Private Equity Performance: What Do We Know?

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Abstract

We study the performance of nearly 1400 U.S. buyout and venture capital funds using a new dataset from Burgiss. We find better buyout fund performance than has previously been documented – performance consistently has exceeded that of public markets. Outperformance versus the S&P 500 averages 20% to 27% over a fund's life and more than 3% annually. Venture capital funds outperformed public equities in the 1990s, but underperformed in the 2000s. Our conclusions are robust to various indices and risk controls. Performance in Cambridge Associates and Preqin is qualitatively similar to that in Burgiss, but is lower in Thomson Venture Economics.

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Despite the large increase in investments in private equity funds and the accompanying academic and practitioner scrutiny, the historical performance of private equity (PE) remains uncertain, if not controversial. The uncertainty has been driven by the uneven disclosure of private equity returns and questions about the quality of data available for research. While several commercial enterprises collect performance data, they do not obtain information for all funds; they often do not disclose, or even collect, fund cash flows; and the source of the data is sometimes obscure, resulting in concerns about biases in the samples. Furthermore, some data are only periodically made available to academic researchers.

In this paper, we use a new research-quality data set of private equity fund-level cash flows from Burgiss. We refer to private equity as the asset class that includes buyout funds and venture capital (VC) funds. We analyze the two types of funds separately. The data set has a number of attractive features that we describe in detail later. A key attribute is that the data are derived entirely from *institutional investors* (the limited partners or LPs) for whom Burgiss' systems provide record-keeping and performance monitoring services. This feature results in detailed, verified and cross-checked investment histories for nearly 1400 private equity funds derived from the holdings of over 200 institutional investors.

Using these data, we reassess the performance of private equity funds in absolute terms and relative to public markets. Our results are markedly more positive for buyout funds than previously have been documented with commercial datasets. Analyzing the cash flow data from Burgiss, we find that average U.S. buyout fund returns have exceeded those of public markets for most vintages since 1984. The public market equivalent (PME) method of Kaplan and Schoar (2005), which compares how much a PE fund investor actually earned net of fees to what the investor would have earned in an equivalent investment in the public market, shows that outperformance versus the S&P 500 averages 20% to 27% over the life of the fund and more than 3% per year.

Buyout fund outperformance remains similar in magnitude using other benchmarks, such as the Nasdaq and the (small-cap) Russell 2000, and is lower, but also positive, measured against the (small-cap) Russell 2000 value index and Fama-French size deciles. These results are consistent with those in Robinson and Sensoy (2011a) who use data from a single large LP who, they argue, invested much like an index fund, particularly for buyout funds.

Average venture capital fund returns in the U.S., on the other hand, outperformed public equities in the 1990s, but have underperformed public equities in the most recent decade.

Although we cannot directly estimate the systematic risk of the underlying portfolio companies, our results, for both buyouts and venture capital funds, are qualitatively similar when we assume higher levels of systematic risk.

We also examine whether fund performance is linked to capital – both the aggregate amount of capital flowing into private equity and to the capital committed to a particular fund. We find that both absolute performance and performance relative to public markets are negatively related to aggregate capital commitments for both buyout and VC funds. This is consistent with and extends the results in Kaplan and Stromberg (2009). This result also is consistent with those in Robinson and Sensoy (2011a) except that they do not find a negative relation between capital commitments and buyout fund PMEs.

We find no significant relation between performance and fund size for buyout funds. For VC funds, we find that funds in the bottom quartile of fund size underperform. Controlling for vintage year, top size quartile funds have the best performance although they do not differ significantly from funds in the 2nd and 3rd size quartiles.[1]

[1] The other relationship of interest relates to performance persistence across funds of the same GP, as analyzed by Kaplan and Shoar (2005). In this sample of the Burgiss data, we do not have access to fund sequence numbers. Using a later sample of Burgiss data, Harris et al. (2013) explore persistence.

We also compare the Burgiss evidence to that derived from the other leading commercial datasets – Cambridge Associates (CA), Preqin and Thomson Venture Economics (VE) [2]. Our results show that private equity performance in CA and Preqin is qualitatively similar to the performance in the Burgiss data. Consistent with Stucke's (2011) finding of a downward bias, performance is lower in the VE data, particularly for buyout funds.

We make these comparisons even though we do not have access to the underlying cash flows in the other three data sets. Our approach is to combine summary level data from the other leading commercial sources – CA, Preqin, and VE – with patterns we find in the Burgiss data for which we do have complete cash flow information. Harnessing fund-level cash flows from Burgiss, we study the relationship between market-adjusted performance (PME) and absolute performance measures –the internal rate of return (IRR) and multiple of invested capital. We find that within a given vintage year, PMEs are reliably predicted by a fund's multiple of invested capital and IRR. Regression results show that multiples and IRRs explain at least 93% of the variation in PMEs in more than 90% of vintage years. Although both add explanatory power, the multiple of invested capital provides more explanatory power than the IRR overall and in most vintage years. This suggests that multiples of invested capital are preferable to IRRs as summary measures of private equity performance.

Using the strong statistical relationship between PMEs, multiples and IRRs found in the Burgiss data, we estimate the average market-adjusted performance implicit in the other commercial databases. We apply the regression coefficients to the vintage year multiples of invested capital and IRRs from CA, Preqin, and VE to estimate vintage year PMEs for the funds in those databases. This procedure requires only the vintage year multiples and IRRs from the

[2] Harris et al. (2010) and Cornelius (2011) also present performance data from different commercial data sets, but do not use cash flow data for individual funds. Lerner, Schoar and Wongsunwai (2007) use Preqin data.

other databases, even if the underlying fund cash flows are not available to us or, even, to the commercial source.

As with the Burgiss data, we estimate that buyout funds outperform public markets in the 1990s and 2000s in the three other commercial databases. We estimate that the funds in CA and Preqin, like those in Burgiss, outperform the S&P 500 in the average vintage year by at least 20% over the life of the fund. Although the PMEs are lower in the (likely downwardly biased) VE database, the VE PMEs still imply that the average private equity fund outperformed the S&P 500 by more than 10% over the life of the fund. For VC funds, the PME results are generally consistent across all four databases although, again, slightly lower in the VE data.

Overall, our findings strongly suggest that buyout funds have outperformed the public equity markets net of fees over most of our sample period. To invalidate that conclusion, all three reliable commercial datasets would have to be subject to a similar and large positive selection bias despite very different data collection and reporting methods. We view this as highly unlikely. Instead, we view the similar results as more consistent with the conclusion that all three databases provide unbiased estimates of the overall performance of private equity.

Because private equity investments are illiquid it is, perhaps, not surprising that they yield investors some premium relative to investing in public markets. As well as the relatively illiquid nature of private equity investments, there is also uncertainty regarding how much to commit to private equity funds to achieve a target portfolio allocation. This is due to the uncertain time profile of capital calls and realizations. Consequently, "commitment risk" exists when investing in private equity. This contrasts with investing in public markets where there is no distinction between capital committed and invested, and trading is continuous. The cost of illiquidity or commitment is likely to vary across investors, and remains an important area for research.[3]

[3] The size of the commitment risk premium is likely to depend upon the ability (or willingness) of the investor to diversify their holdings across vintage years and, within vintage years, between funds. Given that many funds have

Several prior papers have studied private equity returns. Kaplan and Schoar (2005) examine the returns to buyout and VC funds using fund cash flow data from Venture Economics. While their focus is return persistence across funds of the general partner (GP), they report that buyout fund investors earn slightly less than the public market. Venture capital funds slightly underperform public markets on an equal-weighted basis, but outperform on a capital-weighted basis. Using a slightly updated version of the Kaplan and Schoar (2005) dataset, Phalippou and Gottschalg (2009) obtain qualitatively similar results and reach a similar, but somewhat more negative, conclusion for buyout funds. They assume that any remaining investments held by funds for which VE reports no cash flows after 10 years have no value (rather than the net asset value applied by Kaplan and Schoar (2005)).

Stucke (2011), however, identifies a significant problem with the VE data: he presents strong evidence that many funds stopped being updated from around 2001 and yet were retained in the VE database. For these funds, no additional cash flows were recorded and net asset values (NAVs) were simply rolled forward each quarter. As a result, fund-level IRRs in the VE sample fall with the passage of time; multiples of invested capital remain constant, rather than increasing. This is consistent with the findings of Harris *et al.* (2010) that returns based on the VE sample are consistently lower than those for other commercial providers for most vintage years. We confirm this finding. This serious bias in the VE performance data suggests that the results in Kaplan and Schoar (2005) and Phalippou and Gottschalg (2009) understate fund returns, particularly for buyout funds.

Furthermore, these papers focus on funds that were close to being fully liquidated at the time the data were made available to the researchers, and so only funds that started investing (the

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minimum investment levels, this in turn would depend upon the overall size of the portfolio being managed. Furthermore, the cost of deviating from an "optimal" portfolio allocation, and the impact of cash-flow uncertainty, will vary across investors. Hence, it is likely that risk premia will vary significantly across investors. Note that such risks could be mitigated, to some extent, by secondary transactions to sell commitments to private equity funds. However, the development of such trading is still in its infancy.

so-called "vintage year") before 1995 are included.[4] Subsequent years have seen a huge increase in the number and size of private equity funds. Whereas around $148 billion was raised by U.S. buyout and VC funds from 1980 to 1995, $668 billion was raised for 1996 to 2004 vintage funds. These sums were further eclipsed by the boom period of 2005 to 08 when $794 billion was raised by private equity funds over just four vintage years.[5] The samples in the earlier papers offer no evidence on more recent performance from private equity investing.

More recently, Robinson and Sensoy (2011a) study the returns earned by a large bank LP in buyout and VC funds. Their results are qualitatively similar to ours, albeit somewhat lower for VC funds. Higson and Stucke (2012) study buyout fund performance using cash flow data from Cambridge Associates. They obtain qualitatively similar results to ours. They do not study VC funds. The Higson and Stucke study also provides an "out of sample" test of our methods to estimate PMEs implied by a data set even without access to the underlying cash flow data. Applying our regression results (that were estimated and circulated before the Higson and Stucke article) to the summary data in Higson and Stucke, our PME estimates closely approximate the PMEs that Higson and Stucke calculate using the actual cash flow data. This provides strong support for our PME estimation methodology. Phalippou (2012) estimates PMEs as of 2011 for a subset of funds from the Preqin dataset that have cash flows. (He also includes very recent 2009 and 2010 vintages that are immature and have lower PMEs). He obtains qualitatively similar PMEs to ours using the S&P 500. He obtains PMEs of roughly 1.0 using a very small cap-value index.

The paper proceeds as follows. In the next section, we discuss the important features of the Burgiss data. Section II contains our main performance results. In section III, we analyze whether performance is related to aggregate fundraising and to fund size. Section IV explores the

[4] The main results of Phalippou and Gottschalg (2009) use funds with a vintage year of 1993 or earlier, although they also report results for the same sample – up to the 1995 vintage – as employed by Kaplan and Schoar (2005).
[5] These figures are estimates from Private Equity Analyst. For details, see the Internet Appendix, Table IA.I.

relationship between our preferred PME performance measure and the absolute performance measures most often used in practice, and allows us to estimate the PMEs that would be found if one had detailed cash-flow data from the other leading datasets. Section V concludes.

