

Appropriateness and Feasibility of Targeted Diversification in a Private Equity Portfolio

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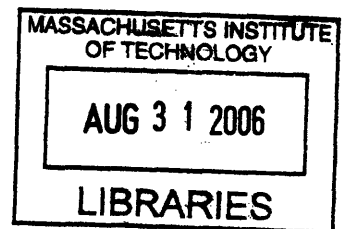
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ABSTRACT

Diversification tools such as modern portfolio theory are used by institutional investors when making asset allocation decisions, which often result in an allocation to the private equity asset class. While some level of diversification within a private equity portfolio, in theory, should produce higher risk-adjusted returns, in practice it is problematic. Through a combination of quantitative analysis of historical private equity returns and qualitative analysis of the investment programs of several large institutional investors with long histories in private equity, the appropriateness and feasibility of targeted diversification is evaluated. The research indicates that the success of private equity investment programs is influenced more by the quality of the managers in the portfolio than by strategic design. Therefore, the ability of investors to access strong performing managers, and to choose not to invest when such access is not possible, is paramount. That said, institutions generally maintain some level of diversification in their portfolios. However, they often do so on an opportunistic basis or within a policy that affords them sufficient flexibility to overweight an area that offers the best expected returns.

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1. INTRODUCTION

Institutional investors with large pools of capital to manage typically utilize modern portfolio theory (MPT) to construct an asset allocation designed to produce over the long term a target return for a given level of risk. Private equity often is included in these portfolios because it is viewed as having low correlation with other asset classes such as public equities, fixed income and real estate, and MPT models often show that allocations to private equity will increase expected returns through diversification. This same analysis, however, is less frequently used for purposes of diversification within a private equity portfolio.

This paper considers whether diversification tools such as MPT can be applied effectively in private equity programs and whether sophisticated investors are designing and managing their private equity portfolios to achieve targeted diversification. The research involved both quantitative and qualitative analysis. Historical fund returns across different investment categories were analyzed for expected risk, return and correlation. In addition, a qualitative assessment of the investment programs, policies and processes of sophisticated private equity investors was made based on data gathered through a series of interviews with ten long-term institutional investors in private equity.

Because of the limited time series of historical return data for private equity, it does not fit well in a MPT mean variance based model. Despite this shortcoming, the research suggests that some level of diversification within a private equity portfolio would be beneficial. However, while diversification within a private equity portfolio, in theory, should provide higher risk-adjusted returns for investors, the application of diversification strategies within this asset class is problematic. Private equity investors

cannot “invest the index” as is possible with marketable securities. The reported private equity indices themselves are skewed toward the higher performing funds in the index. In order to build and maintain a portfolio that is capable of achieving index-level or better returns, investors must consistently access strong performing managers. Moreover, early access to new managers whose positive performance will likely persist over multiple funds is critical.

This need to access high quality managers requires organizations to deploy significant resources in their pursuit. Private equity is a relationship-based asset class, and without sufficient human capital to identify and build relationships with good managers, investors will face difficulty achieving their target exposure to private equity, and consequently, their target returns. Strict diversification policies within a private equity mandate further strain investor’s resources and could drive investors to invest in lower performing managers in order to achieve a desired level of diversification.

To understand how sophisticated investors are diversifying their portfolios, detailed interviews were conducted with ten private equity investors with significant and long-term portfolios. These investors included endowments, foundations, corporate pensions and public retirement plans. The data collected from these interviews identified certain trends across the group and with respect to specific classes of investors. For example, it is apparent that many investors, particularly university endowments, avoid formal diversification policies and instead invest on a purely opportunistic basis. Other investors, including the corporate pensions and public retirement plans, are managing portfolios within a diversification policy mandate. However, these formal policies often utilize permissible ranges of exposures to accommodate over- or underweighting in a

given area in order to permit the investment officers to focus investments with the most promising managers.

While it appears that best practices across the group call for flexibility in managing a private equity program, investors still pursue some level of diversification in their portfolios. With the surveyed group, diversification is mainly achieved through exposure to various managers, strategies, stages and geographies. All investors maintained relationships with a number of firms -- ranging from 12 to 70, with an average of 48 relationships. With respect to strategy diversification, investors reported on average actual exposure by market value of 70% to buyouts and 30% to venture capital. Within these strategies, the endowments and foundations reported an investment bias toward smaller buyout funds and early stage venture capital funds, while the pension and retirement plans reported a current overweighting to larger buyout funds and no investment bias by venture capital stage. With respect to geographic diversification, only three investors reported a formal non-US allocation, but almost all investors reported actual non-US exposure. These investors' portfolios are weighted by market value on average 80% US and 20% non-US exposure.

This paper begins in Section 2 with an analysis of traditional asset allocation theories and the various ways to diversify a private equity portfolio. Section 3 presents the results of quantitative analysis of expected risk/return profiles of diversified private equity portfolios and correlations among different categories of private equity. Section 4 describes the challenges that investors face in attempting to implement diversification policies. Section 5 then summarizes the data gathered from the investor interviews. This section identifies how these institutions are diversifying by strategy, stage and geography,

with particular emphasis on their approach to non-US investing. This section ends with a discussion of the constraints these investors face in managing their private equity portfolios in the context of target private equity and subasset class allocations. Finally, Section 6 summarizes the findings and presents best practices from the surveyed investors.

2. DIVERSIFICATION IN PRIVATE EQUITY PORTFOLIOS

2.1. Traditional asset allocation

Modern portfolio theory (MPT) suggests that investors can create an optimal portfolio of investments, with varying degrees of expected risk and return, by combining different types of investments according to their correlations to one another. This approach underlies the typical asset allocation approach of numerous institutional investors such as pension and retirement plans, endowments and foundations. These institutions typically invest in a mix of asset classes, including public equities, fixed income and alternative asset classes (e.g., private equity, real estate and absolute return funds). These asset classes often are further diversified by geographic region, with allocations to both developed and emerging markets. Many such organizations are advised by internal or external consultants who model their portfolios for a given risk and return level to support the organization's long-term liabilities or payout obligations (e.g., for payment of retiree benefits in the case of public retirement or corporate pension plans).

2.2. Asset allocation applied to private equity portfolios

The intention behind MPT is to maximize return for a given level of risk. In theory, MPT should apply within each asset class of an investor's overall portfolio. For example, a typical institutional investor's public equities portfolio will contain a mix of domestic and international equities, with exposure to large-, mid- and small-cap stocks. Similarly, a bond portfolio may be diversified by duration and credit rating. Investors typically employ some level of diversification in their alternative asset classes, although the degree of diversification varies greatly among investors. Whether diversification within an alternative asset class portfolio is appropriate could be disputed for a variety of reasons. This issue applies to all types of alternative assets, although this paper will focus on private equity investing.

MPT is most useful for efficient markets in which an investor is able to invest in securities in the index such that its portfolio characteristics mimic the index. Unlike investing in public stocks, private equity interests are not traded on any public exchange.¹ Investments depend on access to private equity managers, and access is based on relationships between the institutional investors and the private equity firms. Moreover, returns on private equity depend on the quality of the managers selected, and therefore, by the ability of investors to access top tier managers. In addition, MPT is based on the assumption that returns occur in a normal distribution. This is not true with private equity, which produces skewed returns with high kurtosis. Therefore, MPT's use of mean variance analysis applied to private equity is suspect.

¹ In recent years, there have been securitizations of private equity portfolios and the emergence of secondary sales of individual interests in private equity funds. However, this industry is still young and for purposes of this discussion, is not viewed as providing an efficient market for accessing private equity investments.

As discussed in Section 4, performance of a private equity portfolio is largely influenced by the quality of the managers in the portfolio as opposed to strategic portfolio design. Many factors constrain investors from building a high performing private equity portfolio. These include limited access to the best managers, limitations on how much capital can be deployed with these managers, the illiquid nature of private equity and the lack of any efficient trading market. Staffing constraints present additional challenges. Not only do many investors lack a sufficient number of investment professionals to manage their programs, but many have difficulty attracting and retaining highly skilled professionals capable of identifying and securing high quality managers. Therefore, while investors may attempt to use MPT as part of their diversification strategy, they must understand that the resulting portfolio design may be impossible to construct.

Given these challenges, some investors avoid attempts to create optimal portfolios within private equity and plan for diversification only at the total portfolio level. This approach may not be unreasonable given the correlation of private equity, as well as the venture capital and buyout subasset classes, with long-term public equities and bonds.² Moreover, private equity often is a small portion of an investor's total portfolio relative to public equities and fixed income securities. Avoiding diversification within this asset class may be acceptable, although it could result in concentration risk for that portion of the total portfolio. As such, most investors will attempt to provide some form of diversification in their private equity portfolios.

2.2.1. Ways to diversify a private equity portfolio

Absent portfolio diversification, an investor might subject itself to unacceptable concentration risk, which could significantly impact total portfolio returns. To mitigate

² See Figures 2.1, 2.2 and 2.3.

this risk, there are a number of ways to introduce diversification into a private equity portfolio. In the first instance, most investors will invest in a number of private equity partnerships managed by different firms, which reduces manager concentration risk. In addition to manager diversification, there are five principal areas by which portfolios can be diversified: (i) vintage year, (ii) industry, (iii) strategy, (iv) stage and (v) geography. These approaches are discussed briefly in the following paragraphs, with more detailed analysis of the last three in later sections of this paper.

Vintage year. Private equity investment funds usually are structured as limited partnership agreements, with the private equity manager serving as the general partner and outside investors taking limited partnership interests. These investment funds have durations of 10 years or more, with the manager typically investing the funds in portfolio companies during the first two to four years, and the portfolio maturing and producing realizations in the later years. Most private equity managers will raise a new fund every three to four years, and the year a fund is formed is called its “vintage year.” The relative performance of a private equity fund customarily is measured against the performance of its vintage year peers.

Returns of private equity funds tend to be cyclical because the success of their underlying portfolio companies depends on the relative health of the public stock and debt markets. Accordingly, it is important for private equity investors to maintain appropriate time diversification in their portfolios, which is achieved with exposure across many vintage years. Investors, however, cannot effectively time private equity markets by making selective bets on vintage years. Because of the long-term nature of private equity investments, investors cannot know at the outset whether a particular

vintage year will perform well. Therefore, private equity investors usually will invest in new partnerships every year knowing that some vintage years will perform better than others.³

Industry. Investors can provide diversification by industry within their private equity portfolios. Absent the use of sector focused investment funds, this diversification is occurring at the portfolio company level (i.e., looking through the investment funds to their underlying exposures). This type of diversification is harder for the investor to control because most private equity partnerships, with the exception of sector focused funds, will not require specific levels of exposure to given industries. In addition, inherent in the asset class is the focus on growth investing, particularly with respect to venture capital investing – buyouts can be growth and/or value focused. As such, venture capital portfolios tend to be heavily exposed to technology industries such as information technology, communications, healthcare and life sciences. Buyout funds typically are more diversified across major industry sectors such as consumer/retail, industrial, energy, media/communications, etc. Thus, an investor’s industry diversification may depend on the relative weighting in the portfolio between venture capital and buyout investments.

Strategy. After vintage year diversification, one of the primary forms of diversification in a private equity portfolio is the mix of investments by strategy, including venture capital, buyouts and special situation funds such as distressed and mezzanine debt. Given the relative size of these industries, meaningful diversification by strategy usually is sought with a mix of venture capital and buyout funds, although many investors also include special situations exposure either as part of their private equity

³ A related issue is the inability of most investors to jump in and out of the private equity asset class without damaging the relationships they have with private equity firms. It would be difficult for an investor to access a new fund formed by a manager in whose prior fund the investor declined to participate.

portfolio or another asset class within the total portfolio. As discussed in detail in Section 3.1, there is low correlation between the returns of venture capital and buyout funds, so investors can design a portfolio with both investment strategies to reduce risk and increase expected returns.

Stage. Investors can further diversify within venture capital and buyouts by stage of investment. In venture capital, this typically is achieved through investments in early stage, late stage, diversified venture and growth equity funds. In buyouts, diversification can be sought through investment across small, mid-market and large buyouts, with fund size as a proxy. VentureXpert categorizes buyouts as follows, based on total capital commitments: small – less than \$250 million; medium – \$250-500 million; large – \$500 million to \$1.0 billion; mega – greater than \$1.0 billion.⁴ However, funds sizes have increased dramatically during the past five years, with many purported mid-market funds now over \$1.0 billion in commitments, large buyout funds in the \$2.0-5.0 billion range and mega-buyouts in the \$5.0-10.0 billion range. Diversification by stage is discussed further in Section 3.2.

Geography. Private equity is not limited to the US market. Many investors diversify their portfolios with commitments to both US and non-US private equity funds. The primary markets for non-US private equity are Europe, Israel and the Asia Pacific region. Europe has the most developed non-US private equity market, although the venture capital industry in Europe significantly lags that of the United States. Israel offers primarily a venture capital market, although it is closely tied to the US venture capital industry given the approach of many Israeli venture capitalists to transition Israeli start-ups to the United States. Asia, as well as India, is still an emerging market for

⁴ VentureXpert online glossary and methodology tools.

private equity, although there has been activity in these regions for many years. As discussed in more detail in Section 3.3, the benefits of geographic diversification differ depending on the region and subasset class targeted.

3. TARGET PORTFOLIOS BASED ON HISTORICAL RETURN ANALYSIS

As mentioned above, investors often seek diversification in their private equity portfolios, but without the strict employment of MPT. One can analyze on a theoretical basis how such diversification will produce an acceptable risk/return profile for a portfolio. However, as mentioned earlier, an investor's ability to achieve this portfolio is limited by a variety of factors, including access to high quality managers, resources needed to investigate and perform due diligence on managers and limitations on the ability to deploy large amounts of capital with the chosen managers. Regardless, this section investigates the theoretical basis for considering diversification, which investors may then attempt to introduce into their portfolios on a less formal basis.

3.1. Strategy diversification

In order to assess the benefits of combining venture capital and buyout investments, the historical since inception IRRs for US venture capital and buyout funds in vintage years 1985-2000 were reviewed.⁵ While this sample is extremely small and lacks sufficient time coverage, a comparison of the returns suggests that there is low correlation between the two subasset classes. Figures 3.1 and 3.2 show the vintage year pooled mean returns, respectively, for the entire universe tracked by VentureXpert and for the top quartile returns of that universe. As shown in the Figures and in Table 3.1

⁵ Return data from VentureXpert. Vintage years prior to 1985 had limited data, and vintages 2001 and more recent years were deemed too immature to have meaningful IRR data.

below, the two strategies have low negative correlation, which indicates that investors would benefit from diversification at this level.

