calmar ratio, the better it performed on a risk-adjusted basis during the given time frame.

12. Rolling percentile rank instead of Sharpe ratio

It is highly sensitive to the time period under consideration. This makes relative comparison between funds very difficult.

For example, consider 2 funds A and B. Fund A started in Jan 2004 and fund B started in Jan 2011. If you look at their Sharpe ratios since inception, chances are that fund A which started in 2004 will have a poorer ratio as it would have faced the entire brunt of 2008 crash.

Fund B, on the other hand, started in 2011 and never faced any such big crash. Rolling percentile rank.

It is fairly simple. We pick a start date (Jan 2004 in our framework) and look at every 3-year period starting Jan 2004 all the way up to dec 2018.

So, 3rd Jan 2004 to 3rd Jan 2007 is one such period. Similarly, 18th Sep 2012 to 18th Sep 2015 is another such period and 31st dec 2015 to 31st dec 2018 will be the last 3-year period. Now, for each 3-year period, we rank the funds based on the returns delivered during that 3-year period.

We don't use absolute rank but percentile rank. For example, if there were 17 funds during a period, and a fund is ranked 4th, it's percentile rank would be 23.5%

To get a sense of the fund's "long-term performance with respect to peers", the best way is to calculate the average rank over all periods.

13. Internal rate of return (IRR)

The internal rate of return (IRR) is a metric used in financial analysis to estimate the profitability of potential investments. IRR is a discount rate that makes the net present value (NPV) of all cash flows equal to zero in a discounted cash flow analysis.

Generally speaking, the higher an internal rate of return, the more desirable an investment is to undertake. IRR is uniform for investments of varying types and, as such, can be used to rank multiple prospective investments or projects on a relatively even basis.

$$0 = \mathrm{NPV} = \sum_{t=1}^{T} \frac{C_t}{(1+IRR)^t} - C_0$$

where:

$C_t =$ Net cash inflow during the period t

$C_0 =$ Total initial investment costs

$IRR =$ The internal rate of return

$t =$ The number of time periods

MONITORING AND DE-SELECTING ALTERNATIVE FUNDS

We benchmark against peer, broad market indices and other relevant risk and performance metrics. Monitoring of the firm and the investment process are particularly important in alternative investment structures where the manager cannot be terminated easily. Key elements to monitor include **key person risk, alignment of interests, style drift, risk management, client/asset turnover, client profile, and service providers**. An alternative investment program should be monitored relative to the goals established for the alternative investment program, not simply relative to a benchmark. The investor must monitor developments in the relevant markets to ensure that the fundamental thesis underlying the decision to invest remains intact.

HEDGE FUNDS

Hedge funds are investment pools that offer greater flexibility than traditional pools in offering such features as large short positions, high degrees of leverage, and rapidly changing risk exposures. Hedge funds are often structured as private placement vehicles, where the funds are not publicly listed on a securities exchange.

Hedge funds are not a homogeneous asset class. There are a number of distinct strategies with differing risk and return characteristics

PERSISTENCE IN HEDGE FUND PERFORMANCE

More often than not, hedge funds are evaluated based on their historical performance. Good historical performance is almost always followed by a growth in assets under management while poor historical performance is penalized. This suggests that market participants have the belief, conscious or unconscious, that performance is persistent. This is despite numerous **studies that show that past performance is a very poor guide to future performance.**

We start with the simple monthly returns for the hedge funds to initially test for persistence in hedge fund performance.

We divide the past six-year period into two sub-periods and calculate average returns, standard deviations and Sharpe ratios for each fund in two sub-periods. To verify the robustness of our results and to reduce the effects of market crashes we repeat this analysis for different two-year sub-periods in the same six years.

First, we use non-parametric contingency tables to test the hypothesis of whether or not returns, standard deviations and Sharpe ratios display any persistence. In order to do this, we calculate the median values for all of the performance variables in each period and categorize each hedge fund as a winner (W) or a loser (L) based on its performance being better or worse than median performance for all the funds in the strategy type. Persistence exists, if a winner (loser) in the first subperiod as defined above continues to be a winner (loser) in the second sub-period.

The CPR captures the ratio of the managers that show persistence to the managers that do not.

$$CPR = \frac{\text{W1W2} * \text{L1L2}}{\text{W1L2} * \text{L1W2}}$$

W1 → winner in the first sub-period

W2 → winner in the second sub-period

L1 → loser in the first sub-period

L2 → loser in the second sub-period.

