NBER WORKING PAPER SERIES

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Working Paper 17874
http://www.nber.org/papers/w17874

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
February 2012

This research has been supported by the UAI Foundation and the Center for Research in Security Prices. Rui Cui provided able research assistance. We thank Burgiss for supplying data. Kaplan has consulted to private equity general partners and limited partners. He also has invested in private and public equities. We thank James Bachman, Stuart Lucas and participants at the University of North Carolina Private Equity Conference for helpful comments. Address correspondence to Steven Kaplan, University of Chicago Booth School of Business, 5807 South Woodlawn Avenue, Chicago, IL 60637 or e-mail at skaplan@uchicago.edu. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

At least one co-author has disclosed a financial relationship of potential relevance for this research. Further information is available online at http://www.nber.org/papers/w17874.ack

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NBER Working Paper No. 17874
February 2012
JEL No. G10,G24,G30

ABSTRACT

We present evidence on the performance of nearly 1400 U.S. private equity (buyout and venture capital) funds using a new research-quality dataset from Burgiss, sourced from over 200 institutional investors. Using detailed cash-flow data, we compare buyout and venture capital returns to the returns produced by public markets. We also compare the evidence from Burgiss to that derived from other commercial datasets – Venture Economics, Preqin and Cambridge Associates – as well as recent research. We find better buyout fund performance than has previously been documented. This in part reflects recently discovered problems with data provided by Venture Economics, upon which several previous studies had relied. Average U.S. buyout fund performance has exceeded that of public markets for most vintages for a long period of time. The outperformance versus the S&P 500 averages 20% to 27% over the life of the fund and more than 3% per year. Average U.S. venture capital funds, on the other hand, outperformed public equities in the 1990s, but have underperformed public equities in the 2000s. Using individual fund data, we explore the relationship between absolute measures of performance – internal rates of return (IRRs) and multiples of invested capital – and performance relative to public markets. Within a given vintage year, performance relative to public markets can be predicted well by a fund's multiple of invested capital and IRR, so we are able to estimate the performance relative to public markets that would have been derived from the other commercial datasets, had the required cash-flow data been available. Private equity performance in the other commercial sources – other than Venture Economics – is qualitatively similar to that we find using the Burgiss data.

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1. Introduction

Despite the large increase in investments in private equity funds and the concomitant increase in 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 the data that have been 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 often 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 have previously been documented.

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 (VE). They calculate a public market equivalent (PME) that 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 S&P 500. 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 (VC) funds slightly underperform public markets on an equal-weighted, 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 book value applied by Kaplan and Schoar (2005)).

However, Stucke (2011) 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 internal rates of return (IRRs) in the VE sample fall with the passage of time. 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 so-called "vintage year") before 1995 are included.[1] Subsequent years have seen a huge increase in the number and size of private equity funds. Whereas around $148bn was raised by U.S. buyout and VC funds from 1980-95, $668bn was raised for 1996-2004 vintage funds. These sums were further eclipsed by the boom period 2005-08 when $794bn was raised by private equity

[1] 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).

funds over just four vintage years.[2] The samples in the earlier papers offer no evidence on more recent performance from private equity investing.

To shed new light on private equity performance and on the data issues that have hindered private equity research, we use data from four commercial sources to study U.S buyout and venture capital funds. Our most detailed analyses take advantage of Burgiss data on fund-level cash flows. In tandem, we use summary level data from the other leading commercial sources – Preqin, Cambridge Associates (CA) and Venture Economics (VE).[3] We also compare our results to vintage year performance taken from Kaplan and Schoar (2005) and Robinson and Sensoy (2011a), both of which use underlying cash flow data for funds. Kaplan and Schoar study VE data. Robinson and Sensoy use data from a single large LP who, they argue, invested very much like an index fund, particularly for buyout funds. By comparing results across datasets with very different selection criteria and methods of gathering information, we are able to draw stronger conclusions. Moreover, since our data allow us to examine more recent vintage years than covered in prior research, we can compare performance across different time periods, including parts of the last decade when private equity fund raising increased dramatically.

Using Burgiss cash flow data, we find that average U.S. buyout fund returns have exceeded those of public markets for most vintages since 1984. The 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 when benchmarked against the Nasdaq and the (small-cap) Russell 2000, and is also positive, but slightly lower, measured against the (small-cap) Russell 2000 value index. These results are consistent with and supported by those in Robinson and Sensoy (2011a). 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

[2] These figures are estimates from Private Equity Analyst, see Table 2.
[3] 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.

most recent decade. We do not find any evidence that our conclusions for buyout funds or venture capital funds are affected by different assumptions of systematic risk.