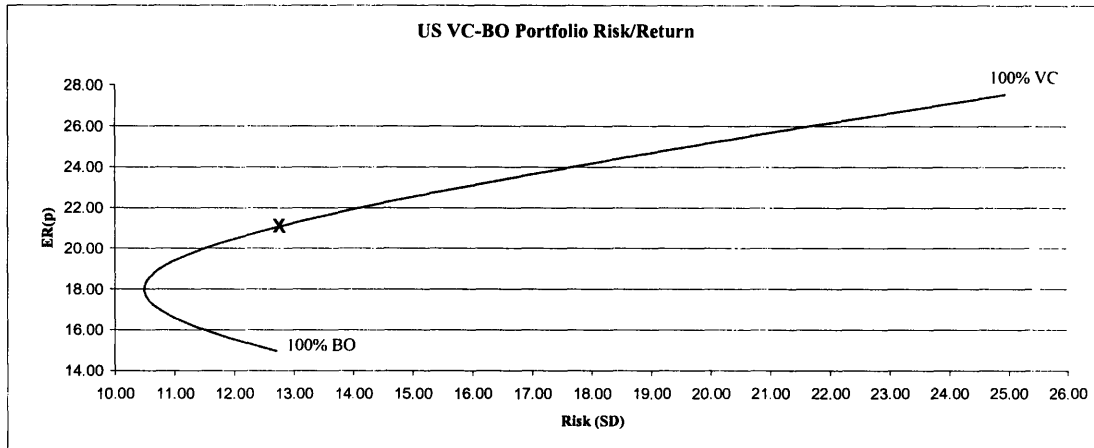
Table 3.1

Vintages 1985-2000	BO pooled mean	VC pooled mean
Average/Expected Return	14.97	27.56
Standard Deviation	12.70	24.93
Variance	161.41	621.59
Covariance	-52.15	
Correlation BO and VC	-0.18	
Correlation:		
w/ 5-year S&P 500 returns (1980-2000)	-0.06	0.28
w/ 5-year NASDAQ returns (1980-2000)	-0.29	0.53
w/ 5-year ML Bond index returns (1980-2000)	0.52	-0.43

Source: VentureXpert (returns as of March 31, 2005); Bloomberg

In addition, shown below is the efficient frontier using these data series. As the graph demonstrates, the all buyout portfolio has the lowest risk profile, but the returns are lower (15% expected return and 12.7% standard deviation), while the all venture capital portfolio has the highest return expectation, but also the highest risk profile (25% standard deviation and 27.6% expected return). Combining these two investments theoretically produces an optimal set of portfolios depending on the risk/return characteristics sought by the investor. Point X on the graph identifies the portfolio weighted 52% buyout and 48% venture capital, which yields approximately the same level of risk (12.68%) as the all buyout portfolio, but with a substantially higher expected return (21%). Investors with an even higher risk tolerance could move further out on that frontier by increasing their exposure to venture capital and approaching expected returns

in the high twenties closer to the all venture capital portfolio. Similar results were found using total value to paid in capital return multiples.⁶



Source: VentureXpert; returns as of March 31, 2005

3.2. Stage diversification

Investors can further diversify their portfolios within a strategy by stage of investment. In venture capital, this typically results in a mix of early stage, late stage and diversified or balanced funds. In the buyout arena, this is usually accomplished with a mix of small-, mid- and large-buyout funds, which often correspond to small, medium and large fund sizes, which is how they are discussed in this paper.

3.2.1. VC returns by stage

Analyzing VentureXpert data for US venture capital vintage years 1985-2000, it appears that there are significant differences in return and risk expectations for seed, early, late and balanced venture capital funds. As shown in Table 3.2, early stage funds appear to have the highest return and highest risk expectations, with late stage having the lowest

⁶ See Appendix A.

expected risk/return profile. This also is evident in the plot of venture capital returns by stage shown in Figure 3.3.

Table 3.2

US Venture Capital Returns

<u>Vintages (1985-2000)</u>	Pooled mean return (IRR)			
	<u>seed</u>	<u>early</u>	<u>late</u>	<u>balanced</u>
Average/expected return	20.66	37.67	18.33	21.25
Standard Deviation	37.05	38.97	18.31	18.09

Source: VentureXpert; returns as of March 31, 2005

Table 3.3 sets forth the correlation data for the various venture capital stage funds. The data shows the highest correlation between seed and early stage funds and the lowest correlation between early and late stage funds. Not surprisingly, the balanced stage funds show fairly strong positive correlation with each of the other stages. This data suggests that investors may benefit from including a general mix of funds by stage in their portfolios, particularly with exposure to early stage funds.

Table 3.3

<u>Correlation Matrix (1985-2000)</u>	<u>seed</u>	<u>early</u>	<u>late</u>	<u>balanced</u>
Seed	1.00			
Early	0.71	1.00		
Late	0.58	0.35	1.00	
Balanced	0.65	0.65	0.44	1.00
Correlation with:				
S&P500 rolling 5-year	-0.03	0.31	0.55	0.51
ML Master Bond index rolling 5-year	-0.23	-0.41	-0.16	-0.06
NASDAQ rolling 5-year	0.03	0.40	0.65	0.55

Source: VentureXpert (returns as of March 31, 2005); Bloomberg

Another interesting trend in the data is the inverse relationship between vintage year performance and the number of funds raised in the year.⁷ This suggests that heavy fundraising environments might signal an underperforming vintage year. However, it would be impractical to cost average investment pace by vintage year in order to mitigate exposure to underperforming vintage years. In particular, should investors pull back from investing during heavy fundraising environments, they might lose access to the managers' whose funds they declined.

3.2.2. BO returns by fund size

Buyout funds were analyzed by fund size, with the categories as follows: small funds of less than \$250 million, medium size funds of \$250-500 million, large funds of \$500 million to \$1.0 billion, and mega funds of over \$1.0 billion. Given that mega funds, particularly multi-billion dollar mega funds, have become a more recent phenomenon, the data on them is very limited. Accordingly, the results with respect to mega funds would seem unreliable and are for the most part ignored in this discussion. As shown in Table 3.4, the data suggests that medium size funds produce the most attractive risk adjusted returns, although large funds produced the highest expected returns. This also is evident in the plot of returns by stage shown in Figure 3.4.

Table 3.4

US Buyout Returns

<u>Vintages (1985-2000)</u>	Pooled mean return (IRR)			
	<u>small</u>	<u>medium</u>	<u>large</u>	<u>mega</u>
Average/expected return	12.42	13.14	15.32	13.19
Standard Deviation	18.13	7.93	15.27	10.99

Source: VentureXpert; returns as of March 31, 2005

⁷ See Appendix B.

As shown in Table 3.5, the correlation of small and medium sized funds and the correlation of large and mega funds is fairly high. As expected, the correlation of both small funds and medium sized funds to large sized funds is low. This suggests that diversification by fund size could be beneficial if an investor could access quality small or medium funds and large funds. The buyout data also suggests an inverse relationship between number of funds raised in a vintage year and performance of the vintage.⁸

Table 3.5

<u>Correlation Matrix (1985-2000)</u>	<u>small</u>	<u>medium</u>	<u>large</u>	<u>mega</u>
Small	1.00			
Medium	0.43	1.00		
Large	-0.20	0.22	1.00	
Mega	0.46	0.37	0.46	1.00
Correlation with:				
S&P500 rolling 5-year	0.22	0.42	0.10	0.44
ML Master Bond index rolling 5-year	0.39	0.23	0.14	0.09
NASDAQ rolling 5-year	0.00	0.31	0.06	0.38

Source: VentureXpert (returns as of March 31, 2005); Bloomberg

3.3. Geographic diversification

To evaluate the impact of geographic diversification in a private equity portfolio, the historical since inception IRRs of US and European venture capital and buyout funds for vintage years 1985-2000 were reviewed for expected return, expected risk and correlation.⁹ Table 3.6 presents the summary results.

⁸ See Appendix C.

⁹ VentureXpert. This analysis excluded other regions such as Asia due to the limited data available.

Table 3.6

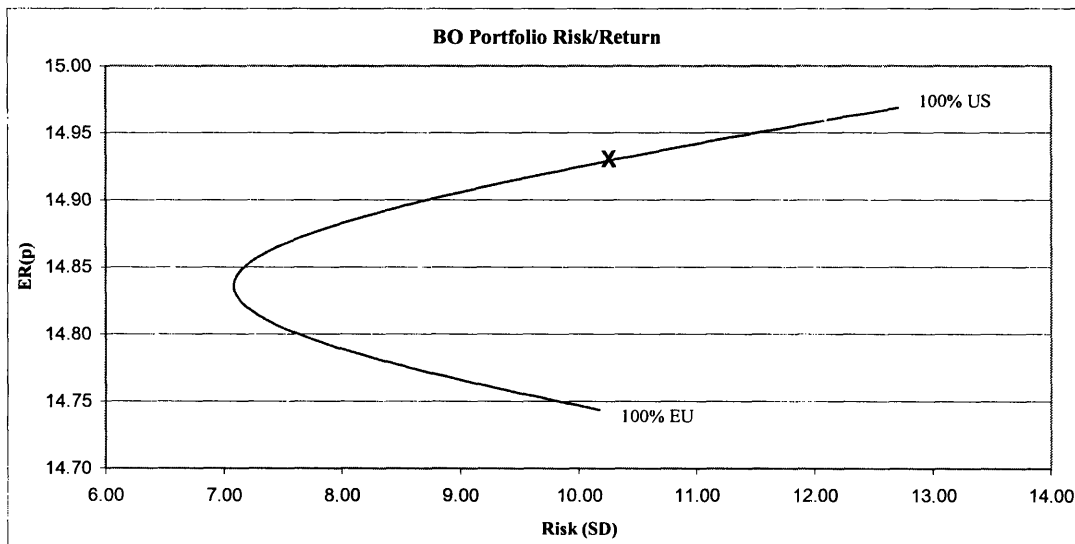
<u>Vintages 1985-2000</u>	US pooled mean	EU pooled mean	US top quartile	EU top quartile	US bottom quartile	EU bottom quartile	US median	EU median
<i>Venture Capital</i>								
Average/Expected Return	27.56	9.93	29.50	11.62	-1.08	-3.61	11.13	4.16
Std. Deviation	24.93	12.65	25.67	7.89	8.23	5.29	12.13	6.18
Variance	621.59	160.14	659.11	62.20	67.70	27.94	147.18	38.24
Covariance	204.49		87.89		31.62		34.59	
Correlation	0.79		0.46		0.78		0.49	
<i>Buyout</i>								
Average/Expected Return	14.97	14.74	18.31	19.81	2.98	3.80	10.66	9.63
Std. Deviation	12.70	10.17	9.45	10.45	6.02	5.39	7.22	5.86
Variance	161.41	103.50	89.31	109.23	36.29	29.01	52.09	34.30
Covariance	-26.90		-18.43		22.18		8.63	
Correlation	-0.22		-0.20		0.73		0.22	

Source: VentureXpert; returns as of March 31, 2005

US venture capital funds produced significantly higher returns than their European peers, albeit with correspondingly higher expected risk. This holds true with respect to the pooled mean returns as well as at the median and the top and bottom quartile returns. Only with funds in the top quartile did European venture capital returns produce expected returns close to US median returns. Therefore, there seems to be little argument from a return perspective for diversifying a predominantly US-based venture capital portfolio with European venture capital investments, unless one would expect to access the best European managers.¹⁰ In addition, there appears to be high correlation of returns between the US and European venture funds, further supporting an argument that geographic diversification among US and European venture capital funds is inadvisable except on an opportunistic basis.

¹⁰ While overall European venture capital returns have been unimpressive, there is reason to invest in this space on an opportunistic basis. In any given vintage year, there were funds that produced exceptional returns. For example, in vintage years 1995-2000, the maximum fund IRRs exceeded 100%.

On the other hand, European buyout funds have performed as well or better than US buyout funds, with similar risk levels. In addition, the correlation of US and European buyout returns is low, indicating that an investor could provide beneficial diversification in its buyout portfolio with a mix of US and European buyout funds. Shown below is the efficient frontier representing the portfolio of US and European buyout funds. Point X on the frontier represents the expected risk and return for a portfolio weighted 82% US and 18% European buyout funds. This portfolio would have an expected return of 14.93% with standard deviation of 10.17%. This return is only four basis points lower than the all US portfolio return, but the risk level is approximately 250 basis points lower. To the extent an investor has good access to top quartile buyout funds, the excess return through geographic diversification is even higher, although in this case, the data suggests that investors would target a predominantly European portfolio given higher historical top quartile buyout returns in Europe than in the United States.¹¹



Source: VentureXpert; returns as of March 31, 2005

¹¹ See Appendix D. Note that based on return multiples, as opposed to IRRs, US top quartile buyout funds outperformed European top quartile buyout funds.

4. CHALLENGES TO DIVERSIFICATION IN A PRIVATE EQUITY PORTFOLIO

While the diversification strategies discussed above in theory should provide higher risk adjusted returns for investors, in practice they would be quite difficult to achieve. There are a number of factors that limit an investor's ability to achieve a targeted diversification strategy without sacrificing the quality of the managers selected for the portfolio. First, there is no index into which an investor can invest. Therefore, investors cannot invest evenly across the universe of private equity funds in order to achieve an "index" return. Investors will be limited by the managers whom they can access. This is compounded by the fact that most investors do not have access to all of the best performing managers. Moreover, private equity funds are fixed in size, and usually have large bases of limited partner investors. Thus, it is difficult for any one investor to commit substantial amounts to a select group of funds. Therefore, if an investor is mandated to achieve a certain exposure level within strategies, stages or geographies, the investor might be forced to invest in second tier funds to meet its targets. This likely would result in lower returns and increased volatility in the portfolio.

4.1. Difference in risk/return by quality of managers in the portfolio

As mentioned above, private equity investors cannot invest in every venture capital or buyout fund raised. This indicates that investors cannot easily construct their portfolios to achieve the returns reported by providers such as Venture Economics and Cambridge Associates. However, the data reported by these providers may not be fully representative of the asset class. The providers may not have access to the performance results from every fund. The index also is limited by survivorship bias. Funds that perform poorly and are terminated early drop out of the index. This is similar for firms

that fail to raise successive funds due to poor performance in earlier funds. As a result, the index is skewed toward better performing funds. Another challenge discussed later in this paper is the heavy human resource commitment required for investors to access attractive managers.

Types of index measures. Even within the index, there is a significant difference in performance between the best performers and the worst performers. To best understand this, one first must appreciate the different ways that a private equity index return can be reported: a simple average or mean, a median and a pooled mean. As reference for the discussion following, Figure 4.1 shows the mean, median and pooled mean returns for US venture capital funds in vintages 1985-2000.

The most common measure of central tendency in a distribution is the average or mean. Under this measure, a simple arithmetic average of all the individual returns of the funds in the index is calculated. With respect to private equity returns, however, an average or mean return does not take into account the size of the cash flows that produce each individual fund return. Therefore, the performance of a \$50 million fund would be given the same weight in the mean as the performance of a \$500 million fund.¹²

VentureXpert indicates that the average or mean return may be more appropriate for smaller sample sizes or samples where the distribution of returns is relatively normal.¹³

If the returns are skewed either more positively or more negatively, the mean return will be similarly skewed. Given these issues, most investors do not use a simple average or mean to report private equity index returns.

¹² An alternative to this is a capital-weighted return, which weights the returns by fund size. However, the capital weighted return does not take into account the timing of the cash flows, so it is not typically used by investors.

¹³ VentureXpert online glossary and methodology tools.

A second measure of private equity index performance is the median return of the index. The median return is the middle return of all fund returns in the index. Half the returns in the index are above the median return and half are below the median return. If the index reported a fairly normal distribution of returns, the median and the average would be very close. However, if the index is skewed (as private equity typically is), the median will be less skewed than the average. VentureXpert suggests that the median will mitigate the impact of outlier performance in the index and might be more appropriate for larger sample sizes.¹⁴

A third measure of private equity index returns is the pooled mean return of the index. The pooled mean method captures the timing and scale of the cash flows of all funds in the index. It treats all the cash flows of the index funds as cash flows of a single fund representing the universe. Based on these “pooled” cash flows, an IRR or similar end-to-end cash flow weighted return (versus a time weighted return used in public index returns) is calculated. The drawback of this calculation is that larger cash flows will influence the index performance more than smaller cash flows. This means that outlier performance will skew the returns in the direction of the outliers. This effect is compounded when the outlier performance occurs in funds that are themselves very large, with very large cash flows. For example, if a portfolio contains both small buyout funds of less than \$250 million in commitments and large or mega buyout funds with over \$1.0 billion in commitments, the large funds will have a greater impact on the pooled mean return. Venture Economics suggests that the pooled mean return is used by many investors because it is viewed as closely mimicking the performance of their own

¹⁴ VentureXpert online glossary and methodology tools.

portfolios.¹⁵ As evident in Figure 4.1 and discussed further below, investors who use the pooled mean return as the benchmark for their portfolio's performance may be overestimating the potential performance of their own portfolios because of the pooled mean return's tendency to skew toward the outliers in the index.