I. Data

This is the first paper to take advantage of data from Burgiss so we explain it in some detail. According to Burgiss, the dataset "is sourced exclusively from LPs and includes their complete transactional and valuation history between themselves and their primary fund investments." The data include all funds and cash flows from the LPs that provide the data. This is the first advantage of the Burgiss data: in order to compute performance relative to public markets, which we view as the most relevant metric, timed cash-flow data are required. Few commercial providers have such detailed data, although they often have large samples of self-reported IRRs and investment multiples. (See Harris *et al.* (2010) for a summary of the main commercial databases.)

The second important advantage of the Burgiss data is that it comes from over 200 investment programs that represent over $1 trillion in committed capital. The LPs comprise a wide array of institutions; over two-thirds have private equity commitments in excess of $100 million. Of these, about 60% are pension funds (a mix of public and corporate) and over 20% are endowments or foundations. This broad range of investors differentiates this paper from others that have sourced similar high-quality cash-flow data from single investors (for example, Ljungqvist and Richardson (2003) and Robinson and Sensoy (2011a,b)).

The identities of the underlying investors are not made available to us, and so we cannot formally test how representative the LPs (and their chosen GPs) are. It is possible that the LPs in the Burgiss sample have had better than average experience with private equity, which is why

they use Burgiss and allow Burgiss to aggregate their results. The results that follow using the other commercial databases, however, lead us to doubt that this is the case.

A third important feature of the Burgiss data is that LPs use the Burgiss systems for record keeping and fund investment monitoring. This "check book" data – recording the exact cash outflows made by the LPs to the GPs as well as the distributions from the GPs back to the LPs – has a number of unique advantages for research purposes. The fact that the data are sourced from the back-office systems used by the LPs for reporting and fund accounting, and, importantly, are cross-checked across investors in the same fund, results in a level of data integrity and completeness that cannot be achieved by surveys, voluntary reporting, or (largely) involuntary reporting using Freedom of Information (FOIA) requests – the method primarily employed by Preqin. Furthermore, when data are sourced at least in part from GPs (as do CA[6], Preqin and VE), it is possible for a GP to strategically stop reporting. The Burgiss data also are up to date – given the need for quarterly reporting by most investors – and so there are no problems resulting from a lack of updating as there can be with other commercial databases.

Finally, we have Burgiss' detailed data for nearly 1400 U.S. funds. Table I reports the distribution of our sample by vintage year,[7] and compares our coverage with that of other commercial and proprietary databases.[8] We distinguish between buyout funds and venture capital funds, and focus on funds formed between 1984 (the first year with meaningful numbers of funds in the datasets) and 2008. Our sample is comprised of 598 buyout funds and 775 VC funds. In comparison, Robinson and Sensoy (2011a) have information on 446 buyout funds and 260 VC funds. The earlier Kaplan and Schoar (2005) study used Venture Economics cash-flow data, and

[6] Cambridge Associates provides investment advice to LPs and, as a result, obtains its data from LPs as well as from GPs who have raised or are trying to raise capital. This may introduce a bias towards GPs who are raising new funds and, therefore, may have performed well. Our results, however, suggest that this is not the case.

[7] Vintage years are defined in various ways by data providers. Burgiss classifies a vintage year as the year in which a fund first draws capital from its LPs.

[8] In Internet Appendix Table IA.I we compare the databases on the basis of the size of the funds for which performance data is available, both in absolute terms and relative to an estimate of the total size of the market.

focused on vintage years up to 1995. Although Preqin has summary performance data (reported IRRs and money multiples) for a larger number of funds, it has cash-flow data for only a subset of funds.[9] This is sourced mainly from public investors subject to the Freedom of Information Act.[10] Until recently, Cambridge Associates, who have more funds than any other provider, had not made their data – which *are* based on cash flows – available to researchers. However, since the first version of this paper circulated, Higson and Stucke (2012) report results for U.S. buyout funds based on this data. They do not analyze VC funds. As we report later in section 4, their results are similar to ours, and in line with the PMEs that we estimate for Cambridge Associates from our regression model. This provides support for our method for estimating PMEs using the more generally available IRRs and money multiples.

While we believe the Burgiss data is of higher quality than that used in previous work, it is important to note some weaknesses. In terms of U.S. buyout funds, the coverage is excellent since 2000, but includes relatively few funds before 1993. Consequently, Higson and Stucke (2012) have a more even, and larger, coverage of U.S. buyout funds, but they do not analyze VC funds. Robinson and Sensoy (2011a) have greater buyout fund coverage through 2001 (their single investor participated in more U.S. buyout funds than the entire samples of each of the other data providers in the late 1990s), but this collapses after 2001. It appears that their investor effectively wound down their private equity investment program at this point, and so their data miss the large growth of the buyout industry from 2001-2008. For VC funds, the Burgiss sample is less extensive in the early years than Venture Economics (and hence Kaplan and Schoar), but the coverage increases significantly over the sample period.

[9] The Preqin numbers also overstate U.S. buyout funds because they include some funds raised by U.S. GPs in dollars that are earmarked for investment outside the U.S. The Burgiss data do not include such funds.

[10] Preqin's data is largely derived from quarterly FOIA requests, where investors provide information on cash invested, realizations and net asset values on a quarterly basis. It is, therefore, a quarterly aggregation of the cash flows, rather than the individual, timed cash-flows in the Burgiss data. Furthermore, Preqin may be missing some high performing funds that refuse to accept public pension funds as investors precisely because they are subject to FOIA requests.

In summary, the strengths of the Burgiss data are its detailed cash flows for both venture capital and buyout funds, the fact that it is sourced exclusively from investors, the broad base of over 200 institutional investors who contribute data, the fact that the data is used for control (audit and performance measurement) purposes, its quality (being cross-checked when LPs invest in the same fund), and the good coverage of funds (particularly in more recent years).

II. Private Equity Performance

A. Performance measures: IRR and Investment Multiples

Private equity performance can be measured in various ways. The most widely used metrics among funds and investors are the fund IRR and the investment multiple (also referred to as the multiple of invested capital). The former measures the LP's annualized IRR based on fund contributions and distributions, net of fees and profit shares (also known as carried interest) paid to the GP. Until all the investments in the fund are realized, and the cash returned to the investors, the IRR calculation includes the estimated value of any unrealized investments (the residual net asset value, or NAV) as of the last reporting date as a final "cash flow." The investment multiple compares the sum of all fund contributions by investors to the sum of all fund distributions and the value of unrealized investments, again net of fees and carried interest.

The proportion of invested capital that has been realized in the Burgiss data is presented in Table II for the median fund in each vintage year. For buyout funds unrealized investments never exceed 3% of invested capital for the median fund in pre-1999 vintages and are only 10% of invested capital for the median 1999 fund. The pre-2000 vintages, therefore, represent largely realized funds. The proportion of realized investments naturally falls for the later vintages, to less than 20% for vintages after 2003. Similar patterns apply to the VC funds. The residual value (NAV) assumptions, therefore, become increasingly important for more recent vintages.

Assumptions about NAVs have generated controversy in the literature and merit discussion. As we do, Kaplan and Schoar (2005) use the stated NAVs in their analysis of VE data. Phalippou and Gottschalg (2009) question the NAVs based on patterns in the VE data and, in their primary analysis, assume that for funds beyond their 10th year with no cash flow activity, NAVs are zero. Stucke (2011) convincingly demonstrates that VE did not update cash flows and NAVs for many funds. As a consequence, calculations using VE data that were available to Phalippou and Gottschlag understate returns for many funds even if the stated NAVs are used. The Phalippou and Gottschalg (2009) assumption that NAVs are zero, therefore, is clearly (with hindsight) inappropriate and understates performance even more.

Although caution is warranted before including residual values in returns calculations, we benefit from two differences not available to the authors of the earlier papers. First, the Burgiss figures for both distributions and NAVs are up-to-date because the data are sourced directly from LPs, subject to extensive cross-checking, and part of the Burgiss systems that are used for the LPs' monitoring and record-keeping. Second, since the end of 2008, the Financial Accounting Standards Board (FASB) has required private equity firms to value their assets at fair value every quarter, rather than permitting them to value the assets at cost until an explicit valuation change.[11] This likely has had the effect of making estimated unrealized values closer to true market values than in the past, particularly for buyout funds.

Furthermore, recent evidence from Brown et al. (2013) and Jenkinson et al. (2013) finds that, on average, residual values have historically been conservative estimates of the ultimate cash returned to investors. The estimates in this paper for funds that are not fully realized, therefore, may be conservative.

[11] This was formalized in the Statement of Accounting Standards 157, known as FAS157, relating to topic 820 on Fair Value Measurement. FAS 157 was first proposed in September, 2006 and required as of December 15, 2008.

Table II shows the average IRRs and investment multiples derived from the Burgiss data, separately for buyout funds and venture capital funds.[12] The mean, median and the weighted average (where the weights are capital commitments) figures are shown for each vintage year, as well as averages for the 1980s, 1990s and 2000s. There is considerable variation in average performance across vintage years, with cycles that appear to lead economic booms and busts. This is due to the convention of classifying funds by vintage year, the year of the fund's first investment in a company. Most funds have a 5 or 6 year investment period, and so deploy most of their capital in the few years after their designated vintage year.

For buyout funds, the IRR has averaged around 14% per annum, and the average investment multiple has been about 2. Average performance peaked in the mid-1990s, but was also high for vintage years in the early 2000s. Buyout funds that started investing just before the financial crisis have, on average, lower IRRs and investment multiples close to 1.

For VC funds, the pattern of performance over time is more variable. IRRs and investment multiples were extremely high for vintage years in the mid-1990s. For instance, the (weighted average) IRR for 1996 vintage funds was around 76%, and the investment multiple was over 6. However, post-1998 and after the demise of the dot-com boom, the fortunes of VC investors reversed. The vintages with the largest amounts of VC fundraising, 1999 and 2000, have returned negative IRRs and investment multiples well below 1. The generally lower average returns from VC have persisted in the 2000s.

B. Does private equity out-perform public markets?

Although most practitioners have historically focused on IRRs and investment multiples, one of the key questions regarding private equity is how returns compare with those to public equity. To perform such a comparison requires timed cash flows that many data providers either

[12] In the Internet Appendix, Tables IA.II and IA.III and Figures IA.1, IA.2 and IA.3 we compare our results with IRRs and investment multiples obtained using alternative averaging techniques and the different data sources.

do not have or do not make available to researchers. Such cash flows are one of the key strengths of the Burgiss data.

Comparisons with public markets can be performed in various ways. We focus on the public market equivalent from Kaplan and Schoar (2005), which compares an investment in a private equity fund to an equivalently timed investment in the relevant public market. The PME calculation discounts (or invests) all cash distributions and residual value to the fund at the public market total return and divides the resulting value by the value of all cash contributions discounted (or invested) at the public market total return. The PME can be viewed as a market-adjusted multiple of invested capital (net of fees). A PME of 1.20, for example, implies that at the end of the fund's life, investors ended up with 20% more than they would have if they had invested in the public markets.

