Alignment Capital Group, LLC

Diagnosis and Prognosis

Example Critique of a Private Market Portfolio
as of June 30, 2001

April 2, 2002

Executive Summary

Overall Summary

CLIENT's private equity portfolio has outperformed the S&P 500 benchmark and has a Sharpe ratio (return per degree of risk) that is slightly less than, but comparable to, the index. It is extremely important to note that CLIENT's current benchmark, 500 basis points over the S&P 500, is therefore inappropriate. Given the risk and return characteristics of both the CLIENT private equity portfolio and the public market index, all return in excess of the index should be viewed as alpha and the benchmark should be the index itself, with nothing added for additional risk.

The private equity portfolio also has a low correlation with itself (internal correlation) and with the S&P 500 index (external correlation). Depending upon the liquidity constraints typical of a mature pension plan, this may mean that CLIENT's asset allocation to private equity is lower than it could be and/or should be.

Diversification analysis shows reasonably good diversification in the CLIENT portfolio, with only approximately 28% of the outcome of any particular private investment associated with the outcome of the other investments in the portfolio. The TME-based SIRS diversification analysis, on the other hand, estimates that approximately 98% of the outcome of any particular private market investment is associated with the outcome of the other investments in the portfolio. This contrast between IRR-based and TME-based diversification analysis is the result of the relative youth of the CLIENT portfolio – early in the life of a portfolio small TME differences cause large IRR differences, so the small differences in TME make the portfolio appear to be undiversified and the large differences in IRR make the portfolio appear to be highly diversified. At this writing, we believe that the preponderance of the analytical evidence shows that CLIENT's portfolio is well diversified and that the results of effective diversification, which include very low or no nonsystematic risk and, because of low correlation with the index, low or no systematic risk as well, are likely to continue to benefit the portfolio over the long run.

ALIGNMENT CAPITAL

Summary of Analyses

This report is broken into three main sections: diagnosis, prognosis and market outlook.

Diagnosis consists of analysis of CLIENT's return against the benchmark; performance attribution; portfolio return, risk and correlation; and degree of diversification.

- Return against benchmark (page **Error! Bookmark not defined.**)

	CLIENT	S&P 500	Diff.	CLIENT Value > S&P 500
Total Portfolio	15.9%	12.2%	377 bp	$598.4
Total Portfolio w/o Asset #1	16.4%	11.7%	468 bp	$649.0
Total Portfolio w/o 1994 Mgr. #1	13.5%	11.4%	205 bp	$288.3
Total Portfolio w/o Asset #2	17.4%	13.4%	402 bp	$595.3
Total Portfolio w/o Venture	11.4%	10.1%	124 bp	$124.3
Sub-Asset Classes				
Buyouts	13.0%	10.2%	274 bp	$171.9
Venture Capital	23.1%	17.1%	607 bp	$474.1
Asset #2	5.7%	5.6%	15 bp	$3.1
Asset #1	12.4%	14.8%	-249 bp	($50.6)

CLIENT's private market portfolio has shown good performance, especially in light of the relatively low risk and correlation of the portfolio that make the private market portfolio's return entirely alpha (excess return, *see* Portfolio return, risk and correlation on page .

The international portfolio's returns have been low, indicating a need to rethink the strategy and execution of this sub-asset class. The timber program is too small to affect the overall portfolio at this point.

- Performance attribution

	Selection	Timing
Total Portfolio	-2.09%	-2.35%
Buyouts	0.63%	1.78%
Venture Capital	1.27%	-2.90%
Asset #2	1.67%	0.53%

The total CLIENT private market portfolio shows a negative return to selection skills of -2.09%, which is damaging but not disastrous, and a negative return to timing (over which the staff has no control other than a disciplined vintage cost averaging program). The positive return to selection skills in the venture capital and international portfolios are good. Most of the negative selection effect occurred in just two vintage years and involved just four buyout investments, which skewed that sub-asset class; otherwise, selection skills were remarkably consistent over the life of the portfolio. The negative return to timing skills

indicates that CLIENT should implement an effective vintage cost averaging program across the sub-asset classes. The positive selection skills in the international portfolio demonstrate the importance of sub-asset allocation: even though investments were selected well, the international sub-asset class detracted from overall portfolio return and added risk.

- Portfolio return, risk and correlation

	Sharpe Ratio 1926-1987	Sharpe Ratio 1926-2000	Sharpe Ratio 1988-2000
S&P 500 Index	.57	.64	1.17
Total Portfolio	.40	.43	0.62
Total Portfolio w/o Asset #1	.40	.43	0.62
Total Portfolio w/o 94 Mgr. #1	.38	.41	0.58
Total Portfolio w/o Asset #2	.62	.65	0.91
Total Portfolio w/o Venture	.09	.10	.15
Sub-Asset Classes			
Buyouts	.23	.24	.30
Venture Capital	.76	.80	1.12
Asset #2	.20	.24	.47

The CLIENT private market portfolio, as well as all its sub-asset classes (except buyouts in one period and international in all three periods) displayed Sharpe ratios less than but comparable to the S&P 500 over three different time periods, two of which incorporated the longest bull market in history. The venture capital portfolio was demonstrably superior to the S&P 500 index in all time periods. This is good performance overall, although, again, the international portfolio's results indicate a need to rethink the strategy and execution of that program.

- Degree of diversification

	Estimated Correlation Coefficient, IRR Basis	Estimated Correlation Coefficient, TME Basis
Total Portfolio	.5	.9+
Buyouts	.3	-.2
Venture Capital	.6	.9
Asset #2	-.6	-.5

On an IRR basis, CLIENT's total private market portfolio is reasonably well diversified, an outstanding attribute in helping to diversify the entire pension plan's investments. On a TME basis, on the other hand, CLIENT's portfolio appears to be almost completely undiversified. These two results can be explained, in part, by the behavior of the venture capital portfolio, a sub-asset class that tends to be highly correlated. The most important reason for the apparent lack of TME-based diversification, however, is the relative youth of the CLIENT portfolio. Immature portfolios show little variation in TME, since most

of the investments have yet to write their investments either up or down and the overall TME therefore hovers around 1. *See* the TME bubble chart in Overview of the Portfolio on page . As the portfolio matures, its TME diversification will follow suit. The international sub-asset class apparently contributed to overall diversification, although for other reasons its performance detracts from overall returns.

Prognosis uses the outcome of the diagnosis above to estimate the future return, risk and correlation characteristics of the CLIENT private market portfolio. After reviewing all of the analysis and taking into account the market outlook[1], we believe that the CLIENT portfolio will continue to outperform the public markets over the long run. We have recommended that CLIENT take certain steps to increase the return and decrease the risk of the portfolio in Section VII Recommendations Based on the Analysis on p. .

[1] The Market Outlook beginning on page . examines current trends in the public and private equity markets likely to affect the future of the CLIENT private market portfolio and, indeed, the entire CLIENT private investment program.

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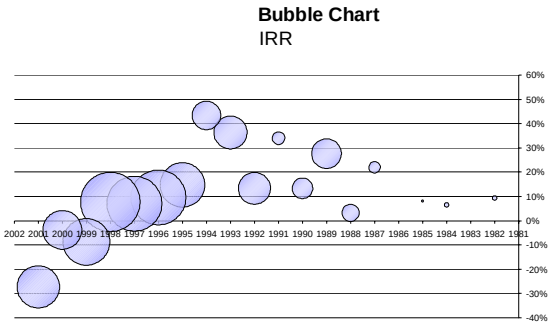
I. Introduction

A. Introduction: Risk

The term "risk" is used in an extremely specific way in this report. While in most of the financial literature risk is synonymous with the amplitude of fluctuations in asset price over short time periods (usually months or quarters), in this paper risk is defined as ***the likelihood of a predicted outcome***. The use of outcomes, particularly with regard to completely or almost completely realized investments, lends a degree of certainty to private market investment risk that pricing (which is inherently subjective, sticky and, at times, self-serving in the private markets), cannot. For an introduction to outcomes-based risk assessment, *see* Long, "Inferring Periodic Variability of Private Market Returns as Measured by σ from the Range of Value (Wealth) Outcomes over Time," *The Journal of Private Equity*, Summer 1999, p. 68. For an outcomes-based assessment of reinvestment risk, *see* Long, "Quantification of Reinvestment Risk in the Private Investment Portfolio," *The Journal of Private Equity*, Spring 2001, p. 70.

B. Overview of the Portfolio

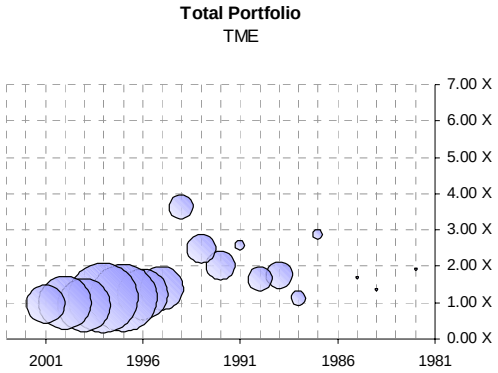
The CLIENT private market portfolio exhibits the following relationship between and among the returns (the *y* axis) to each vintage year (the *x* axis, note that the scale has been inverted to illustrate the j-curve) and the amount committed by vintage year (the size of the associated bubble):



This view of the portfolio makes it clear that the CLIENT private investment program was substantially larger in the 90s than it was in the 80s, a disparity that distorts overall IRR calculations. Since the later vintage years of the late 90s are still in the j-curve, it is difficult to say what the returns to the overall portfolio will be once the returns of those years become known. However, because of the degree of diversification of the portfolio it is likely that overall portfolio returns, whether measured in terms of IRR or in terms of TME (times money earned) are likely to improve substantially over the next few years.[2]

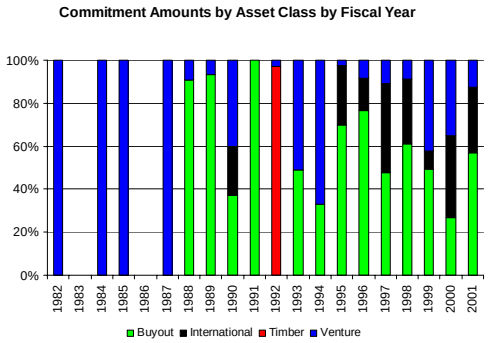
[2] For the reasons why effective diversification decreases both nonsystematic and systematic risk and enhances return, see Long and Nickels, *Portfolio Structure and Effective Diversification of*

Another view of CLIENT's portfolio shows the following TME relationships:

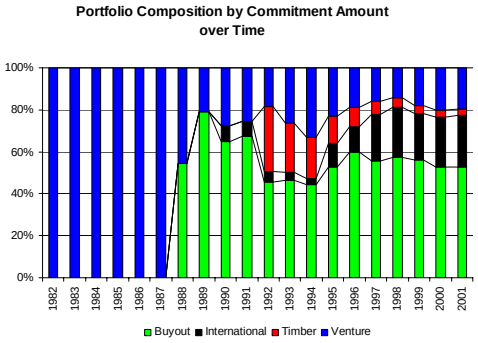


Note the consistency in terms of TME of vintages 1995 through 2001. It is this consistency that results in a finding of low diversification across vintages in the SIRS analysis below (*see* p. 29 *et. seq*.).

The following graph displays the percentage of commitments for each sub-asset of CLIENT's portfolio by vintage year…



…which ultimately resulted in the following cumulative sub-asset allocation over the years:



Risk in the UTIMCO Private Market Portfolio (unpublished confidential white paper, April 2001), attached.

As these graphs make clear, CLIENT's private market portfolio consisted solely of venture capital until 1987, after which buyouts became and remained the predominant sub-asset class. Asset #2 private market investments began in 1990 and, after a four-year hiatus, became a regular feature of CLIENT's commitments in 1995 and thereafter.[3] The single timber investment in 1992 has been sufficiently diluted at this writing to be immaterial in terms of affecting overall private market portfolio performance. Thus, the consistent theme of CLIENT's private market portfolio for most of the dollars invested has been to invest in venture capital, international private equity and buyouts with what appears to be a target allocation of 20% venture, 25% Asset #2 and 55% buyouts. This report will review each of these sub-asset classes in detail, in addition to how they result in overall private market portfolio performance.

C. How to read this report

This report examines various attributes of CLIENT's private market portfolio, using analytical methods developed by the authors, to determine (1) performance against a benchmark return; (2) performance attribution; (3) risk taken in the portfolio versus that of the public markets; and (4) degree of diversification.

Put another way, this report sets out in detail (1) how CLIENT's private market portfolio has performed; (2) how the performance was achieved; (3) the risk incurred in achieving the performance; and (4) the contribution of diversification to minimizing risk. The paragraphs following describe and explain the quantitative analyses used by Alignment Capital Group to make these determinations. For further information on the statistical methods employed, *see* Long and Nickels, *A Primer on Statistics for Use in Understanding Alignment Capital Group Reports*, last revised February 14, 2002.

1. The Index Comparison Method (ICM)

The ICM is an investment performance benchmark, based on the opportunity cost of investing in a public market index (or any other liquid investment with readily available time series data). The ICM allows the analyst to compare private market and public market returns. It. calculates the value that a benchmark index would have produced had the same amounts been invested into and withdrawn from the benchmark index with the same timing as a private market investment. The ICM uses the resulting value to calculate a benchmark IRR that is directly comparable to the private market IRR. It is generally (but erroneously) accepted among U.S. pension funds and other institutional investors that private market returns should be higher than the ICM-based public market benchmark (usually the S&P500) to

[3] Although the lack of return to timing in terms of performance attribution implies a dollar cost averaging program (*see* Executive Summary above), these inconsistencies in sub-asset commitments should be addressed in a formal strategic plan with a target sub-asset allocation and implementation schedule.

compensate for the additional risk, generally described as various difficulties and costs associated with investing in the private market. As this critique of the CLIENT portfolio makes clear, the relatively low risk, as defined, of the private equity portfolio (which is, in any event, not higher than the public markets for its return[4]) and its lack of correlation with the public market,[5] dictates that any return over that of the benchmark should be viewed as excess return or alpha.

The ICM results in the pages below take the following form, using CLIENT's total private market portfolio results as an example:

	Investment Dates			Net		Remaining	Multiple Earned			IRR		Value >
	Beginning	Ending	Yrs Held	Invested	Realized	Valuation	Realized	Valuation	Total	Fund	S&P	S&P
Total Portfolio	**12/30/82**	**6/30/01**	**18.5**	**$4,707.1**	**$2,790.0**	**$3,697.2**	**0.59 X**	**0.79 X**	**1.38 X**	**15.94%**	**12.17%**	**$598.4**

The first six columns are relatively self-explanatory. The three Multiple Earned columns express the absolute numbers in the preceding three columns as a ratio of return relative to investment. Thus, cash realization of $2,790 on an investment of $4,707 represents a multiple earned (in the pages below this is usually referred to as times money earned or TME) of $2,790 / $4,707 = 0.59. Or, using cash received of $2,790 plus remaining valuation of $3,697, the result is a TME of 1.38 ($2,790 + $3,697) / $4,707 = 1.38).

The IRR columns contain the private market IRR and the index IRR as determined by the ICM. The result of subtracting the index IRR from the private market IRR is that CLIENT has outperformed the S&P 500 index by 377 basis points (15.94% - 12.17% = 3.77%) since the inception of the private market portfolio.

The Value > S&P column represents the dollar amount of relative performance, expressed as the private market terminal value subtracted from the public market index terminal value. Negative values indicate that the public market has outperformed the private market investment; positive numbers indicate that the private market investment has outperformed the public market. As the table above shows, CLIENT's private market portfolio has produced $598.4 million in value in excess of the index. Put another way, had the same dollars been invested in the index and distributed from the index with the same timing as the private investment portfolio, the index would have produced a value $598.4 million less than the private market portfolio.

[4] *See* Opportunity Cost Outcomes Method (OCOM) Plot – Return, Risk and Correlation on page 27 *et. seq*.