Variations of performance within the index. Figure 4.2 presents, for the full index of funds, the pooled mean return, top quartile return, bottom quartile return and median return for US venture capital funds for vintage years 1985-2000. As is evident on the graph, there is significant disparity between the performance of the top quartile and bottom quartile of the index in every vintage year. It also is clear that the pooled mean return tends to skew toward top quartile performance when returns are trending positively and toward bottom quartile returns when returns are trending negatively. The median return is less volatile, but it does not capture to the same extent the impact of positive or negative outlier performance.

4.2. Access limitations

One can infer from this data above that investors cannot duplicate the reported index return (i.e., the pooled mean return) unless they have significant exposure to top quartile funds in every vintage year. As discussed further below, most investors do not have the access or the capital or human resources to commit substantial sums to the expected top quartile performers in every vintage year. These hurdles to achieving targeted returns are compounded when an investor attempts to invest to specific diversification targets because the investor will have a smaller pool of funds from within each strategy to select.

¹⁵ VentureXpert online glossary and methodology tools.

Impracticality of investing across the index. For vintage years 1980-2000,

Venture Economics (in its VentureXpert database) reports that over 3000 US venture capital funds were raised with aggregate capital commitments of almost \$300 billion.

Table 4.1 breaks down by vintage year the funds tracked in VentureXpert for these years.

Even limiting consideration to the smaller subset of funds for which VentureXpert reports performance, an investor seeking to exceed the median performance, theoretically, could be required to invest in mostly first and second quartile funds, in each vintage year.

Table 4.1

US Venture Capital

Vintage year	No. Funds Raised	Total Commitments (millions)	No. Funds reporting performance in index	Pooled mean	Top quartile	Median	Bottom quartile
1980	49	\$2,151	17	18.8	18.2	13.1	8.8
1981	72	\$1,650	22	11	14.8	9.9	0
1982	77	\$1,925	29	5.1	9.1	4.2	0
1983	130	\$3,732	59	8.3	10.1	5.2	1.2
1984	135	\$3,607	66	6.1	11.3	3.8	1
1985	99	\$3,777	46	9.8	15.1	8.4	2.2
1986	83	\$3,789	44	12.5	12.2	6.3	2.3
1987	109	\$4,289	66	13.7	17.1	6.6	-0.6
1988	89	\$4,835	46	19	18.5	8.3	1.3
1989	92	\$5,243	55	18.3	17.3	10.5	1.7
1990	65	\$2,973	23	27.4	25.2	13.7	-0.3
1991	42	\$1,904	18	31.2	25.7	18.4	4.4
1992	79	\$5,130	27	30.1	31.7	15	10.9
1993	90	\$4,914	40	43.9	39.8	12.3	-0.4
1994	106	\$8,990	41	39.3	39.8	19.7	4.5
1995	166	\$10,084	47	61.6	63.4	22	3.5
1996	145	\$12,082	33	86.4	95.8	37.9	1.1
1997	217	\$20,711	59	51.3	60.7	19.3	-2.5
1998	246	\$30,727	79	13.6	12.1	2.4	-5.6
1999	387	\$61,092	108	-11	-0.8	-13.1	-23.1
2000	526	\$101,472	115	-6.2	-1.6	-9.7	-16.6

Source: VentureXpert; returns as of March 31, 2005

Viewed another way, for an investor to achieve the pooled mean return for its 1998 vintage funds only, it could be required to invest in the 79 reported funds in equal commitment sizes (ignoring survivorship and database reporting bias evidenced by the total number of funds raised that year). To achieve a top quartile return for that vintage, an investor would need to invest in the top 25% of the funds in equal commitment sizes or in some subset of top quartile and other funds in the index in commitment weightings that would skew the portfolio return toward the upper quartile. Extending this analysis across multiple vintage years, which is necessary to assess the feasibility of achieving the index or the top quartile return of the index for a long-term private equity portfolio, an investor would need to make similar investments in each vintage year. Achieving a commitment pace of this magnitude and quality is on its face impractical if not impossible.

Investing in every fund per vintage year is admittedly impractical. This then implies that investors who achieve the index or top quartile returns must be investing in a subset of funds that are more heavily skewed by number and/or commitment sizes toward the top performing funds. This suggests that access to specific investment managers plays a key role in the feasibility of an investor in achieving targeted returns. Access, in turn, can be directly tied to the investor's ability to devote substantial resources to sourcing and maintaining access to top performing funds.

4.3. Human resource constraint

Another constraint in managing a private equity portfolio is human capital. To be successful in private equity investing, institutional investors must build long term relationships with fund managers, particularly their best performing managers. They also

must continuously be seeking new relationships with managers who either have proven track records or may be the future top performers in the industry. This requires a dedicated investment staff and ideally one that remains with the investor for a long period of time. Relationships are based on the people, and investors who have high turnover will have a harder time maintaining relationships with their private equity managers over the long term.

Staffing resources are important both before and after a private equity investment is made. Human capital is needed to source potential investments, which require relationship building and analysis of the team and any prior investment performance. Post-investment, it is critical for investors to monitor the performance of the fund and the fund manager. Monitoring is critical for future reinvestment decisions because an investor will need to evaluate how well the prior investments of the team have performed, whether the team that made the prior investments is the team that will make future investments, and whether the organization will persist. Building deep relationships with the private equity managers in one's portfolio provides an investor with better access to information about the fund's portfolio companies and the investment professionals of the organization. This in turn facilitates the investor's monitoring role, which otherwise would depend primarily on the limited information provided in the fund financial reports.

Relationship building also is critical for solidifying the investor's place in the firm's limited partner roster. Investors in prior funds typically are given priority access to a firm's future funds. Given the persistence of quality across successive funds, demand for access to subsequent funds of the best managers will increase, and early and continued access to these managers is critical. In addition, investors will want to

successively increase their commitments to their best managers, which is difficult, although more likely to occur in the context of a strong relationship.

5. LIMITED PARTNERS' APPROACH

5.1. Survey of sophisticated institutional investors

As discussed in the preceding Sections, investors face many obstacles to achieving targeted returns, including the inability to invest the index, the need to access the best managers and the ability to deploy sufficient human capital resources to manage a private equity portfolio. This is compounded when an investor is further burdened with specific diversification requirements such as target exposure by strategy, sector or geography. Requiring a specific exposure level or targeted suballocations within a portfolio further hinder an investor's ability to achieve a targeted return by deploying capital with only the most promising managers.

However, as discussed in Section 2, investors should benefit from some level of diversification in their private equity portfolios, if it could be achieved without sacrificing quality. To understand how investors are handling this dilemma, a group of ten institutional investors were interviewed regarding their private equity investment programs. The group included three corporate pension plans, two public retirement plans, three university endowments and two foundations. These investors have been investing in private equity on average for over 20 years. Their private equity programs are substantial. The average size portfolio was \$1.7 billion in current net asset value, with 48 manager relationships and 170 individual partnership investments.

The data was collected through phone interviews, which tracked a list of questions sent to the investor before the call.¹⁶ Table 5.1 summarizes the primary characteristics of the survey participants. Note that, in Table 5.1 and throughout this discussion, the identity of each individual interviewed and that individual's organization are not disclosed given the confidentiality of the interview process.¹⁷

Table 5.1

Characteristics of Surveyed Institutions

Type of Organization	Age of PE Program (years)	NAV of portfolio (\$ millions)	No. of Managers	No. of Funds	PE staff	PE consultant
Corporate plan	5-15	501-1500	20-40	0-50	0-2	yes
Corporate plan	16-25	1501-2500	61-80	151-250	3-5	no
Corporate plan	16-25	2501-3500	41-60	151-250	0-2	yes
Endowment	26-35	501-1500	41-60	151-250	3-5	no
Endowment	26-35	1501-2500	20-40	251-350	3-5	no
Endowment	not reported	0-500	10-20	not reported	0-2	yes
Foundation	26-35	0-500	20-40	51-150	0-2	no
Foundation	16-25	501-1500	20-40	51-150	0-2	no
Public Plan	16-25	1501-2500	61-80	151-250	3-5	yes
Public Plan	not reported	2501-3500	not reported	not reported	3-5	yes
AVERAGE	25	1848	48	187	3	
Average / Majority Response						
Corporate Plan	16-25	1501-2500	41-60	151-250	3-5	yes
Endowment	26-35	501-1500	41-60	251-350	0-2	no
Foundation	16-25	0-500	20-40	51-150	0-2	no
Public Plan	16-25	2501-3500	61-80	151-250	3-5	Yes

The survey questions presented to investors were divided into five sections. The first section solicited basic information about the investor's private equity program in terms of total commitments, number of relationships and investments, size of the dedicated private equity team, if any, and whether the investor was using an outside

¹⁶ A copy of the survey questions is attached as Appendix E.

¹⁷ The order of investor answers within each category of investor also has been altered in each chart in this Section 5 to further protect investors' proprietary information.

consultant to supplement investment activity or policy making for the organization. The second and third sections of the survey collected data on the investor's current program allocations, including suballocations intended to achieve diversification in the portfolio, and how those allocations and suballocations were determined. The fourth section sought information on the investor's targeted risk and return for the program and how that was determined. It further probed whether the investor's private equity team was using quantitative analysis either in designing or implementing the private equity allocation strategy. The last section of the survey sought more detailed information on the investor's activities with respect to geographic diversification.

5.2. Investment trends

The interview data suggested several trends in the way investors or specific classes of investors are managing their private equity investment activities, including diversification within their portfolios. While the data is not statistically significant given the limited sample size, it is enlightening with respect to investor mindset and practice. It should be noted, however, that the trends discussed in this Section 5 and the conclusions discussed in Section 6 relate to sophisticated private equity investors, who employ investment officers with significant experience and skill in private equity investing. For institutions lacking this level of expertise (either in house or through consultants), a different approach to investing may be appropriate.

5.2.1. Portfolio construction

Not surprisingly, none of the investors are utilizing modern portfolio theory to design their private equity portfolios. Instead, most rely on internal or external consultants to identify an overall risk and return expectation for the private equity asset

class (which is sometimes weighted by risk/return expectations for venture capital and buyouts based on the policy subasset class allocations), which then influences how much of the organization's total portfolio will be allocated to private equity.¹⁸

As discussed in more detail in the following sections, the actual composition of these investors' private equity portfolios is driven by the investments chosen by staff, largely driven by quality of the managers. They may invest under the umbrella of a policy allocation, which in many cases gives the team flexibility to invest opportunistically or within a broad range based on opportunities, or they invest completely on an opportunistic basis.¹⁹

5.2.2. Diversification by strategy

All investors have some level of diversification in their portfolios by strategy, primarily with a mix of venture capital and buyout funds. All investors also have exposure to special situation funds such as distressed debt, mezzanine or hedge funds. However, four of the ten investors interviewed report exposure to special situation investments outside of their private equity allocation. In these cases, special situations are either part of a separate alternative marketables asset class or included as part of the fixed income or high yield asset class within the organization's total portfolio.

While all investors report actual diversification by strategy, they do not all manage their portfolios to a target strategy allocation – i.e., as a policy matter, strategy

¹⁸ Three investors, two endowments and one corporate pension plan, use internal staff to perform the quantitative analysis to determine the risk and return of their private equity portfolios. All investors surveyed are using other quantitative analyses in managing their portfolios as a part of due diligence and monitoring existing investments and evaluating new investments (e.g., attribution analysis of managers, benchmark comparisons, deeper analysis of cash flows and returns reported by managers, etc.).

¹⁹ Tighter policy guidelines may be appropriate for investors with less experienced investment officers who may not possess the skills needed to identify good managers, which is imperative for an opportunistic investment approach. A question not addressed here is whether an institution should be active in the private equity asset class without equipping itself with experienced investment professionals either in house or through consultants.

diversification is not required. Table 5.2 shows the breakdown of target and actual allocation by strategy of the ten investors surveyed. As shown, half the group manages their portfolios to target allocations, while the other half invests across strategies on an opportunistic basis. However, reviewing by investor type, we see that the endowments all invest opportunistically without target strategy allocations. A majority of the corporate pension plans and the public retirement plans use target strategy allocations, while the two foundations interviewed were divided on the matter.

Table 5.2

Investor Allocations by Strategy

Type of Organization	<u>Buyout</u>		<u>Venture Capital</u>		<u>Special Situation</u>		
	Target	Actual	Target	Actual	Target	Actual	outside PE
Corporate plan	opportunistic	98	opportunistic	2	opportunistic	in BO	no
Corporate plan	75	77	20	22	5	1	no
Corporate plan	60*	49	40*	41	-	10	no
Endowment	opportunistic	50	opportunistic	50	opportunistic	-	yes
Endowment	opportunistic	66	opportunistic	34	opportunistic	-	yes
Endowment	opportunistic	75	opportunistic	25	opportunistic	-	yes
Foundation	50	58	30	25	20	17	no
Foundation	opportunistic	65	opportunistic	35	opportunistic	0	no
Public Plan	50	62	40	26	10	12	no
Public Plan	50*	70	50*	30	2*	0.5	yes
AVERAGE	57	67	36	29	9	7	
Average / Majority Response							
Corporate Plan	68	75	30	22	split	6	no
Endowment	opportunistic	64	opportunistic	36	opportunistic	-	yes
Foundation	opp/50 split	62	opp/30 split	30	opp/20 split	9	no
Public Plan	50	66	45	28	6	6	split

* Investor has target, but actual can be within a broader range

Of the investors with target subasset class allocations, two had changed those targets in the last few years, in both cases increasing the target allocation to buyouts versus venture capital; in one case this was coupled with grouping buyouts and special situations

together under one target allocation. In both cases, the policy changes were driven by the investment staff's view that access to sufficient venture capital or special situation managers was limiting their ability to maintain an allocation close to their targets, albeit within their permissible ranges. Of this same group, four investors anticipate making changes to their target subasset class allocations over the next few years. These potential changes also relate to staff's view on the opportunities available to them in the coming years and their efforts to rationalize the target allocations in the context of the likely opportunities.

The interviews also identified the investors' general approach to determining strategy target allocations or actual exposure through investment activities. All of the investors to some extent came to their current actual allocations through opportunistic investing in the best managers the organization could access. For those investors with target allocations by strategy, the actual exposure heavily influenced the policy decisions regarding target portfolios. Two of the five investors with targets also use policy ranges, which give them further flexibility to invest based on attractiveness of current or staff's view of future opportunities. With respect to those investors with no policy targets, their actual exposure would move in weighting between buyouts and venture capital mostly based on the opportunities.

5.2.3. Diversification by stage or size

Similar to the analysis above regarding diversification by strategy, investors also provided information relating to diversification within their venture capital or buyout portfolios by stage or fund size. None of the investors have policy targets within the

buyout and venture capital strategies. However, five of the 10 investors reported having either actual or tactical biases. These are shown below in Table 5.3.