We also report (but do not present) an annualized excess return measure using the Long-Nickels methodology in Kocis *et al.* (2009). This method calculates the annualized IRR that a fund investor would have earned if it had invested the same amounts at the same time in the S&P 500 or relevant index. The annualized excess return is the difference between the fund's actual IRR and the annualized S&P 500 IRR. This excess return measure is generally positive when the PME is greater than one and negative when the PME is less than one. We do not focus on the Long-Nickels measure because it has the mathematical peculiarity that for a small number of funds with particularly good performance, it is not possible to calculate a return on an S&P 500 equivalent investment.

Like Kaplan and Schoar, we use the S&P 500 index to proxy the public market. This is arguably an appropriate standard of comparison for institutional investors. More formally, Sorensen and Jagannathan (2013) show that the PME and its use of a value-weighted stock market index have a strong theoretical underpinning. The PME is equivalent to using the stochastic discount factor of the log utility investor to value risky cash flows.

There also are additional empirical justifications for this assumption, particularly for buyout funds. In their study of publicly traded funds-of-funds that invest in unlisted private equity funds, Jegadeesh et al. (2009) find that publicly traded funds-of-funds have a market beta of 1.0. Driessen, Lin, and Phalippou (2011) report a beta of 1.3 for buyout funds, but a higher beta of 2.7 for venture funds. Axelson et al. (2013), however, report a beta of greater than 2 for individual buyout fund investments gross of fees. That estimate, however, overstates fund betas net of fees because the total fees, particularly the carried interest, have a negative beta.

Later in this section, we report on the sensitivity of PMEs to alternative benchmark indices (such as Nasdaq, growth or size-focused indices, that are sometimes used by LPs and partially control for differences in risk) as well as to different beta assumptions.

Table III presents average PMEs by vintage year. Buyout funds consistently out-perform the S&P 500. The average of the weighted average vintage PMEs is 1.27; the average of the averages is 1.22; and the average of the medians is 1.16. All of these significantly exceed 1.0. The weighted average, average, and median PMEs also exceed 1.0 in all three decades. The weighted average and the average buyout PMEs each exceed 1.0 for 20 of 25 vintages from 1984 to 2008; even the median PME exceeds 1.0 for 19 of 25 vintages. Three of the six vintage years with a median below 1.0 – 1984, 1985 and 1992 – have five or fewer funds. In vintage years with at least 10 funds, the median PME is below 1.0 in only 2 of 15 years. And, ignoring vintage years, the average fund in the entire sample has an average PME of 1.20 and a median PME of 1.11.

We also calculate the Long-Nickels annualized excess return measure (from Kocis *et al.* (2009)). The average fund in the sample has a return that is 6.6% greater than if it had been invested in the S&P 500 while the median is 3.4%. The capital weighted average excess return is 3.7% while the median is 3.0%. We could not calculate an S&P 500 equivalent for 22 funds. These funds have an average PME of 2.0. If we assume these funds have an excess return of

10% (top quartile) and include them, the averages increase by 0.10% and the medians increase by 0.40%.

The average PME of 1.20 and an average annual excess return of roughly 4% suggest that the typical duration of a buyout fund is on the order of five years, a duration lower than the typical fund's legal life of ten to thirteen years. This is true because committed capital is drawn down over a five-year investment period (rather than all at the beginning of the fund) and capital is returned through company sales and IPOs over the life of the fund.

These results strongly suggest that the buyout funds have significantly outperformed public markets – by at least 20% over the life of the fund, or at least 3.7% per year – for a long period of time. Not only have top quartile funds outperformed the S&P 500, but so have average and median funds. Figure 1 illustrates that these results imply significantly better performance for buyout funds than those found in earlier research by Kaplan and Schoar (2005) and Phalippou and Gotschalgh (2009) (although the results are largely consistent with the performance realized by the single investor of Robinson and Sensoy (2011a)).

In part, the lower performance in earlier work may be due to the problems with the VE data noted earlier, although to some extent the differences also derive from using a more recent sample of funds. The Burgiss data include a relatively large number of 1990s and 2000s vintage funds, reflecting the growth in the buyout market in recent years.

It is worth stressing again that the eventual performance for the more recent vintages will depend on the future realization of investments over the funds' remaining lives. That performance will improve if the historical J-Curve pattern of private equity funds – in which fund multiples increase over a fund's life – continues to hold.[13]

[13] See Kocis et al. (2009) for a description of the J-Curve. Consistent with this general time profile for fund returns, Harris et al. (2013) find higher average PMEs, particularly for post-2004 vintages, using a later sample (from December 2011) of Burgiss data.

The performance of venture capital contrasts considerably with that of buyouts. Panel B of Table III shows that the PMEs for early venture capital vintages were less than 1.0, but then increased sharply after 1986. Weighted average PMEs exceed 1.0 for the 1987 to 1998 vintage years, with the 1996 vintage having a weighted-average PME above 4.0.

From 1999 to 2008, the pattern reverses. Except for 2005, none of those vintages have a weighted average or simple average PME greater than 1.0. The 1999 to 2002 vintages are particularly low with all PMEs at, or below, 0.90. Overall, then, the results suggest that VC PMEs exceeded 1.0 for most of the 1990s by a fairly wide margin. Since 1999, they have been less than 1.0, being particularly low for 1999 to 2002 vintages. Compared to earlier research, the more negative findings for VC returns largely reflect the fact that our data includes more recent funds. As can be seen from Figure 1, the returns obtained from the Burgiss data have a similar trend to those found by Kaplan and Schoar (2005), although the PMEs are somewhat higher. However, the inclusion of more recent vintages reverses the previous finding that VC generally out-performed public markets: this was true up to 1998, but afterwards the performance has not kept pace. Our results are consistent with the findings of the Kaufmann Foundation for their investments in VC (see Kauffman Foundation (2012)).

C. Sensitivity of PMEs to the Choice of Benchmark

So far our PME calculations have used the S&P 500 because it is a widely used proxy for U.S. public market returns, has a natural asset pricing interpretation and allows direct comparison to past research. However, LPs commonly use other investable benchmarks (e.g. Nasdaq or other size related indices) to control for what they perceive as differences in risk or other return characteristics.[14] To gauge the sensitivity of our results, Table IV reports vintage-year average,

[14] For instance, a number of LPs indicated to us that they considered the Nasdaq or, particularly, the Russell 2000 better benchmarks for VC funds as these indices capture returns to smaller firms.

average, and median PMEs using a number of different indices each of which represents a different public market alternative for investing funds.

The first five columns of Table IV calculate PMEs with the S&P 500 and four other commonly used benchmarks. For buyout funds (Panel A), the average vintage-year PMEs exceed 1.0 measured using all five benchmark indices. The PMEs are of similar magnitude (1.20 to 1.22) using the S&P500, Nasdaq, Russell 3000, and (small cap) Russell 2000 indices. The average vintage-year PME is slightly lower (1.16) using the narrower Russell 2000 Value (small cap value) index. Average vintage-year PMEs also are consistent across time for those four indices – they all exceed 1.0 for each of the indices in each of the three decades for which we have data.

The overall sample average PMEs also exceed 1.0 across all indices. Measured against the S&P 500, Nasdaq, the Russell 3000 indices, sample average PMEs are between 1.17 and 1.20. They are lower using the Russell 2000 (1.11) and the Russell 2000 Value (1.07), but, again, still statistically greater than 1.0. The lower PMEs for the Russell 2000 Value index are driven by PMEs below 1.0 for the late 1990s vintages and the more recent 2007 and 2008 vintages.

The next four columns of Table IV calculate PMEs using returns to Fama-French size deciles 8, 6, 4, and 2 whose firms have average market values, respectively, of roughly $6 billion, $2.5 billion, $1.2 billion and $0.5 billion in both 2007 and 2011.[15] As with the commonly used benchmarks, the average vintage-year PMEs and the sample average PMEs for buyout fund significantly exceed 1.0 for all four size indices. The PMEs are somewhat lower although still greater than 1.0 for the 6th and 8th size deciles, driven to a large extent by lower PMEs in the more recent and less fully realized 2006 to 2008 vintages. It is worth noting that it is unusual for even the largest funds to make individual equity investments exceeding $2.5 billion. In other

[15] The results are qualitatively similar using the odd Fama-French size deciles. To conserve space, we do not report them in the table.

words, deciles 8 and, even, 6, are larger than the corresponding deciles for most buyout funds. Firms in size deciles 4 and 2, on the other hand, are more similar in size to the firms in which most buyout funds invest.

Unlike the sample means, the sample medians are not significantly different from 1.0 for the smaller capitalization indices (Russell 2000, Russell 2000 Value and Fama French indices). An important question, then, is whether the mean or the median is a more appropriate measure of fund performance. If limited partner investors can freely choose among different funds and create a diversified portfolio of funds, then the mean is the appropriate measure of limited partner performance. If, instead, some limited partners can distinguish in advance which funds will outperform and those funds are not available to the typical limited partner, then the median may be the more appropriate measure.

The results of recent work suggest that the mean is the appropriate measure for buyout funds. Harris et al. (2013) find that buyout fund persistence has declined post-2000, suggesting that it is difficult to predict which funds will outperform based on previous fund performance. Sensoy et al. (2013) do not find that any particular type of limited partner (including endowments) is able to access or choose better performing buyout funds, both before and after 2000. These results suggest that the typical buyout fund limited partner has been able to access the average buyout fund.

For venture funds (Panel B of Table IV), the patterns identified using the S&P 500 persist across the different indices. Although average vintage-year PMEs exceed 1.0 across all indices, they are below 1.0 in the 2000s and well above 1.0 in the 1990s. Sample average PMEs are similar for the different indices with the lowest using the Nasdaq (1.12) and the highest using the Russell 2000 Growth index (1.25). Similarly, the average vintage year PMEs and sample average PMEs using the four Fama-French size deciles are qualitatively identical to those using the Russell 2000.

While the overall sample average performance of VC funds is greater than 1.0, the sample median is below 1.0. For VC funds, it is less clear whether the median or mean is the appropriate measure for the typical VC limited partner. Harris et al. (2013) find that VC fund persistence is equally strong pre- and post-2000, suggesting that it is possible to predict which funds will outperform based on previous fund performance and that the typical VC limited partner may not be able to access the average fund. Alternatively, Sensoy et al. (2013) do not find that any particular type of limited partner (including endowments) is able to access or choose better performing venture capital funds post-1998, suggesting that the mean is a more appropriate measure of fund performance.

Overall, then, Table IV shows that average PMEs across our sample are robust to a range of public market benchmarks. Size (smaller) and value benchmarks reduce the outperformance of buyout funds somewhat, but do not eliminate it. This reinforces our conclusions about private equity performance from the prior section. In keeping with prior research and the Sorensen and Jagannathan (2013) asset pricing interpretation, we rely on PMEs using the S&P 500 for the remainder of our analysis.

D. Sensitivity of PMEs to Beta or Systematic Risk

As mentioned above, Sorensen and Jagannathan (2013) provide a strong economic justification for our PME analyses, particularly the assumption that one can discount at the market return (like that of the S&P 500) without making assumptions about systematic risk (or betas). The relatively stable and positive pattern of PMEs for buyout funds that we find over the 1980s, 1990s, and 2000s – periods of very different market returns – suggests this assumption is reasonable.

