TUCK SCHOOL OF BUSINESS AT DARTMOUTH

CENTER FOR PRIVATE EQUITY AND ENTREPRENEURSHIP

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Note on Private Equity Asset Allocation

Over the past 20 years, managers of institutional capital have increasingly allocated more funds to private equity. During that time period, private equity has been an asset class with relatively high returns compared to public stock market indices. However, the recent economic downturn has made it clear that this asset class also has significant risks. This note describes the characteristics and challenges of private equity as an asset class.

The table below shows a sample of recent publicly announced changes in allocations to private equity by major institutional investors in 2002 and 2003.

Organization	Type	Action	Fund Size ($Bn)	Old Alloc.	New Alloc.	Net Change ($Bn)
TIAA-CREF	Private Pension	New	275	0%	1%	2.8
CalPERS	State Pension	Increase	136	6%	7%	1.4
CalSTRS	State Pension	Increase	108	5%	8%	3.2
FL St Bd of Admin	State Pension	Increase	106	3%	4%	1.6
State of Wisconsin IB	State Pension	Increase	46	3%	6%	1.4
Maryland St Ret Pens Sys	State Pension	Increase	25	0%	1%	0.2
Colorado PERA	State Pension	Decrease	24	11%	8%	-0.7
Illinois TRS	State Pension	Increase	23	3%	6%	0.7
PennSERF	State Pension	New	21	0%	4%	0.8
Yale	Endowment	Decrease	11	25%	18%	-0.8
Indiana PERS	State Pension	New	10	0%	2%	0.2

This case was written by Rob Hatch T'04 and Adjunct Assistant Professor Fred Wainwright under the supervision of Professor Colin Blaydon of the Tuck School of Business at Dartmouth College. It was written as a basis for class discussion and not to illustrate effective or ineffective management practices.

St Univ Ret Sys of IL	State Pension	Decrease	9	7%	5%	-0.2
Stanford	Endowment	Decrease	8	17%	10%	-0.6
Los Angeles City ERS	County Pension	Increase	7	5%	7%	0.1
1199 Nat'l Ben & Pen Fund (NY)	Union	Increase	6	2%	10%	0.5
Louisiana State ERS	State Pension	Increase	6	1%	2%	0.0
Illinois Gen Revenue Fund	State Pension	New	6	0%	1%	0.1
Indiana St TRF	State Pension	New	6	0%	5%	0.3
Missouri SERS	State Pension	New	5	0%	3%	0.2
United Needle Trades Employees	Union	Increase	4	5%	10%	0.2
Arkansas PERS	State Pension	New	4	0%	Unknown	Unknown
San Bernardino City RA	County Pension	New	3	0%	7%	0.2
Partners Healthcare Boston	Private Pension	Reviewing New	3	0%	Unknown	Unknown
Allstate	Private Pension	Increase	3	1%	4%	0.1
Federated City ERS of San Jose	County Pension	New	1	0%	3%	0.0
Hartford ERS	County Pension	Reviewing New	1	0%	Unknown	Unknown
United Food & Comm Wkrs (Oregon)	Union	New	1	0%	5%	0.0
Chicago Pk Employees A&B Fund	County Pension	New	1	0%	5%	0.0
Total						11.7

The decisions by some investors to reduce allocations to private equity, and other events such as IRR disclosure lawsuits and private equity funds reducing their own fund size, have left several institutional investors wondering whether private equity is an asset class that belongs in their portfolios over the long-term. Those investors that have retained or increased their allocations are struggling with how to manage their private equity investments after the historic stellar returns have evaporated.

General Asset Allocation Theory

Institutional investors' asset allocation decisions are made based on the concepts of modern portfolio theory (MPT). In essence, MPT shows that diversification may improve portfolio returns while reducing risk. Hence, rather than investing in one

company that may or may not succeed, investors should strive to be on an efficient frontier (maximizing return for a given level of risk), and, if possible, expanding the efficient frontier (achieving an even higher return for a given level of risk). Investors achieve this through the power of diversification. In principle, investors should be able to evaluate returns, risk (as measured by standard deviations of returns), and correlations for different asset classes to determine an asset allocation.

With the abundance of available data, investors are able to utilize the tools of MPT effectively for their allocations to domestic and international public security markets, government and corporate bonds, and many alternative assets including types of publicly traded real estate investments. However, many investors have difficulty fitting private equity into the requirements for MPT because of both the specific model assumptions and the challenges presented by private equity data.