Again harnessing fund-level cash flows from Burgiss, we study the relationship between market-adjusted performance (PMEs) and absolute performance (IRRs 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 to us that multiples of invested capital should be preferred to IRRs as summary measures of private equity performance.

Using these strong statistical patterns, we are then able to estimate the market-adjusted average performance in the other commercial databases. We apply the regression coefficients to the vintage year IRRs and investment multiples from VE, Preqin, and CA to estimate vintage year PMEs for the funds in those databases. This procedure only requires the vintage year IRRs and multiples from the other databases, even if the underlying fund cash flows are not available to us or, even, to the commercial source (as is likely the case for some of the Preqin data).

As with the Burgiss data, we find that buyout funds outperform public markets in the 1990s and 2000s in the three other commercial databases. We estimate that the funds in Preqin and CA, like those in Burgiss, all 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, lower in the VE data.

Our results suggest that it is highly likely that the VE returns, upon which a number of academic papers have relied, understate buyout and, possibly, VC fund performance.

Furthermore, the consistency of the returns from Burgiss, Preqin and CA despite very different sample selection criteria suggests that they likely represent reliable measures of average buyout and VC fund performance.

Overall, our findings strongly suggest that buyout funds have outperformed the public equity markets 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 very unlikely.

We also examine whether fund performance is linked to the aggregate amount of capital flowing into private equity or to the size of a 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). These results differ from those in Robinson and Sensoy (2011a) who do not find that buyout funds PMEs are negatively related to capital commitments. 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 it does not differ significantly from funds in the 2nd and 3rd size quartiles.[4]

The paper proceeds as follows. In section 2, we discuss the data we use. In section 3, we present and discuss performance results. In section 4, we consider the relationship of performance relative to public markets (PMEs) to IRRs and multiples of invested capital. In section 5, we use the relationships from section 4 to estimate the PMEs implied by the vintage year IRRs and multiples in the VE, Preqin and CA databases. In section 6, we study the relation

[4] The other relationship of interest relates to performance persistence across funds of the same GP, as analyzed by Kaplan and Shoar (2005). At present the Burgiss data do not include sequence numbers for funds, but this information will be available in due course and so remains for future research.

of performance to aggregate fundraising and fund size. We conclude by summarizing the implications of our results.

2. Data

We use vintage year performance data for U.S. buyout and venture capital funds from four commercial sources: Burgiss, Venture Economics (VE), Preqin, and Cambridge Associates (CA). The data are for performance as of March 2011. Our results aggregate performance for funds in a particular fund raising (vintage) year as defined by the data provider. Burgiss, for example, classifies a vintage year as the year in which a fund first draws capital from its LPs. We report performance for vintages from 1984 through 2008.

Each of the four datasets gathers information on fund performance differently. Given that this paper is the first to take advantage of the Burgiss data we explain it in detail. The Burgiss dataset "is sourced exclusively from LPs and includes their complete transactional and valuation history between themselves and their primary fund investments. The flows are rescaled to be representative of the full fund." The Burgiss data include all funds and cash flows from the LPs that provide the data. The data come from "over 200 investment programs and represent over $1 trillion in committed capital." The LPs comprise a wide array of institutions and over two thirds have private equity commitments in excess of $100 million. Of these, about sixty percent are pension funds (a mix of public and corporate) and over 20% are endowments or foundations.

The underlying cash flow data of the funds are likely to be extremely accurate because Burgiss systems are used by the LPs 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 are cross-checked across investors in the same fund, results in

levels of data integrity and completeness that could not be achieved by surveys, voluntary reporting, or (largely) involuntary reporting using Freedom of Information (FOIA) requests (the method employed by Preqin). Furthermore, when data are sourced at least in part from GPs 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. In other words, for a given LP, there is unlikely to be any selection bias. This is an advantage over other commercial sources whose data rely on voluntary and FOIA disclosures by GPs and LPs.

The potential bias in the Burgiss data – which it shares with the other commercial sources – is how representative the LPs (and resulting GPs) are. For example, 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. Our results that follow, however, lead us to doubt that this is the case.

VE sources data from both LPs and GPs. Preqin obtains data primarily from public filings by pension funds, from FOIA requests to public pension funds, and also voluntarily from some GPs and LPs. As a result, for some, if not many funds, Preqin has IRRs and multiples, but does not have the underlying fund cash flows. CA provides investment advice to LPs and, as a result, is able to obtain its data from LPs and from GPs who have raised or are trying to raise capital. Harris et al. (2010) describe VE, Preqin and CA in greater detail.

Each dataset has a potential bias. Burgiss, while providing complete data from each LP, may have a selected sample of LPs. VE is dependent on LPs and GPs providing information. Preqin is dependent on public filings and FOIA requests. As a result, Preqin may be missing some high performing funds that do not have public pension fund investors. CA may have a bias towards GPs who are raising new funds and, therefore, may have performed well.