Nevertheless, to further consider the effect of this assumption, we approximated assuming betas of 1.5 and 2.0 by estimating PMEs assuming that an alternative investment earned, respectively, 1.5 times and 2 times the return on the S&P 500.

For buyout funds, we find that the average fund has a PME of 1.20, 1.18, and 1.20, respectively, assuming public market returns of 1.0, 1.5, and 2.0 times the S&P 500. The median PMEs are, respectively, 1.12, 1.11, and 1.13. The PMEs are similarly insensitive to the public market return assumption for 1990s vintages and 2000s vintages. The one set of vintages where beta seems to matter is the 1980s – a period of particularly high leverage and a rising stock market. Overall, we conclude that systematic risk does not explain our PME results for buyout funds, particularly since 1990.

Interestingly, the patterns are potentially consistent with a change in the nature of the buyout industry and how GPs add value to their portfolio companies. In the 1980s, GPs relied more heavily on leverage and financial engineering while since then GPs appear to have relied less heavily on leverage and more heavily on operational engineering (and the accompanying operational improvements).[16]

For venture capital funds, we find that the average fund has a PME of 1.21, 1.10, and 1.07, respectively, assuming public market returns of 1.0, 1.5, and 2.0 times the S&P 500. The medians are closer at 0.90, 0.87 and 0.85. At the vintage year level, the results vary little in the 2000s, but average PMEs vary somewhat more – between 1.40 and 1.77 – for the 1990s vintages depending on the assumed systematic risk. Our basic conclusions are unchanged regardless of our assumption about beta – VC funds outperformed in the 1990s and underperformed in the 2000s.

[16] Kaplan and Stromberg (2009) provide a discussion of this history.

III. Private Equity Performance, Capital Flows and Fund Size

In this section, we re-examine two possible determinants of private equity performance that have been studied in prior research – the relation of performance to aggregate private equity capital commitments (or fund flows) and the relation of private equity performance to fund size. Kaplan and Schoar (2005), Kaplan and Stromberg (2009) and Robinson and Sensoy (2011a) all find some evidence that increased aggregate capital commitments to buyout and venture capital funds are related to subsequent performance. At the fund level, Kaplan and Schoar (2005) find a concave relation between performance and fund size for VC funds, but not for buyout funds. Robinson and Sensoy (20011a) find that PMEs for both buyout and VC funds are modestly concave in the log of fund size. We undertake a similar, but slightly different, analysis using the Burgiss data.

A. Capital Flows

To measure fund flows into the industry, we take capital committed to U.S. buyout and VC funds using annual estimates from Private Equity Analyst for the current and previous vintage year.[17] This sum provides an (imperfect) estimate of the amount of capital available to fund deals.[18] In order to compare these capital flows over a long period of time, we deflate the two-year capital commitments by the total value of the U.S. stock market at the beginning of the vintage year. In a typical year, the two-year capital commitments to buyout funds average 0.76% (median of 0.70%) of the stock market value. The two-year capital commitments to VC funds average 0.27% (median of 0.23%). We then regress weighted-average vintage year performance – as measured by PME, as well as IRR and investment multiple – on aggregate capital flows, separately for buyouts and VC. The results are qualitatively and statistically similar using

[17] These estimates from Private Equity Analyst are reported in the Internet Appendix, Table IA.I.
[18] Ideally we would use an estimate of the "dry powder" – capital committed that has not been invested – for buyouts and VC separately, by year back to the mid-1990s. However, such estimates are only available for recent years.

unweighted average performance. We limit the analysis to vintage years from 1993 onwards, the point at which Burgiss begins to have more substantial fund coverage.

Table V shows that buyout fund performance is significantly negatively related to capital commitments. Absolute performance measures – IRRs and investment multiples – are negatively related to capital commitments. When capital commitments increase from the bottom quartile of years (0.42%) to the top quartile of years (0.87%), IRRs decline by more than 5% per year while multiples decline by around 0.45. We also find that PMEs are negatively related to capital commitments. The regression coefficients imply that PMEs decline by 0.14 when capital flows move from the bottom to top quartile. Overall, these results suggest that an influx of capital into buyout funds is associated with lower subsequent performance. Our findings are consistent with and extend the results in Kaplan and Stromberg (2009). Our results are also consistent with Robinson and Sensoy's (2011a) findings using absolute performance measures (IRR and multiples), although they do not find a negative relation between buyout PMEs and capital commitments.

Table V also shows a negative relation between capital commitments and performance for VC funds. The regression coefficients imply that when capital flows move from the bottom to top quartile, IRRs decline by 9% per year, multiples decline by 0.75 and PMEs decline by 0.33. These results are broadly consistent with Kaplan and Stromberg (2009) and Robinson and Sensoy (2011a) and add support to the finding that an influx of capital into VC funds is associated with lower subsequent performance.

B. Fund Size

Most practitioners are concerned with how performance varies with fund size. Over time, fund sizes have, on average, increased for both buyout and VC funds. This is apparent in panel A of Table VI where we classify funds into size quartiles by decade. Buyout fund sizes have

increased from an average size of $390 million in the 1980s to $782 million in the 1990s to $1.4 billion in the 2000s. VC fund sizes also increased from an average of $77 million to $191 million to $358 million. Similar increases have occurred over time for each fund size quartile.

Panel A also reports PMEs by size quartile, across the entire sample, for buyout and VC funds. Although not controlling for any vintage year effects, these average returns by size quartile do not demonstrate strong correlation between fund size and performance. The only noticeable relationship is that the smallest quartile of both buyout and VC funds tend to have lower performance.

To investigate this further, Panel B reports fund-level regressions of PME on fund size quartiles (by decade). When vintage year dummies are not included the regressions have little explanatory power, as might be expected given the important time-series trends in returns reported earlier. When controlling for vintage years there remains no significant relationship between fund size and returns for buyout funds. These results are consistent with the findings of Lopez-de-Silanes, Phalippou and Gottschalg (2012) who find no relationship between buyout fund size and returns, but find evidence of diseconomies of scale related to the number of simultaneous deals being undertaken for buyout fund. Our findings are also consistent with the earlier results of Kaplan and Schoar (2005).

For VC funds, however, we find a strong positive relation between size and performance. Funds in the smallest two size quartiles significantly underperform funds in the 3rd and 4th size quartiles once we control for vintage year effects.

Our conclusions about the effects of fund size are not sensitive to our size classifications. We find (but do not report in the table) qualitatively similar results when we classify funds by their size quartile in a particular vintage year.

IV. Relation of Absolute and Relative Performance Measures

The cash-flow level data we employ in this paper allow us to explore an additional question: how PMEs are related to the absolute performance measures – IRRs and investment multiples – provided by most commercial data sources. This exploration has two primary motivations. First, if there is a robust relationship between PMEs, IRRs and investment multiples in the Burgiss data, we can use this to estimate the PMEs that would be obtained were the required cash-flow data available. Since absolute performance measures are often the only metrics available from data providers (as well as from some LPs and GPs), this approach provides a way to assess the extent to which conclusions on private equity performance depend on the data sample being studied. Second, our analysis can shed light on the debate among practitioners as to whether IRRs or multiples provide more accurate indicators of market-adjusted performance.

A. PME and Absolute Performance Measures

We start, in Table VII, by reporting regressions of PMEs on IRRs and multiples. We report standard errors both unclustered and clustered by vintage years. Clustering by vintage years increases standard errors, but all coefficients of interest remain strongly statistically significant. As before, we focus on vintages starting with 1993 because from that year onward all VC vintages and all but one vintage for buyout funds have at least ten observations. Results using the full sample are similar and are presented in the Internet Appendix Table IA.IV.

Columns 1 to 3 of Table VII report regressions, each with vintage year dummies, of buyout fund PMEs on IRRs, on multiples and on both IRRs and multiples. Buyout fund PMEs are strongly related to IRRs and multiples. IRRs and vintage years alone explain 75% of the variation in PMEs; multiples and vintage years alone, 92% of the variation; and IRRs, multiples and vintage years also explain 92% of the variation in PMEs. In other words, it is possible to

predict a buyout fund's PME with a great degree of reliability knowing a fund's IRR, multiple, and vintage year. IRRs explain less of the variation than multiples and add little incremental explanatory power. Columns 4 to 6 repeat the regressions for VC funds with similar findings.

We also ran the regressions by vintage year, to allow the regression relationship to change over time, and find that there is not a single vintage year in which IRRs and multiples explain less than 86% of the variation in PMEs. In all but three of the thirty-two vintage year cohorts, IRRs and multiples explain at least 93% of the variation in PMEs. As with the combined regressions in Table VII, multiples typically provide greater explanatory power for PMEs than do IRRs. These results are presented in the Internet Appendix, Table IA.V.

These results have two implications for understanding performance. First, the consistent findings for both buyout and VC funds suggest that multiples are more robust indicators of fund performance relative to public markets than are IRRs (controlling for vintage year). Second, each 0.10 increase in a multiple (equal to 10% of invested capital) is associated with an increase in PME of 0.071 for buyout and 0.056 for VC funds. If the funds have an effective duration of about five years and we use the estimated impact on PME, a 0.10 increase in multiple translates to roughly an additional 110 to 140 basis points per year relative to public markets.

B. Estimating PMEs from Other Data Sources

Having found a strong relationship between PME, IRR and investment multiple in the Burgiss data, we take advantage of this relationship to estimate the PMEs that are implicit in other commercial data sources. Our approach uses the regression results from the Burgiss cash flow data to translate vintage year IRRs and investment multiples into PMEs even when the underlying cash flow data are not available. We would expect any selection biases affecting a given sample to show up in the IRRs and investment multiples as well as PMEs, all of which are interconnected.

For our analysis, we use the regressions coefficients by vintage year reported in the Internet Appendix Table IA.V and apply these to the IRRs and investment multiples reported by CA, Preqin and VE as of March 2011, the same date for which we have the Burgiss data. We note that in some of the earlier vintage years, the number of observations in the regressions is small so there is more potential for estimation error. With these caveats in mind, Table VIII presents the estimated PMEs for the other main private equity data samples, along with the actual PMEs from the Burgiss data and those found by Robinson and Sensoy (2011a).

Panel A of Table VIII reports the PME estimates for buyouts. These results are also presented graphically in Figure 2. The estimates imply that the weighted average PMEs and average PMEs for buyout funds of 1990s and 2000s vintages exceed 1.0 for all three commercial databases just as they do for the Burgiss data. The average PMEs are slightly higher in the Preqin data than in Burgiss and slightly lower for CA. The VE estimates, although greater than 1.0, are markedly lower than those from the other three commercial data sets, consistent with the downward bias uncovered in Stucke (2011). The very similar overall results obtained using samples from Burgiss, CA and Preqin, despite each source's very different collection processes, suggests these samples provide unbiased estimates of overall buyout performance.

Panel B of Table VIII repeats our analysis for venture capital funds. The results are consistent across all four commercial datasets. VC funds outperformed public markets substantially until the late 1990s. The performance is stronger in the Burgiss data than in the others and lowest in VE. In contrast to the strong VC performance in earlier vintages, from the 1999 vintage year onwards VC funds have generally underperformed public markets in all four commercial datasets. The average vintage year PMEs are similar across all four commercial datasets.