The Issue of Private Equity Valuations

By definition, private equity firms invest in private companies. As such, there are no public markets which help set the valuation of the portfolio companies in which the private equity firms have invested. Naturally, portfolio companies are valued at the time capital is invested, but even then determining a "true" value of the firm based on the investment can be a tricky matter due to deal terms such as liquidation preferences and other security structures. Along the same lines, the vast majority of private equity investment firms themselves are private, and as such neither they nor their funds have a market to value them nor are they required to make any public disclosures.

However, investors in a fund are entitled to receive quarterly reports which, among other things, value the fund as of the time of that report. Data-gathering services, such as Venture Economics, receive many of these quarterly valuations, and these data points are generally the basis for the return, risk, and correlation estimates that are publicly available. However, there are inherent drawbacks with using the quarterly "mark-to-market" data, specifically problems with inconsistency and stale prices. The inconsistency problem arises from the fact that since there is no public market valuing the private companies, the fund managers set a value for a given investment. Currently there are no industry-wide valuation guidelines. Different approaches include the valuation at the time of the given firm's investment (which as mentioned above can be variable), valuation from the latest round at which a new third party investor participated, and for later-stage deals, a valuation based on public market multiples with a suitable discount for shareholders equity on the balance sheet. Research has shown that funds vary widely in their valuation practices and that different private equity firms can simultaneously have very

different values for the same portfolio company[1]. So when estimating returns for a private equity investment, there is a degree of subjectivity that goes into the interim valuation numbers, which makes return figures potentially inaccurate. When a fund has ten to thirty companies to mark-to-market, the valuation issues of the individuals companies will be compounded when estimating the overall fund's return.

The problem with stale returns is that, in addition to the valuations being questionable when they are calculated, the valuations are only typically regularly published once a quarter, as opposed to daily for public equities. The result is that the standard deviation of returns and correlation with other asset classes may be dramatically understated. More on this topic will be discussed in the *Correlation* section. In short, due to the infrequent and often subjective valuations, the return, risk, and correlation figures for private equity investments may be inaccurate and misleading.

MPT Assumptions

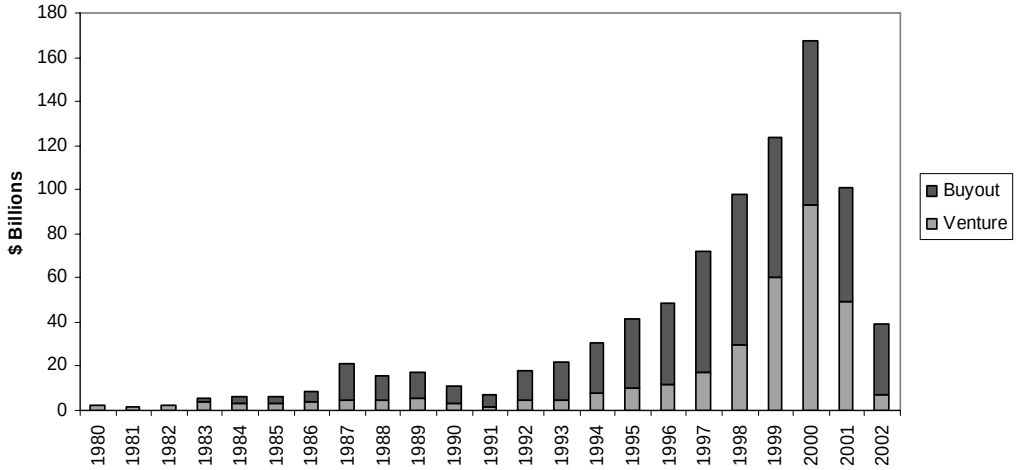
In addition to difficulties in determining accurate data for risk, return, and correlation of private equity returns needed for asset allocation, private equity does not fit the assumptions of MPT in a number of other ways. The key assumptions for MPT are:

- Investors are limited to publicly traded financial assets such as stocks and bonds.
- All investors act as though security prices are unchanged by their own trades in those securities.
- All investors have the same time horizon.
- All investors have the same information and interpret it in the same manner.
- Investors pay no taxes or transaction costs.
- Investors seek to achieve the highest returns with the least risk.