Therefore if a manager isa winner during both sub-periods, he/she will be labeled as W1W2. Under the null hypothesis of no persistence the CPR so defined equals 1. In other words, when there is no persistence one would expect each of the four categories denoted by W1W2, W1L2, L1L2, and L1W2 to have 25% of the total number of the funds.

The significance of CPR is tested by a z-score, which is the ratio of natural logarithm of the CPR to the standard error of first of the natural logarithm of cpr and is calculated as follows:

$$sigma = \sqrt{\frac{1}{W1} + \frac{1}{W2} + \frac{1}{L1} + \frac{1}{L2}}$$

Where sigma is the standard error of the natural logarithm of the CPR and the

Z score = ln(CPR)/ sigma

When the Z-score is greater than 1.96, the null hypothesis of no persistence is rejected at a 5% level of significance. The next slide presents example contingency tables, cprs, and z-scores to test the persistence in returns, standard deviations, and sharpe ratios of the managers of the seven hedge fund strategies for the three-year sub-periods previously defined. Results show that none of the strategies display statistically significant persistence in their returns or sharpe ratios. However, we find much more persistence in standard deviation.

A — Persistence in Returns

Strategy	W1W2	W1L2	L1L2	L1W2	CPR	Z SCORE
Convertible Arbitrage	14	12	14	12	1.36	0.55
Distressed Securities	4	4	3	4	0.75	-0.28
Merger Arbitrage	7	5	6	5	1.68	0.62
Fixed Income Arbitrage	7	3	6	3	4.67	1.56
Equity Market Neutral	10	12	9	12	0.63	-0.76
Equity Long/Short	21	38	21	38	0.31	-3.08
Global Macro	11	11	11	11	1.00	0.00

B — Persistence in Volatility

Strategy	W1W2	W1L2	L1L2	L1W2	CPR	Z SCORE
Convertible Arbitrage	18	8	18	8	5.06	2.70
Distressed Securities	7	2	5	1	17.50	2.11
Merger Arbitrage	8	4	7	4	3.50	1.43
Fixed Income Arbitrage	8	2	7	2	14.00	2.34
Equity Market Neutral	16	6	15	6	6.67	2.79
Equity Long/Short	44	16	43	15	7.88	4.93
Global Macro	16	6	16	6	7.11	2.90

C — Persistence in Sharpe Ratio

Strategy	W1W2	W1L2	L1L2	L1W2	CPR	Z SCORE
Convertible Arbitrage	13	13	13	13	1.00	0.00
Distressed Securities	4	5	2	4	0.40	0.84
Merger Arbitrage	5	7	4	7	0.41	-1.04
Fixed Income Arbitrage	5	5	4	5	0.80	0.24
Equity Market Neutral	10	12	9	12	0.63	-0.67
Equity Long/Short	30	29	30	29	1.07	0.18
Global Macro	11	11	11	11	1.00	0.00

We found no evidence of persistence in returns for the managers in the hedge fund strategies covered using a methodology that compares returns to some defined median return as described above. However we note empirically that some managers appear to demonstrate some degree of internal performance persistence. The challenge for quantitative manager selection is to identify these persistent managers.

The approach we take is to examine the problem of persistence directly, and not define it by some relative return. **An approach that makes no assumptions on either the nature of the return distribution or relative value of returns is the Hurst exponent.** The hurst exponent is a measure of whether a trend (negative or positive) will persist or mean revert to some historical average. The hurst exponent H makes no assumptions about the frequency distribution of the underlying data and can be formulated as follows:

$$\mathrm{R}S_t = (ct)^H$$

Where is $\mathrm{R}S_t$ the range of cumulative deviations from the mean divided by the standard deviation. H as defined above is the hurst exponent and varies between zero and one. In this derivation a hurst exponent of

H= 0.5 → manager performance is truly random: for example with returns in a given period completely independent of returns in the previous period.

$0.5 < H \leq 1$ → performance is persistent. We note that persistence as defined by this criterion relates to persistence of either negative returns or positive returns.

$0 < H \leq 0.5$ → anti-persistent or mean reverting manager performance. Anti-persistent performance implies that a period of poor performance will generally be followed by a period of good performance and vice versa.

We divide the six-year time period into two three-year sub-periods and repeat the methodology of the previous section, only this time using the hurst component as the determiner of persistence.