The results in Higson and Stucke (2012) provide an opportunity to conduct an "out of sample" test of our approach because their paper appeared subsequent to our analysis. They

analyze fund-level cash flow data for a sample of buyout funds, most of which come from CA. (They do not analyze VC funds.) Higson and Stucke report sample average values for PMEs, IRRs and multiples by vintage year that they calculate from the cash flow data.

To gauge how well our regression approach works, we use average IRRs and multiples for each vintage year to estimate the vintage year PMEs we would predict, paralleling our analysis in Table VIII. Our estimates come very close to the mark. The mean (median) predicted vintage year PME is 1.23 (1.25) from 1993-2008. For this same time interval, the PMEs directly calculated by Higson and Stucke from the fund cash-flows have a mean (median) vintage year value of 1.27 (1.26). Looking at differences in individual vintage years, the mean (median) difference is -0.04 (-0.04) with a standard error of 0.05. The mean (median) absolute vintage year difference is 0.05 (0.05). Thus, our procedure provides estimates that closely track the actual sample PMEs that could have been calculated with cash flow data.

C. Conclusions about Performance

Overall, the PME results across the different datasets reinforce the earlier conclusions about private equity performance. Buyout funds have consistently outperformed public markets for some time. Such outperformance holds despite the different selection criteria and data gathering methods used in the various datasets. Confirmation of this claim must await the emergence of a complete buyout fund dataset. Nevertheless, for this conclusion to turn out to be incorrect, the four commercial datasets (as well as Robinson and Sensoy (2011a)) with different selection criteria would all have to have a substantial positive selection bias. The PME results from different datasets also confirm the earlier findings on VC funds. While VC performance was strong in earlier vintages, from the 1999 vintage year onwards VC funds have generally underperformed public markets.

V. Conclusions

Our research highlights the importance of high quality data for understanding private equity and the returns it provides to investors. Some of the existing papers in the academic literature have relied upon data whose reliability has recently been questioned. Most previously published papers also have focused on funds raised up until the mid- or late-1990s. The enormous growth in investor allocations to private equity funds since the late 1990s has created a need for a re-evaluation of private equity performance. This paper is the first to take advantage of a new research-quality cash flow data set from Burgiss, using data as of March 2011. We believe the results in our paper have several implications.

First, it seems likely that buyout funds have outperformed public markets, particularly the S&P 500, net of fees and carried interest, in the 1980s, 1990s, and 2000s. Our estimates imply that each dollar invested in the average fund returned at least 20% more than a dollar invested in the S&P 500. This works out to an outperformance of at least 3% per year. The conclusion that there has been outperformance is relatively insensitive to assumptions about benchmark indices and systematic risk. For the more recent and less fully realized vintage funds, however, the eventual performance will depend on the ultimate realization of their remaining investments. Our results (and those we estimate from the other commercial datasets) imply that buyout funds outperformed public markets much more substantially gross of fees. Nailing down the sources of this outperformance seems a fruitful subject for future research.

Second, VC funds outperformed public markets substantially until the late 1990s, but have underperformed since. Extant research focused on the earlier vintage years and inevitably obtained more positive results. Since 2000, the average VC fund has underperformed public markets by about 5% over the life of the fund. Although disappointing, this under-performance is less dramatic than the more commonly quoted absolute return measures. Again, the qualitative conclusions do not appear sensitive to assumptions about systematic risk.

Third, vintage year performance for buyout and VC funds decreases with the amount of aggregate capital committed to the relevant asset class, particularly for absolute performance, but also for performance relative to public markets. This suggests that a contrarian investment strategy would have been successful in the past in these asset classes. The magnitudes of these relations have been greater for VC funds. Why these patterns have persisted is something of a puzzle and an interesting topic for future research.

Fourth, within a given vintage year, PMEs are reliably related to the more generally available absolute performance measures – IRRs and investment multiples. For both buyout and VC funds, IRRs and investment multiples explain at least 90% of the variation of PMEs in most vintage years, with investment multiples explaining substantially more of the variation than do IRRs. As a result, researchers and practitioners can use our models to estimate PMEs without having the underlying fund cash flows.

Fifth, the Burgiss, CA and Preqin datasets yield qualitatively and quantitatively similar performance results. There is little reason to believe that the Burgiss and Preqin datasets, in particular, suffer from performance selection biases in the same direction. Accordingly, we think this suggests that the three datasets are unbiased and, therefore, suitable for academic research and practitioner use. At the same time, consistent with Stucke (2011), we find that performance, particularly for buyout funds, is markedly lower in the VE data. This confirms that academic research and practitioners should be cautious in relying on VE data.

Finally, although it is natural to benchmark private equity returns against public markets, investing in a portfolio of private equity funds across vintage years inevitably involves uncertainties and potential costs related to the long-term commitment of capital, uncertainty of cash flows and the liquidity of holdings that differ from those in public markets. While the average out-performance of private equity we find is large, further research is required to calibrate the extent of the premia investors require to bear these risks.

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Table I
Number of Funds in Private Equity Datasets

This table shows the number of funds in the various private equity datasets, for which performance data are available by vintage year (as defined by each source). Preqin has summary performance information (IRR and investment multiples) for the number of funds shown; it only has cash-flow information, which is required for computing public market equivalent measures of performance, for a subset of these funds. Panel A focuses on buyout funds, and Panel B on venture capital, using the classifications provided by the suppliers or authors. Only funds with a North American geographical focus are included.

Panel A : Buyout Funds

Vintage	Burgiss	Venture Economics	Preqin	Cambridge Associates	Kaplan-Schoar	Robinson-Sensoy
1984	2	7	6		6	
1985	1	7	3		12	
1986	5	10	9	8	16	1
1987	7	25	7	9	22	8
1988	7	17	14	14	21	14
1989	8	24	10	15	22	16
1990	2	9	14	5	14	7
1991	4	5	8	11	6	2
1992	5	15	17	12	17	4
1993	11	21	18	22	11	9
1994	13	26	24	17	6	24
1995	17	23	22	28	7	24
1996	9	23	24	33		41
1997	30	40	35	44		40
1998	38	53	50	51		59
1999	28	38	43	49		59
2000	39	46	67	65		68
2001	26	27	25	18		26
2002	21	15	28	29		5
2003	13	13	29	32		8
2004	46	17	35	58		3
2005	57	20	63	73		2
2006	67	26	60	64		8
2007	74	22	65	67		6
2008	68	14	53	52		12
Total	598	543	729	776	160	446
Total 2000-08	*411*	*200*	*425*	*458*		
Total 1990-99	*157*	*253*	*255*	*272*	*61*	*269*
Total 1984-89	*30*	*90*	*49*	*46*	*99*	*39*

Panel B : Venture Capital Funds

Vintage	Burgiss	Venture Economics	Preqin	Cambridge Associates	Kaplan-Schoar	Robinson-Sensoy
1984	18	63	17	32	57	6
1985	20	46	23	25	37	5
1986	12	41	19	30	36	3
1987	17	64	21	34	63	6
1988	16	44	24	26	42	9
1989	18	50	38	37	45	10
1990	13	21	20	16	20	1
1991	6	18	12	17	11	
1992	17	27	22	23	18	4
1993	13	41	32	37	45	5
1994	20	36	31	42	49	7
1995	18	49	29	34	43	13
1996	20	36	35	40		13
1997	33	64	54	73		19
1998	46	78	59	81		36
1999	65	107	78	112		40
2000	80	122	115	156		55
2001	48	59	66	52		18
2002	18	20	47	32		7
2003	25	17	37	35		
2004	32	22	51	64		
2005	48	20	58	58		1
2006	62	37	77	69		
2007	65	18	71	52		2
2008	45	14	57	55		
Total	775	1114	1093	1232	466	260
Total 2000-08	*423*	*329*	*579*	*573*		
Total 1990-99	*251*	*477*	*372*	*475*	*186*	*138*
Total 1984-89	*101*	*308*	*142*	*184*	*280*	*39*

Table II
Private Equity Fund Internal Rates of Return and Investment Multiples

This table shows average Internal Rates of Return (IRR) and Investment Multiples, by vintage year on the individual funds using the Burgiss data. Investment multiples are ratio of total value to paid-in capital (TVPI). Total value is the sum of the cash returned to investors and the remaining net asset value (NAV) as estimated by the private equity fund manager. Given the limited life of the funds, for the early vintage funds the vast majority of the investments have been realized; whereas the opposite is true for the later vintages, for which the reported IRRs and multiples relate mainly to NAVs, with little cash having been returned to investors. Weighted averages use the capital committed for each fund as a proportion of the total commitments for each vintage year. Panel A focuses on buyout funds, and Panel B on venture capital, as classified by Burgiss. Only funds with a North American geographical focus are included.