Private equity fails to meet many of the MPT assumptions. The long investment period (10 to 12 years) and illiquidity of ownership stakes in private equity funds violate the time horizon assumption. The informational assumption is clearly inadequate as only investment funds who invest in a private company generally have access to the company's financial information, and only LPs who invest in a given fund have access to that fund's performance. The market for private equity is

[1] Blaydon, Horvath, Wainwright, 2002

inefficient; valuations are unreliable and infrequent, holdings are illiquid, and there are relatively few buyers and sellers. However, regarding the risk-aversion condition, investors can be risk-averse and still invest in the fairly risky private equity, as portfolio theory has shown that adding a risky asset with a low correlation of pricing trends compared to other types of investments can actually reduce the risk of an overall portfolio.



Despite the fact that private equity will not fit into conventional asset allocation models, investors are allocating combined billions of dollars into private equity. In fact, private equity commitments have grown substantially even considering the "bubble." Private equity commitments in 2002 were 3 times what they were in 1990[2] and the number of private equity firms have also increased substantially. Additionally, the average fund size has grown. The average venture and buyout fund in 1981 was $17 and 39 million respectively, increasing to $305 and $542 million by 2000[3]. Clearly, institutional investors have, as a whole, been increasing their exposure to private equity, despite potentially inaccurate data and other information asymmetries. How then, do chief investment officers make the decision to invest in private equity and secure the necessary approvals from their advisory boards?

[2] Venture Economics.
[3] Salomon Smith Barney, *Private Equity and Asset Allocation: Clues to a Puzzle*.

LBO and VC - Different Asset Classes

Before delving into the potential data with which investors base their private equity investment decisions, it is helpful to further refine the components of private equity. Up until now, the term private equity has been used to describe the overall asset class. However, within private equity are buyout funds, venture capital, and mezzanine financing, which display characteristics of being distinct asset classes. When we examine the risk, returns, and correlations of private equity, we will have to examine the data separately for the various components of private equity. For the purposes of this note, buyout and venture capital investments will be the focus, and the mezzanine stage will not be analyzed in depth.

By definition, venture capital firms usually take a minority stake in early-stage, private companies, often in technology, biotech, or other high growth industries. The transactions are usually all equity, and the companies are sometimes at pre-revenue stage. Buyout firms typically purchase controlling stakes in relatively established companies, sometimes public, with a steady cash flow. The transaction is usually levered from 60-80% and a large degree of financial engineering accompanies the transaction. The industries for buyouts often exhibit lower growth than those of venture capital, and high returns come from financial restructuring, cost reductions and improved operating efficiencies.

Venture capital investments usually perform best with a strong equity market, particularly with respect to high P/E ratios in the IPO market and growth sector stocks. Lucrative buyout investments, on the other hand, are often made when P/E multiples are depressed since purchase prices are lower. The success of buyout investments is tied more to the availability of debt in the market. In addition to these differences, the return characteristics of a venture capital and buyout portfolio differ markedly. Venture portfolios typically have the majority of their investments fail and lose close to all of the original investment, while a few companies (hopefully) are highly successful and drive the return of the portfolio. In contrast, buyouts typically have very few companies that lose all their money, but the winners do not have the same high multiples of the successful venture-backed firms. Given the differences between buyouts and venture in portfolio dynamics, exposure to technology, leverage, and drivers for valuation, we will treat the two as distinct asset classes.

Private Equity Returns

The most standard method for stating private equities returns is to use annualized IRRs based on the net asset values reported quarterly. For the ten and twenty year

annualized returns ending in Q1 2000, private equity as a whole had a return of 21.7% for 10 years and 19.9% for 20 years; venture capital had returns of 27.2% for 10 years and 19.6% for 20 years; and buyout had returns of 17.4% for 10 years and 20.4% for 20 years[4]. When the data is taken up to Q4 2002, reflecting the post-bubble devaluations, private equity returns for 5, 10, and 15 years are 7.8%, 14.8%, and 14.3% respectively[5].

Private Equity IRRs		All Private Equity	Venture Capital	Buyout	Mezzanine
Ending Q1 2000	10 Year	21.7%	27.2%	17.4%	
	20 Year	19.9%	19.6%	20.4%	
Ending Q4 2002	5 Year	7.8%	28.3%	1.0%	6.3%
	10 Year	14.8%	26.2%	8.7%	9.8%
	20 Year	14.3%	16.6%	12.4%	10.3%

Another methodology used to estimate returns is to measure the IRR on a cash-in, cash-out basis, which avoids some of the problems associated with interim valuations. The National Bureau of Economic Research (NBER) conducted a study based on 73 private equity funds started between 1981 and 1993 comprising aggregate commitments of $36.7 billion. Computing the return on a purely cash basis yields results similar to those from Venture Economics as of 2000, with an average IRR of 19.8% for the private equity funds as a whole over the time period, with the venture funds performing slightly better than the buyouts[6].