[5] *Ibid.*

2. Neutrally-Weighted Portfolio (NWP) performance attribution[6]

The NWP performance attribution method breaks private market investment performance down into two categories: timing and selection. The reports in the pages below take the following form:

Performance Attribution - Total Portfolio

	$	Time	Explanation	Total Portfolio
I	Neutral Weight	Zero-based	Portfolio index, common start date	20.38%
II	Actual	Zero-based	Actual weights, common start date	18.29%
III	Neutral Weight	Actual	Neutral-weight portfolio, actual start dates (timing)	16.93%
IV	Actual	Actual	Actual weights, actual timing (conventional IRR)	15.94%

I	Portfolio index	20.38%
II - I	Selection (relative weighting) against portfolio index	-2.09%
IV - II	Timing	-2.35%
IV	Manager's return	15.94%
IV - I	Manager's contribution	-4.45%
IV - III	Selection (relative weighting) against actual outcome	-0.99%

The portfolio index denoted by **I** in the table above is not the same calculation as the index return calculated by the ICM in the previous section. The ICM calculates the performance of a public market index versus the private market investment or portfolio. The portfolio index denoted by **I** in the table above assumes that the investments in the portfolio comprise the index – in other words, that the investments in the portfolio are the entire universe of possibilities, without regard to the rest of the market. The purpose of the NWP performance attribution analysis is not to determine whether the portfolio performed well against a benchmark, which is the function of the ICM. Rather, it is to determine how well the managers managed their portfolio. Effective managers put the most money into the best investments and the least money into the under-performing investments. Poor managers do the opposite. Our experience with NWP analysis indicates that the most common cause of consistently poor investment results is personal attachment, whether to an investment manager, sub-asset class, geographic location, industry or investment style, leading to excessive investment in the face of underperformance. Outstanding investment results, on the other hand, are usually the result of effective diversification and constant attention to pruning the portfolio of under-performing assets by seeking the best investments in the current market.

The importance of performance attribution is that, to the extent that performance was the result of timing, it is unlikely to be repeated. On the other hand, to the

[6] Patent pending.

extent that performance was the result of investment selection it is likely to be repeated. Repeatability of performance (or the lack thereof) directly affects the risk of the portfolio.

The table above shows that the CLIENT private market portfolio exhibits –2.09% returns to investment selection. In other words, if an equal amount of money had been invested in each investment in the portfolio, the IRR of the portfolio would have been 2.09% higher, a meaningful but not disastrous effect. The improvements suggested by this result are primarily in the processes for sub-asset allocation and manager selection. The effect of timing was to decrease returns by 2.35%, although it is important to understand that timing is not entirely within the control of the CLIENT staff. However, timing, too, can be improved upon by employing a disciplined dollar cost averaging strategy while implementing an effectively diversified sub-asset allocation.

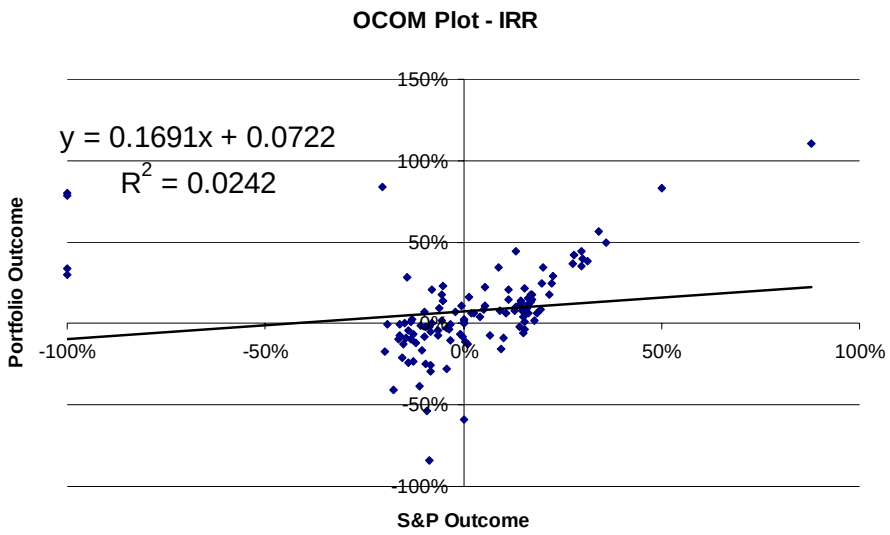
3. The Opportunity Cost Outcomes Method (OCOM) plot and determination of portfolio risk and correlation with the public markets[7]

The OCOM plot uses the ICM result above, an exact and direct computation of opportunity cost in terms of the benchmark, to calculate the excess return (alpha) and the risk of a private market portfolio in terms of outcomes. The ratio of risk to return is termed the Sharpe ratio, perhaps the most important measurement of portfolio efficiency. The OCOM plot can also be used to determine the degree to which the private market portfolio's return is correlated with the return to the public market benchmark.

The optimal OCOM plot is slightly negatively sloped (i.e., has a low negative beta reflecting effective diversification and a low correlation with the public market) and a positive alpha (excess return over the public market). Overall, the optimal OCOM plot requires optimal sub-asset allocation, discipline in adhering to it year by year in a dollar cost averaging program and excellent manager selection skills.

The following OCOM plot analyzes the total CLIENT private market portfolio:

[7] Patent pending.



The trend line in this graph is calculated using linear regression; the formula shown is in the form $y = \beta x + \alpha$. The β *(beta)* term is the slope of the regression line, a measure of the non-diversifiable risk measured by the relationship between the private market portfolio investment outcomes and the public market index outcomes that are their opportunity costs. A high β means that the investment outcomes in the private market fluctuate more (up or down) than the associated public market outcomes, while, as in the graph above, a low β of 0.1691 means that private market investment outcomes fluctuate less (up or down) than those of the public market. The α (*alpha*) term is the point at which the linear regression line intersects the *y*- axis (a measure of the excess return to be expected from the private markets, 7.22% in the graph above). In other words, alpha is the amount the portfolio would be expected to return when the public market has a zero return.

The R^2 term is called the coefficient of determination; its square root, usually denoted as *r(*also denoted as ρ, the Greek letter *rho,* in some texts*)*, is called the coefficient of correlation. The coefficient of correlation should be thought of as the degree to which the movement of the dependent variable (the *x*-axis, in this case the ICM return to the S&P 500) is associated with the movement of the independent variable (the *y*-axis, in this case the return to the investments in the CLIENT private market portfolio). In the terms shown in the graph above, the coefficient of correlation is the degree to which the investment outcome of the private market is associated with the investment outcome of public market index. Thus, since $R^2 = .0242$ in the graph above, then $r = 0.1556$, meaning that about 15% of the investment outcome of the CLIENT private market portfolio is associated with the outcome of the same cash flows in the

public markets. This is a very good result for the portfolio. Given good returns against the benchmark and a Sharpe ratio (return per degree of risk) that is comparable to the public markets, the lower the correlation of the private market portfolio with the public markets, the better.

As shown in the table below, given knowledge of the risk and return characteristics of the public market and the private market portfolio parameters derived from the graph above, it is possible to calculate the risk of the private market portfolio and thus its Sharpe ratio.

Risk of the Total Portfolio (Individual Investment Basis)

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

				**		Calculated by Alignment Capital Group			
				1926-1987		1926-2000		1988-2000	
			S&P 500 arithmetic mean	12.0%		13.0%		17.6%	
			S&P 500 sigma	21.1%		20.2%		15.1%	
			Sharpe ratio		**0.57**		**0.64**		**1.17**
	y = βx + α								
	β	α	R^2	σ_{VC}	Sharpe	σ_{VC}	Sharpe	σ_{VC}	Sharpe
Total Portfolio by Individual Investment	0.1691	0.0722	0.0242	22.9%	**0.40**	21.9%	**0.43**	16.4%	**0.62**

** Per Ibbotson & Sinquefield, "Stocks, Bonds, Bills and Inflation: Historical Returns (1926-1987)", Dow Jones Irwin 1989, p. 72, Exhibit 19

Because the private equity portfolio's σ (standard deviation or sigma) is calculated by reference to the public market index, we have used three time periods in the history of the public market index: 1926-1987, the original Ibbotson & Sinquefield study; 1926-2000, which updates the original Ibbotson & Sinquefield study through the bull market of the 80s and 90s; and 1988 through 2000, the biggest bull market in history.

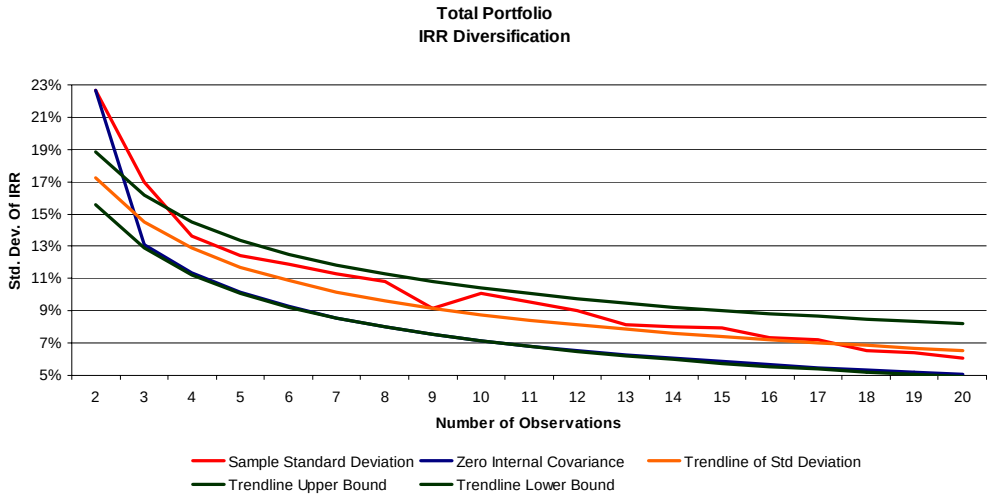
This table shows that the CLIENT private market portfolio has a Sharpe ratio of 0.40 versus the original Ibbotson & Sinquefield study's 0.57 for the public market. Using the S&P 500 1988-2000 time period, which includes the biggest bull market on record, the CLIENT private market portfolio shows a Sharpe ratio of 0.62, a little more than half the public market's 1.17. These results show that CLIENT's private equity portfolio is somewhat riskier than the public market – although it is generating higher returns.

The rest of the OCOM plot results in the body of this report are shown in the summary form of the table above. A complete set of OCOM plots, together with such statistical descriptors as the students *t* test, is in Appendix B.

4. Sequential Incremental Random Sampling (SIRS) determination of portfolio internal correlation[2]

SIRS makes it possible to determine a portfolio's degree of diversification. Fisher and Lorie[8] proved that portfolio diversification minimizes risk if the assets in the portfolio are not highly correlated. However, Fisher and Lorie worked with public market data. Alignment Capital Group has developed a diagnostic analysis using a technique similar to that of Fisher and Lorie to determine the correlation of assets in the private market portfolio. This analytical method employs sequential incremental random sampling (SIRS), the mechanics of which are described in detail in Appendix D.

The red line in the following graph depicts the result of the SIRS analysis for CLIENT's entire private market portfolio:

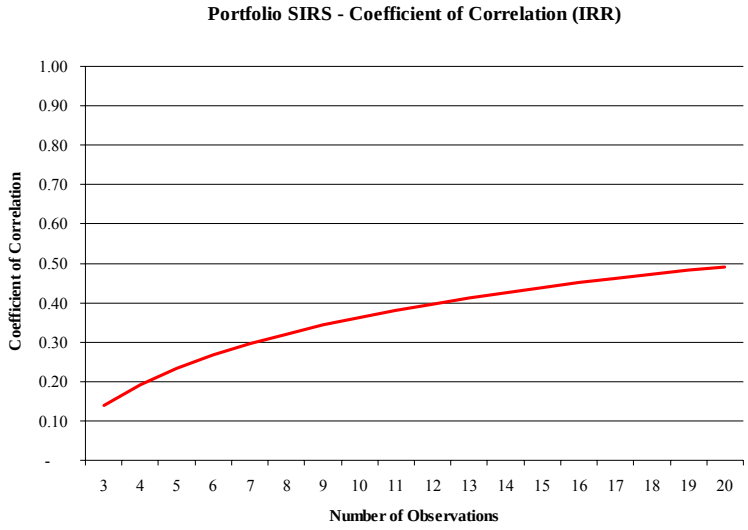


The amber line, is the trend line of the actual data shown in the red line. The blue line is a theoretically perfect SIRS plot with zero average correlation between random groups of assets. The green bands on either side of the amber line represent one standard deviation above and below the trend (a probability of 68%, meaning that plot points inside the green bands have a 68% probability of being within the trend). CLIENT's actual results (the red line) and the trend line of those results (the amber line) above the blue line reflect positive covariance (i.e., correlation); actual and/or trend results below the blue line would reflect negative covariance (i.e., negative correlation). It is possible, by determining the distance between the blue line and the amber line (a subject dealt with in some detail in Appendix D), to calculate the average coefficient of correlation of the assets in the portfolio – in effect, how well the assets in the portfolio are correlated with each

[8] Fisher, Lawrence and Lorie, James H., "Some Studies of the Variability of Returns on Investments in Common Stocks," *Journal of Business*, p. 43, April 1970 (University of Chicago Press).

other. Low internal correlation in the portfolio is highly desirable, since low internal correlation in turn makes it highly likely that the portfolio is not correlated with the public markets, i.e., if one asset is perfectly correlated with the public markets and the rest of the assets are not correlated with the first asset, then by definition, the rest of the assets are not correlated with the public markets. Note that CLIENT's lower green band almost exactly overlaps the blue line representing zero covariance, a result that can be interpreted to mean that there is a substantial likelihood that CLIENT's overall portfolio IRR diversification has a 68% chance of being optimal.

The graph below displays the correlation coefficient *r* (*rho*) calculated by analyzing the trend line of CLIENT's actual results.



The conclusion, using unadjusted actual data, is that the internal correlation coefficient of CLIENT's private market portfolio is about 0.50, which implies reasonably good diversification, although CLIENT's diversification can be improved upon by optimizing sub-asset allocation and focusing on risk/return/diversification issues in asset allocation and in the manager selection process.

This report also analyzes the CLIENT private market portfolio in segments, including sub-asset classes and vintages, to see which portions of the portfolio have low internal correlation and which portions do not. The SIRS results in the body of this report are summarized in graphic form; Appendix D contains detailed computations and graphs.

II. Index Comparison Method (ICM) – Benchmark Return

A. **Total Portfolio**

	Investment Dates			Net		Remaining	Multiple Earned			IRR		Value >
	Beginning	Ending	Yrs Held	Invested	Realized	Valuation	Realized	Valuation	Total	Fund	S&P	S&P
Total Portfolio	**12/30/82**	**6/30/01**	**18.5**	**$4,707.1**	**$2,790.0**	**$3,697.2**	**0.59 X**	**0.79 X**	**1.38 X**	**15.94%**	**12.17%**	**$598.4**

CLIENT's total private market portfolio has outperformed the S&P 500 since 1982 by 377 basis points since inception, good comparative performance. This performance has produced $598.4 million of value in excess of the benchmark (i.e., the value the S&P 500 would have produced had the same amounts been invested into and withdrawn from the S&P 500 with the same timing). The rapid increase in portfolio commitments over the last few years has resulted in a relatively low TME (times money earned, or investment return multiple) of 1.38 (including ending value). However, given the quality of the managers selected and the fair amount of diversification of the portfolio, we believe that this return is likely to increase as the portfolio matures.