	Panel A: Buyout Funds								Panel B: Venture Capital Funds							
			Internal Rate of Return			Investment Multiple					Internal Rate of Return			Investment Multiple		
Vintage year	Funds	Median % Realised	Average	Median	Weighted average	Average	Median	Weighted average	Funds	Median % Realised	Average	Median	Weighted average	Average	Median	Weighted average
1984	2	100.0	10.6	10.6	15.8	2.44	2.44	3.28	18	100.0	8.2	6.9	7.9	1.78	1.71	1.73
1985	1	100.0	13.7	13.7	13.7	2.66	2.66	2.66	20	100.0	5.5	8.7	7.1	1.96	1.81	1.93
1986	5	100.0	13.6	16.8	16.0	2.40	2.36	3.27	12	100.0	9.0	9.3	9.4	1.83	1.93	1.82
1987	7	100.0	17.3	16.2	15.3	2.93	2.55	2.58	17	100.0	15.8	16.7	20.2	2.70	2.35	2.77
1988	7	100.0	14.4	10.1	18.4	2.03	1.74	2.32	16	100.0	17.9	21.6	24.4	2.45	2.55	2.88
1989	8	100.0	20.6	22.4	21.1	2.55	2.69	2.75	18	100.0	20.5	15.3	25.7	2.92	2.41	3.09
1990	2	97.8	31.9	31.9	52.9	3.03	3.03	3.37	13	100.0	25.3	21.7	29.5	2.96	2.48	3.30
1991	4	100.0	25.7	24.9	27.8	2.45	2.54	2.54	6	100.0	28.1	24.4	28.5	3.11	2.70	2.92
1992	5	100.0	11.2	10.7	15.0	1.68	1.41	1.88	17	100.0	21.0	14.2	24.8	2.69	2.07	2.72
1993	11	100.0	31.0	19.1	26.0	2.62	2.07	2.48	13	100.0	47.1	40.9	51.9	6.65	3.28	6.34
1994	13	100.0	29.6	25.7	34.5	2.73	2.18	3.29	20	100.0	41.7	31.8	41.4	5.27	3.05	6.58
1995	17	99.5	20.9	10.5	16.9	2.08	1.51	1.82	18	100.0	49.2	28.9	46.4	3.64	2.50	3.55
1996	9	100.0	6.0	5.7	2.4	1.46	1.30	1.17	20	98.3	64.5	25.2	76.7	5.92	2.06	6.33
1997	30	98.3	8.6	5.5	8.8	1.42	1.28	1.50	33	97.6	65.9	26.3	76.1	3.03	1.87	3.28
1998	38	96.9	6.4	8.0	3.6	1.42	1.39	1.28	46	97.1	16.3	-1.2	15.5	1.55	0.93	1.60
1999	28	89.9	3.3	4.3	4.8	1.31	1.21	1.40	65	85.0	-7.4	-5.6	-4.5	0.81	0.73	0.94
2000	39	62.2	12.7	11.9	14.3	2.66	1.58	1.75	80	66.7	-2.7	-2.1	-1.3	0.91	0.88	0.97
2001	26	57.5	13.7	14.6	15.1	1.58	1.72	1.67	48	60.5	-1.7	-2.4	-0.7	0.97	0.87	1.01
2002	21	44.9	16.1	16.4	18.4	1.72	1.79	1.84	18	55.0	-1.1	-0.2	0.6	1.01	0.99	1.07
2003	13	29.4	19.5	16.2	22.5	1.98	1.75	1.80	25	41.7	-2.1	0.1	0.9	0.99	1.00	1.11
2004	46	18.1	12.8	11.7	15.4	1.53	1.50	1.64	32	23.9	-1.5	-1.0	0.3	1.01	0.97	1.07
2005	57	9.7	6.8	7.6	7.1	1.26	1.25	1.27	48	17.3	2.2	0.5	3.3	1.37	1.02	1.31
2006	67	10.8	2.6	1.2	0.5	1.08	1.03	1.02	62	16.0	-1.3	-2.4	0.6	1.01	0.95	1.04
2007	74	1.9	3.7	6.2	4.4	1.11	1.12	1.09	65	3.0	1.7	2.6	3.2	1.06	1.06	1.09
2008	68	6.3	3.2	2.8	1.5	1.07	1.04	1.04	45	13.0	-2.8	-1.6	-4.5	0.99	0.98	0.97
Average	598	72.9	14.2	13.0	15.7	1.97	1.81	2.03	775	85.8	16.8	11.1	19.3	2.34	1.73	2.46
Average 2000s	*411*	*26.8*	*10.1*	*9.8*	*11.0*	*1.55*	*1.42*	*1.46*	*423*	*33.0*	*-1.0*	*-0.7*	*0.3*	*1.03*	*0.97*	*1.07*
Average 1990s	*157*	*98.2*	*17.5*	*14.6*	*19.3*	*2.02*	*1.79*	*2.07*	*251*	*97.8*	*35.2*	*20.7*	*38.6*	*3.56*	*2.17*	*3.76*
Average 1980s	*30*	*100.0*	*15.0*	*14.9*	*16.7*	*2.50*	*2.41*	*2.81*	*101*	*100.0*	*12.8*	*13.1*	*15.8*	*2.27*	*2.13*	*2.37*

Table III
Private Equity Fund Public Market Equivalent Ratios

This table shows the average Public Market Equivalent (PME) ratios by vintage year, comparing private equity returns to equivalent timed investments in the S&P 500 using the Burgiss data. Vintage years are defined by the date of the first investment by a fund. Weighted averages use the capital committed to the funds as weights. Only funds with a North American geographical focus are included.

Vintage year	Panel A: Buyout Fund PMEs				Panel B: Venture Capital Fund PMEs			
	Funds	Average	Median	Weighted average	Funds	Average	Median	Weighted average
1984	2	0.87	0.87	1.09	18	0.70	0.63	0.69
1985	1	0.91	0.91	0.91	20	0.71	0.70	0.73
1986	5	1.00	1.11	1.11	12	0.75	0.73	0.80
1987	7	1.25	1.21	1.20	17	1.18	1.09	1.29
1988	7	0.98	0.80	1.13	16	1.18	1.31	1.44
1989	8	1.26	1.28	1.22	18	1.34	0.95	1.52
1990	2	1.57	1.57	2.34	13	1.50	1.18	1.66
1991	4	1.23	1.23	1.32	6	1.37	1.26	1.35
1992	5	0.79	0.87	0.89	17	1.27	0.94	1.34
1993	11	1.35	1.11	1.24	13	2.79	1.54	2.74
1994	13	1.48	1.34	1.75	20	2.40	1.43	2.86
1995	17	1.34	1.00	1.20	18	2.16	1.48	2.09
1996	9	1.13	1.01	0.90	20	3.79	1.75	4.17
1997	30	1.23	1.16	1.30	33	2.43	1.45	2.65
1998	38	1.35	1.32	1.21	46	1.43	0.93	1.48
1999	28	1.19	1.06	1.27	65	0.76	0.65	0.90
2000	39	1.42	1.39	1.47	80	0.79	0.77	0.85
2001	26	1.31	1.43	1.38	48	0.80	0.71	0.84
2002	21	1.42	1.47	1.53	18	0.82	0.79	0.88
2003	13	1.75	1.56	1.58	25	0.88	0.90	0.99
2004	46	1.40	1.35	1.51	32	0.90	0.85	0.96
2005	57	1.20	1.19	1.23	48	1.27	0.95	1.23
2006	67	1.03	0.97	0.99	62	0.93	0.85	0.97
2007	74	1.03	1.03	1.02	65	0.97	0.96	0.99
2008	68	0.91	0.88	0.90	45	0.84	0.81	0.84
Average	**598**	**1.22**	**1.16**	**1.27**	**775**	**1.36**	**1.02**	**1.45**
Average 2000s	*411*	*1.27*	*1.25*	*1.29*	*423*	*0.91*	*0.84*	*0.95*
Average 1990s	*157*	*1.27*	*1.17*	*1.34*	*251*	*1.99*	*1.26*	*2.12*
Average 1980s	*30*	*1.04*	*1.03*	*1.11*	*101*	*0.98*	*0.90*	*1.08*

Table IV
Private Equity PMEs Using Alternative Public Market Indices

This table shows vintage-year average, average and median Public Market Equivalent ratios calculated with alternative market benchmarks. The Russell 3000 index is based on the largest 3000 U. S. companies. The Russell 2000 measures the performance of small-cap stocks and is based on a 2000 company subset of the Russell 3000. The Russell 2000 Growth and 2000 Value indices are subsets of the Russell 2000 chosen on the basis of forecasted growth rates and price-to-book ratios. We also include selected Fama-French size deciles. The final columns calculate PMEs using multiples of the S&P 500 to approximate the effect of betas of 1.5 and 2. Panel A focuses on the 598 buyout funds, and Panel B on the 775 venture capital funds, in the Burgiss dataset.

Panel A: Buyout Funds

			Russell indices			Fama French				Multiple of S&P 500	
Vintage years	S&P 500	Nasdaq	3000	2000	2000 value	8th	6th	4th	2nd	1.5X	2X
1984	0.87	0.97	0.90	1.15	1.07	0.93	0.96	1.15	1.39	0.59	0.44
1985	0.91	0.98	0.94	1.18	1.09	0.98	0.99	1.20	1.45	0.6	0.42
1986	1.00	1.02	1.02	1.18	1.10	1.05	1.05	1.21	1.36	0.75	0.61
1987	1.25	1.2	1.27	1.43	1.32	1.31	1.30	1.49	1.59	0.95	0.75
1988	0.98	0.9	0.99	1.05	0.99	1.00	0.97	1.09	1.14	0.74	0.58
1989	1.26	1.15	1.27	1.34	1.23	1.29	1.26	1.36	1.36	0.95	0.76
1990	1.57	1.48	1.57	1.58	1.43	1.49	1.51	1.56	1.47	1.23	1.03
1991	1.23	1.15	1.25	1.40	1.31	1.35	1.32	1.39	1.35	0.95	0.77
1992	0.79	0.78	0.82	0.97	0.92	0.92	0.98	0.98	0.88	0.58	0.44
1993	1.35	1.33	1.38	1.62	1.56	1.53	1.60	1.59	1.45	1.03	0.81
1994	1.48	1.45	1.52	1.78	1.70	1.59	1.76	1.72	1.51	1.13	0.9
1995	1.34	1.3	1.35	1.5	1.43	1.33	1.54	1.48	1.25	1.13	0.99
1996	1.13	1.26	1.12	1.02	0.83	0.92	1.05	1.00	0.80	1.06	1.07
1997	1.23	1.3	1.19	1.01	0.88	0.94	1.03	0.99	0.83	1.21	1.28
1998	1.35	1.56	1.3	1.01	0.81	0.98	1.02	0.99	0.85	1.39	1.51
1999	1.19	1.36	1.15	0.92	0.74	0.91	0.88	0.89	0.84	1.2	1.28
2000	1.42	1.48	1.38	1.18	1.05	1.17	1.08	1.12	1.16	1.38	1.43
2001	1.31	1.27	1.28	1.15	1.12	1.12	1.04	1.09	1.16	1.23	1.24
2002	1.42	1.34	1.39	1.28	1.29	1.22	1.12	1.21	1.32	1.34	1.35
2003	1.75	1.66	1.72	1.63	1.66	1.54	1.39	1.54	1.71	1.75	1.87
2004	1.40	1.3	1.38	1.32	1.36	1.24	1.12	1.25	1.35	1.42	1.54
2005	1.20	1.1	1.19	1.12	1.17	1.07	0.97	1.07	1.14	1.26	1.39
2006	1.03	0.94	1.02	0.96	0.99	0.95	0.87	0.94	0.99	1.1	1.19
2007	1.03	0.95	1.02	0.94	0.97	0.95	0.90	0.94	0.96	1.07	1.13
2008	0.91	0.86	0.91	0.85	0.87	0.89	0.88	0.91	0.90	0.94	0.91
Average	1.22	1.20	1.21	1.22	1.16	1.15	1.14	1.21	1.21	1.08	1.03
Average 2000s	*1.27*	1.21	1.25	1.16	1.16	*1.13*	*1.04*	*1.12*	*1.19*	1.28	1.34
Average 1990s	*1.27*	1.30	1.27	1.28	1.16	*1.20*	*1.27*	*1.26*	*1.12*	1.09	1.01
Average 1980s	*1.07*	1.04	1.07	1.22	1.13	*1.09*	*1.09*	*1.25*	*1.38*	0.76	0.59
Sample average	1.20	1.17	1.18	1.11	1.07	1.07	1.04	1.09	1.09	1.18	1.21
Sample median	1.11	1.05	1.09	1.02	0.99	1.00	0.96	1.01	1.01	1.11	1.13

Table IV
Private Equity PMEs Using Alternative Public Market Indices (continued)