While these numbers on the whole suggest a strong return for the asset class, many investors feel that a more appropriate valuation metric is return above that of public equities. For the 15 year performance ending 12/31/2000, the return for private equity was 20.7%, Dow Jones Industrial Average was 14.0%, S&P 500 was 13.2%, and NASDAQ was 14.5%[7]. Thus the excess returns from private equity range from 6.2% to 7.5%. For the post-bubble era, 10 and 15 year private equity returns ending Q3 2002 were 15.2% and 14.2% respectively[8]. The S&P 500 had a return for both time periods of 9%[9], meaning private equity had excess returns of 6.2 % and 5.2%.

[4] Venture Economics
[5] Venture Economics.
[6] Alexander Ljungqvist and Matthew Richardson, *The Cash Flow, Return, and Risk Characteristics of Private Equity*, National Bureau of Economic Research, January 2003.
[7] Venture Economics.
[8] Venture Economics.
[9] Datastream

Private Equity IRRs – Excess Returns Over Public Equities					
		Private Equity	S&P 500	DJIA	NASDAQ
Ending Q4 2000	15 Year IRR	20.7%	13.2%	14.0%	14.5%
	Excess Returns		7.5%	6.7%	6.2%
Ending Q3 2002	10 Year IRR	15.2%	9.0%		
	Excess Returns		6.2%		
	25 Year IRR	14.2%	9.0%		
	Excess Returns		5.2%		

The National Bureau of Economic Research did similar benchmarking when performing its cash-based return analysis. The results were that private equity averaged returns 8.1% above that of the S&P 500 and 6.3% above the NASDAQ[10]. Note that this was for funds raised between 1981 and 1993. The results show that depending on the time period and market index, private equity has excess returns ranging from 5.2 to 8.1%. This matches with a common "rule of thumb" among investors, which is to expect long-run excess returns from private equity on the order of 500 to 600 basis points above public market returns.

Risk

While the evidence suggests positive excess returns from investing in private equity, there is a question of whether these returns are high enough to justify the added risk of investing in private equity. As a result, investors have attempted to quantify the risks by measuring the standard deviation of returns, as taken by quarterly valuations. The resulting measures of risk from Q1 1986 to Q3 2000 are 9.3% for private equity as a whole, 18.7% for VC, 12.0% for buyout, and 6.3% for mezzanine[11].

Private Equity Standard Deviation of Returns				
	All Private Equity	Venture Capital	Buyout	Mezzanine
Q1 1986 to Q3 2000	9.3%	18.7%	12.0%	6.3%

[10] Ljungqvist and Richardson, *The Cash Flow, Return, and Risk Characteristics of Private Equity*.
[11] Venture Economics.

While, as expected, venture capital is more risky than buyouts, what may be counter-intuitive is that the risk measured for the S&P 500 during this period is actually higher than that of private equity as a whole. This is due to the fact that private equity's valuation practices may significantly understate the volatility of its holdings. If a private company's value changes primarily based on the occurrence of somewhat infrequent events, such as a new round of financing, then a company's value on the books may remain constant despite fluctuating market conditions and changes in the company's outlook.

This leads many investors to conclude that private equity investing, and particularly investing in venture capital, is much more risky than the data suggests. While it is hard to put an exact number on the risk, some investors suggest as a rule of thumb that buyout is about 1-2 times as risky as public equities and venture capital is 2-4 times as risky[12]. The reason that venture capital is more risky is partly due to the "home run" model of VC portfolios. Another reason is that severe market cycles may harshly affect the returns of VC portfolios to the extent that they may not return all committed capital. In the buyout world this is less likely due to the more established companies and mainstream industries in which investments are made.