Table 5.3

Investor Diversification within Strategies

Type of Organization	Targets within BO	Bias within BO	Current overweight	Targets within VC	Bias within VC	Secondary Bias within VC
Corporate plan	no	no	large BO	no	diversified	-
Corporate plan	no	smaller funds	-	no	-	-
Corporate plan	no	no	large BO	no	-	-
Endowment	no	smaller funds	-	no	early stage	diversified
Endowment	no	smaller funds	-	no	early stage	growth equity
Endowment	no	smaller funds	-	no	early stage	growth equity
Foundation	no	no	large BO	no	early stage	-
Foundation	no	smaller funds	-	no	early stage	smaller funds
Public Plan	no	no	-	no	-	-
Public Plan	no	no	-	no	-	-
Average / Majority Response						
Corporate Plan	no	no	large BO	no	-	-
Endowment	no	smaller funds	-	no	early stage	growth equity
Foundation	no	smaller funds	large BO / -	no	early stage	- / smaller funds
		/ no				
Public Plan	no	no	-	no	-	-

Within their buyout portfolios, half of the investors report a deliberate bias toward smaller buyout funds.²⁰ In most cases, investors believe that the smaller buyout funds focus more on value creation through operational improvements, thereby creating greater value for investors than is created on the larger end of the market. This subset of investors was weighted toward endowments and foundations. On the other hand, the majority of the corporate pensions and public plans and one foundation report no tactical bias within their buyout portfolios, but three of these five investors have a current

²⁰ While investors noted their bias toward smaller buyout funds, generally they were referring to medium and large size funds of less than \$1.0 billion in commitments, as compared to larger buyout funds of greater than \$1.0 billion of commitments.

overweighting in very large and mega buyout funds. It is noteworthy that most investors agreed that recent performance in the buyout market was driven by larger buyout funds, and despite the general perception that more value is created at the smaller end of the market, the portfolios with an overweight in large and mega buyouts may have performed better over the past few years. Most investors, however, questioned whether this performance would persist.

Within their venture capital portfolios, half of the investors reported a tactical bias toward early stage funds. This group consisted of all endowments and foundations surveyed. The corporate pensions and public plans reported no tactical bias within venture capital. The rationale for the endowment and foundation bias toward early stage was similar to that with respect to smaller buyout funds in that smaller, early stage funds were viewed as the greater value creators within venture capital. Aside from early stage, several investors reported biases toward either growth equity funds or diversified venture capital funds, which were viewed generally as either value creators or attractive on a risk adjusted basis. None of the investors perceived pure late stage funds as particularly attractive.

5.2.4. Diversification by geography

The investor surveys revealed significant data regarding strategies with respect to geographic diversification in their portfolios. Table 5.4 summarizes this data. Similar to the data relating to policy versus actual allocation by venture capital and buyout strategies, investors were split between those with target policy allocations to US and non-US exposure. In this case, however, only three of the 10 investors surveyed had

policy allocations to non-US investments, while nine reported actual exposure to both US and non-US regions.

Table 5.4

Investor Allocations by Region

Type of Organization	United States		Non-US	
	Target	Actual	Target	Actual
Corporate plan	opportunistic	71	opportunistic	29
Corporate plan	80	75	20	25
Corporate plan	opportunistic	75	opportunistic	25
Endowment	opportunistic	80	opportunistic	20
Endowment	opportunistic	100	opportunistic	0
Endowment	opportunistic	85	opportunistic	15
Foundation	opportunistic	90	opportunistic	10
Foundation	65	70	35	30
Public Plan	85	not reported	15	not reported
Public Plan	opportunistic	75	opportunistic	25
AVERAGE		80		20
Average / Majority Response				
Corporate Plan	opportunistic	74	opportunistic	26
Endowment	opportunistic	88	opportunistic	12
Foundation	opp/65 split	80	opp/35 split	20
Public Plan	opp/85 split	75	opp/15 split	25

All of the investors reported actual diversification by region, with the average across the group being 80% US exposure and 20% non-US exposure.²¹ Similar to the responses to strategy diversification, investors generally reported that their actual exposure, combined with a view of potential opportunities, significantly influenced the target allocations for those investors with formal diversification policies. In general, the

²¹ Investor responses for the actual allocation outside the US included both responses based on fund level exposure (i.e., the NAV of non-US funds) and of company level exposure (i.e., the NAV of the underlying portfolio companies of all funds in the investor's portfolio). Given that many US funds invest outside the United States, the responses of those investors answering based on fund level exposure may have understated their non-US exposure. This distinction, however, has been omitted in the analysis for purposes of simplicity.

investors' actual practice with respect to non-US investing was driven by opportunities and not a specific strategic design.

5.2.4.1. Diversification within the non-US portfolio

While it is clear that investors believe diversification outside the US is important (as demonstrated by their policy and/or actual allocations), further diversification within the non-US portfolio is less evident. As shown in Table 5.5, most investors' non-US portfolios are heavily weighted to European buyout investments. Every investor expressed skepticism or avoidance of European venture capital. A secondary, and much smaller, weighting is to Asia, with investors roughly split on their bias toward venture capital and buyouts in Asia. As opposed to the split among investors with respect to strategy diversification, in this area, there was much less distinction between endowments and foundations on the one hand and corporate pensions and public plans on the other.

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Table 5.5

Investor Diversification within Non-US regions

Type of Organization	Primary non-US exposure	Secondary non-US exposure	Targets w/in Region	Bias within Region		
				Europe	Israel	Asia/EM
Corporate plan	European BO	BO Asia	no	BO		BO
Corporate plan	European BO	Asia	no	BO	-	-
Corporate plan	European BO	Asia	no	BO	VC	BO
Endowment	n/a	n/a	n/a	n/a	n/a	n/a
		BO/VC Asia				
Endowment	European BO	VC Israel	no	BO	VC	Both
Endowment	European BO	BO/VC Asia	no	BO	-	Both
Foundation	European BO	-	no	BO	-	BO
Foundation	European BO	VC Asia	no	BO		VC
			non-US 10% of BO and 5% of VC			
Public Plan	not reported	not reported		-	-	-
Public Plan	European BO	-	no	BO	-	-
Average /Majority Response						
Corporate Plan	European BO	Asia	no	BO	-	BO
Endowment	European BO	split	n/a	BO	-	BO/VC
Foundation	European BO	Asia/-	no	BO	-	split
Public Plan	-/European BO	-	split	BO	-	-

5.2.4.2. Global versus country specific funds

While investors report a clear bias to European buyouts, they have differing views on whether that exposure should be achieved using global funds (which include very large pan-European or pan-Asian funds) or with country-specific funds. As shown in Table 5.6, the investors are about evenly split on their actual investments in and biases toward global versus country funds.

Table 5.6

Global versus Country-Specific Funds

Type of Organization	<u>Global Funds</u>				<u>Country-specific Funds</u>			
	Invest	Bias against	Benefits	Drawbacks	Invest	Bias against	Benefits	Drawbacks
Corporate plan	yes	no	diversification lower risk	-	no	no	-	staffing country risk
Corporate plan	yes	no	diversification lower risk	-	no	yes	-	country risk
Corporate plan	no	no	global market shift lower risk	better local managers	yes	no	better local managers	country risk; staffing
Endowment	no	yes	-	better local managers	yes	no	better local managers	country risk
Endowment	yes	no	-	-	-	-	-	-
Endowment	no	no	manager specific	-	yes	no	manager specific	-
Foundation	no	no	-	-	yes	no	local team access to deals	country risk
Foundation	yes	no	global market shift diversification	-	no	no	-	Staffing; country risk
Public Plan	yes	no	-	-	yes	no	-	-
Public Plan	yes	yes	global market shift; manager specific	better local managers	yes	no	better local managers	country risk
Average / Majority Response								
Corporate Plan	yes	no			no	no		country risk
Endowment	no	no			yes	no		-
Foundation	split	no			split	no		country risk
Public Plan	yes	split			yes	no		country risk/split

Investors with preferences for global funds highlight the benefits of diversification within these funds because the managers typically have teams located in multiple regions, and the fund can shift its investment focus based on where it anticipates the best opportunities. Investors with a global fund bias tend to rely on the global fund for diversification within their non-US portfolios, often because they do not have the

resources they view as necessary to invest in enough country funds to produce diversification and offset country risk in their portfolios.

Other investors, however, clearly prefer to invest in country funds because they believe that there are better local teams in each country, which are better equipped to find the best local opportunities than a large global player, who might be focusing its efforts in another region. With respect to country risk, these investors either believed it was acceptable to take on the country risk because of the quality of the manager or the organization was investing broadly across different countries and viewed its portfolio as sufficiently diversified by country.

All investors acknowledged the expansion of many large US buyout firms into Europe and Asia as they pursue global investment strategies. As shown in Table 5.7, investor reaction to this expansion is mixed with the majority of investors skeptical about the success of these ventures. These investors generally are waiting to make investments with these US global funds until they believe the manager has built sufficient resources in the region to be successful. A few investors noted that they plan to monitor their underlying company-level non-US exposure more closely in the future for fear that it will increase too much as more US funds deploy capital overseas. Future policy allocation or investment emphasis could change based on a view that the organization's private equity portfolio was becoming overly weighted in non-US investments.

Table 5.7**US Managers investing outside the US**

Type of Organization	Estimated % of managers	Estimated % of US commitments	Investor views	Investment approach
Corporate plan	20	15	interested in global diversified managers; attractive at large end of market	OK if manager is prepared
Corporate plan	35	25	none	OK if manager is prepared
Corporate plan	50	22.5	skeptical; watch underlying exposure need to evaluate underlying company exposure	OK if manager is prepared
Endowment	50	22.5	skeptical; prefer local manager in the market	not interested
Endowment	33	0	skeptical	OK if manager is prepared
Foundation	7.5	1.5	skeptical; less interest in non-US managers	wait and see
Foundation	40	20	watch underlying exposure	OK if manager is prepared
Public Plan	-	-	watch underlying exposure	OK if manager is prepared
Public Plan	75	25	watch underlying exposure	OK if manager is prepared
Average / Majority Response				
Corporate Plan	35	21		OK if manager is prepared
Endowment	38	14		OK if manager is prepared
Foundation	24	11		Split
Public Plan	75	25		OK if manager is prepared

Overall, investors expressed caution in their activities in emerging markets such as India, China, Eastern Europe and Latin America. Many had suffered losses on prior investments in these regions and were not ready to commit substantial private equity investments to these areas. Most, however, believed that these regions in the future

would provide private equity opportunities, and they were evaluating how and when to increase exposure there.²²

5.2.4.3. Reasons for non-US investment program

The analysis of how and why investors arrived at their current geographic diversification involves both quantitative and qualitative factors. The surveys attempted to identify the primary reasons investors sought non-US exposure and the limitations they faced, which impacted their investment decisions. Table 5.8 summarizes the survey findings with respect to the benefits and challenges investors faced when investing outside the US.

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²² Only 50% of the investors stated that they would consider using a fund of funds structure to access emerging markets private equity.

Table 5.8

Benefits and Challenges of a non-US investment program

Type of Organization	<u>Direct Benefits</u>		<u>Indirect Benefits</u>		<u>Due diligence challenges</u>		
	Primary	Secondary	Primary	Secondary	Staffing	Travel	Other
Corporate plan	diversification	returns	knowledge	-	-	yes	distance; time zone
Corporate plan	diversification by economies	more opportunities	knowledge	understand US expansion	yes	yes	-
Corporate plan	returns	more opportunities	knowledge	understand US expansion	yes	yes	lack of network
Endowment	returns	-	knowledge	cross-team diligence	no	yes	staff time / schedules
Endowment	returns	-	none expected	-	n/a	n/a	n/a
Endowment	returns	diversification by economies	knowledge	build global network	no	yes	-
Foundation	more opportunities	diversification by economies	EM knowledge sharing in portfolio	-	no	yes	incomplete analysis
Foundation	returns	diversification by customers	knowledge	-	yes	yes	-
Public Plan	returns	-	cross-team due diligence	knowledge	no	yes	-
Public Plan	returns	diversification by economies	knowledge	-	no	yes	-
Average / Majority Response							
Corporate Plan	diversification		knowledge		yes	yes	
Endowment	returns		knowledge		no	yes	
Foundation	split		knowledge		split	yes	
Public Plan	returns		knowledge/ cross-diligence		no	yes	

The primary reasons these investors seek non-US exposure are (i) more opportunities to make private equity returns and (ii) diversification, with return potential being the principal reason identified by most investors. Investors also viewed the diversification benefit differently, with some highlighting diversification resulting from

different macroeconomic conditions and others identifying diversification by portfolio company customer bases. All investors identified knowledge gains as one of the primary indirect benefits from non-US investing. However, the knowledge benefit meant different things to different investors, from knowledge of other countries' economies, to global macroeconomic trends, to information about US firms' expansion into non-US regions and how local conditions might impact such expansion.

In most cases, the knowledge benefit was confined within the private equity investment team. Only three of the 10 investors surveyed believed that knowledge of non-US markets was being productively shared across asset class teams in their organizations. In these cases, professionals from different asset class teams might work together to review investment opportunities. For example, the public equities team members with emerging market expertise might participate in meetings with the private equity emerging market managers. One private equity investor stated that he would visit with investment managers in his organization's international equities portfolio when he was in Asia for private equity meetings. While only a few investors stated that their organizations were sharing global markets information across their organizations, several investors admitted that such knowledge sharing or cross-team due diligence efforts should be more actively promoted within their organizations.

5.2.5. Investor constraints in achieving diversification in their portfolios

As discussed above, investors generally are achieving some level of diversification in their private equity portfolios. In some cases, investors are managing their portfolios to implement policy allocations. In other cases, investors are investing purely on an opportunistic basis, while keeping in mind the benefit of diversification.

This diversification occurs through strategy differences (venture capital versus buyout), stage differences (small versus large buyout funds, or early stage versus balanced venture funds) and geographic differences (US versus non-US investments, or global versus country specific funds). However, regardless of the benefit of diversification, the overriding criteria for investors was the quality of the managers in its portfolio. In other words, despite policy allocations or a concentration or overweighting in their portfolios, investors would not seek diversifying investments if the managers were not viewed as high quality and likely to produce expected returns. This is reflected in Table 5.9, which shows the weighting investors gave to three criteria with respect to their influence on policy or actual subasset class allocations within their portfolio: (i) risk and return expectations for investments, (ii) available investment opportunities and (iii) staffing limitations.

Table 5.9
Factors influencing allocation/exposure

Type of Organization	1st	2nd	3rd
Corporate plan	risk/return	staffing	opportunities
Corporate plan	risk/return	opportunities	staffing
Corporate plan	commitment cap	risk/return	staffing
Endowment	risk/return	opportunities	n/a
Endowment	risk/return	staffing	opportunities
Endowment	risk/return	opportunities	n/a
Foundation	staffing	opportunities	risk/return
Foundation	opportunities	staffing	risk/return
Public Plan	opportunities	risk/return	n/a
Public Plan	opportunities	staffing	risk/return
Average / Majority Response			
Corporate Plan	risk/return	split	staffing
Endowment	risk/return	opportunities	split
Foundation	staffing/opportunities	split	risk/return
Public Plan	opportunities	split	split

As shown in the table, most investors believed that risk/return expectations for investments played the greatest role in determining the combination of assets in their private equity portfolios. Most investors also felt that limited investment opportunities, which directly related in most cases to staffing constraints, also influenced how their private equity portfolios were invested.²³

For example, one investor stated that in the early and mid-1990s, its private equity portfolio was heavily weighted in venture capital investments. However, as a result of numerous realizations in the late 1990s, followed by massive declines in venture capital valuations in the early 2000s, followed by strong performance in the buyout portfolio during the past few years, the organization's private equity portfolio today is heavily weighted in buyout funds. This investor also believed that the buyout exposure would continue to increase because there were more opportunities to invest significant dollars with quality managers in the buyout market than in the venture capital market. The investor stated that significant human resources would be required to source and conduct due diligence on numerous new venture capital firms to achieve a material increase in the venture capital exposure. A similar analysis was used in limiting the organization's non-US investment program. The organization's philosophy was that the quality of the investment manager was paramount, and if the organization with its resources could access better managers in a specific strategy, then the private equity portfolio could be overweighted in that strategy.

²³ It should be noted that within the group of 10 investors interviewed, the average number of dedicated private equity investment managers per organization was three, in a range of zero to four and one-half. While most investors felt that staffing limitations influenced the investment opportunities pursued, several noted that their having a dedicated staff of long term employees created a competitive advantage that permitted the organization to investigate more opportunities and build stronger relationships with managers than many other private equity investors were capable of doing.