First sub-period → in-sample development period

Second sub period → out-of-sample validation period.

The process is then as follows. First, we calculate the hurst exponent for managers in our database by using the three-year performance data in the in-sample development period. We then rank the managers based on their hurst exponent, and create three groups. These groups are the low hurst, the medium hurst, and the high hurst. In general, none of the groups are strategy specific and all of the strategies are represented in all groups.

The final part of this analysis is to then construct the returns of these hurst portfolios in the out-of-sample period or validation ie, the three years following the in sample selection period, and then investigate the returns for evidence of persistence. We construct three portfolios by giving equal weights to each manager in each group. During the in-sample development period, we do not see any significant distinction in returns, standard deviations, and sharpe ratios; however, the number of consecutive months with up or down performance—another measure of persistence— increases from low to high hurst portfolio. When we analyze the results within the out-of-sample validation period, we see that the high hurst portfolio has the highest rate of return with the lowest volatility, and therefore the highest sharpe ratio. Equally the high hurst portfolio demonstrates the lowest maximum drawdown, the highest calmar ratio, the largest number of up months, and the highest number of months with consecutive gains.

Our findings show that during the out-of-sample validation period, portfolios containing persistent managers significantly outperform portfolios with managers having little or no persistence. It would therefore appear conclusive that one should in general prefer managers with relatively higher hurst exponents

As the next step, we further analyze the high hurst managers and, given the importance we place on capital conservation, eliminate those with high downside risk. To define this parametrically, we use the d-statistic, which compares the value and frequency of a manager's losing months to his or her winning months. This statistic makes no assumptions about a manager's return distribution and is therefore particularly suitable for this asset class. The d-statistic is defined as follows:

$$\mathrm{D} - \mathrm{statistic} = \frac{sum|negative\ returns|}{sum|all\ returns|}$$

The D-statistic thus defined ranges from 0 to 1,with D = 0 representing a return distribution with no downside risk and D = 1 representing one in which a manager has no positive returns. We therefore are predisposed to managers with low d-statistics.

The low d portfolio also has the highest sharpe ratio, lowest maximum drawdown, the highest calmar ratio, the highest number of up months, and the highest number of months with consecutive gains.

These results indicate that a pure, non-relative, measure of persistence such as the hurst exponent, in combination with a downside risk measure such as the d-statistic to filter negative persistence, is a very powerful tool for selecting managers with consistently good performance and generally lower volatility and downside risk.

Formally the alpha t-statistic is defined as T(alpha) = â std(â) this statistic is important because the magnitude of T(alpha) measures the “significance” of the manager’s alpha. A value above 1.645 suggests that the manager has been able to generate persistent positive alpha over time (it is significant at a 5% significance level). A value below this threshold suggests that the manager’s actual alpha may be zero or even negative. A value above 1.645 suggests that the manager has been able to generate persistent positive alpha over time (it is significant at a 5% significance level). A value below this threshold suggests that the manager’s actual alpha may be zero or even negative.

$$T_{(alpha)} = \frac{\hat{a}}{std(\hat{a})}$$

MONITORING OF HEDGE FUND

Risk analysis at a general level should include monitoring variables such as value-at-risk, conditional value-at-risk, and performing stress tests at both fund and aggregate levels. At a more specialized level, idiosyncratic risk such as optionality, liquidity, and spread blowout risk should be tailored to the individual strategy. However, we describe a measure called “omega” that was recently developed by Keating and Shadwick [2002]. In addition, murphy [2002] suggests that widely used statistical measures of investment risk have significant limitations and introduces omega to capture higher levels of information. Omega is applied to the performance history and monitors the ongoing profile of a fund’s risk over time at a level that takes into account the distribution of returns unlike “average” value measures such as volatility. We further find this measure to be particularly sensitive to the investor utility function and therefore effective in determining redemption risk. Omega can be calculated as follows:

$$\Omega(L) = \frac{\int_b^L \big(1 - F(r)\big)dr}{\int_a^L F(r)dr}$$

Where L is the required return threshold, a and b are the return intervals, and f(r) is the cumulative distribution of returns below threshold L.

Omega involves partitioning returns into loss and gain above and below a required return threshold and then considering the probability-weighted ratio of returns above and below partitioning. It therefore employs all the information contained within the return series. In the discrete case, with equal frequency, we can write:

$$\Omega(L) = \frac{\sum_{a}^{b} Max(0, R^{+})}{\sum_{a}^{b} Max(0, \left|R^{-}\right|)}$$

Where R positive (negative) is the return above (below) a threshold l.