Correlation

Given an estimate of risk and return, albeit somewhat shaky, an investor also needs to know what the correlation of an asset is with the rest of his portfolio when deciding on inclusion. Estimates of correlation based on quarterly mark-to-market data between Q1 1985 and Q1 2002 are 0.6 between venture capital and NASDAQ, and 0.4 with venture capital and a broader market index[13]. Buyout correlations were slightly lower with respect to the broad market and almost zero with respect to the NASDAQ. Another study yields correlations between Q1 1986 to Q3 2000 as 0.26 between the S&P 500 and VC, and approximately zero between buyout and the S&P 500[14]. Venture Economics uses an index called the Venture Capital Pooled Average, which has a 0.19 correlation to the S&P 500[15].

Private Equity Correlations

Correlation With:		S&P 500	Nasdaq
Q1 1985 to Q1 2002	VC	0.4	0.6
	Buyout		~ 0

[12] Merrill Lynch Draft Document.
[13] Merrill Lynch Draft Document.
[14] Venture Economics.
[15] Venture Economics.

Q1 1986 to Q3 2002	VC	0.3
	Buyout	~ 0
Venture Capital Pooled Average		0.2

However, many investors feel that the valuation drawbacks that understate the risks in private equity investing also understate the correlations, particularly given that public market valuations are a large driver of private valuations. Some financiers suggest that investors estimate the correlation with the broad market to be 0.5 for venture capital and 0.7 for buyouts[16].

One problem that is particularly troublesome with computing correlations is the stale price issue. To illustrate this, Salomon Smith Barney performed an analysis where two public stocks were compared to the S&P 500 from 1950 to 2000. The prices for the stocks were updated once every three months, but the time period used to compute the correlation was once a month. The result was correlations of 0.33 and 0.25 between the stocks and the S&P500. When the stock prices were updated once every two months, the correlations rose to 0.37 and 0.31. When the stock prices were updated monthly, the correlations rose to 0.74 and 0.58[17]. Clearly, stale pricing can have a significant effect on calculated correlations.

Correlations of Two Stocks With The S&P 500			
Value updated every:	1 Month	2 Months	3 Months
Stock 1	0.74	0.37	0.33
Stock 2	0.58	0.31	0.25

Illiquidity and Long Time Horizon

The illiquidity of private investments is another area that deserves attention. While most of an investor's assets will be able to be sold fairly easily on the market at a fair price, private equity investments may not be able to be sold at all, and if they are it will usually be at a significant discount. In addition to the illiquidity, an investment in a private equity fund has a long time horizon. The typical fund lasts up to 10 years, and it is usually many years before the committed capital is returned. In fact, the return on most funds is negative in its beginning stages, as early losses are taken before significant gains, a phenomenon known as the J-curve. A study

[16] Merrill Lynch Draft Document.
[17] Salomon Smith Barney, *Private Equity and Asset Allocation: Clues to a Puzzle*.

funded by the National Bureau of Economic Research (NBER) estimates that it usually takes funds between 7 and 8 years to return the committed capital[18]. This was on funds originating between 1981 and 1993, and while there was a contracting of the time period during the boom, many believe it will return to historic averages.

Do Private Equities Outperform Public Equities on a Risk-Adjusted Basis?

Given the estimates for risk, return, and correlation, an investor is now better suited to answer the question of whether private equity outperforms public equity on a risk-adjusted basis. One tool used to address the risk / return trade-off is the Sharpe Ratio. The Sharpe Ratio is defined as the expected return of an asset minus the risk free rate, all divided by the standard deviation of the asset. Data from Q1 1986 through Q3 2000 computes the Sharpe Ratio as 1.01 for venture capital and 1.38 for buyouts, while the Sharpe Ratio for the S&P 500 is 0.83 during this time period[19]. While these figures suggest private equity does offer superior risk-adjusted returns compared to the S&P 500, there is the recurring problem that the risk estimates for private equity may be low (and the return estimates inaccurate as well). This has led some investors to state that it is impossible to conclude definitively that private equity does offer superior risk-adjusted returns compared to public equities.

To deal with this uncertainty, a number of investors have performed sensitivity analyses by examining the profile of a theoretical public equity portfolio as private equity is added to it. Merrill Lynch performed an analysis by using a public equity portfolio with a standard deviation of 15.0%, similar to that of the S&P 500. In a worst case scenario, where the standard deviation of returns for private equity are three times that of the public equity portfolio and the correlation is 0.5, allocating 10% of the portfolio to private equity only increases the volatility of the total portfolio from 15.0% to 16.2%[20].