With respect to non-US investing, investors agreed that there were challenges to actively investing in markets outside the US. Many of these related to the organization's ability to source the best investments in those regions. This posed a bigger problem in non-US regions than in US regions for a number of reasons. None of these investors have offices or staff located outside the US, so the travel required to source and monitor non-US investments is burdensome. One investor indicated that it generally does not invest outside the US because it has limited staff, and this staff does not wish to travel. In addition, as US based investors, their knowledge of foreign private equity markets is limited, and these investors do not have strong networks outside the United States to leverage in pursuing and investigating investment opportunities.

6. CONCLUSION

As discussed in Section 2, it is questionable whether modern portfolio theory can be applied in designing a private equity portfolio. First, there is limited historical return data to be analyzed. Data providers such as Venture Economics only report venture capital and buyout fund returns back to the late 1970s or early 1980s. Evaluating subsets of the return data based on different strategies, stages and regions reduces the sample size and time period covered even further. In addition, MPT is based on the assumption that the distribution of returns in each security in the portfolio is normal, which is not true with private equity returns that are highly skewed.

However, with the caveat that results are merely indicative and not conclusive, we can analyze the historical private equity performance data to assess whether some level of diversification, in theory, would be appropriate. As shown in Section 3, a portfolio of all

buyout funds, which have a lower risk/return profile than venture capital funds, could achieve a higher expected return for the same risk level by including a small portion of venture capital funds. Depending on the investor's risk tolerance, even higher returns could be targeted with increasing concentrations in venture capital. Similarly, the data suggests that portfolios would benefit from diversification by region, although primarily in the buyout industry given the immature venture capital markets outside the United States. The analysis also suggested that diversification within venture capital or buyouts by stage or fund size could be beneficial.

While diversification in theory would be beneficial within a private equity portfolio, there are a number of constraints on investors who seek to diversify their portfolios. First, it is impossible to "invest the index" with private equity in the same manner that you can with a public equities portfolio. Given this limitation, investors must access the right mix of managers who can produce returns that mimic the index. This is quite difficult in private equity. There is a significant difference in performance between the best and the worst performers. In addition, the index returns themselves are skewed toward the top quartile returns. Therefore, investors cannot achieve index level returns without access to a sufficient number of, and in sufficient commitment amounts to, the better managers. Staffing limitations further impede investor efforts. In the first instance, the investment officers must have the experience and skills to identify and evaluate attractive investment opportunities. In addition, private equity is a relationship-based asset class that requires substantial and ongoing contact between individuals at the investment firm and at the investor's organization.

These challenges were confirmed through interviews with established private equity investors. While the sample of 10 institutions is small, the responses are indicative of general trends in the industry. None of these investors is attempting to apply modern portfolio theory within their private equity programs. They are, however, still achieving some level of diversification in their portfolios, at a minimum by investing with a number of different managers. For some investors, further diversification is a matter of policy, and these investors are managing assets to meet specific subasset class or regional allocations. For many, the investment programs are run on a more opportunistic basis with relative weightings within the private equity portfolio shifting over time as opportunities grow or dissipate in certain areas. Even among those investors with policy allocations designed to achieve diversification, most admitted that they have the flexibility within their organizations to invest opportunistically rather than be forced to make investments in an area with few attractive opportunities in order to meet their target allocations. In these cases, the organizations either used broad ranges for their subasset class allocations or the organizations had a higher tolerance for revising the asset allocation based on feedback from the private equity staff regarding current and prospective investment opportunities.

The primary areas for diversification by these investors were by strategy (venture capital versus buyout) and by region (primarily the US, Europe and Asia). Almost all of the investors interviewed had both venture capital and buyout exposure and both US and non-US exposure in their portfolios. The non-US exposure currently is predominantly European buyout funds, with investors uniformly skeptical of the European venture capital market. Investors also expressed skepticism relating to large US funds expanding

their programs into Europe and Asia, although most investors did not rule out future investments with these groups once they felt comfortable that the manager had the right resources in place to be successful in the region.

Despite this actual diversification, all investors emphasized that the primary driver of their investment activities and resulting exposure is the quality of their managers. The main constraint on the investment program is the ability to access a sufficient number of such high quality managers to fill the organization's overall allocation to private equity, regardless of further diversification objectives. Many suggested that staffing limitations further constrained their ability to access many new managers, noting that substantial human capital resources are required to pursue new investment opportunities, particularly in geographic regions far from the investor's home base. Most investors do not have foreign offices or networks to leverage in pursuing opportunities in Europe or Asia, and many are not interested in using funds of funds to get exposure to these regions. Investors also are interested in emerging markets, primarily because they offer new managers who may be capable of producing private equity level returns, and most investors are actively investigating the best way to tackle the challenges of finding the best managers in these regions.

Taking both the quantitative analysis of historical returns described in the first half of this paper and the qualitative analysis of actual investor activities discussed in the second half of this paper, there are several best practices or guidelines that institutions should consider in designing and managing their private equity portfolios:

- Private equity investing should be done generally on an opportunistic basis, with the primary goal of achieving a portfolio of high quality managers.

This practice is appropriate for institutions employing skilled investment professionals (in house or through consultants). Tighter investment restrictions may be appropriate for institutions lacking such resources.

- If target allocations to the private equity asset class are to be used, they should be based on a permissible range of exposure, which provides flexibility to the investment team to increase or decrease investment pace based on the best opportunities available. In addition, the organization should understand that target allocations may need revision from time to time based on the opportunities available to the organization.
- Diversification strategies within a private equity program may be reasonable, and institutions can leverage modern portfolio theory in designing and structuring portfolios. However, MPT should not dictate asset allocation, but rather guide an analysis more heavily based on qualitative factors such as existing access, team resources and available future opportunities. Furthermore, any diversification strategy should provide sufficient flexibility to permit over- or underweighting based on available opportunities.
- Organizations must be cognizant of the human capital required to create and sustain a private equity investment program. Without commitment of sufficient human capital resources, and a means for retaining individuals over the long term, the organization's ability to achieve long-term exposure to strong performing private equity assets will be impaired.

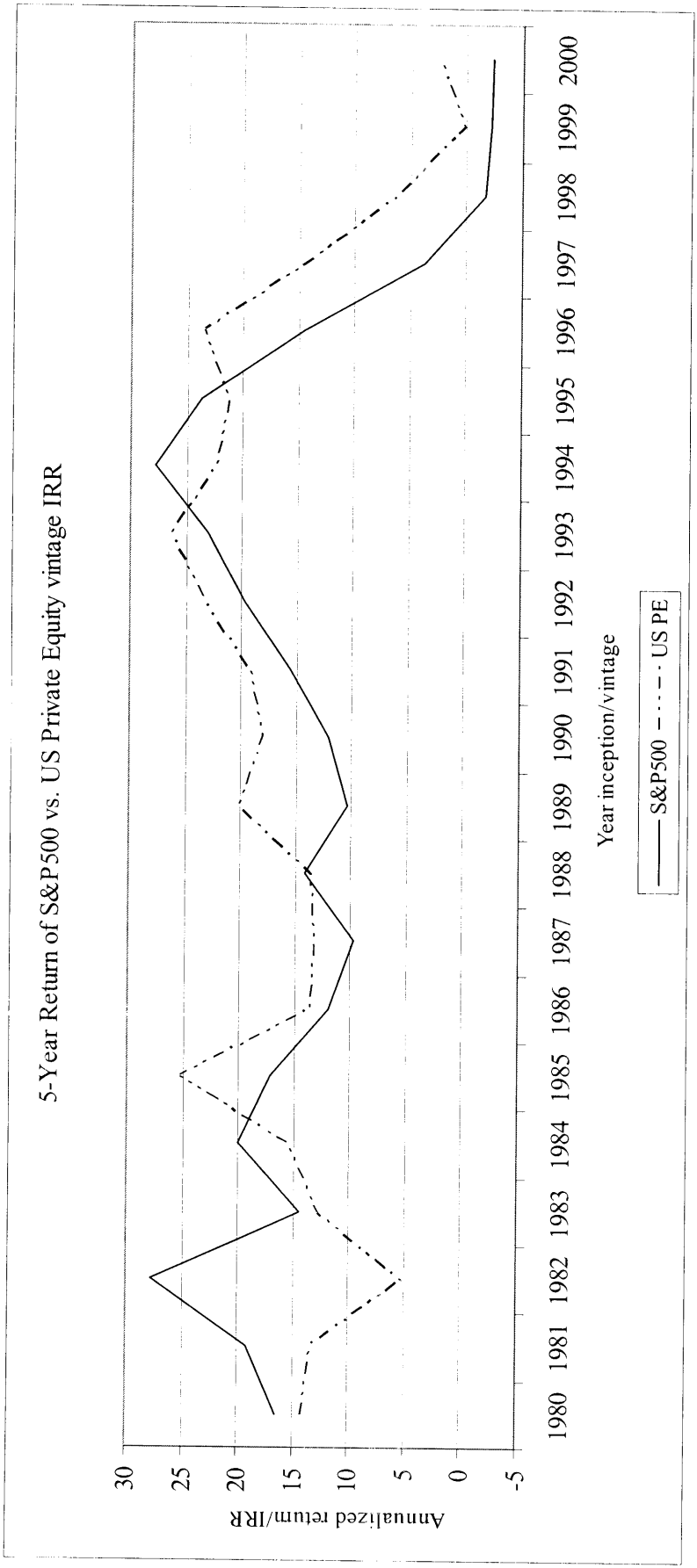
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FIGURES

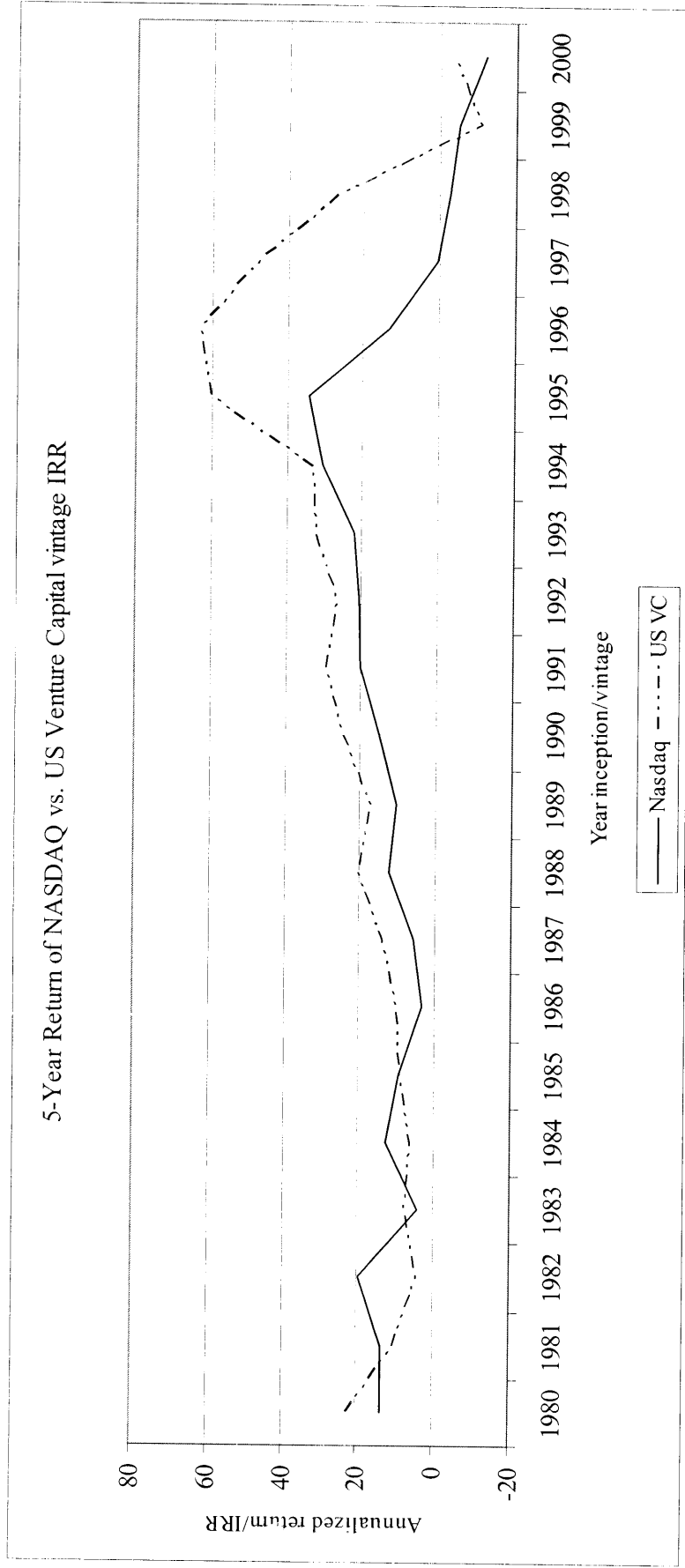
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Figure 2.1