Stressing the portfolio by removing certain assets or sub-asset classes makes clear the relative contribution these assets generate for the portfolio. For example, Asset #1 has under-performed relative to the other asset classes on an IRR basis, so removing Asset #1 from the portfolio results in increasing its IRR (and increases its return relative to the index). However, Asset #1 has outperformed on a TME basis and removing it from the portfolio reduces the overall TME:

	Investment Dates			Net		Remaining	Multiple Earned				IRR		Value >
	Beginning	Ending	Years Held	Invested	Realized	Valuation	Realized	Valuation	Total	S&P	Fund	S&P	S&P
Ex-Timber	**12/30/1982**	**6/30/2001**	**18.5**	**$4,528.8**	**$2,720.9**	**$3,421.4**	**0.60 X**	**0.76 X**	**1.36 X**	**1.21 X**	**16.40%**	**11.72%**	**$649.0**

The portfolio at this point would have performed better without its Asset #2 component than with it in both IRR and TME basis (although the cost in terms of value in excess of the index is negligible):

	Investment Dates			Net		Remaining	Multiple Earned				IRR		Value >
	Beginning	Ending	Yrs Held	Invested	Realized	Valuation	Realized	Valuation	Total	S&P	Fund	S&P	S&P
Ex-Intl.	**12/30/1982**	**6/30/2001**	**18.5**	**$3,638.5**	**$2,459.4**	**$2,853.8**	**0.68 X**	**0.78 X**	**1.46 X**	**1.30 X**	**17.39%**	**13.37%**	**$595.3**

Conversely, without its venture capital sub-allocation the portfolio would have performed significantly worse:

	Investment Dates			Net		Remaining	Multiple Earned				IRR		Value >
	Beginning	Ending	Years Held	Invested	Realized	Valuation	Realized	Valuation	Total	S&P	Fund	S&P	S&P
Ex-VC	**12/31/88**	**6/30/01**	**12.5**	**$3,851.0**	**$1,716.6**	**$3,032.2**	**0.45 X**	**0.79 X**	**1.23 X**	**1.20 X**	**11.37%**	**10.13%**	**$124.3**

Even a single major asset can make a difference in the overall portfolio, as indicated by the portfolio's return without the 1994 Mgr. #1:

	Investment Dates			Net		Remaining	Multiple Earned				IRR		Value >
	Beginning	Ending	Years Held	Invested	Realized	Valuation	Realized	Valuation	Total	S&P	Fund	S&P	S&P
Ex-Warburg	**12/30/1982**	**6/30/2001**	**18.5**	**$4,607.1**	**$2,430.6**	**$3,535.6**	**0.53 X**	**0.77 X**	**1.30 X**	**1.23 X**	**13.45%**	**11.40%**	**$288.3**

B. Sub-Asset Classes

1. Buyouts[9]

	Investment Dates			Net		Remaining	Multiple Earned				IRR		Value >
	Beginning	Ending	Years Held	Invested	Realized	Valuation	Realized	Valuation	Total	S&P	Fund	S&P	S&P
Buyout	12/31/88	6/30/01	12.5	$2,604.2	$1,317.0	$1,913.0	0.51 X	0.73 X	1.24 X	1.17 X	12.98%	10.24%	$171.9
1988	12/31/88	6/30/01	12.5	$72.2	$83.2	$.3	1.15 X	0.00 X	1.16 X	2.57 X	4.34%	15.25%	($102.2)
1989	6/30/89	6/30/01	12.0	$138.1	$240.4	$3.9	1.74 X	0.03 X	1.77 X	0.91 X	30.89%	-100.00%	$118.2
1990	5/10/90	6/30/01	11.1	$77.3	$110.1	$1.8	1.42 X	0.02 X	1.45 X	1.74 X	13.60%	16.88%	($22.5)
1991	1/7/91	3/7/00	9.2	$34.1	$88.1	$.0	2.58 X	0.00 X	2.58 X	0.26 X	33.87%	-100.00%	$79.0
1993	9/23/94	6/30/01	6.8	$108.9	$150.1	$65.1	1.38 X	0.60 X	1.98 X	1.38 X	41.87%	27.90%	$65.4
1994	2/1/94	6/30/01	7.4	$55.6	$27.1	$23.1	0.49 X	0.42 X	0.90 X	1.68 X	-3.33%	15.31%	($42.9)
1995	8/4/95	6/30/01	5.9	$345.0	$195.4	$210.5	0.57 X	0.61 X	1.18 X	1.37 X	7.07%	13.28%	($67.0)
1996	6/28/96	6/30/01	5.0	$507.1	$208.1	$432.0	0.41 X	0.85 X	1.26 X	1.22 X	11.69%	9.96%	$22.4
1997	3/24/97	6/30/01	4.3	$381.0	$88.4	$356.7	0.23 X	0.94 X	1.17 X	1.04 X	9.37%	2.27%	$49.5
1998	1/8/98	6/30/01	3.5	$634.4	$112.9	$603.6	0.18 X	0.95 X	1.13 X	0.99 X	8.07%	-0.59%	$87.8
1999	3/29/99	6/30/01	2.3	$170.8	$4.5	$148.1	0.03 X	0.87 X	0.89 X	0.93 X	-14.68%	-9.59%	($6.2)
2000	7/26/00	6/30/01	0.9	$57.7	$2.8	$53.1	0.05 X	0.92 X	0.97 X	0.88 X	-4.49%	-16.66%	$5.0
2001	4/13/01	6/30/01	0.2	$22.0	$6.1	$14.9	0.28 X	0.68 X	0.95 X	0.99 X	-45.83%	-7.51%	($.9)

As the table above demonstrates, CLIENT's buyout portfolio has outperformed the S&P 500 by 274 basis points since 1988, creating $171.9 million of value in excess of the benchmark. The buyout portfolio's performance is therefore less than the performance of the total portfolio, indicating that this asset class has had less of a return than some of the other sub-asset classes. However, the buyout portfolio contains most of the newest and largest investments and as this asset class ages its returns will improve. By vintage year, comparative performance ranges from the 13,089 basis point out-performance of the 1989 vintage year to the 1,864 basis point underperformance in the 1994 vintage. On the whole, 7 vintages outperformed the index and 6 vintages under-performed it. Of the vintages that have under-performed we believe that 1995 needs to be watched closely as it is of the age where performance should be increasing rapidly.

Viewing buyouts on a worldwide basis (i.e., including both domestic and international buyouts in a single functional portfolio) and breaking the worldwide buyout portfolio by size of fund, the results were as follows:

	Investment Dates			Net		Remaining	Multiple Earned				IRR		Value >
	Beginning	Ending	Years Held	Invested	Realized	Valuation	Realized	Valuation	Total	S&P	Fund	S&P	S&P
Large Buyout	**12/31/1988**	**6/30/2001**	**12.5**	**$2,890.7**	**$1,439.9**	**$2,136.9**	**0.50 X**	**0.74 X**	**1.24 X**	**1.16 X**	**13.14%**	**9.66%**	**$230.1**
Mid Buyout	**2/23/1996**	**6/30/2001**	**5.3**	**$230.5**	**$23.0**	**$170.9**	**0.10 X**	**0.74 X**	**0.84 X**	**1.07 X**	**-9.10%**	**3.40%**	**$52.1**
Small Buyout	**4/19/1996**	**6/30/2001**	**5.2**	**$35.9**	**$9.6**	**$27.7**	**0.27 X**	**0.77 X**	**1.04 X**	**1.06 X**	**1.99%**	**2.94%**	**$.7**

While large buyouts have outperformed mid- and small-market buyouts in CLIENT's portfolio, it is our experience that it is possible to build a portfolio of small- and mid-market buyout investments that outperforms the large funds. Although the small-and mid-market funds in CLIENT's portfolio are relatively

[9] The **Amount > S&P** column does not foot due to the various effects of time and dollar weighting on the pooled totals that comprise the vintages and the sub-asset class total. S&P IRRs of –100% represent private market outperformance sufficient to drive the index so negative as to lose the entire investment in the index.

young, dating from 1996, these results indicate a need to improve the due diligence model used in manager selection for the small- and mid-markets.

2. Venture Capital[10]

	Investment Dates			Net		Remaining	Multiple Earned				IRR		Value >
	Beginning	Ending	Years Held	Invested	Realized	Valuation	Realized	Valuation	Total	S&P	Fund	S&P	S&P
Venture Capital	**12/30/82**	**6/30/01**	**18.5**	**$856.1**	**$1,073.4**	**$665.0**	**1.25 X**	**0.78 X**	**2.03 X**	**1.48 X**	**23.14%**	**17.07%**	**$474.1**
1982	12/30/82	11/16/95	12.9	$5.0	$9.6	$.0	1.91 X	0.00 X	1.91 X	4.03 X	9.26%	16.15%	($10.6)
1984	12/31/84	11/13/98	13.9	$5.0	$6.8	$.0	1.36 X	0.00 X	1.36 X	3.17 X	6.43%	15.77%	($9.0)
1985	12/31/85	11/13/98	12.9	$2.0	$3.3	$.0	1.67 X	0.00 X	1.67 X	3.20 X	8.01%	14.87%	($3.1)
1987	12/15/87	12/31/98	11.0	$25.0	$72.1	$.0	2.89 X	0.00 X	2.89 X	1.02 X	22.04%	5.50%	$46.6
1988	6/29/88	6/30/01	13.0	$5.0	$1.3	$1.7	0.27 X	0.34 X	0.61 X	3.97 X	-5.64%	15.28%	($16.8)
1989	1/25/89	6/30/01	12.4	$10.7	$16.9	$1.3	1.57 X	0.13 X	1.70 X	2.67 X	10.35%	16.02%	($10.4)
1990	12/22/88	6/30/01	12.5	$74.0	$125.9	$8.0	1.70 X	0.11 X	1.81 X	1.93 X	13.82%	14.64%	($9.2)
1992	4/3/92	6/30/01	9.2	$6.0	$16.0	$7.6	2.66 X	1.27 X	3.93 X	2.28 X	31.96%	23.84%	$9.9
1993	5/19/93	6/30/01	8.1	$102.6	$277.8	$33.2	2.71 X	0.32 X	3.03 X	2.16 X	34.38%	27.47%	$89.1
1994	11/29/94	6/30/01	6.6	$102.0	$359.3	$164.2	3.52 X	1.61 X	5.13 X	2.10 X	55.70%	33.83%	$309.6
1995	2/21/95	6/30/01	6.4	$11.0	$48.2	$10.9	4.38 X	0.99 X	5.37 X	2.21 X	60.03%	40.10%	$34.7
1996	10/10/96	6/30/01	4.7	$50.0	$36.5	$25.9	0.73 X	0.52 X	1.25 X	1.33 X	11.47%	14.32%	($3.9)
1997	1/29/97	6/30/01	4.4	$118.9	$78.4	$96.1	0.66 X	0.81 X	1.47 X	1.20 X	19.26%	9.50%	$31.5
1998	6/26/98	6/30/01	3.0	$84.0	$6.6	$93.5	0.08 X	1.11 X	1.19 X	0.94 X	13.66%	-5.02%	$21.6
1999	1/13/99	6/30/01	2.5	$166.8	$12.0	$137.7	0.07 X	0.83 X	0.90 X	0.90 X	-8.96%	-8.99%	$.1
2000	3/29/00	6/30/01	1.3	$68.3	$2.6	$65.0	0.04 X	0.95 X	0.99 X	0.89 X	-1.30%	-14.05%	$6.7
2001	6/4/01	6/30/01	0.1	$19.7	$.0	$19.7	0.00 X	1.00 X	1.00 X	1.00 X	0.00%	0.00%	$.0

The venture capital portfolio outperformed the index by 607 basis points since 1982, producing $474 million in excess value an excellent overall result. Venture capital is by far the best performing asset class in the portfolio. The 1994 vintage was the greatest single contributor to excess value, with Mgr. #1 almost the entire source of return for the vintage. Although 9 vintages outperformed the index while 7 under-performed it, the under-performing vintages are relatively smaller in amounts invested (albeit at earlier dates) than the outperforming vintages, thus resulting in superior overall portfolio performance.

3. Asset #2[2]

	Investment Dates			Net		Remaining	Multiple Earned				IRR		Value >
	Beginning	Ending	Years Held	Invested	Realized	Valuation	Realized	Valuation	Total	S&P	Fund	S&P	S&P
International	**6/14/90**	**6/30/01**	**11.0**	**$1,068.6**	**$330.6**	**$843.4**	**0.31 X**	**0.79 X**	**1.10 X**	**1.10 X**	**5.72%**	**5.57%**	**$3.1**
1990	6/14/90	6/30/01	11.0	$30.0	$43.7	$8.8	1.46 X	0.29 X	1.75 X	2.44 X	11.71%	16.52%	($20.8)
1995	6/28/95	6/30/01	6.0	$119.9	$120.3	$69.7	1.00 X	0.58 X	1.59 X	1.36 X	24.20%	17.36%	$27.1
1996	2/23/96	6/30/01	5.3	$91.9	$18.3	$74.6	0.20 X	0.81 X	1.01 X	1.31 X	0.37%	9.19%	($27.5)
1997	1/10/97	6/30/01	4.5	$329.2	$52.9	$264.1	0.16 X	0.80 X	0.96 X	1.02 X	-2.05%	1.03%	($18.3)
1998	2/13/98	6/30/01	3.4	$305.8	$78.6	$252.7	0.26 X	0.83 X	1.08 X	0.98 X	5.41%	-1.09%	$30.5
1999	4/20/99	6/30/01	2.2	$49.8	$13.9	$38.9	0.28 X	0.78 X	1.06 X	0.93 X	5.33%	-6.69%	$6.6
2000	1/10/00	6/30/01	1.5	$123.7	$2.8	$116.9	0.02 X	0.95 X	0.97 X	0.92 X	-5.57%	-13.95%	$6.1
2001	4/3/01	6/30/01	0.2	$18.3	$.0	$17.6	0.00 X	0.96 X	0.96 X	0.99 X	-25.38%	-6.19%	($.6)

CLIENT's international portfolio outperformed the index by only 15 basis points since inception and produced only $3.1 million of excess value. These results are similar to the index return; thus, if no other value can be attributed to the Asset #2 portfolio, perhaps CLIENT should rethink its efforts in this asset class.

[10] *See* footnote 1 above.

From a geographic perspective, the European and Latin American investment strategies seems to have had the best outcome, although all the investments except for the Global strategy are really too early to tell. The Global strategy has not performed well.

	Investment Dates			Net		Remaining	Multiple Earned				IRR		Value >
	Beginning	Ending	Years Held	Invested	Realized	Valuation	Realized	Valuation	Total	S&P	Fund	S&P	S&P
Asia	10/1/1996	6/30/2001	4.7	$179.3	$29.8	$146.3	0.17 X	0.82 X	0.98 X	1.05 X	-1.07%	2.78%	($11.9)
Emerging Markets	8/21/1997	6/30/2001	3.9	$48.4	$9.2	$32.3	0.19 X	0.67 X	0.86 X	0.95 X	-10.40%	-3.18%	($4.7)
Europe	3/8/1996	6/30/2001	5.3	$273.3	$94.0	$202.6	0.34 X	0.74 X	1.09 X	1.04 X	5.63%	2.94%	$11.4
Global	6/14/1990	6/30/2001	11.0	$306.3	$141.6	$240.5	0.46 X	0.79 X	1.25 X	1.26 X	10.21%	10.71%	($4.7)
Latin America	2/23/1996	6/30/2001	5.3	$261.3	$56.0	$221.6	0.21 X	0.85 X	1.06 X	1.01 X	4.48%	0.96%	$12.9

4. **Asset #1**

	Investment Dates			Net		Remaining	Multiple Earned			IRR		Amt >
	Beginning	Ending	Years Held	Invested	Realized	Valuation	Realized	Valuation	Total	Fund	S&P	S&P
Timber	**1/9/92**	**6/30/01**	**9.5**	**$178.3**	**$69.0**	**$275.8**	**0.39 X**	**1.55 X**	**1.93 X**	**12.35%**	**14.84%**	**($50.6)**

The CLIENT timber investment has underperformed the index by 249 basis points, although its small size produces little effect at the overall portfolio level.

C. Investment Managers

The ICM calculations for CLIENT's investment relationships and for the individual funds managed by those relationships are in Appendix A (attached).