In this convention, therefore, high omegas are to be preferred to low omegas at equal points of the threshold. It is important to note that in keeping with the philosophy of this article the omega function is equivalent to the return distribution itself, rather than being an approximation of it.

Unlike moment information, it does not lose any information and is therefore as statistically significant as the return series itself. No assumptions about distribution function, risk preferences, and utility function are necessary. By definition, since it contains all higher moments, it is particularly well suited for the performance measurement of hedge funds in a very elegant fashion.

Omega measure reveals all the information contained within return series, and is very useful in identifying changes in a manager’s risk profile and performance. This would be an especially helpful tool for the ongoing monitoring process, since the purpose of that process is to capture any changes in a manager’s risk profile and performance attributes.

DE-SELECTION OF HEDGE FUNDS

Without transparency it is not always possible to identify funds that are in distress and could eventually liquidate by simply examining monthly returns. These findings imply that besides receiving monthly performance data, it is critical to have transparency as to the manager's portfolio and communications on a regular basis to identify distress. In particular, in keeping with the results of the logit analysis presented in the last section that identified a variety of factors relevant to the stability of client capital such as poor performance, short lockup periods, and short redemption notice as criteria pertinent to liquidation.

PRIVATE EQUITY

Private equity investments are emblematic of the innovative and potentially very high-performing assets that make up the spectrum of alternative investments. The key feature of private equity is its illiquidity. As in the case of private real estate, illiquidity provides higher return potential but requires expanded tool sets to be effectively selected and managed. For example, investing in private equity funds often entails requirements to contribute additional capital to the fund (capital calls), causing net negative cash flows for several years.

Data paucity, limited benchmarking possibilities and the long time lag between commitment decisions and performance outcomes makes private equity fund due diligence more difficult.

GENERAL CRITERIA FOR MANAGER SELECTION

1.Performance track record

Standard performance measures, such as IRR and performance quartiles, as well as the ‘delta IRR’ ie, the difference between actual IRR and the average IRR of a fund’s same-vintage and same-stage peers. We considered either the ‘latest mature’ fund or the average of all prior funds. Whenever performance data from several prior funds is used, their performance is aggregated by weighting funds by both their size and their duration. This is the closest possible approximation of the overall performance of the GP.

A general partner(GP) is a part-owner of a partnership business and is involved with its operations and shares in its profits.

2. Dealflow

- An important aspect to look at is the ability of a GP to generate an appropriate and stable flow of investments. This ability can be assed using two complementary measures.

First, the percent of fund size invested (measured as of year 4 after vintage) for the 'latest mature' fund. This variable captures if the GP was able to find enough investments opportunities to invest the capital raised in the most recent mature fund.

Second, the variance in number of deals per year of the GP prior to focal fund vintage, which measures whether investments occurred regularly or in waves, where the latter could be interpreted as a possible indication of lower dealflow generation ability.

3.GP experience

The number of prior funds raised by the GP and second as the count of the number of prior investments made by the GP prior to the focal fund's vintage (incl. Multiple investment rounds).

4. Differences between the focal and prior funds

We capture this effect by including the percentage change in fund size between focal fund and latest mature predecessor fund in the analysis

FACTORS THAT CORRELATE WITH FUTURE PERFORMANCE

After doing a bivariate correlation analysis that documents which of the different GP characteristics are significantly correlated with the ultimate performance (IRR) of the focal fund. Several observations are in order. First of all, we find support for the view that measures of past performance of a GP's funds (as of the vintage year of the focal fund) are strongly correlated with the subsequent performance of the next fund raised by this GP. Interestingly, measures of relative performance (latest mature delta IRR, overall weighted delta IRR, overall weighted quartile) show stronger correlations than comparable measures of absolute performance (latest mature IRR, overall weighted IRR).

This suggests that performance persistence is driven by a GP's ability to repeatedly generate returns that are higher than those of a peer group of comparable funds, rather than to always generate returns of the same magnitude. At the same time, the bivariate analysis also shows support for the importance of GP experience as a determinant of future returns of the focal funds: funds raised by GPs with either a larger number of prior funds or a larger number of prior deals perform better ceteris paribus.