Panel B: Venture Capital Funds

			Russell indices			Fama French				Multiple of S&P 500	
Vintage years	S&P 500	Nasdaq	3000	2000	2000 growth	8th	6th	4th	2nd	1.5X	2X
1984	0.70	0.80	0.73	0.92	1.01	0.75	0.78	0.91	1.11	0.48	0.35
1985	0.71	0.76	0.73	0.91	0.98	0.75	0.77	0.93	1.10	0.49	0.36
1986	0.75	0.73	0.76	0.86	0.95	0.76	0.75	0.89	1.00	0.54	0.41
1987	1.18	1.10	1.18	1.32	1.42	1.20	1.18	1.36	1.48	0.85	0.66
1988	1.18	1.07	1.18	1.26	1.34	1.20	1.16	1.29	1.32	0.87	0.66
1989	1.34	1.18	1.35	1.45	1.57	1.40	1.36	1.48	1.47	0.98	0.74
1990	1.50	1.32	1.50	1.55	1.68	1.52	1.48	1.58	1.54	1.14	0.89
1991	1.37	1.23	1.40	1.64	1.75	1.55	1.61	1.66	1.53	0.98	0.74
1992	1.27	1.24	1.32	1.56	1.68	1.50	1.55	1.57	1.46	0.92	0.68
1993	2.79	2.38	2.92	3.88	3.90	3.55	3.92	3.86	3.42	1.91	1.35
1994	2.40	2.10	2.50	3.23	3.35	2.86	3.33	3.24	2.75	1.70	1.24
1995	2.16	1.89	2.21	2.59	2.67	2.33	2.67	2.58	2.25	1.71	1.40
1996	3.79	3.01	3.85	4.46	4.34	3.92	4.62	4.47	3.82	3.13	2.69
1997	2.43	2.05	2.42	2.45	2.42	2.21	2.53	2.47	2.12	2.26	2.15
1998	1.43	1.52	1.38	1.15	1.37	1.08	1.18	1.14	0.97	1.47	1.58
1999	0.76	0.89	0.73	0.57	0.72	0.56	0.54	0.55	0.52	0.81	0.92
2000	0.79	0.83	0.77	0.64	0.73	0.63	0.56	0.61	0.64	0.80	0.87
2001	0.80	0.76	0.78	0.69	0.72	0.68	0.60	0.66	0.72	0.80	0.84
2002	0.82	0.76	0.80	0.73	0.73	0.71	0.63	0.70	0.78	0.81	0.84
2003	0.88	0.82	0.87	0.82	0.80	0.80	0.71	0.80	0.88	0.91	0.98
2004	0.90	0.82	0.89	0.83	0.80	0.81	0.73	0.81	0.87	0.95	1.01
2005	1.27	1.16	1.26	1.18	1.13	1.15	1.03	1.14	1.22	1.36	1.48
2006	0.93	0.85	0.92	0.85	0.82	0.85	0.79	0.85	0.87	0.98	1.02
2007	0.97	0.89	0.95	0.88	0.86	0.91	0.86	0.91	0.92	1.02	1.04
2008	0.84	0.78	0.83	0.77	0.75	0.79	0.78	0.80	0.79	0.84	0.81
Average	1.36	1.24	1.37	1.49	1.54	1.38	1.44	1.49	1.42	1.15	1.03
Average 2000s	*0.91*	0.85	0.90	0.82	0.82	*0.81*	*0.74*	*0.81*	*0.85*	0.94	0.99
Average 1990s	*1.99*	1.76	2.02	2.31	2.39	*2.11*	*2.34*	*2.31*	*2.04*	1.60	1.36
Average 1980s	*0.98*	0.94	0.99	1.12	1.21	*1.01*	*1.00*	*1.14*	*1.25*	0.70	0.53
Sample average	1.20	1.12	1.19	1.21	1.25	1.14	1.17	1.21	1.17	1.10	1.07
Sample median	0.88	0.86	0.87	0.83	0.85	0.81	0.76	0.83	0.84	0.87	0.85

Table V
The Relationship Between Aggregate Flows into Private Equity and Performance

This table reports regressions where the dependent variable is fund performance – as measured by IRR, Multiple or PME – and the explanatory variable is an estimate of capital flows into private equity. We measure capital flows by summing the capital commitments (as estimated by Private Equity Analyst, see Internet Appendix Table IA.I) in the current and previous vintage years, and then take the ratio of this sum to the aggregate U.S. stock market value at the start of the current vintage year. This provides a measure of the amount of capital available to fund private equity deals. The performance measures are weighted averages, where the weights are the proportion of capital committed in each vintage year to the total capital committed over the vintages included in the regression. Given the small sample sizes in early vintages, only vintage years from 1993 onwards are included. See Tables II and III for explanations of the performance measures. Separate regressions are estimated for buyout funds and venture capital funds. Standard errors are reported in brackets. ***, ** and * denote significance at the 1%, 5% and 10% respectively.

	Buyout Funds			**VC Funds**		
Dependent variable:	PME	IRR	Multiple	PME	IRR	Multiple
Capital Commitments to	-31.7***	-12.23***	-71.9***	-278.9**	-75.0*	-625.8**
Total Stock Market Value	[9.9]	[3.97]	[23.9]	[128.6]	[37.9]	[268.8]
Constant	1.58	0.24	2.30	2.48	0.43	4.39
	[0.10]	[0.04]	[0.25]	[0.47]	[0.14]	[0.98]
N	16	16	16	16	16	16
R-squared	0.42	0.40	0.39	0.25	0.22	0.28

Table VI
The Relationship Between Private Equity Fund Size and Performance

This table examines whether fund size affects performance. In Panel A, funds are classified into size quartiles by decade. The cut off points for each quartile, by decade, are reported. The performance – as measured by PME – is then analyzed for these size quartiles. Buyout funds and venture capital funds are considered separately. Panel B reports regressions where the dependent variable is PME, and the explanatory variables are fund size quartiles (calculated as above) and, for some regressions, vintage year dummies. Standard errors are reported in brackets. ***, ** and * denote significance at the 1%, 5% and 10% respectively.

Panel A: Average Performance by Fund Size Quartile

	Buyout Funds				Venture Capital Funds			
	Bottom quartile	Median	Top Quartile	Mean	Bottom quartile	Median	Top quartile	Mean
Size Cutoffs ($ Millions)								
1980s	85	215	425	390	34	55	90	77
1990s	200	485	998	782	81	137	250	191
2000s	284	700	1530	1420	137	278	475	358
PME								
Small Funds	0.80	1.02	1.37	1.16	0.57	0.78	1.08	1.03
2nd Quartile Funds	0.90	1.16	1.49	1.23	0.61	0.90	1.24	1.25
3rd Quartile Funds	0.93	1.14	1.40	1.21	0.69	0.96	1.30	1.34
Large Funds	0.91	1.14	1.43	1.19	0.70	0.90	1.14	1.18

Panel B: Regressions of PME on Fund Size Quartiles

Dependent variable: PME	Buyout Funds		Venture Capital Funds	
2nd size quartile	0.065	0.039	0.219	0.138
	[0.059]	[0.057]	[0.149]	[0.140]
3rd size quartile	0.042	0.059	0.314**	0.318**
	[0.059]	[0.057]	[0.150]	[0.141]
4th (highest) size quartiile	0.027	0.031	0.149	0.349**
	[0.059]	[0.057]	[0.150]	[0.145]
Vintage year dummies	No	Yes	No	Yes
Funds	598	598	775	775
R-squared	0.00	0.15	0.01	0.21

Table VII
The Relationship Between PME, IRR and Multiples

This table reports fund-level regressions where PME is the dependent variable. Given the small sample sizes in early vintages, only vintage years from 1993 onwards are included. Ordinary standard errors are reported in brackets, and standard errors clustered by vintage year are in curly brackets. ***, ** and * denote significance at the 1%, 5% and 10% respectively using standard errors clustered by vintage.

	Buyout Funds			VC Funds		
IRR	2.52***		0.43	3.47***		1.21***
	[0.07]		[0.07]	[0.11]		[0.07]
	{0.43}		{0.25}	{0.55}		{0.25}
Multiple		0.71***	0.62***		0.56***	0.44***
		[0.01]	[0.02]		[0.01]	[0.01]
		{0.06}	{0.10}		{0.07}	{0.07}
Vintage Year Dummies	Y	Y	Y	Y	Y	Y
N	557	557	557	638	638	638
R-squared	0.75	0.92	0.92	0.71	0.91	0.94

Table VIII
Actual PMEs and Implied PMEs

This table reports, by vintage year, average actual PMEs for Burgiss and Robinson-Sensoy and implied PMEs for Venture Economics, Preqin and Cambridge Associates. The implied PMEs use the results of vintage year regressions of PMEs on IRRs and Multiples from Burgiss data which are reported in Internet Appendix Table IA.V. Weighted averages use as weights fund capital commitments, as a proportion of total commitments for funds reporting performance data, in each vintage. Capital commitments at the fund level are not reported by Cambridge Associates.

Panel A: Buyout Funds

	Weighted Average				Unweighted Average			
Vintage	Actual PME	Actual PME	Implied PME		Actual PME	Implied PME		
	Burgiss	Robinson-Sensoy	Venture Economics	Preqin	Burgiss	Venture Economics	Preqin	Cambridge Associates
1984	1.09	1.56			0.87			
1985	0.91	1.27			0.91			
1986	1.11	0.93			1.00			
1987	1.20	1.28			1.25			
1988	1.13	0.77			0.98			
1989	1.22	1.15			1.26			
1990	2.34	1.35			1.57			
1991	1.32	0.84			1.23			
1992	0.89	1.31			0.79			
1993	1.24	1.49	1.07	1.16	1.35	1.02	1.17	1.06
1994	1.75	1.28	0.91	1.14	1.48	0.91	1.10	0.89
1995	1.20	1.33	1.00	1.16	1.34	1.04	1.23	1.26
1996	0.90	1.07	1.08	1.27	1.13	1.15	1.56	1.19
1997	1.30	1.41	1.23	1.22	1.23	1.03	1.25	1.21
1998	1.21	1.25	1.04	1.18	1.35	1.21	1.37	1.61
1999	1.27	1.20	1.42	1.30	1.19	1.23	1.31	1.56
2000	1.47	1.14	1.31	1.52	1.42	1.25	1.55	1.41
2001	1.38	1.03	1.15	1.78	1.31	1.16	1.62	1.65
2002	1.53	1.25	1.25	1.43	1.42	1.15	1.30	1.45
2003	1.58	1.43	1.46	1.71	1.75	1.21	1.43	1.38
2004	1.51	1.04	1.31	1.42	1.40	1.28	1.39	1.33
2005	1.23	1.04	1.04	1.16	1.20	1.07	1.21	1.20
2006	0.99		0.89	1.02	1.03	0.98	1.05	1.12
2007	1.02		0.98	1.00	1.03	1.06	1.08	1.03
2008	0.90		0.87	0.92	0.91	0.93	0.95	0.88
Average 2000s	*1.29*	*1.16*	*1.14*	*1.33*	*1.27*	*1.12*	*1.29*	*1.27*
Average 1993-99	*1.27*	*1.29*	*1.11*	*1.21*	*1.30*	*1.08*	*1.29*	*1.25*