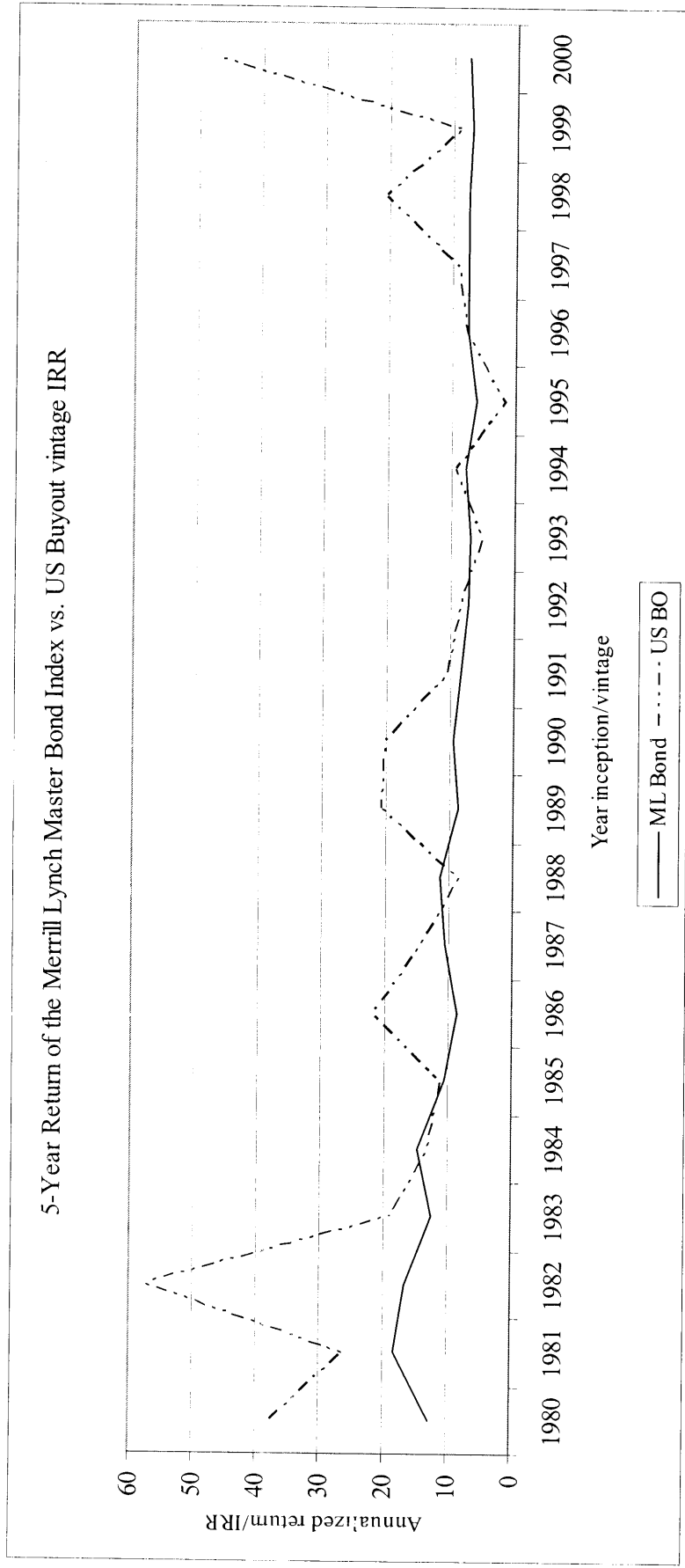
Source: Bloomberg; VentureXpert

Figure 2.2



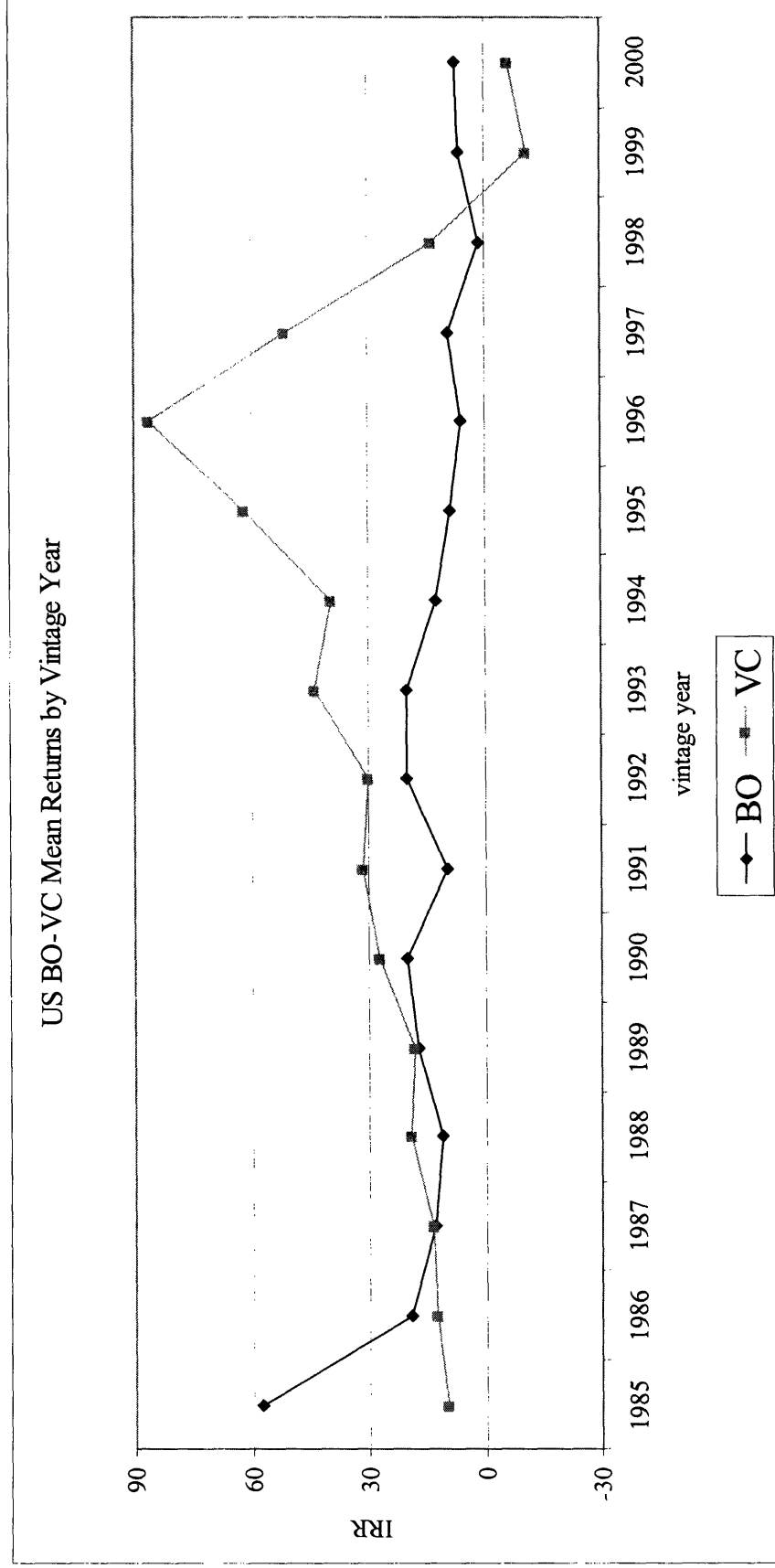
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Figure 2.3



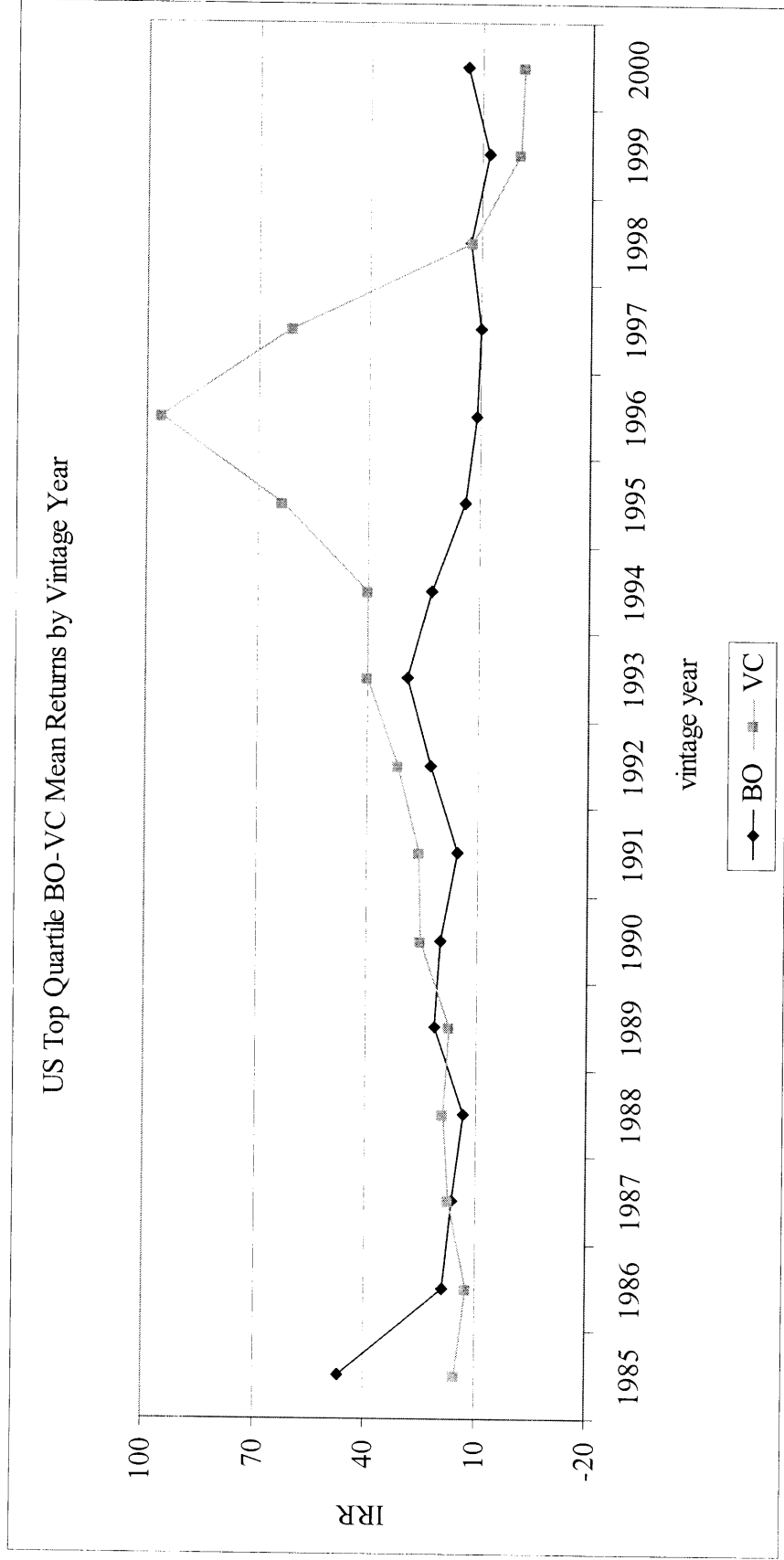
Source: Bloomberg; VentureXpert

Figure 3.1



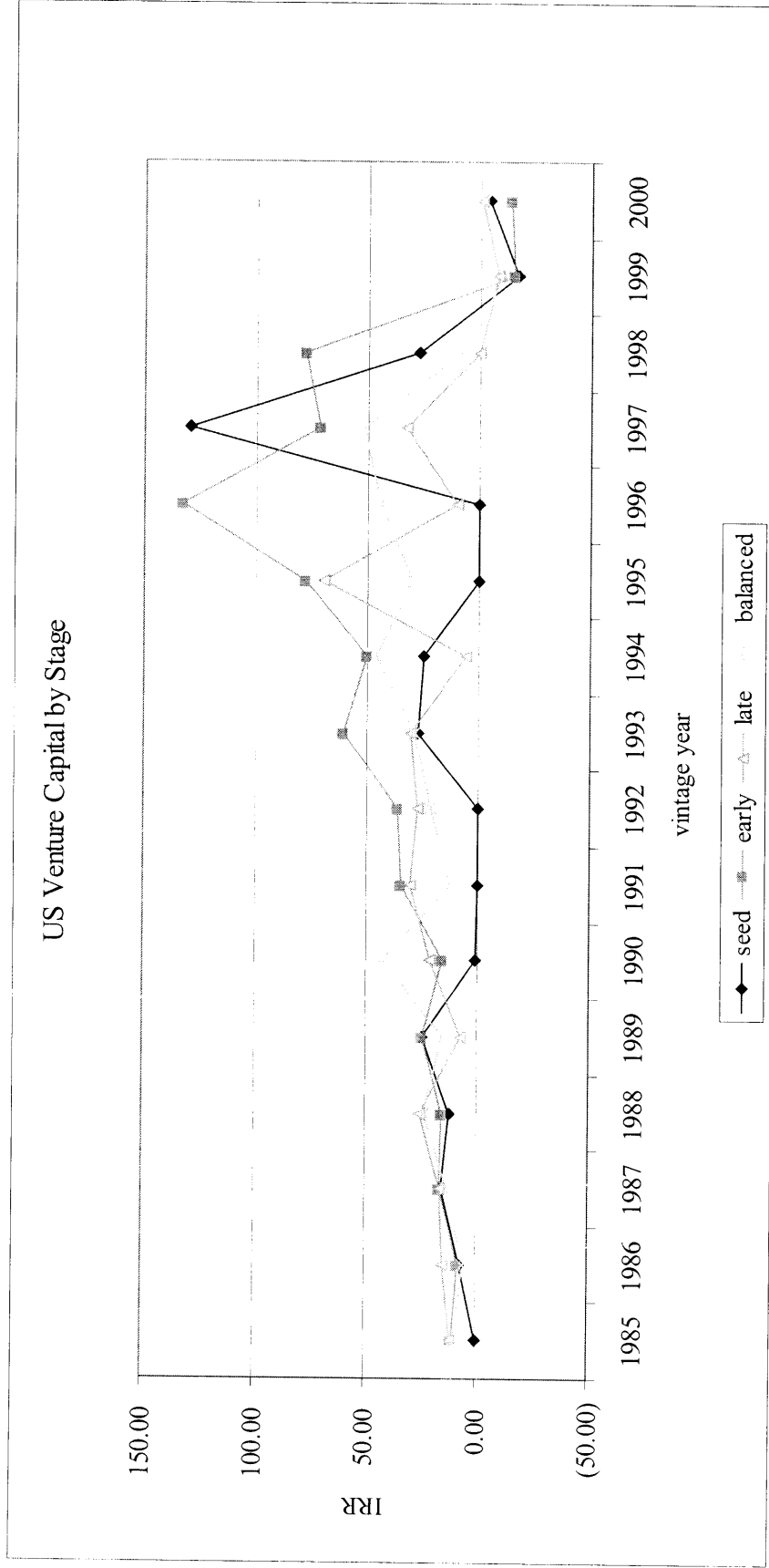
Source: VentureXpert, returns as of March 31, 2005

Figure 3.2



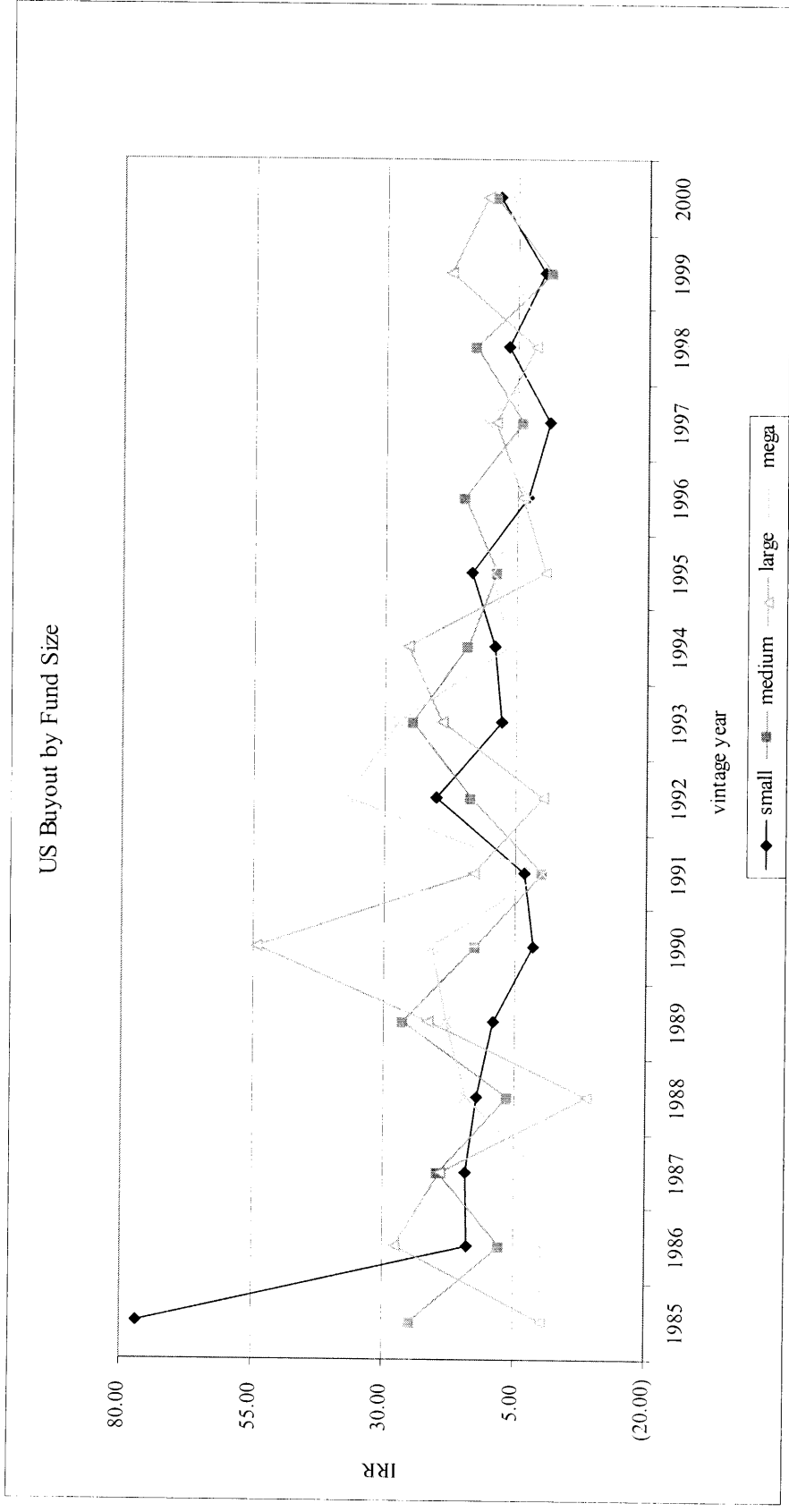
Source: VentureXpert; returns as of March 31, 2005