RANDOM CHOICE VS. THE CRYSTAL BALL: AN APPROACH TO MEASURING PE FUND SELECTION EFFICIENCY

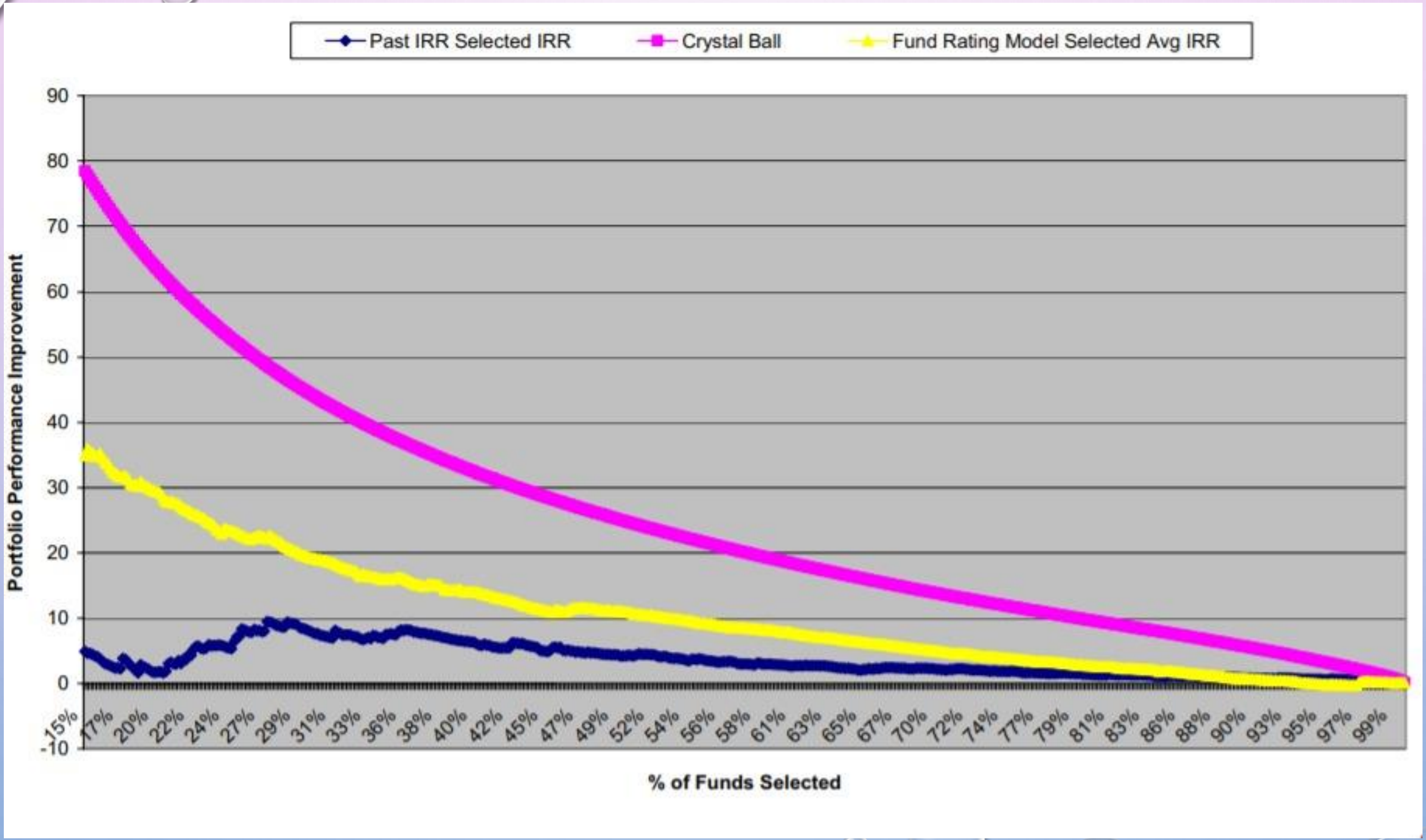
First determine the upper and lower 'benchmark performance' values for alternative fund selection rules.

This **lower bound benchmark** corresponds to the return an investor would have enjoyed had she invested proportionally in all private equity funds offered – or in a random sub-set of those. Any efficient fund selection rule should be able to lead to an average performance above this value.