Other Challenges in Private Equity Investing

While there is some evidence that private equity does offer better risk-adjusted returns, there are other issues that make investing in private equity challenging. While the risk-adjusted returns for private equity are potentially attractive compared to public markets, there should be excess returns to compensate for the longer time horizon and illiquidity of the investment. If these additional required returns are

[18] Ljungqvist and Richardson, *The Cash Flow, Return, and Risk Characteristics of Private Equity*.
[19] Venture Economics.
[20] Merrill Lynch, *Private Equity Investing: Overcoming the Information Gap*, September 2000.

added to the risk-based required return, it is unclear whether private equity clears the hurdle – it depends on the premium required for the longer time horizon and illiquidity. In addition, the private equity data may be further compromised by survivorship bias. Only funds that have been successful survive to report their returns, so the risk and return estimates may be favorably biased.

From a cost perspective, the fees to the fund managers are generally much more than those earned by public fund managers. A number of costly resources are also required to invest in private equity from an LP's perspective arising from extensive due diligence and monitoring efforts. These activities may be outsourced to a fund-of-funds or gatekeeper, but this adds in another layer of fees.

Access to Top Managers is Very Important

Another challenge that deserves special attention is that the performance variability among private equity fund managers is very large. When investing in public securities, the asset allocation drives the portfolio return and profile, while in private equity selecting the right fund manager can make a huge difference. While the spread between the 1st and 3rd quartiles for bond fund managers is about 1%, and it is about 3% for public equities, the span is estimated to be about 15% for private equity investors[21]. Other sources estimate the span to be 21% for private equity as a whole[22], with 16.5% for venture capital and 22.0% for buyouts[23]. In addition, there is high persistence, meaning the top performing funds tend to continue to generate the best returns. Given the persistent variability in performance, access to the best managers is crucial to achieving the best returns.

Is There Too Much Money Currently Invested in Private Equity?

Another issue that is more relevant to recent times is the thought that the private equity market, and venture capital in particular, has become somewhat saturated. As was mentioned earlier, the level of private equity commitments has risen dramatically in the last ten years. There were approximately 4,000 private equity funds as of 2000[24], which translates to approximately 750 to 1,000 partnerships raising capital a year on average. Studies have shown that the more money is raised in a given vintage year, the worse is the performance, on average, for the funds in

[21] Salomon Smith Barney, *Private Equity and Asset Allocation: Clues to a Puzzle*.
[22] Invesco, *Private Equity: The Role of Funds of Funds Investing*, 2Q00.
[23] Swensen, David, *Pioneering Portfolio Management: An Unconventional Approach to Institutional Investment*, 2000.
[24] Invesco, *Private Equity: The Role of Funds of Funds Investing*, 2Q00.

that vintage year[25]. However, despite the increase in private equity commitments, private equity remains a small fraction of the capitalization of the public markets. With $300 billion for the net asset value of private equity and $20 trillion for the global market capitalization of public equities[26], private equity is about 1.5% of the size of public equities. Many feel that the large amount of capital currently committed to private equity does not present a serious problem in the long run, and that the pace of innovation, deregulation, and privatization will ensure good transactions in the future.

Other Reasons for Private Equity Investing

Despite the drawbacks mentioned above, many investors continue to invest in private equity, as evidenced by the increases in invested capital. From an economic perspective, since the private equity market is inefficient, many feel that experienced investors can extract value from the inefficiencies. Some claim that institutions invest in private equity due to what is referred to as the "Halo Effect". When managers hear about the stellar performance of a top fund, or sometimes even a particularly lucrative investment, they may make the decision to allocate funds to private equity. This decision may be made even when the investor can't gain access to that particular fund, and despite the fact that that fund's return may not be representative of the industry average.