Figure 3.3



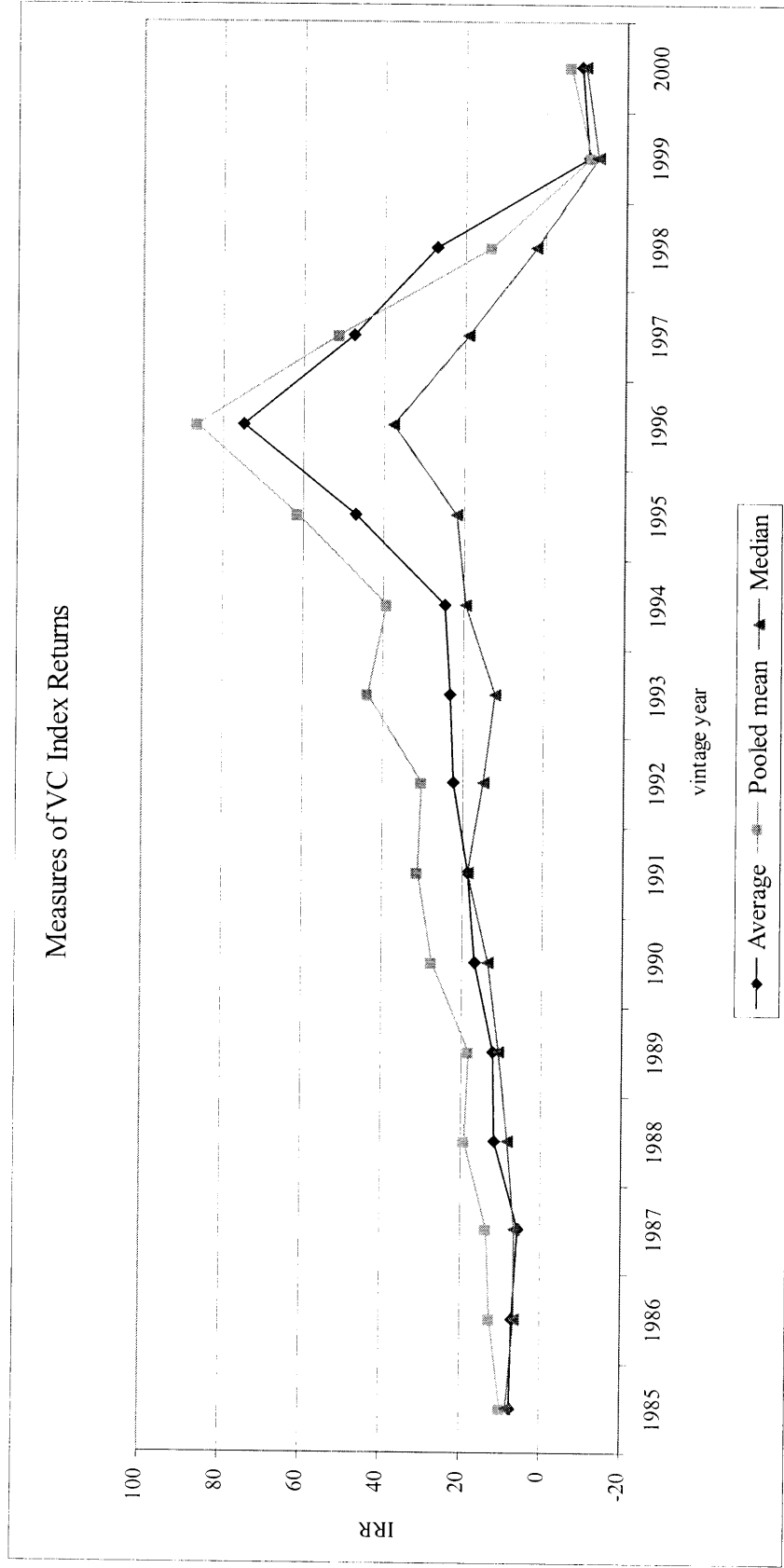
Source: VentureXpert; returns as of March 31, 2005

Figure 3.4



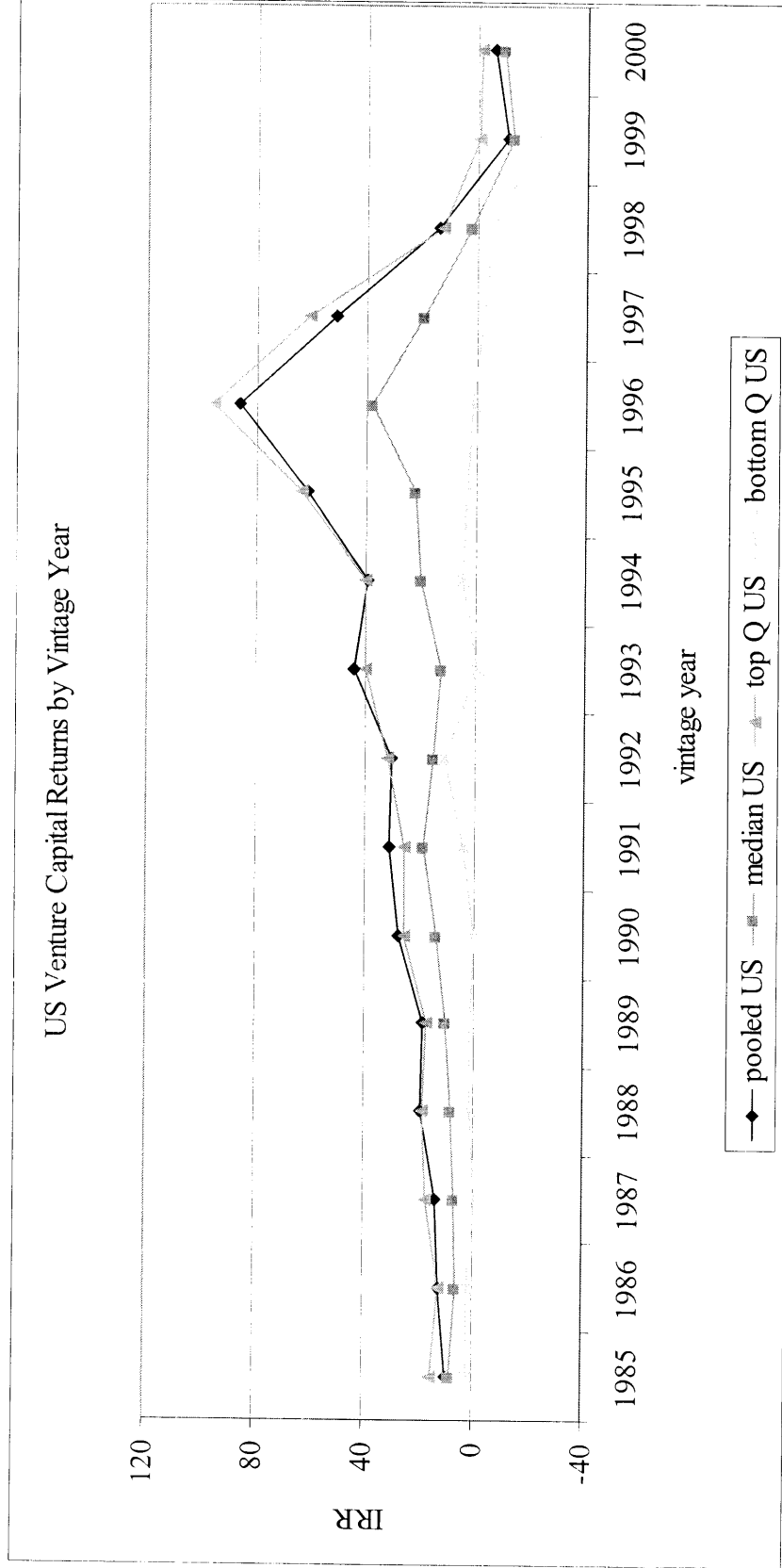
Source: VentureXpert; returns as of March 31, 2005

Figure 4.1



Source: VentureXpert; returns as of March 31, 2005

Figure 4.2



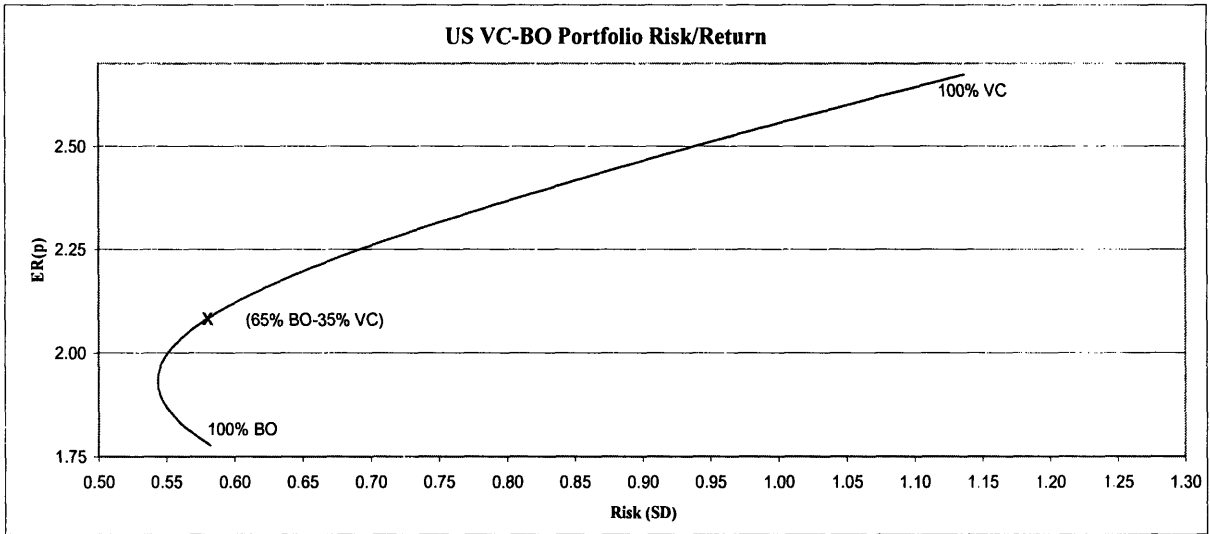
Source: VentureXpert; returns as of March 31, 2005

APPENDIX A

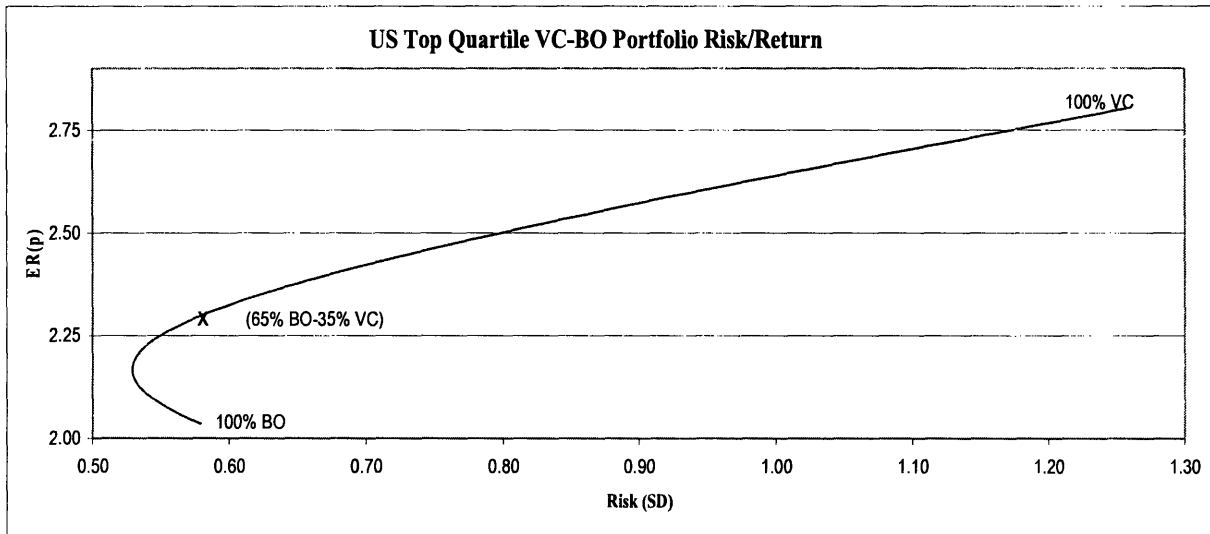
EFFICIENT FRONTIERS WITH TWO ASSET PORTFOLIO CONSISTING OF BUYOUT/VENTURE CAPITAL STRATEGIES

Using total value to paid-in-capital multiple returns:

(i) all funds



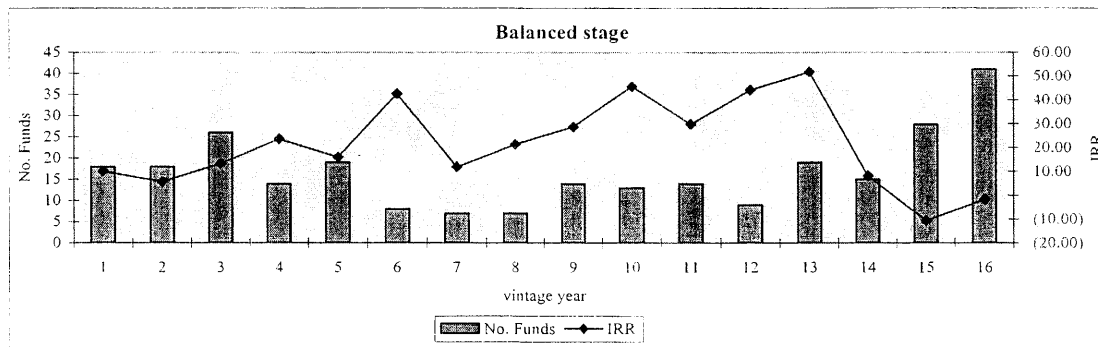
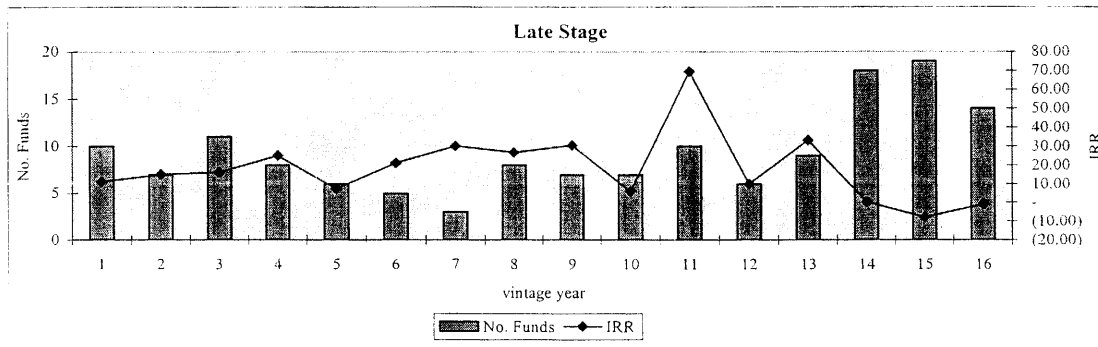
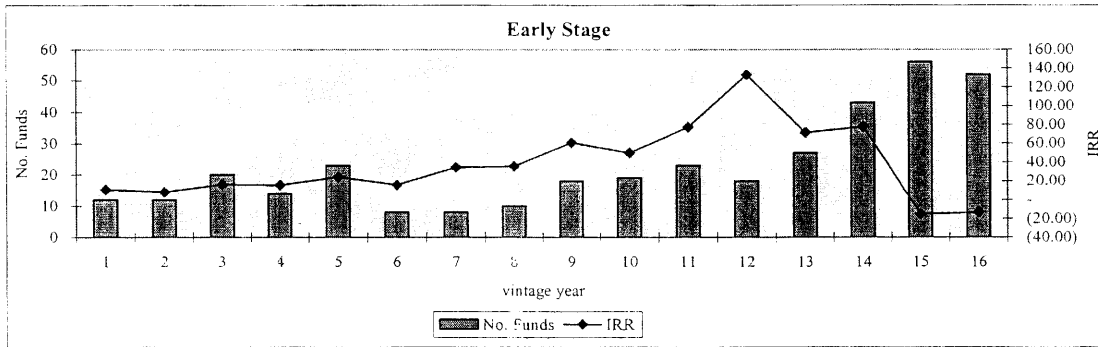
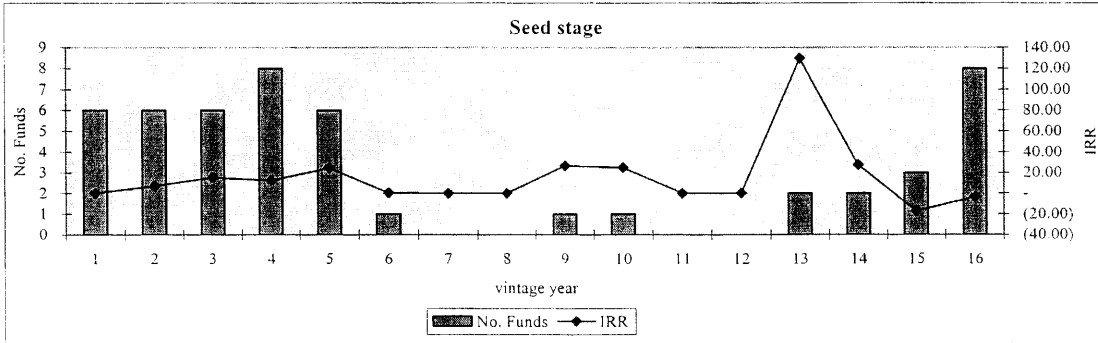
(ii) top quartile funds