III. Neutrally-Weighted Portfolio (NWP) – Performance Attribution

The NWP method uses an attribute of portfolio internal rates of return, in conjunction with the time-zero method of calculating IRR (see the glossary for the zero-based methodology), to determine performance attribution in the private market portfolio. Performance is attributed to timing and investment selection. One of the remarkable features of this analysis is that the outcome is expressed in terms of three IRRs that foot to a fourth IRR (the actual/actual IRR of the AIMR standard). Thus, there are no intervening unexplained factors other than those expressed as the performance attribution outcomes.

A. Portfolio

Performance Attribution - Total Portfolio by Asset

	$	Time	Explanation	Total Portfolio
I	Neutral Weight	Zero-based	Portfolio index, common start date	20.38%
II	Actual	Zero-based	Actual weights, common start date	18.29%
III	Neutral Weight	Actual	Neutral-weight portfolio, actual start dates (timing)	16.93%
IV	Actual	Actual	Actual weights, actual timing (conventional IRR)	15.94%

I	Portfolio index	20.38%
II - I	Selection (relative weighting) against portfolio index	-2.09%
IV - II	Timing	-2.35%
IV	Manager's return	15.94%
IV - I	Manager's contribution	-4.45%
IV - III	Selection (relative weighting) against actual outcome	-0.99%

As noted above, the CLIENT private market portfolio exhibits –2.09% returns to investment selection, a meaningful but not disastrous effect. Further details below, analyzing performance attribution by vintage year, isolate most of the causes of negative return to investment selection in three investments in two vintage years. In terms of sub-asset classes, most of the negative investment selection effect stems from over-weighting the buyout portfolio relative to the venture portfolio. The effect of timing was also negative, although the only effect the CLIENT staff can have on timing is a disciplined vintage cost averaging program.

In some cases, a single highly successful investment can make a large difference in the performance attribution of the entire portfolio. For example, performance attribution would suffer noticeably without the Mgr. #1 1994 fund (although note that the performance attributable to timing does not change, a good indicator of vintage year diversification):

Performance Attribution - Total Portfolio w/o Warburg

	$	Time	Explanation	
I	Neutral Weight	Zero-based	Portfolio index, common start date	19.50%
II	Actual	Zero-based	Actual weights, common start date	13.51%
III	Neutral Weight	Actual	Neutral-weight portfolio, actual start dates (timing)	19.81%
IV	Actual	Actual	Actual weights, actual timing (conventional IRR)	13.45%

I	Portfolio index	19.50%
II - I	Selection (relative weighting) against portfolio index	-6.00%
IV - II	Timing	-0.05%
IV	Manager's return	13.45%
IV - I	Manager's contribution	-6.05%
IV - III	Selection (relative weighting) against actual outcome	-6.35%

Similarly, a single sub-asset class can have a marked effect on portfolio performance attribution, as in the case of venture capital:

Performance Attribution - Total Portfolio w/o Venture Capital

	$	Time	Explanation	
I	Neutral Weight	Zero-based	Portfolio index, common start date	8.20%
II	Actual	Zero-based	Actual weights, common start date	11.32%
III	Neutral Weight	Actual	Neutral-weight portfolio, actual start dates (timing)	8.27%
IV	Actual	Actual	Actual weights, actual timing (conventional IRR)	11.37%

I	Portfolio index	8.20%
II - I	Selection (relative weighting) against portfolio index	3.12%
IV - II	Timing	0.06%
IV	Manager's return	11.37%
IV - I	Manager's contribution	3.18%
IV - III	Selection (relative weighting) against actual outcome	3.11%

Note that removal of venture capital from the total portfolio actually improves the remaining portfolio's performance attributable to investment selection, while greatly decreasing total portfolio return. Removal of an outstanding sub-asset class demonstrating excellent investment selection skills leaves the remaining investments to be judged without reference to their superior counterparts in the venture capital portfolio. They are, instead, measured against each other. The contrast reveals that the total portfolio's poor overall investment selection performance attribution resulted from not putting sufficient funds into venture capital, the superior sub-asset class, as a result of poor sub-asset allocation.

The same basic analysis holds true for the Asset #2 sub-asset class, albeit with the opposite outcome:

Performance Attribution - Total Portfolio w/o International

	$	Time	Explanation	
I	Neutral Weight	Zero-based	Portfolio index, common start date	22.41%
II	Actual	Zero-based	Actual weights, common start date	17.72%
III	Neutral Weight	Actual	Neutral-weight portfolio, actual start dates (timing)	22.70%
IV	Actual	Actual	Actual weights, actual timing (conventional IRR)	17.39%

I	Portfolio index	22.41%
II - I	Selection (relative weighting) against portfolio index	-4.69%
IV - II	Timing	-0.34%
IV	Manager's return	17.39%
IV - I	Manager's contribution	-5.02%
IV - III	Selection (relative weighting) against actual outcome	-5.31%

Portfolio investment selection skills fall when the Asset #2 component is removed, while portfolio return rises, indicating that too much money has been invested into an under-performing sub-asset class. Again, this imbalance indicates a poor sub-asset allocation decision.

B. Sub-Asset Classes

1. Buyouts

Performance Attribution - Buyout Portfolio by Asset

	$	Time	Explanation	Total Portfolio
I	Neutral Weight	Zero-based	Portfolio index, common start date	10.57%
II	Actual	Zero-based	Actual weights, common start date	11.20%
III	Neutral Weight	Actual	Neutral-weight portfolio, actual start dates (timing)	14.49%
IV	Actual	Actual	Actual weights, actual timing (conventional IRR)	12.98%

I	Portfolio index	10.57%
II - I	Selection (relative weighting) against portfolio index	0.63%
IV - II	Timing	1.78%
IV	Manager's return	12.98%
IV - I	Manager's contribution	2.41%
IV - III	Selection (relative weighting) against actual outcome	-1.51%

The CLIENT buyout portfolio exhibits a negligible return to investment selection. This low level of selection return is not alarming at this early stage in the portfolio, but if it can be turned into a positive number the overall portfolio results would increase dramatically.

2. Venture Capital

Performance Attribution - Venture Capital Portfolio by Asset

	$	Time	Explanation	Total Portfolio
I	Neutral Weight	Zero-based	Portfolio index, common start date	24.77%
II	Actual	Zero-based	Actual weights, common start date	26.04%
III	Neutral Weight	Actual	Neutral-weight portfolio, actual start dates (timing)	19.04%
IV	Actual	Actual	Actual weights, actual timing (conventional IRR)	23.14%

I	Portfolio index	24.77%
II - I	Selection (relative weighting) against portfolio index	1.27%
IV - II	Timing	-2.90%
IV	Manager's return	23.14%
IV - I	Manager's contribution	-1.63%
IV - III	Selection (relative weighting) against actual outcome	4.11%

The CLIENT venture capital portfolio, on the other hand, shows investment selection returns of 1.27%, albeit with negative returns to timing.

3. Asset #2

Performance Attribution - International Portfolio by Asset

	$	Time	Explanation	Total Portfolio
I	Neutral Weight	Zero-based	Portfolio index, common start date	3.52%
II	Actual	Zero-based	Actual weights, common start date	5.19%
III	Neutral Weight	Actual	Neutral-weight portfolio, actual start dates (timing)	4.40%
IV	Actual	Actual	Actual weights, actual timing (conventional IRR)	5.72%

I	Portfolio index	3.52%
II - I	Selection (relative weighting) against portfolio index	1.67%
IV - II	Timing	0.53%
IV	Manager's return	5.72%
IV - I	Manager's contribution	2.21%
IV - III	Selection (relative weighting) against actual outcome	1.32%

The international portfolio has weak returns relative to venture capital and buyouts, although it has positive investment selection returns that are better than the buyout portfolio's. Given the poor ICM comparison of the international portfolio, the CLIENT staff may want to rethink the design and execution of the international private equity program.

It is important to consider, however, the results of determining performance attribution by geographical area to give some perspective on the international portfolio. If investment selection were materially worse in one geographic area, it

would show up in this analysis – but instead, it appears that no single geographic area dominates the buyout portfolio:

Performance Attribution - Worldwide Buyouts by Geographic Concentation

	$	Time	Explanation	Small	Medium	Large
I	Neutral Weight	Zero-based	Portfolio index, common start date	Only one occurrenc	-8.43%	13.34%
II	Actual	Zero-based	Actual weights, common start date		-9.39%	13.34%
III	Neutral Weight	Actual	Neutral-weight portfolio, actual start dates (timing)		-8.08%	13.55%
IV	Actual	Actual	Actual weights, actual timing (conventional IRR)		-9.10%	13.14%

I	Portfolio index		-8.43%	13.34%
II - I	Selection (relative weighting) against portfolio index		-0.95%	-0.01%
IV - II	Timing		0.29%	-0.19%
IV	Manager's return		-9.10%	13.14%
IV - I	Manager's contribution		-0.67%	-0.20%
IV - III	Selection (relative weighting) against actual outcome		-1.02%	-0.40%

The likely conclusion to be drawn is that the international portfolio is comparatively young and therefore its quality is as yet not fully determined. However, given the poor ICM score the due diligence process for the international program should be reviewed in order to determine how its roster of managers stacks up against the domestic equivalent in terms of track record and deal flow, in addition to the macroeconomic factors that are so critical to international investment.

4. **Asset #1**

The timber sub-asset class does not contain sufficient investments to make performance attribution possible.

C. **Vintage years**

Performance Attribution - Vintage Years

	$	Time	Explanation	1989	1990	1991	1992	1993	1994	1995	1996
I	Neutral Weight	Zero-based	Portfolio index, common start date	16.41%	12.94%	33.87%	23.88%	36.86%	40.12%	41.44%	7.16%
II	Actual	Zero-based	Actual weights, common start date	27.82%	13.32%	33.87%	13.20%	36.96%	46.08%	14.49%	9.68%
III	Neutral Weight	Actual	Neutral-weight portfolio, actual start dates (timing)	16.14%	13.00%	33.87%	23.64%	36.22%	36.94%	43.00%	7.07%
IV	Actual	Actual	Actual weights, actual timing (conventional IRR)	27.53%	13.36%	33.87%	13.18%	36.30%	43.42%	14.70%	9.62%
		I	Portfolio index	16.41%	12.94%	33.87%	23.88%	36.86%	40.12%	41.44%	7.16%
		II - I	Selection (relative weighting) against portfolio index	11.41%	0.38%	0.00%	-10.68%	0.10%	5.96%	-26.95%	2.52%
		IV - II	Timing	-0.29%	0.04%	0.00%	-0.02%	-0.66%	-2.66%	0.21%	-0.06%
		IV	Manager's return	27.53%	13.36%	33.87%	13.18%	36.30%	43.42%	14.70%	9.62%
		IV - I	Manager's contribution	11.12%	0.42%	0.00%	-10.70%	-0.56%	3.30%	-26.74%	2.46%
		IV - III	Selection (relative weighting) against actual outcome	11.39%	0.36%	0.00%	-10.46%	0.08%	6.48%	-28.30%	2.55%

This vintage year analysis stops in 1996 in order to insure that at least a substantial portion of the returns analyzed are outcomes – i.e., fully or partially realized. Most of the overall portfolio's negative selection returns can be ascribed to vintages 1992 and 1995. In 1992, CLIENT invested substantial capital in Hancock Asset #1 Partners, which did not perform well compared to the two other assets in that vintage, which were much smaller. In 1995, CLIENT invested substantial capital in managers #2, 3 and 4, all of which performed poorly compared to manager #5, a much smaller investment.

ALIGNMENT CAPITAL

IV. Opportunity Cost Outcomes Method (OCOM) Plot – Return, Risk and Correlation

The OCOM (Opportunity Cost Outcomes Method) plot uses ICM data points plotted with the public index on the *x* axis (the independent variable) and the private market returns on the *y* axis (the dependent variable). A least squares linear regression of the ICM data points yields a β (*beta*) quantifying the relationship between private market investment outcomes versus the outcomes of those same cash flows in the benchmark. It also, yields an α (*alpha*, the zero intercept on the *y*-axis, also known as excess return) quantifying the outcome return to be expected from the private markets given a zero outcome return to the public market index. The β of the OCOM plot can be used to calculate the correlation of the two returns and thus the correlation of the private market portfolio's outcomes with the opportunity cost outcomes of the public market index. This correlation figure, in association with the published figures available for the risk and return from the public market index, can be used to calculate the risk of the private market portfolio's outcomes, a measurement directly comparable to the risk of the public market.

The table below contains the α (*alpha*), β (*beta*), R^2 and σ (standard deviation or *sigma*, the amount by which a result can be expected to deviate from the mean with a probability of 68%) derived from the OCOM plots in Appendix B (attached) relating to the captioned portions of the portfolio. The table contains three sets of columns representing three different eras of the S&P 500: the 1926 to 1987 time period covered by the original Ibbotson & Sinquefield study; the period 1926 to 2000, incorporating the greatest bull market of all time in addition to the original Ibbotson & Sinquefield time period; and 1988 to 2000, the bull market period itself. Because the derived risk of the private market portfolio, sub-asset class or vintage year depends upon the related characteristics of the public markets, all three public market time periods are different and all are important in understanding the relative risks of the public and private markets.

Items in blue are statistically significant. Items in red are not.

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

				**		Calculated by Alignment Capital Group			
				1926-1987		1926-2000		1988-2000	
			S&P 500 arithmetic mean	**0.1200**		**0.1298**		**0.1759**	
			S&P 500 sigma	**0.2110**		**0.2017**		**0.1508**	
			Sharpe ratio		**0.5687**		**0.6433**		**1.1662**
	beta	alpha	R squared	σ	Sharpe	σ	Sharpe	σ	Sharpe
Total portfolio	0.1691	0.0722	0.0242	0.2294	0.4033	0.2192	0.4294	0.1639	0.6218
LBO portfolio	(0.0715)	0.0525	0.0065	(0.1871)	0.2347	(0.1789)	0.2416	(0.1338)	0.2985
VC portfolio	0.1601	0.1409	0.0254	0.2120	0.7554	0.2026	0.7979	0.1515	1.1158
International portfolio	1.0171	(0.0349)	0.2502	0.4290	0.2031	0.4101	0.2367	0.3067	0.4695

** Per Ibbotson & Sinquefield, "Stocks, Bonds, Bills and Inflation: Historical Returns (1926-1987)", Dow Jones Irwin 1989, p. 72, Exhibit 19

The most important aspect of the OCOM analysis in this table is the Sharpe ratio (return per degree of risk assumed) of CLIENT's private market portfolio and/or sub-asset classifications versus the public markets. As the

table indicates, the Sharpe ratio of the venture capital sub-asset class exceeds the Sharpe ratio of the public markets in two time periods and is approximately equal to the 1988-2000 bull market.

When stressed by the removal of various assets and/or sub-asset classes, CLIENT's results are quite stable, except for the omission of the international portfolio, which enables the entire portfolio to approximately equal the public markets; and the omission of the venture capital portfolio, which points up the importance of that sub-asset class in the portfolio:

Items in blue are statistically significant. Items in red are not.

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

				**		Calculated by Alignment Capital Group			
				1926-1987		1926-2000		1988-2000	
			S&P 500 arithmetic mean	**0.1200**		**0.1298**		**0.1759**	
			S&P 500 sigma	**0.2110**		**0.2017**		**0.1508**	
			Sharpe ratio		**0.5687**		**0.6433**		**1.1662**
	beta	alpha	R squared	σ	Sharpe	σ	Sharpe	σ	Sharpe
Total portfolio	0.1691	0.0722	0.0242	0.2294	0.4033	0.2192	0.4294	0.1639	0.6218
Total Portfolio w/o Timber	0.1686	0.0720	0.0240	0.2295	0.4019	0.2194	0.4279	0.1640	0.6197
Total Portfolio w/o Warburg Pincus 1994	0.1490	0.0687	0.0191	0.2275	0.3806	0.2175	0.4048	0.1626	0.5837
Total Portfolio w/o International	0.1033	0.1123	0.0117	0.2015	0.6188	0.1926	0.6526	0.1440	0.9058
Total Portfolio w/o Venture	0.0727	0.0126	0.0040	0.2425	0.0879	0.2318	0.0950	0.1734	0.1464

** Per Ibbotson & Sinquefield, "Stocks, Bonds, Bills and Inflation: Historical Returns (1926-1987)", Dow Jones Irwin 1989, p. 72, Exhibit 19

The overall conclusion of the OCOM plot analysis is that the CLIENT total portfolio has a slightly higher risk than the public markets but generates superior returns. The venture capital portfolio clearly has a better risk/return profile than the public markets, as the entire portfolio would without the international sub-asset class. With this overall level of risk (i.e., about the same as or slightly more than the public market), any return over the benchmark is outperformance and no additional amount need be added to adjust for "more risk" in the portfolio. Thus, the entire return of the CLIENT private market portfolio in excess of the public markets is alpha, or excess return.