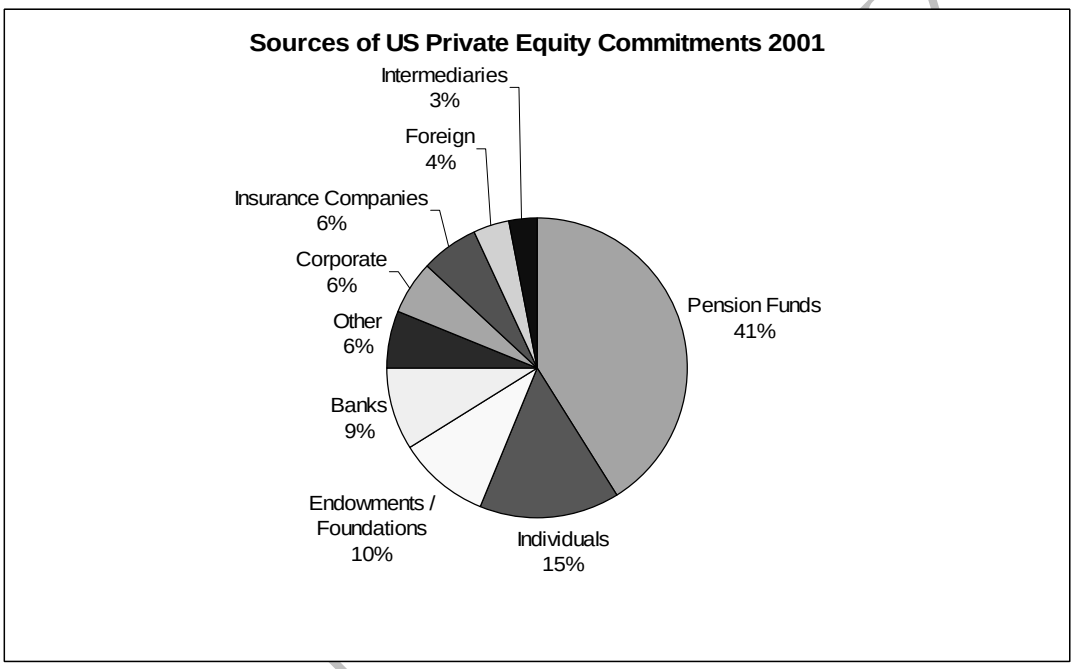
In addition, many corporations invest in private equity in part due to ancillary benefits. For technology firms, this may be an extension of R&D and a toehold into a potential acquisition, while for a financial institution, private equity investments may translate into future revenue from various services. From a qualitative point of view, some investors feel that investing in private equity allows them to "make a difference". Investing in a private company usually allows the investor more interaction with the company compared to an investment in a public company, and may allow the investor to further a nascent concept, make an existing company better, or restructure a company that is near bankruptcy.

Asset Allocation and Private Equity

Given that the attractive return and diversification benefits have convinced an investor to include private equity in his or her portfolio, the next question is how

[25] Ljungqvist and Richardson, *The Cash Flow, Return, and Risk Characteristics of Private Equity*, 2003.
[26] Merrill Lynch Draft Document.

much to include as a percentage of total invested assets. The answer is largely based upon the portfolio manager's ability to handle illiquidity, access to top managers, experience in private equity, and the overall size of assets to invest. Without going into detail about the characteristics of the various constituencies, private equity investments are made 41% by Pension Funds, 15% by families and individuals, 10% by endowments and foundations, 9% by banks, 6% by insurance companies, 6% by corporate funds and the remainder by intermediaries, foreign investors, and others[27].



Within these investors, there is a range of allocations to private equity. Many large university endowments, such as Yale's, invest as much as 1/3 in private equity[28]. Pension funds as of 1999 invested on average 5.6 to 7.3% in private equity[29], with the larger funds usually investing a higher percentage than smaller ones. Overall, institutions have increased their allocation to private equity over recent times. In 1992 institutional allocations were 5% while in 2001 they were 8%[30], although it is hard to tell whether this was caused by the bubble inflating valuations or a deliberate shift in asset allocation. While portfolio theory suggests investors will hold assets in the proportion of the market portfolio, that is, in proportion of the

[27] Venture Economics.
[28] Lamm and Ghaleb-Harter, *Private Equity as an Asset Class: Its Role in Investment Portfolios,* 2001.
[29] Invesco, *Private Equity: The Role of Funds of Funds Investing*, 2Q00.
[30] Lamm and Ghaleb-Harter, *Private Equity as an Asset Class: Its Role in Investment Portfolios,* 2001.

assets total relative capitalization, this would imply that investors would have only a small percent of assets in private equity as compared to public equities (around 1.5% from the numbers computed above). Clearly that is not the case for the abovementioned institutions, which are able to pay the large minimum investments and endure the long illiquidity that prevents many other classes of investors from participating. Many financial institutions give guidelines for private equity allocations in the neighborhood of 5 to 10%. Below 5%, the impact of private equity may not be noticeable in the fund's performance. Going above the 10% is largely a function of the institution's ability to access a sufficient number of quality funds and the financial ability to put a high proportion of funds in such an illiquid asset.