Source: VentureXpert; returns as of March 31, 2005

APPENDIX B

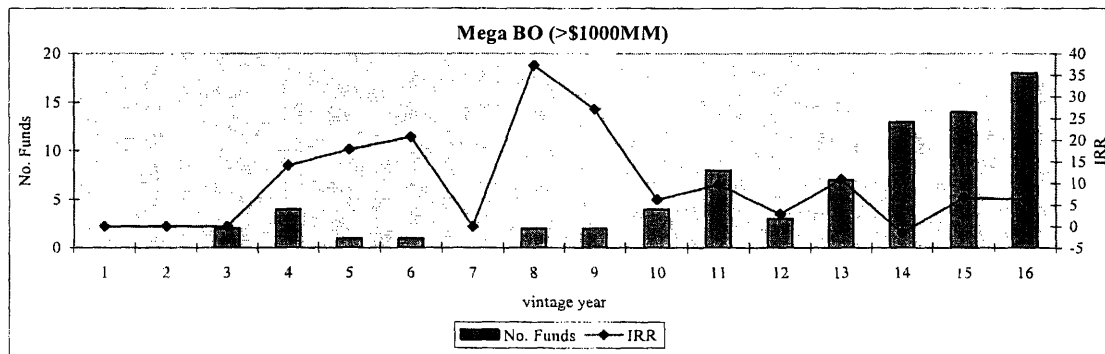
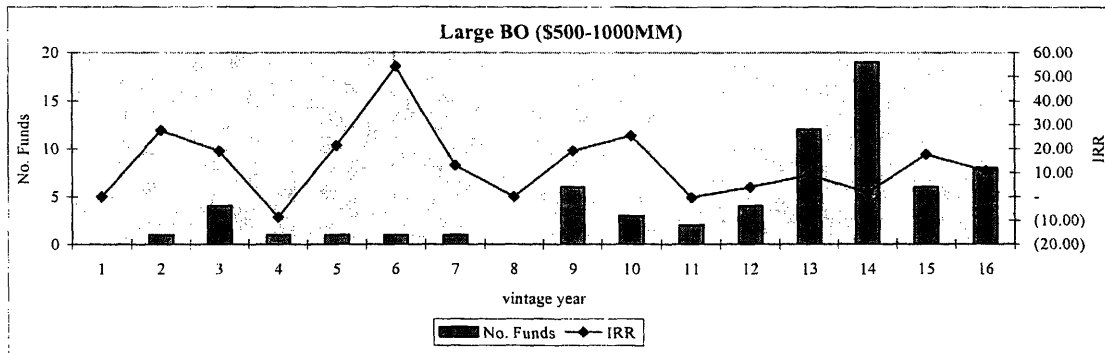
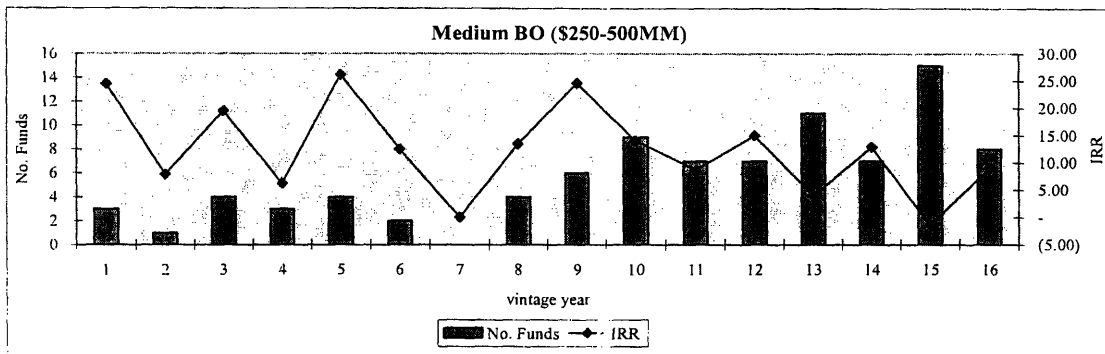
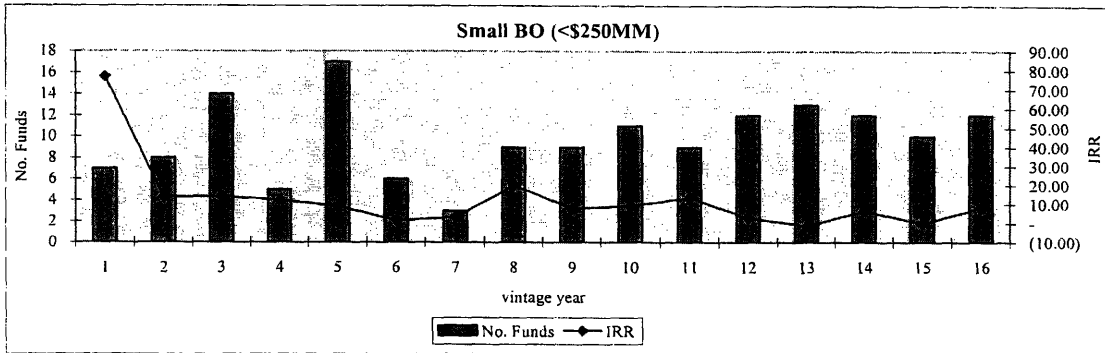
VINTAGE YEAR VENTURE CAPITAL RETURNS VERSUS NUMBER OF FUNDS RAISED



Source: VentureXpert; returns as of March 31, 2005

APPENDIX C

VINTAGE YEAR BUYOUT RETURNS VERSUS NUMBER OF FUNDS RAISED

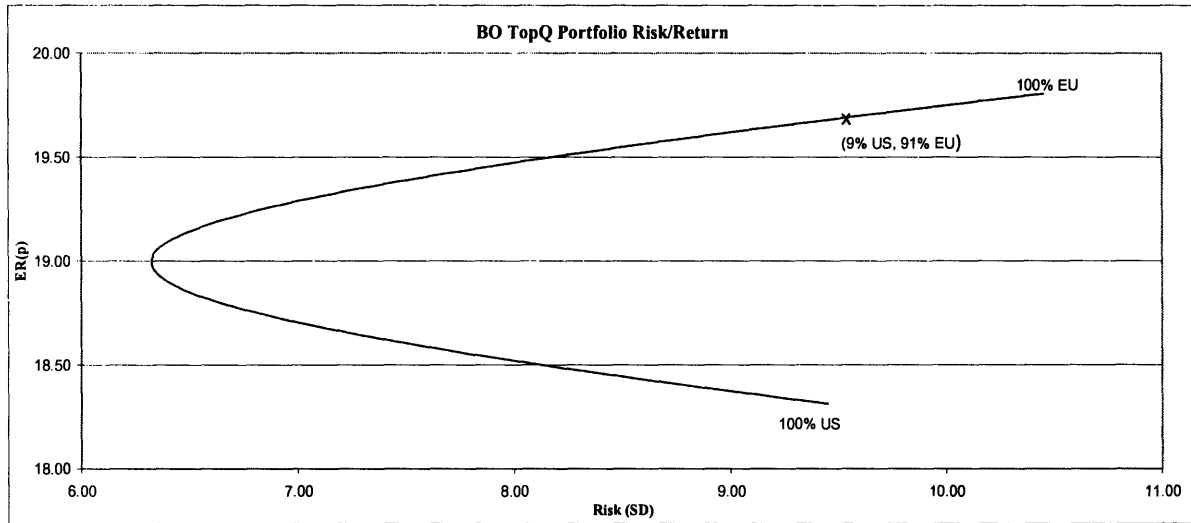


Source: VentureXpert; returns as of March 31, 2005

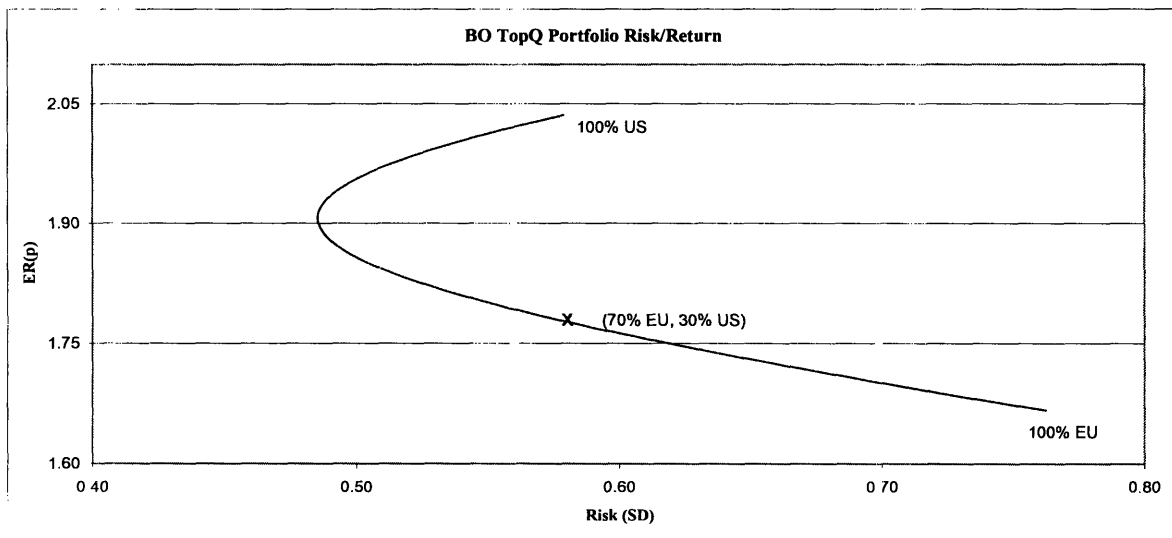
APPENDIX D

GEOGRAPHIC DIVERSIFICATION BENEFIT WITH TOP QUARTILE BUYOUT FUNDS

(i) *Based on IRR.* European top quartile buyout expected returns exceed US top quartile.



(ii) *Based on total value to paid-in-capital multiple.* Note that US top quartile buyout funds produce higher expected return multiples and lower expected risk than European top quartile funds. This suggests that diversification may not benefit a US portfolio. However, given the directional differences between top quartile IRRs and return multiples and the limited sample set, the results may be unreliable. Note that analysis using the universe of funds suggests that diversification is appropriate. Most investors are unlikely to create portfolios of only top quartile US or European buyout funds.



Source: VentureXpert; returns as of March 31, 2005

APPENDIX E

LIMITED PARTNER SURVEY

Name of respondent:

Corporate plan ___ Public plan ___ University endowment ___ Foundation ___

ALL QUESTIONS AS OF _____

Basic Statistics

1. NAV of portfolio:
2. Committed capital:
3. Investment Staff:
4. Operations Staff:
5. Outside consultant:
6. Does the consultant handle due diligence and investment evaluation?

Allocations

<u>Subasset class:</u>	<u>Target:</u>	<u>Actual:</u>
Buyout		
Venture Capital		
Special Situation		
<u>Region:</u>		
US		
Europe		
Israel		
Asia		

7. Do you have target allocations within each subasset class or do you invest opportunistically? If targets are used, explain rationale.
 - a. BO: by size of fund:
 - b. VC: by early stage, late stage, growth, diversified:
 - c. VC/BO within each region:
8. Do you staff by subasset class or region? Do you add staffing resources if you want to invest in a new area?

Allocation Process

9. When were allocations last reviewed?
10. Have any allocation targets been changed in the last 5 years? If so, how and why?
11. Do you anticipate changing any allocation targets in the next 24 months? If so, how and why?
12. How were allocation targets determined? How often are they reviewed?
13. How important were the following in making allocation decisions?
 - a. Risk/return expectations -
 - b. Opportunity set -
 - c. Staffing/resources -

Statistical Analysis

14. What is the return expectation of the target portfolio? How was this determined?
15. What is the risk level of the target portfolio? How was this determined?
16. Have you performed statistical analysis to determine optimal portfolio? If so, what were the results? Risk level/expected return?
17. Has the risk/return expectation changed without any corresponding change in subasset class allocation?
18. Is the portfolio providing expected benefits?

Specific Questions on US/Non-US Investment Activity

19. For how long have you had an allocation or been investing outside the United States?
20. What influenced your decision to invest outside the United States?
21. Do you use a dedicated team for the non-US investments, and, if so, how it is set up?
22. Do you invest in global funds? If so, why? Are you only interested in global funds?
23. Do you invest in country-specific funds? If so, why?
24. In which regions outside the US have you invested, and has your investment approach (and the reasons to invest) differed by region?
25. As US firms increase investment outside the United States, has your interest in non-US partnerships changed? Are you rethinking your non-US allocation as a result of this?
26. Can you estimate the percentage of your US managers who invest outside the US?
27. Can you estimate the percentage of your committed capital in new US funds that is invested outside the US?
28. With respect to your US/Non-US portfolio, address the following:
 - a. Direct benefits (e.g., financial/economic, diversification)
 - b. Indirect (e.g., knowledge, network, leverage information for other asset classes, manager overlap)
 - c. Ease or difficulty of due diligence; contrast with due diligence on US firms; use of consultants.
 - d. Access to firms/information.
 - e. Responsiveness of GPs.
 - f. Alignment of interest with investors
 - g. Investment opportunities for private equity
 - h. Exit opportunities/climate.
 - i. GP team stability.
 - j. GP team track record
 - k. US firms investing outside the US