ALIGNMENT CAPITAL

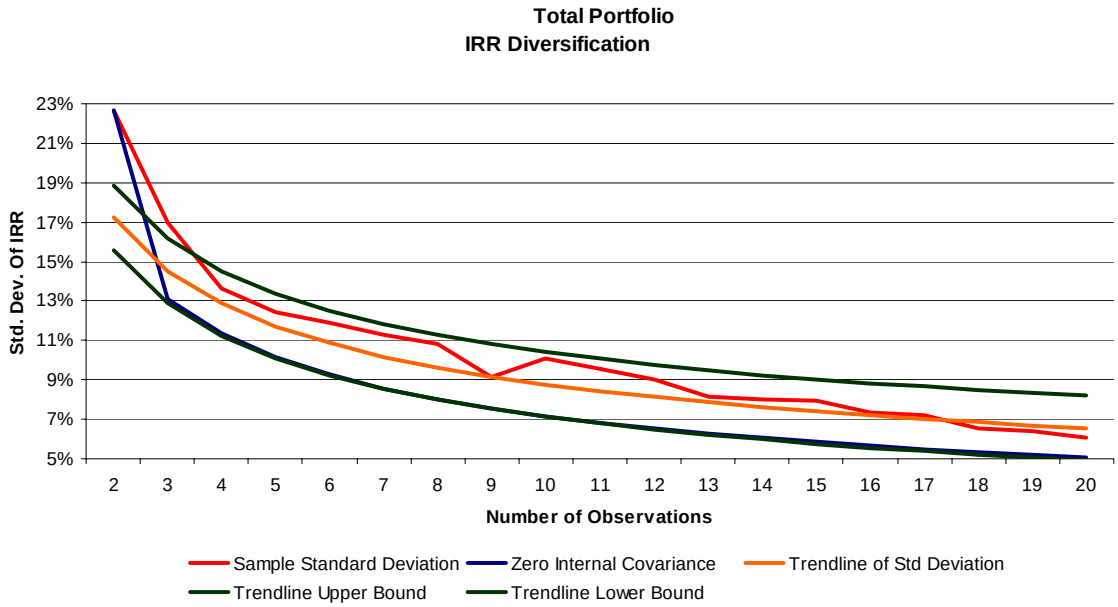
V. Sequential Incremental Random Sampling (SIRS) – Diversification

The SIRS method, the mechanics of which are described in detail in the Appendix D to this Portfolio Critique, is an empirical determination of the degree of diversification of a portfolio. SIRS works on all types of portfolios, including portfolios of oil & gas wells, bonds, stocks or private market assets. Its importance as a diagnostic lies in enabling a portfolio manager or CIO to determine the minimum number of assets required for effective diversification and to assess the need for adding additional assets to obtain the benefits of effective diversification.

A. Portfolio

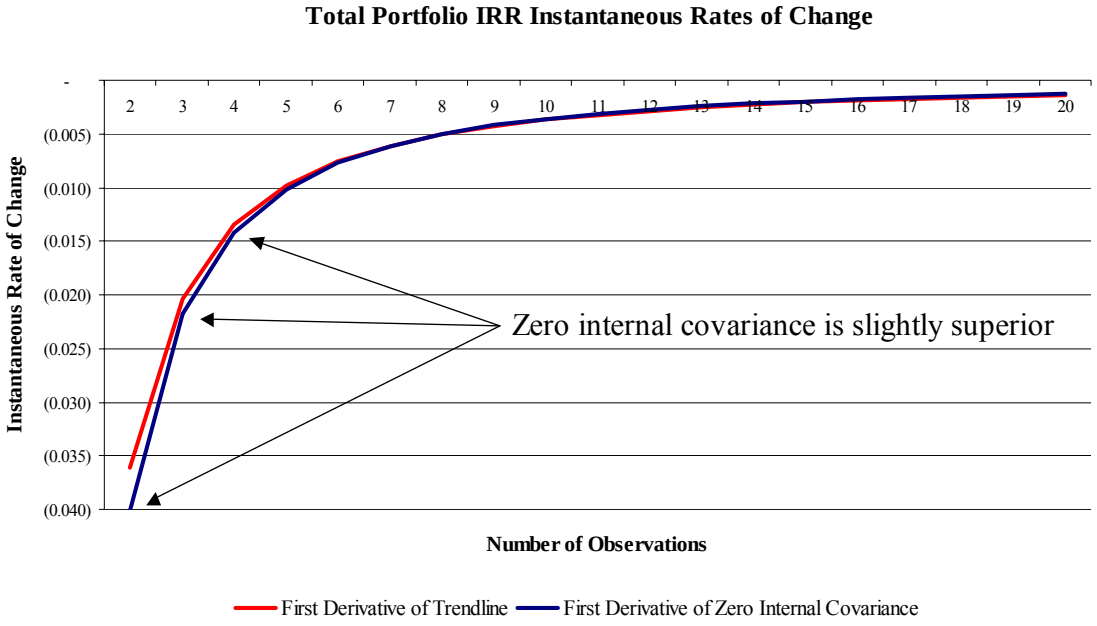
1. IRR basis

In the graph below, the blue curve represents perfect diversification (i.e., a portfolio comprised of assets with a mean coefficient of correlation of zero between randomly-selected pairs). The red curve is based on actual sequential incremental random sampling of the CLIENT portfolio and the green curves represent one standard deviation above and below the amber trend line (a 68% probability). It is clear that the blue curve and the bottom green curve overlap considerably, an indicator that the amber trend line and the blue zero-covariance line have a 68% chance of being statistically the same.

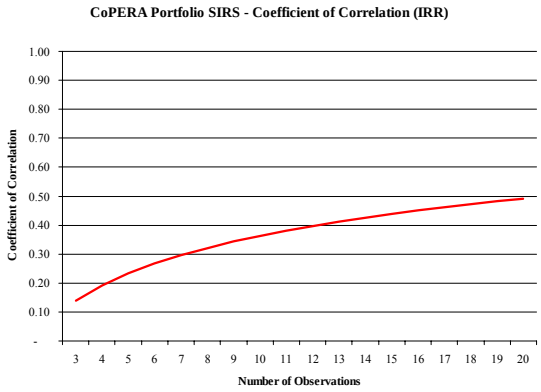


However, it is also clear from a plot of the first derivatives of these two curves that they are not parallel in the case of 2 through 4 observations. After five investments the two lines indicate that the

tangent to the zero covariance curve and the tangent to the trend line are parallel, which means that the zero covariance line and the trend line are parallel. Thus, after five investments, further investments up to twenty produce no tendency to make the trend line converge with the optimal zero covariance line (i.e., there is no convergence toward optimal diversification). We infer from this that most of the portfolio's diversification is achieved by sub-asset allocation (i.e., venture, buyouts, international and timber), and not by manager selection within each sub-asset.

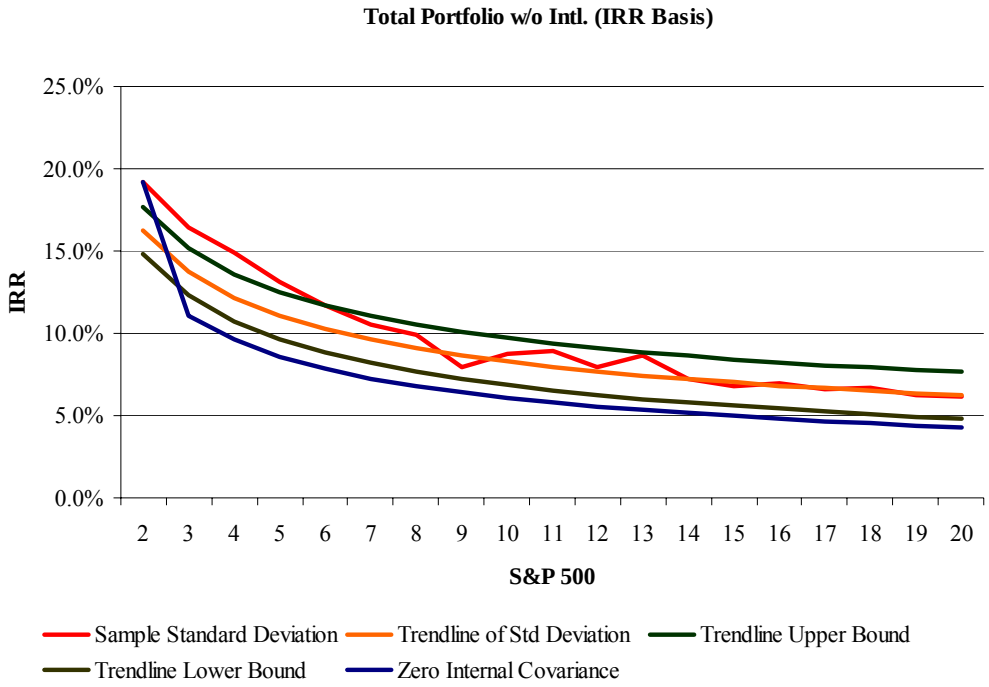


The graph below illustrates the calculated correlation coefficient *r* (*rho*) for the CLIENT private market portfolio calculated using the trend line of CLIENT's actual results:

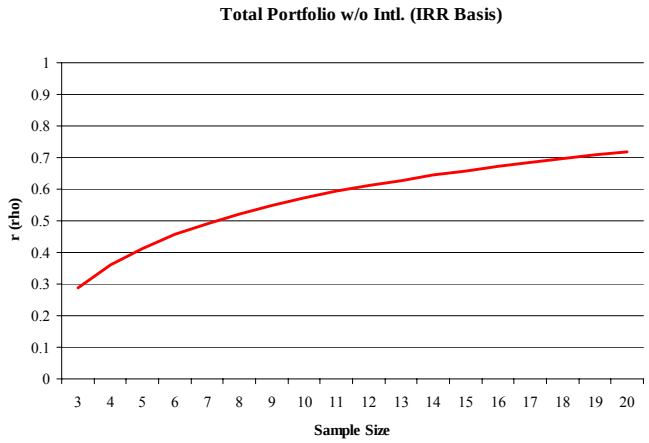


The conclusion using this trend line analysis is that the correlation coefficient approaches 0.50, implying reasonable diversification. However, this level of diversification can be improved upon by optimizing sub-asset allocation to include more venture and by focusing on better processes for individual manager selection.

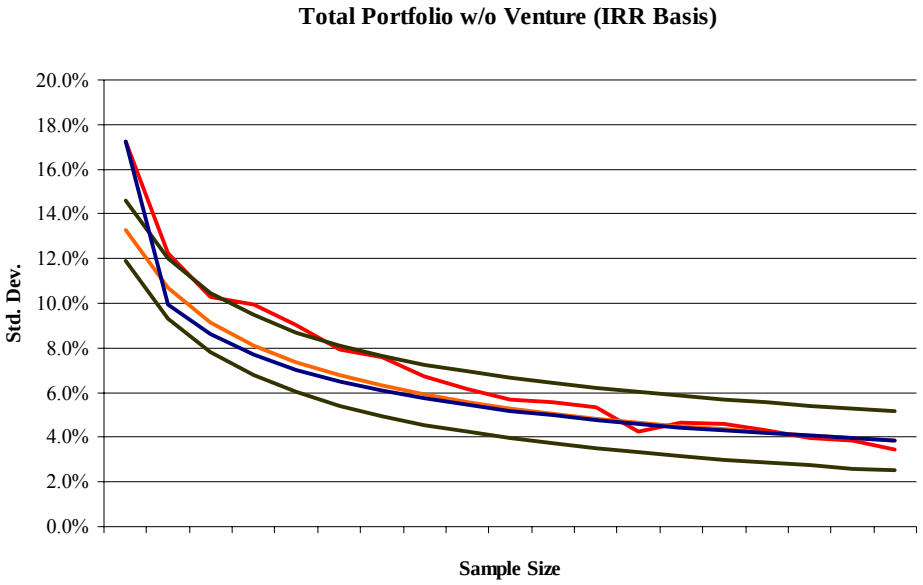
As one example, a SIRS plot of the CLIENT portfolio without the Asset #2 portfolio illustrates the effect of removing a sub-asset class:



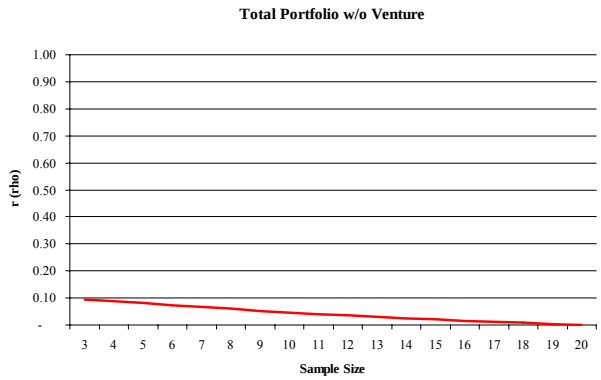
The resulting calculation of *r* (*rho* or ρ) indicates that the Asset #2 portfolio adds diversification to the portfolio, since portfolio internal correlation coefficient rises to 0.72 without it:



These results should be interpreted with caution, however, and only after comparing them to the relevant OCOM plot results for an understanding of the source(s) of diversification. That is to say, it is important to understand the amount of return lost in order to gain the additional diversification. As another example, the following SIRS plot relates to the CLIENT private equity portfolio without the venture capital sub-asset class:



This plot resulted in the following trend line for portfolio r (rho):

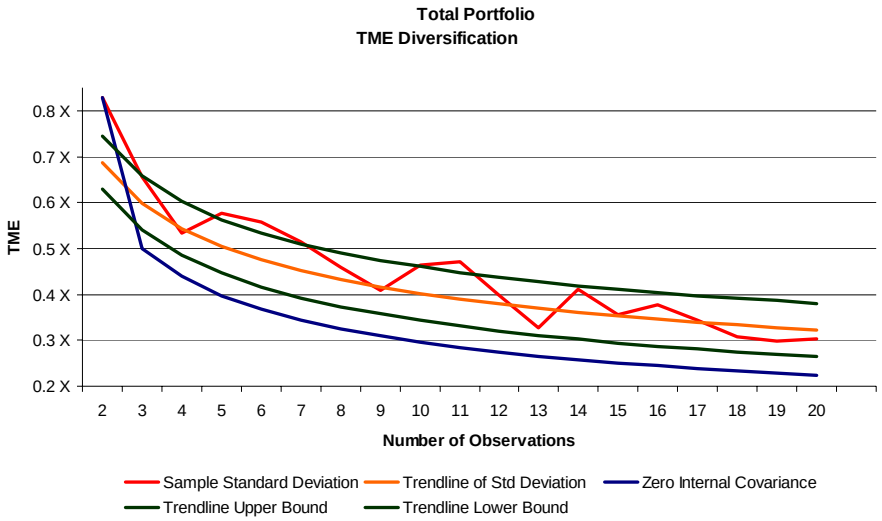


When venture capital is removed from CLIENT's portfolio, the remaining sub-asset classes affect each other more, resulting in nearly perfect lack of correlation with the index. The natural conclusion, if diversification were the only characteristic that matters, would be to gradually exit the venture capital sub-asset class. However, the OCOM plots above clearly show that the venture portfolio adds materially to the return of the portfolio to such a degree that it enhances the risk/return profile. Thus, SIRS diversification is

a measurement that is independent of the return measurement and both results must be considered together before concluding that action must be taken.