Diversification Within Private Equity

Once an investor has decided to diversify by adding private equity to the portfolio, the question remains how to diversify within the private equity asset class. This question entails diversification across vintage year, stage, style, sector, and geology, as well as the number of funds in which to invest. The correlation between buyout and venture capital is estimated to be below 0.3[31] which supports having both asset classes in the portfolio. Since the LBO market is about 5-10 times the size of the venture market[32], some feel the allocation for LBO should be 5-10 times that of VC. However most institutions generally have a larger allocation to VC than 10-20% of their private equity allocation, and the distribution between the two classes seems largely to do with the size of the institutional fund's assets.

Many institutional funds will want to invest in approximately the same number of funds somewhat independently of the size of the institution's assets. This is to get diversification benefits from a number of funds without having overwhelming monitoring responsibilities from investing in too many funds or having to compromise on fund manager quality. The result is that larger institutional funds will generally make larger sized investments, which often translates into a higher proportion of investments in buyouts. For institutional funds with under $5 billion in assets, the allocations as of 1999 were 32.1% in buyout and 30.6% in venture capital (the remainder was in mezzanine, expansion capital and other). For funds with over $10 billion in assets, the allocations were 46.3% in buyout and 16.2% in venture capital[33].

[31] Merrill Lynch Draft Document.
[32] IFE, *Asset Allocation: Deciding Between Venture Capital and Buyouts, Part I.*
[33] Invesco, *Private Equity: The Role of Funds of Funds Investing*, 2Q00.

However, this does not imply that as funds get smaller they will continue to increase their allocation to venture capital. Due to the severe cycles that can affect venture capital returns, institutional investors are often reluctant to allocate more than 40-50% of their private equity portfolio in venture capital. From an international perspective, European and US buyout funds have a correlation of under 0.5[34], and while venture capital's correlation was slightly higher, inclusion of foreign funds can further diversify the private equity part of a portfolio.

Vintage year is an important diversifier as well. Due to swings in the economic cycle, variations in performance across vintages vary quite a bit. Additionally, having staggered vintages can mitigate the illiquidity and long time horizon of the investments and can ideally generate a somewhat more steady stream of cash flows.

In terms of the number of funds in which to invest, the numbers in practice can vary, especially if the investor uses funds of funds or makes direct investments. But for an investor just investing in pure private equity funds, the variation in number can occur due to the private equity funds themselves ranging in scope from being very focused on particular regions or sectors, to being more diversified. Clearly the nature of the funds plays a part in the number that is required for adequate diversification. To get a ballpark number, investors in hedge funds typically try to invest in 10-20 funds[35], and many private equity investors have quoted a similar range of about 15-20 funds.

As was mentioned before, the average fund size of private equity firms has increased dramatically, from $17 million in 1981 to $305 million in 2000 for VC and $39 million to $542 million for buyouts[36]. Many institutional investors with smaller asset bases may not have the resources to research and invest in the target number of firms they desire for diversification purposes. This may be a reason for the rising number of funds of funds which, by aggregating capital from smaller institutions, can access larger and more successful private equity firms.

Summary

In summary, the decision to invest in private equity can be much harder than the decision to invest in other asset classes. Data is harder to procure for private equity performance, and the data that is available may not be accurate due to the valuation

[34] Merrill Lynch Draft Document.
[35] Lamm and Ghaleb-Harter, *Private Equity as an Asset Class: Its Role in Investment Portfolios,* 2001.
[36] Salomon Smith Barney, *Private Equity and Asset Allocation: Clues to a Puzzle.*

practices of the private equity industry. In addition, private equity does not fit nicely into modern asset allocation theories. There should be premiums in returns for the illiquidity and longer time horizon of private investments which are not captured in traditional risk/return models. Furthermore, there is a great variation in the performance of top and lower quartile fund managers and top quartile managers are consistently better than their peers, so selecting and getting access to top managers is critical.

Yet despite these drawbacks, investors are choosing to invest in private equity. The main reasons are the promise of excess risk-adjusted returns and the diversification benefits. While the risk, return, and correlation figures may be inherently somewhat unreliable, fund managers invest nonetheless. Longstanding private equity investors cite the fact that they know that returns are high and correlations are low, although they admit they do not have exact, reliable figures. But many investors have had good experiences over the long run with private equity, so they continue to allocate what part of the portfolio they can to strive for the positive excess returns in the future.

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