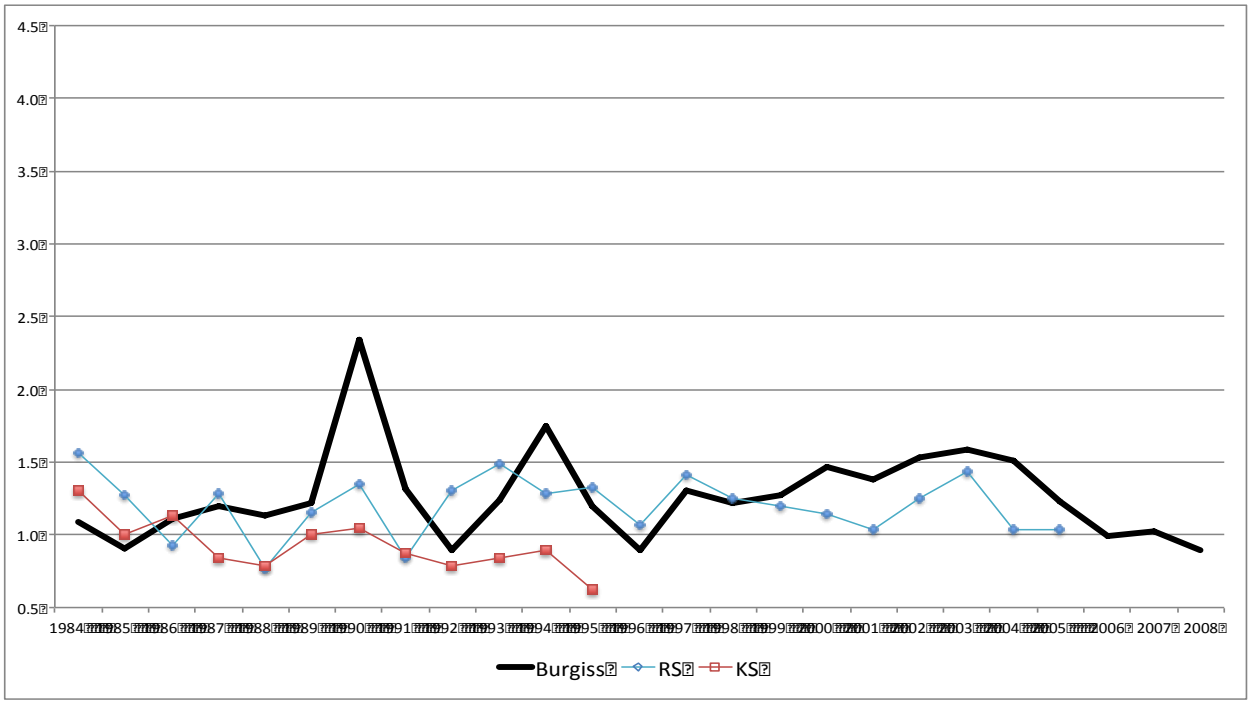
Panel B: Venture Capital Funds

	Weighted Average				Unweighted Average			
Vintage	Actual PME	Actual PME	Implied PME		Actual PME	Implied PME		
	Burgiss	Robinson-Sensoy	Venture Economics	Preqin	Burgiss	Venture Economics	Preqin	Cambridge Associates
1984	0.69	0.78			0.70			
1985	0.73	0.92			0.71			
1986	0.80	0.78			0.75			
1987	1.29	0.73			1.18			
1988	1.44	1.02			1.18			
1989	1.52	1.17			1.34			
1990	1.66	1.01			1.50			
1991	1.35				1.37			
1992	1.34	0.84			1.27			
1993	2.74	1.19	1.51	1.76	2.79	1.30	1.70	1.58
1994	2.86	1.87	2.18	3.14	2.40	1.53	2.08	1.80
1995	2.09	1.22	2.47	3.52	2.16	2.24	2.82	2.97
1996	4.17	1.27	3.21	1.75	3.79	3.25	2.44	3.09
1997	2.65	1.8	1.92	2.28	2.43	2.01	2.09	2.04
1998	1.48	1.54	1.61	1.64	1.43	1.55	1.58	1.40
1999	0.90	0.61	0.69	0.81	0.76	0.79	0.87	0.88
2000	0.85	0.71	0.92	0.90	0.79	0.82	0.98	0.78
2001	0.84	0.67	1.00	0.99	0.80	0.92	0.89	0.90
2002	0.88	0.85	0.80	0.91	0.82	0.81	0.80	0.87
2003	0.99		1.03	0.95	0.88	1.00	0.90	0.96
2004	0.96		0.97	1.06	0.90	0.94	1.07	1.19
2005	1.23	0.8	1.07	1.03	1.27	1.05	0.96	0.98
2006	0.97		0.93	0.97	0.93	0.86	0.94	0.95
2007	0.99		0.93	0.96	0.97	0.96	1.04	1.12
2008	0.84		0.85	0.89	0.84	0.78	0.84	0.90
Average 2000s	*0.95*		*0.94*	*0.96*	*0.91*	*0.90*	*0.94*	*0.96*
Average 1993-99	*2.41*	*1.36*	*1.94*	*2.13*	*2.25*	*1.81*	*1.94*	*1.96*

Figure 1
Buyout and VC fund PMEs

This figure shows average Public Market Equivalent ratios (PMEs) by vintage year, comparing private equity returns to equivalently timed investments in the S&P 500. Panel A focuses on buyout funds, and Panel B on venture capital, using the classifications used by the suppliers or authors. Only funds with a North American geographical focus are included.

Panel A: Buyout fund PMEs from various sources



Panel B: VC fund PMEs from various sources

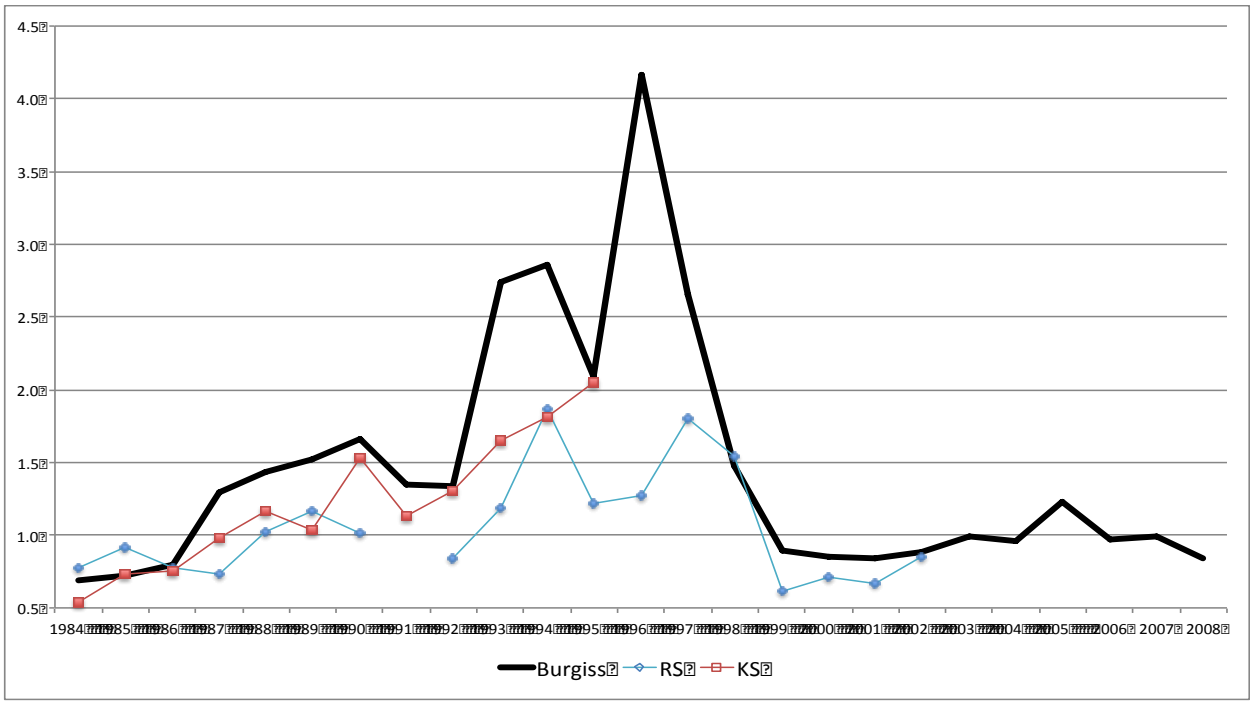
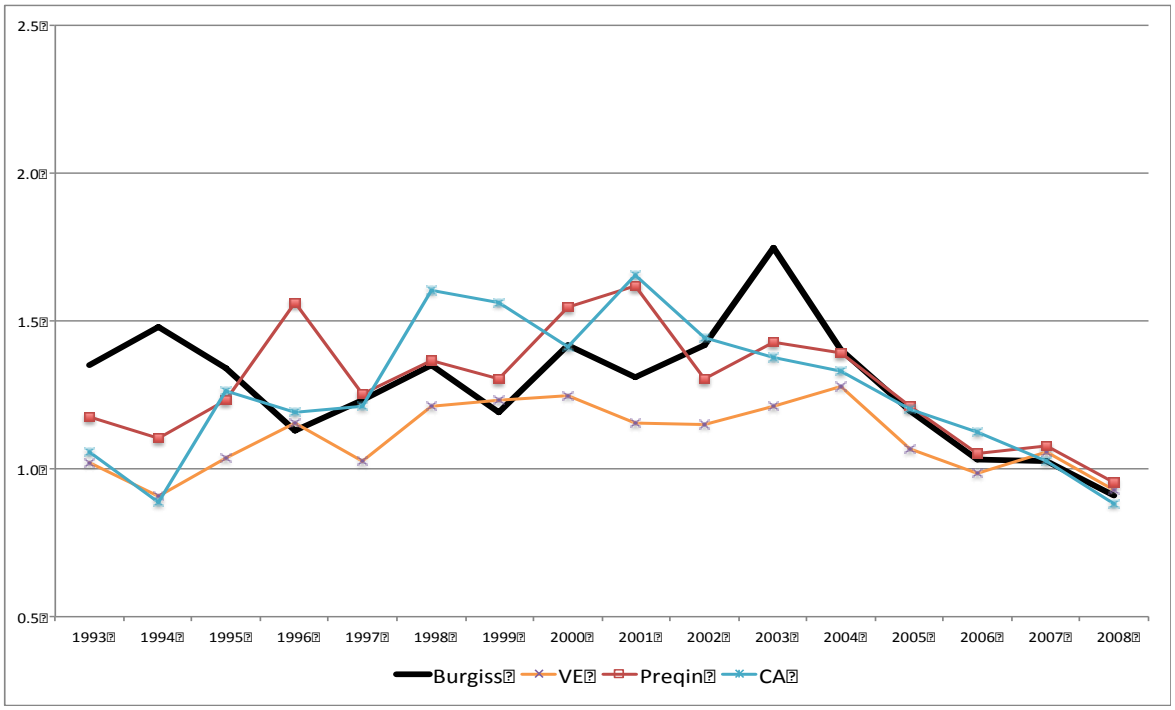


Figure 2
Actual and estimated PMEs

This figure shows, by vintage year, average Public Market Equivalent ratios (PMEs) from different commercial data sets. PMEs for Burgiss are calculated using underlying cash flow data for funds. PMEs for Venture Economics, Preqin and Cambridge Associates, are the PMEs implied by using regressions results as reported in Table VIII. Panel A focuses on buyout funds, and Panel B on venture capital, using the classifications used by the suppliers or authors. Only funds with a North American geographical focus are included.

Panel A: Buyout fund PMEs



Panel B: VC fund PMEs