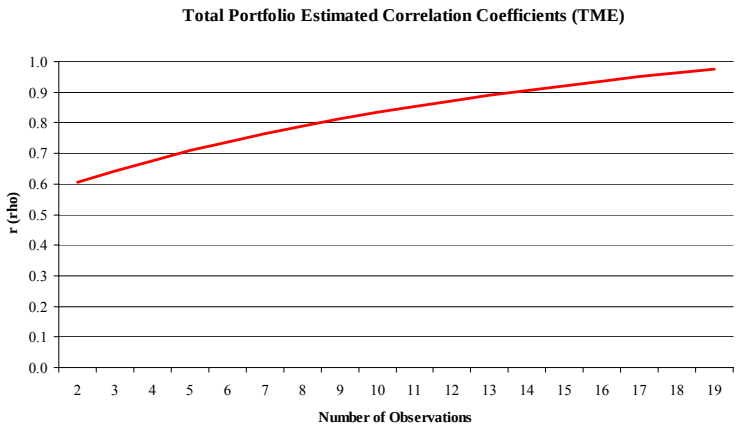
2. TME basis

The graph below is coded in exactly the same way as the IRR graph above, except that it is based on Times Money Earned (TME).



Unlike the IRR diversification plot, the graph above suggests that the zero-covariance curve in blue is well outside the green bands representing one standard deviation above and below the amber trend line. This result means that the portfolio, on a TME basis, is distinctly less diversified than it is on an IRR basis.

A graph of the estimated correlation coefficient for the various sample sizes also makes the point that the TME outcomes of the portfolio are much less diversified than the IRR outcomes:



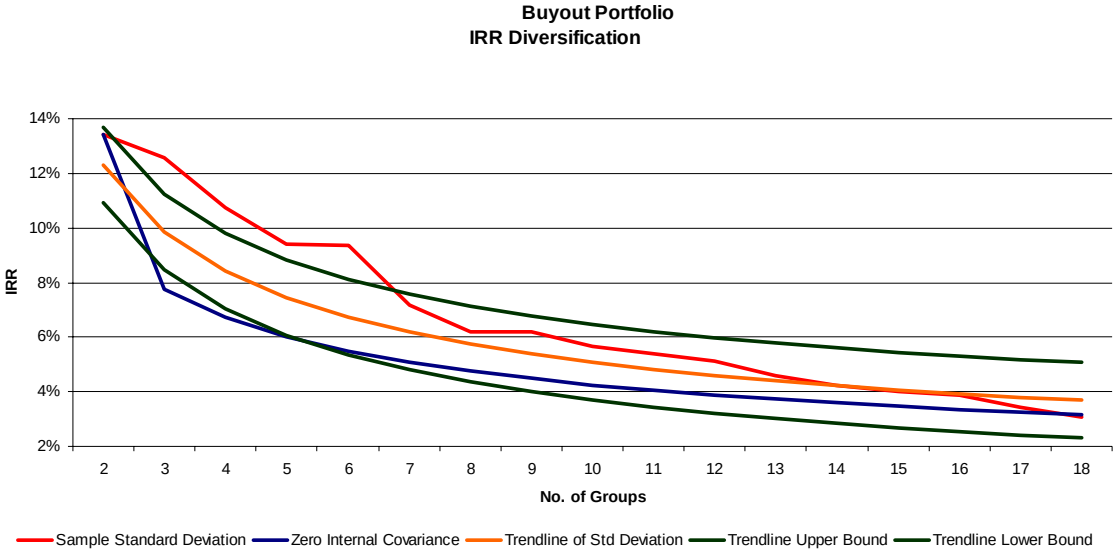
Thus, TME-based diversification analysis estimates that the approximately 98% of the outcome of any particular private market investment is associated with the outcome of the other investments in the portfolio. This extremely high level of correlation can be traced to the relatively immature CLIENT portfolio, which results in TME outcomes near 1 for all vintage years since 1995 (*see* the bubble chart in Overview of the Portfolio on p. 7). The diversification results of the CLIENT OCOM plot, on the other hand, indicate that over time TME diversification will approach the level of IRR diversification.

B. Sub-Asset Classes

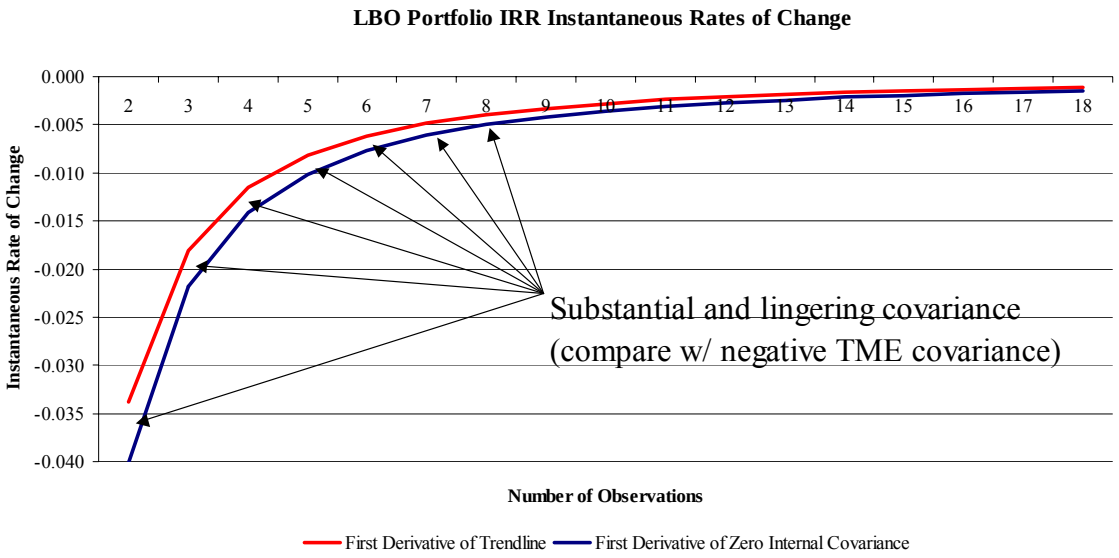
1. Buyouts

a) IRR basis

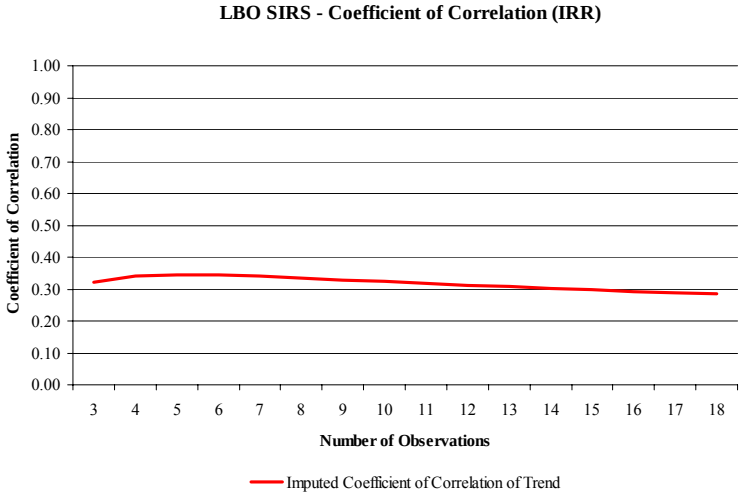
Buyout diversification, examined on an IRR basis, yields mixed results. As the graph below illustrates, the ideal (i.e., zero covariance and thus zero coefficient of correlation) in blue is well outside the lower green line representing one standard deviation less than the expected value of the trend line.



As the graph below makes clear, the slopes of the amber trendline and the blue zero covariance line are substantially different and do not converge within the limits of our test.



The graph below contains the calculated coefficient of correlation for each sample size:

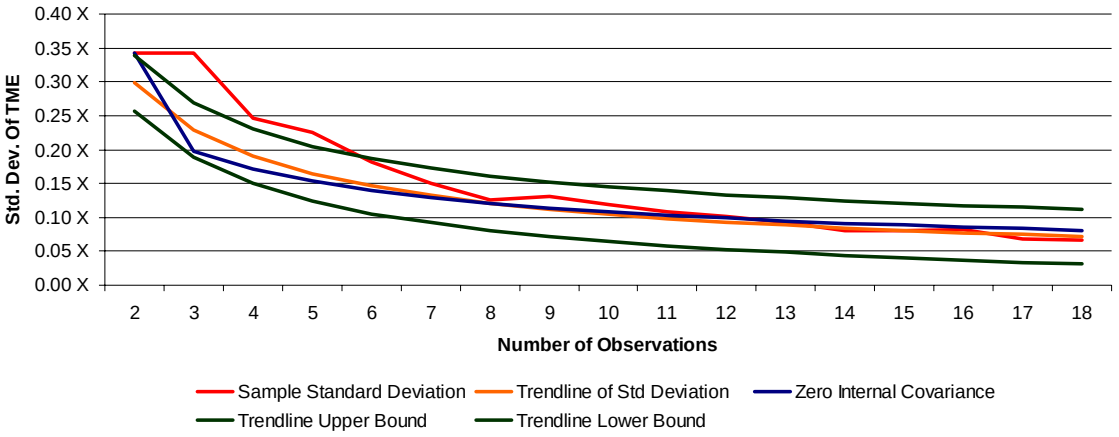


The r = .28 of a sample size of 18 indicates that the CLIENT buyout portfolio is well diversified from an IRR standpoint.

b) TME Basis

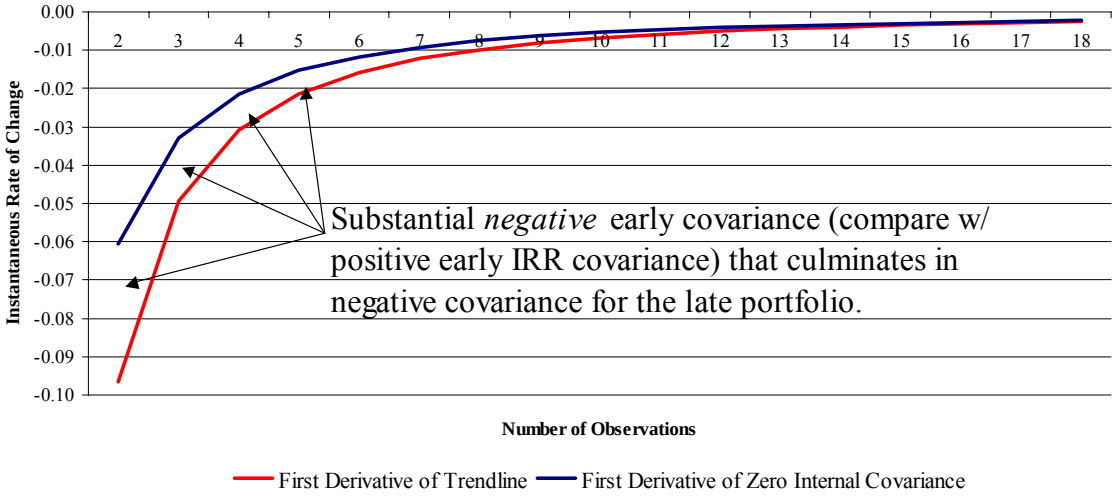
The TME-based SIRS analysis, on the other hand, is much more complicated and difficult, since the amber trend line begins by displaying positive covariance (it is above the blue zero covariance line) and ends by displaying negative covariance (below the blue zero covariance line):

Buyout Portfolio
Times Money Earned (TME) Diversification

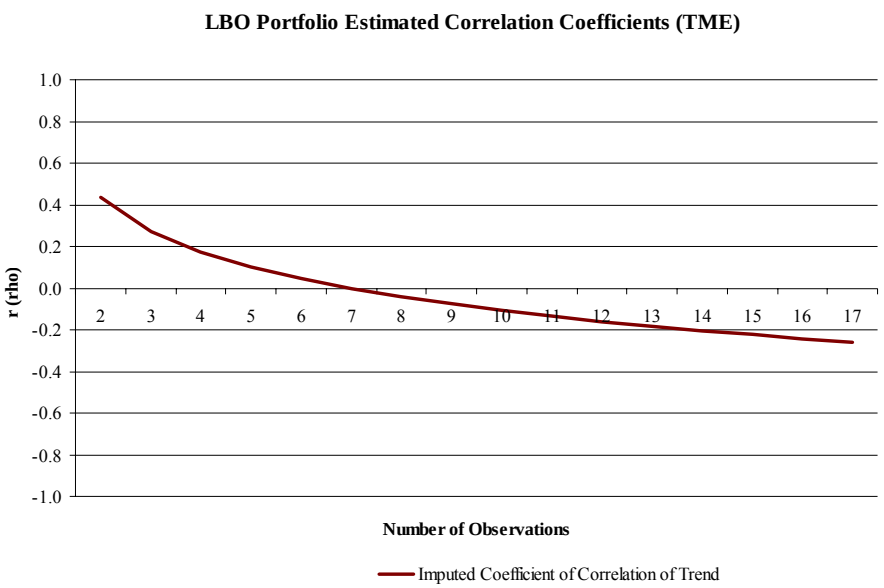


As the graph below illustrates, the slopes of each point of the TME SIRS plot above begin with positive early covariance and end with negative covariance:

LBO Portfolio IRR Instantaneous Rates of Change



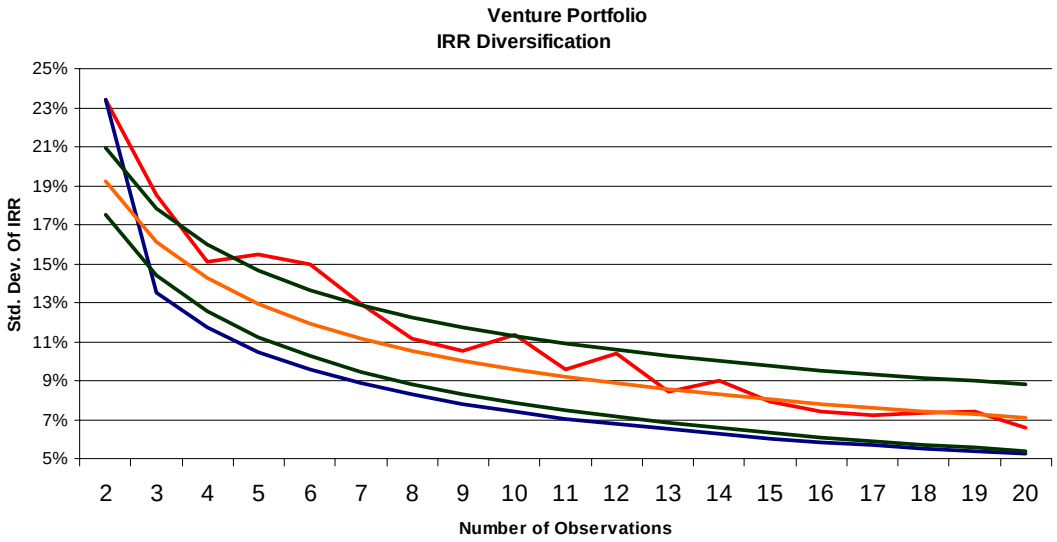
Thus, the calculated coefficient of correlation begins positive and ends negative, indicating a substantial difference between TME and IRR:



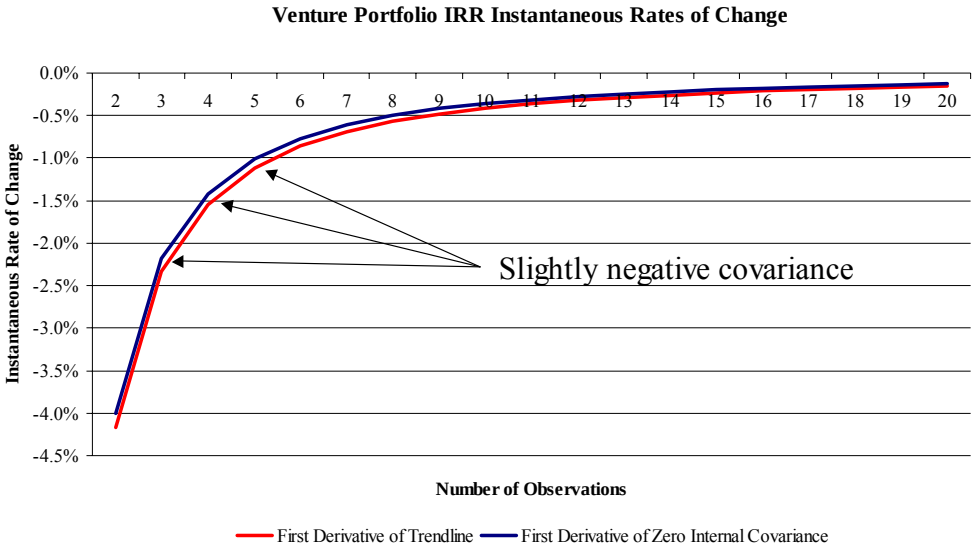
2. Venture Capital

a) IRR Basis

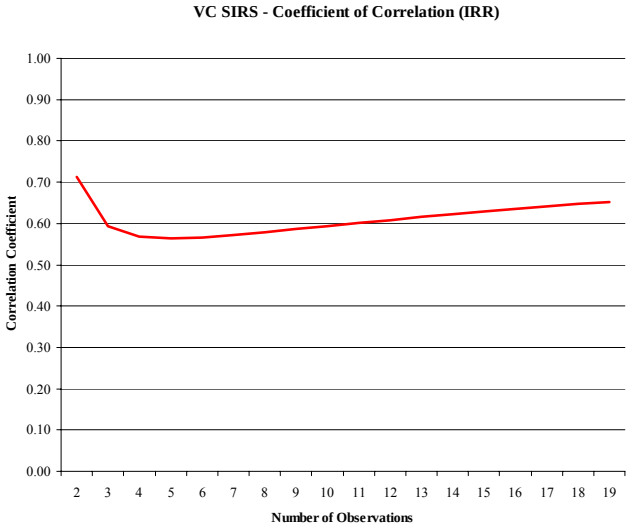
The Venture Capital SIRS plot shows positive covariance outside the one standard deviation statistical bounds of the green lines.



However, as the graph below depicts, the trend line continues to approach the zero covariance line at sample sizes up to twenty:



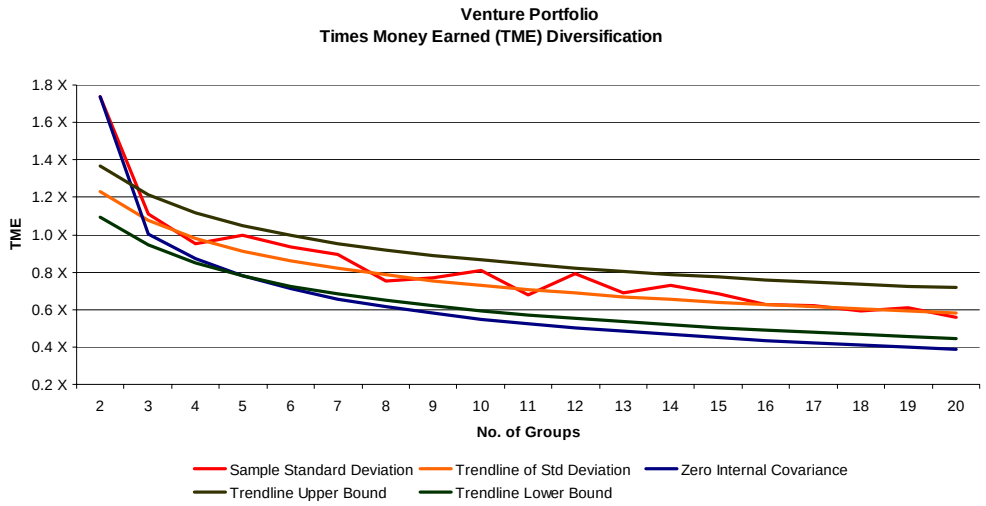
The result is an early decrease in the calculated correlation coefficient, followed by slight increases terminating in an estimated $r = .65$ in a sample size of 19.



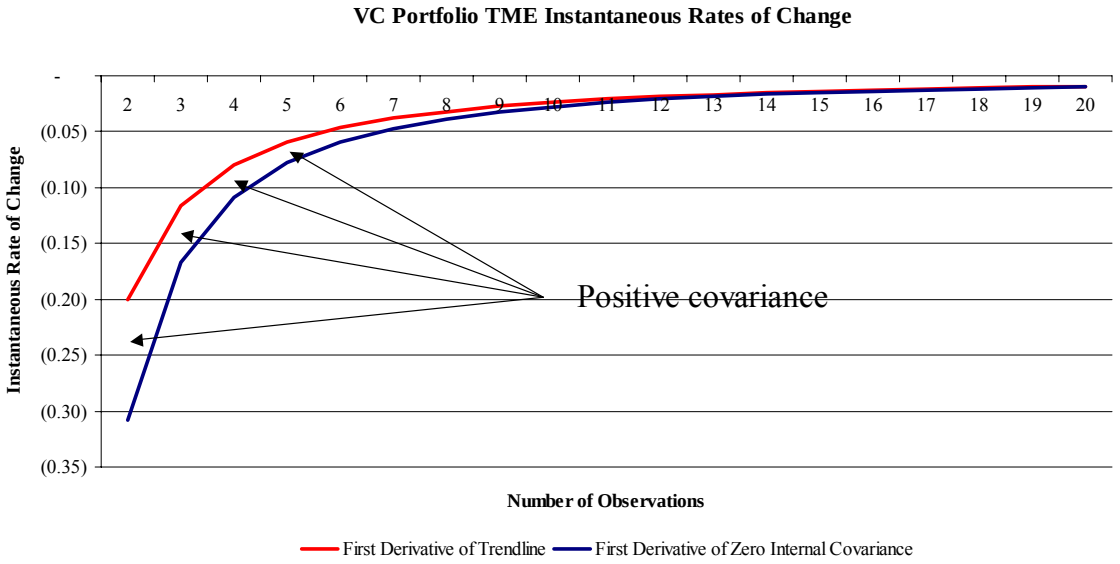
Although a coefficient of correlation of 0.65 is quite high, it is acceptable in venture capital, which, as an asset class, tends to be more highly internally correlated than buyouts.

b) TME Basis

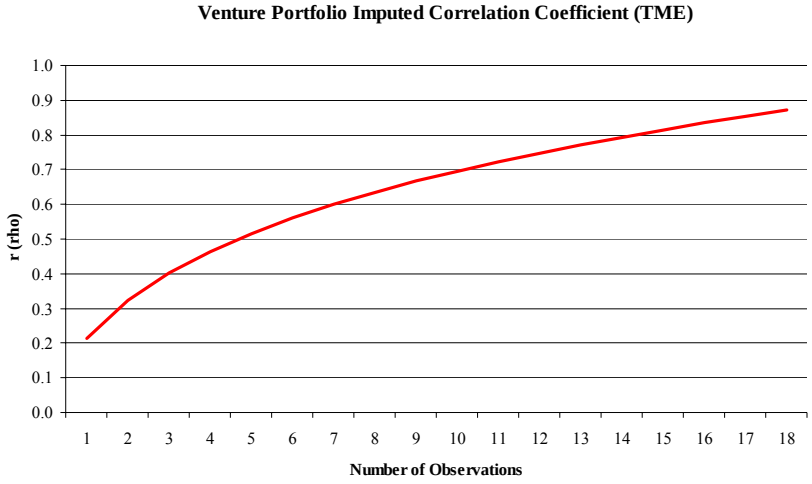
The blue zero covariance line is obviously outside the green lines representing one standard deviation of the venture capital trend line:



This is accompanied by another indicator of positive covariance, a substantial and lingering difference in the slopes of the two lines:



The result is an extremely high correlation coefficient approaching 0.9, as shown below:

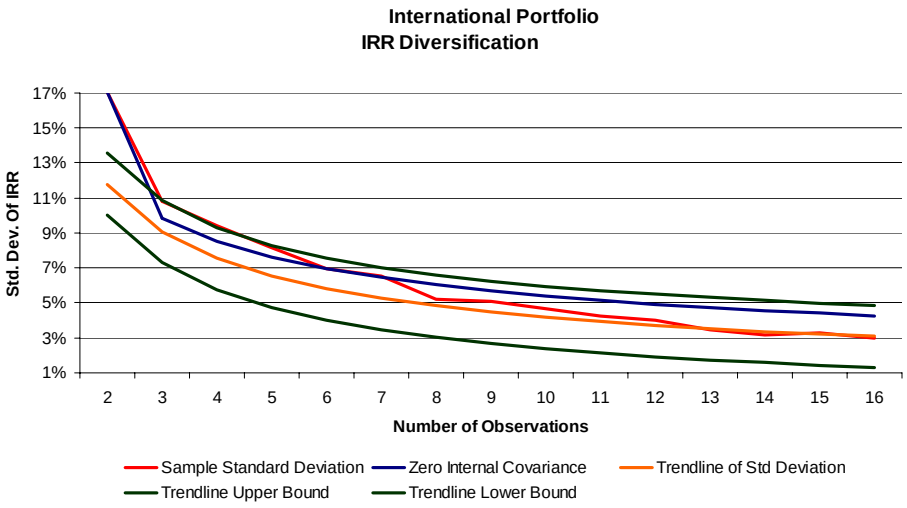


Note that CLIENT's venture capital portfolio exhibits a TME correlation coefficient substantially higher than its IRR correlation coefficient, just as the buyout portfolio does.

3. **Asset #2**

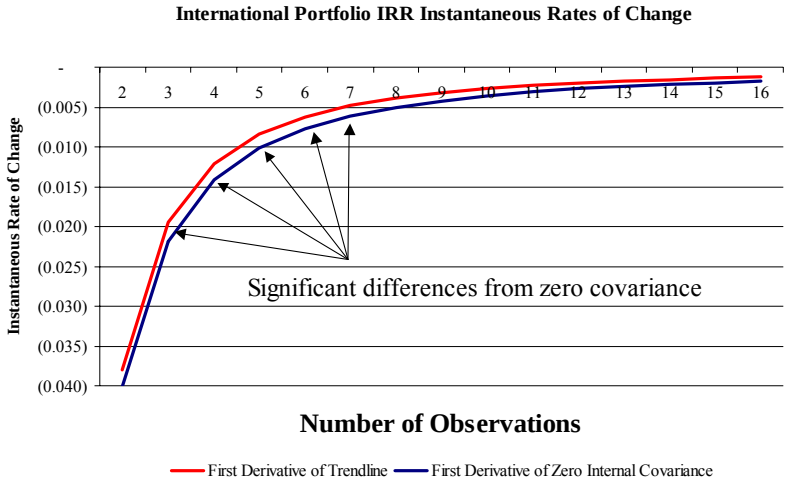
a) IRR Basis

CLIENT's international private equity portfolio exhibits substantial negative covariance, with the amber trend line sitting well below the blue zero covariance line indicating perfect zero covariance (and thus zero coefficient of correlation):

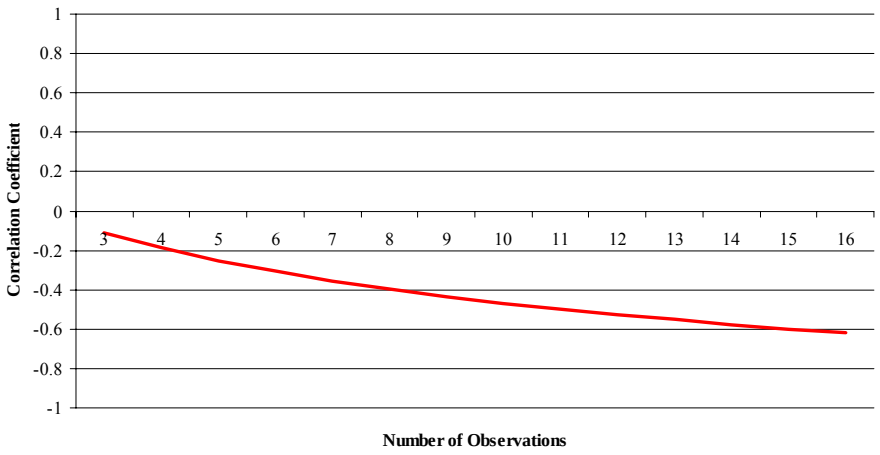


In addition, the slopes of each point of the trend line compared to each point on the zero covariance line show that the two lines continue to diverge further through a

sample size of twenty (i.e., the trend line and the zero covariance line are not parallel and apparently will never converge):

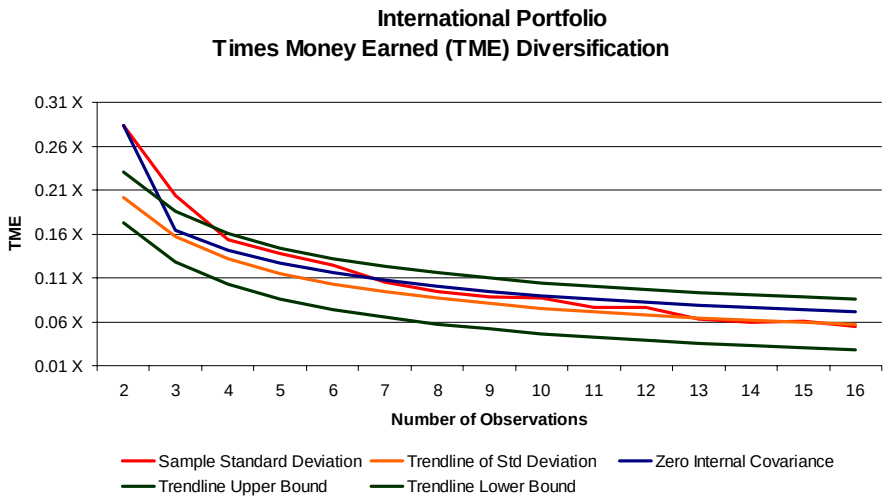


The result is a strong negative correlation coefficient (–0.62), indicating that the outcomes of the international private equity portfolio's investments display returns that are inverse to their opportunity costs, a valuable attribute in diversifying the overall portfolio:

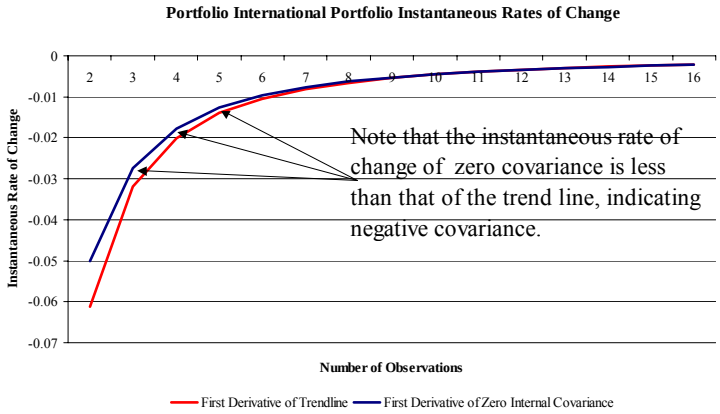


b) TME Basis

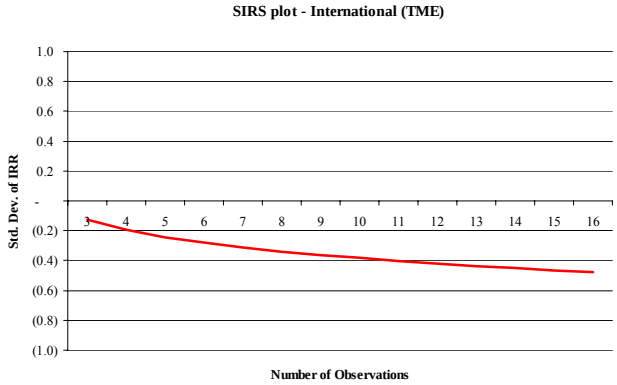
Unlike the buyout and venture capital portfolios, the international private equity portfolio's TME SIRS plot bears a strong resemblance to that of the IRR:



The same is true of the relative slopes of each point on the trendline and zero covariance lines, although the two lines do become parallel at a sample size of about 10:



The result is a TME-based estimate of the correlation coefficient that is negative, but slightly less, than its IRR equivalent:



4. **Asset #1**

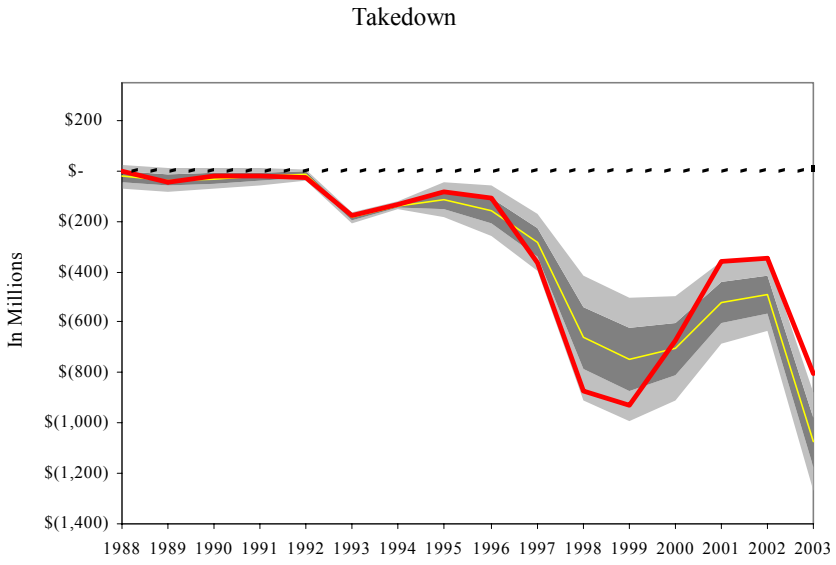
Asset #1 cannot be assessed using SIRS because it is a portfolio of a single asset.

VI. Prognosis for the CLIENT Private Market Portfolio

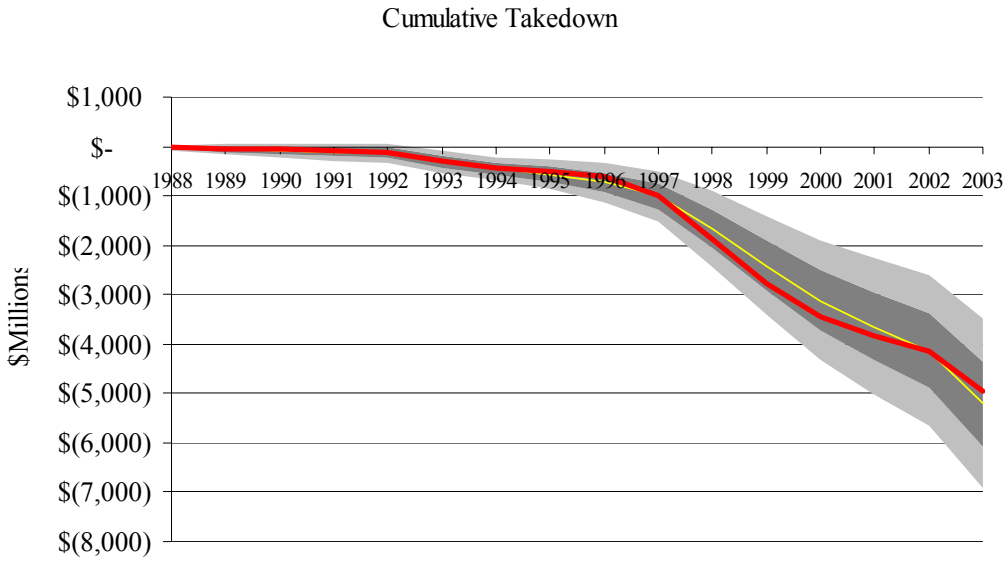
In projecting CLIENT's likely cash flows and valuations, we have used selected private equity fund cash flow data from the Venture Economics database. The timing and amounts of the cash flows in our study includes prior booms (1979-1982) and busts (1983-1987, 2000 to the present) in the venture market; such crises as the Crash of 1987, the Arab oil embargo of 1973 and the bear market of 1974 that ensued; the arrest of Michael Milken and consequent collapse of the junk bond market he had built in 1991; and a host of other important influences on the buyout and distressed securities markets. In short, we believe that the returns and risks incorporated into our cash flow and valuation projections are sustainable over the projection period for this assignment.

There is no market timing built into our projections. All commitments to all sub-asset classes are kept as constant as possible, as a percentage of total commitments, in order to build a portfolio comprised of what we believe is the optimal sub-asset allocation.

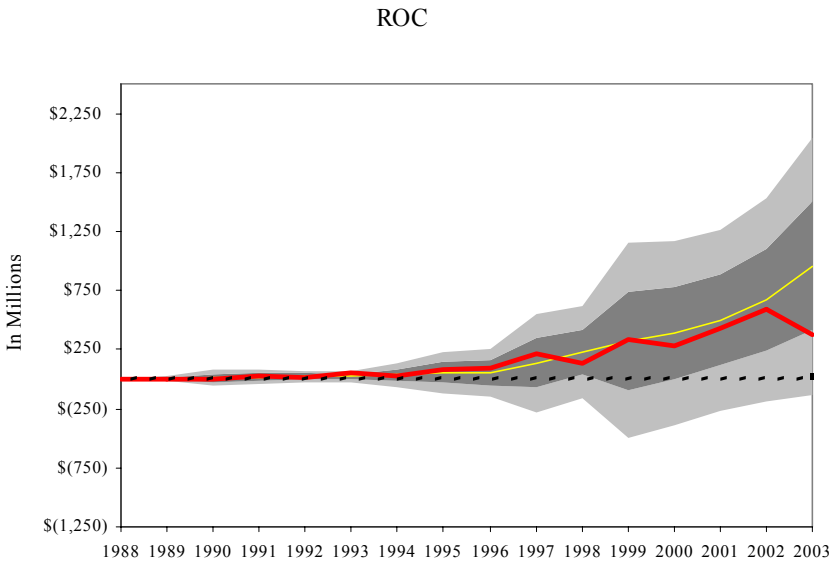
We began by reviewing CLIENT's actual capital contributions against our expectations of what they would have been in light of commitments to private equity since inception.



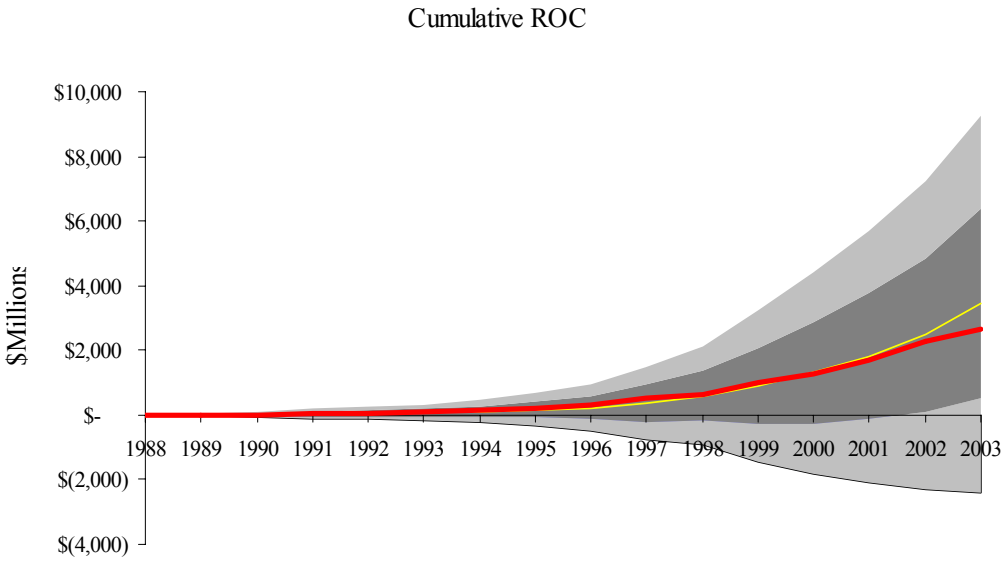
Note that actual capital contributions were much higher than expected in 1998 and 1999 and much lower than expected in 2001 through 2003, reflecting the general industry pattern over the same time period. On a cumulative basis, CLIENT is approximately on track with expectations:



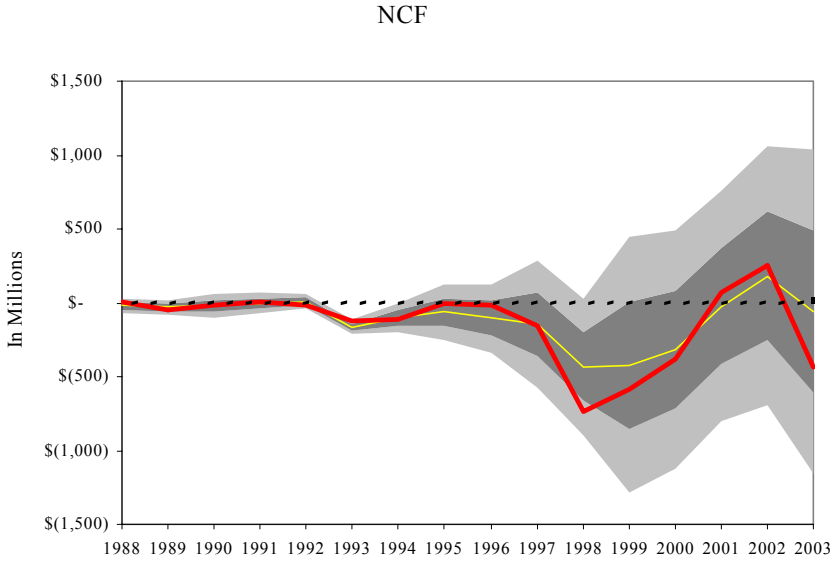
Return of capital began to drop below expectations in 2000, with the bursting of the tech bubble and the decline in the public market, and, like the rest of the private equity market, has fallen off especially sharply in 2003.



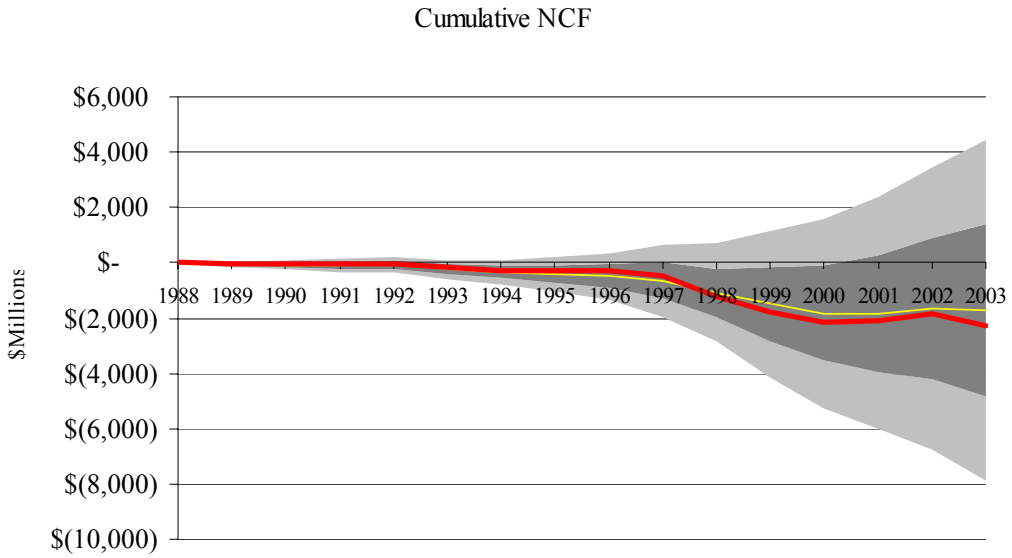
As a result, cumulative return of capital has been almost exactly on track until 2003:



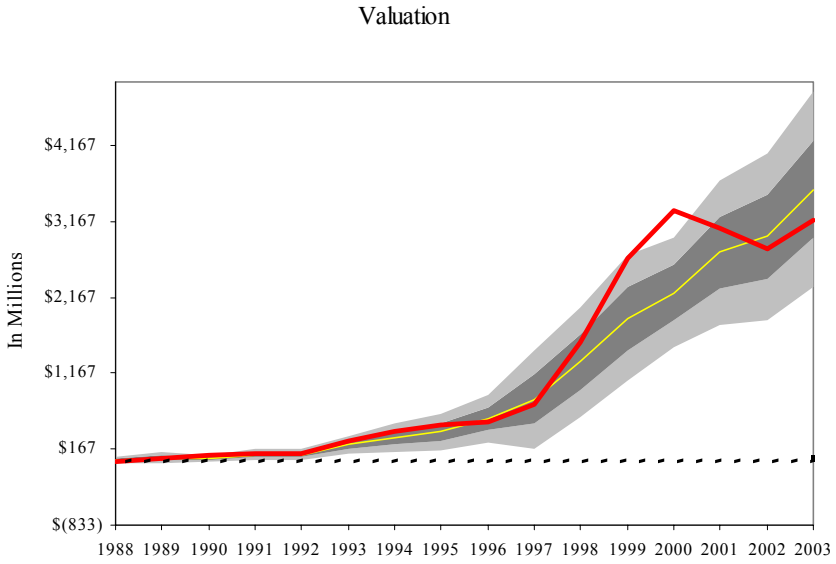
As a result of the increased pace of capital contributions, net cash flow was below expectations in 1998 through 2000 and has fallen well below expectations in 2003.



Cumulative net cash flow remains roughly on track with expectations, although the decline in distributions in 2003 is still obvious:



Valuations rose markedly above expectations during the tech bubble of the late 90s, but have fallen back below expectations recently. The recovery of valuations from the 2002 time period seems encouraging that valuations will more closely track expectations in the future.



We believe, based on the analysis above, that the CLIENT portfolio is reasonably well diversified from an IRR standpoint and, over time, will be reasonably well diversified from a TME standpoint as well. However, the analysis indicates clearly that CLIENT's diversification can and should be improved upon by optimizing sub-asset allocation and modifying due diligence procedures to enhance manager selection and retention.

VII. Recommendations Based on the Analysis

On at least a semi-annual, if not a quarterly basis, CLIENT should **update the analyses** contained in this portfolio critique for use in managing its private equity portfolio by exception.

As a due diligence efficiency measure, CLIENT should **subject all potential investment managers to the quantitative analyses used in this critique** to insure that

only the best receive time-consuming qualitative due diligence and

managers chosen are as likely as possible to advance the diversification and risk/return optimization of the private equity portfolio.

CLIENT should **forecast the cash flows** from its private equity portfolio to insure that the current portfolio and/or an optimized portfolio (see below) meets the liquidity needs of its asset/liability mix.

CLIENT should **review its asset allocation** based on its asset/liability mix with a view to optimizing its overall portfolio risk/return characteristics.

CLIENT should **optimize its sub-asset allocation** to achieve effective diversification and superior risk/return performance. Within the sub-asset classes the portfolio lacks small- and mid-market representation in both buyouts and venture capital and the Asset #2 program needs to be reevaluated with a view to increasing its return through manager selection.

CLIENT should **develop a strategic plan** as a guideline to achieving its optimal sub-asset allocation, thus insuring a disciplined approach to vintage year averaging and to achieving effective diversification.