To assess how efficient different criteria are, it is further important to assess the distribution of returns in the fund population. We need to know the aggregate performance of the best 10%, 11%, 12% of funds in the population and so forth. We determine these values by ranking all focal funds in the population by their end-of-life performance and plot the cumulative average performance of the best 10%, 11%, 12% etc. Of these funds relative to the average as the purple line in figure on slide 32.

- The corresponding line can be interpreted as the result of a ‘**crystal ball**’ fund selection device through which an investor would have perfectly foreseen the future performance of each focal fund at its vintage and invested accordingly. This selection device is obviously impossible to realize, as the exact future performance of proposed funds is unknown

  However it constitutes a good upper benchmark in terms of selection efficiency that alternative selection schemes can be compared to.



Past IRR Selected IRR
Crystal Ball
Fund Rating Model Selected Avg IRR
Portfolio Performance Improvement
90
80
70
60
50
40
30
20
10
0
-10
15%
17%
20%
22%
24%
27%
29%
31%
33%
36%
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45%
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61%
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67%
70%
72%
74%
77%
79%
81%
83%
86%
88%
90%
93%
95%
97%
99%
% of Funds Selected

PERACS PRIVATE EQUITY SELECTION EFFICIENCY MEASURE(PESEM)

$$PESEM = \frac{\int \text{AVERAGE PERFORMANCE OF ALL FUNDS} - \text{AVERAGE PERFORMANCE OF THE BEST X\% OF THE FUNDS}}{\int \text{AVERAGE PERFORMANCE OF ALL PE FUNDS} - \text{CRYSTAL BALL LINE}}$$

We can use these previously developed upper and lower benchmarks to assess and compare the selection efficiency of different fund selection rules in the following way. If we take a given criterion (for example past performance) and apply it to the historic data to select, for example 20% of the overall population, we can compare the average performance of this choice to the true top 20% of the entire population. PESEM allows us to comprehensively quantify and compare the selection efficiency of different fund selection methods.

The PESEM can be interpreted as follows→ a PESEM of 50% enables investors (on average) to reach a level of performance improvement over the average portfolio equivalent to half the improvement that a true crystal-ball device would have generated

A slightly more sophisticated version of a past performance based selection scheme ranks all focal funds by the weighted average IRR of all their predecessor funds and invests into the top x% of funds according to this ranking. We assess the performance of the best 10%, 11%, 12% etc. Of funds according to this list and plot the results as the blue line in figure.

We note that surprisingly, selection schemes based only on past GP performance were historically not very efficient at identifying a high-performing portfolio.

Ingredients of an efficient fund selection model

Key to improving fund selection is the correct combination of multiple criteria. One concrete example is a proprietary fund selection model that has been jointly developed by the due diligence advisory firm PERACS.

It is based on a multifactor fund rating metric that combines different measures of performance track record, dealflow, GP experience and differences between the focal and prior funds. The selection rule increased portfolio performance substantially. The yellow line in figure compares the performance of the portfolio of the best x% of funds selected by this fund rating model to the performance of the crystal ball upper benchmark, as well as to the previously used past performance-based selection results.

If this multi-factor fund rating model has a PESEM of 35%, in other words it enables investors to reach a level of performance improvement over the average portfolio equivalent to 35% of the improvement that a crystal-ball choice would have generated.

MONITORING AND EXIT

Monitoring private equity fund investments may provide relatively diminished benefits because an investor's options are more limited than in the case of public investments as a result of potentially unattractive exit values and limited control over managers. Nevertheless, monitoring is advisable and limited partners can play valuable roles in working with fund managers. As the fund managers are likely to launch a new private equity fund in some future vintage year, this monitoring activity can be quite valuable—particularly when considering which upcoming fund launches the investors would like to allocate to. PE firms acquire businesses with the intent to exit at a higher equity value than was initially invested. A typical timeframe of an exit ranges between five and seven years. Most private equity investors require an expected IRR in excess of 25% before considering undertaking an LBO of a potential target company. Typically, senior members of the investment team will be required to make critical assumptions on the potential exit multiple (EBITDA and P/E) and the maximum amount of debt load the target company can handle to achieve such high returns without taking on excessive risk. The focus is typically on the multiple of invested capital rather than the IRR, because the focus is on obtaining a higher total equity return more so than on receiving the investment back in a shorter time period

CONCLUSION

In this quantitative framework, we proposed the use of several general and fund specific parameters that can be used as screening factors in the manager selection, monitoring and de-selection of Alternative investments.

But it is definitely not a substitute for rigorous qualitative due diligence.