In addition to results using the four commercial sources, we report vintage year performance taken from Kaplan and Schoar (2005) who use fund-level cash flows from VE. We also report performance from Robinson and Sensoy (2011a) who study fund-level cash flows supplied by a single large LP who, they argue, invested much like an index fund, particularly for buyout funds.

A. Buyout funds

Panel A of Table 1 reports the number of U.S. buyout funds in each source from 1984 to 2008, where 1984 is the first year with meaningful numbers of funds in the datasets. Figure 1 (Panel A) graphs the number of funds. VE (and hence Kaplan and Schoar) have the most funds in the 1980s. VE, Preqin, CA and Robinson and Sensoy have roughly equal numbers of funds in the 1990s with CA the highest of the four. In the 2000s, VE coverage tails off markedly while Burgiss increases markedly. Burgiss, Preqin and CA have roughly equal coverage in the 2000s with CA, again, the highest. Unfortunately, because only Preqin reveals the identities of its underlying funds, it is difficult to know the extent of overlap across the various datasets. The Preqin numbers 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.

Panel A of Table 2 reports capital committed to the buyout funds in the Burgiss, Preqin and VE performance datasets. Capital commitments for CA funds were not available. The panel also provides a comparison to the total capital commitments to U.S. buyout funds reported by Private Equity Analyst (PEA). PEA maintains an annual measure of capital commitments to U.S. buyout and VC funds that goes back to the early 1980s.

VE has the greatest coverage of funds in the 1980s, roughly equal to two-thirds of total capital committed (as reported by PEA). Preqin and Burgiss come in substantially lower at 41%

and 29%, respectively. In the 1990s, the coverages in VE and Preqin are similar at over 70% with Burgiss covering over 50%. In the 2000s, Preqin coverage remains above 70%; Burgiss increases to over 60%; while VE declines to below 40%.

These results suggest that the commercial datasets cover a substantial, but incomplete, fraction of capital committed to buyout funds over the last thirty years. Consistent with the number of funds covered, these results suggest that VE's coverage has declined substantially in the 2000s. Preqin and, likely, CA (with its large number of funds) have the greatest coverage in the 1990s and 2000s. In the latest vintages of 2006 to 2008, Burgiss' coverage reaches roughly the same level as Preqin's and, likely, CA's.

B. Venture capital funds

Panel B of Table 1 reports the number of U.S. VC funds in each of the datasets from 1984 to 2008. Figure 1 (Panel B) graphs the number of funds. Again VE (and hence Kaplan and Schoar) have the most coverage for funds in the 1980s. In the 1990s VE and CA have roughly equal numbers of funds and about 100 (200) more funds than Preqin (Burgiss). Robinson and Sensoy have substantially fewer 1990s vintage funds than the other four datasets and less than one-third as many as VE and CA. In the 2000s, VE again tails off markedly dropping well below Preqin, CA, and Burgiss. Preqin and CA have roughly equal coverage with Burgiss having about 30% or 150 fewer funds over this period.

Panel B of Table 2 reports capital committed to VC funds in the Burgiss, Preqin and VE performance datasets, as well as the total capital commitments to U.S. VC funds reported by PEA. Again, VE has the greatest coverage of funds in the 1980s, with more than 100% of the PEA estimate of capital committed. Preqin and Burgiss come in substantially lower at 45% and 53%, respectively. In the 1990s, VE remains the highest of the three, but with coverage of

roughly 75%. Preqin increases to almost 53% while Burgiss declines to 43%. In the 2000s, Preqin increases to over 71%; Burgiss increases to over 58%; while VE declines to below 52%.

As is the case with buyout funds, the commercial datasets appear to cover a substantial, but incomplete, fraction of capital committed to VC funds over the last three decades. While VE initially has the most funds, its coverage has declined substantially in the 2000s. VE and, likely, CA have the greatest coverage in the 1990s while Preqin and, likely, CA have the greatest coverage in the 2000s. Again, for the most recent vintages (2006 to 2008) Burgiss has close to the same coverage as do Preqin and CA.

3. Summary Performance Measures

In this section, we study three measures of private equity performance; each is net of fees. The first measure is the LP's annualized IRR based on fund contributions and distributions. The distributions include the estimated value of any unrealized investments (or residual value) as of the last reporting date. The second measure is the multiple of invested capital. The multiple's numerator is the sum of all fund distributions and the value of unrealized investments. The denominator is the sum of all fund contributions by LPs.

The third performance measure is the public market equivalent (PME) from Kaplan and Schoar (2005). The PME compares an investment in a private equity fund to an equivalently timed investment in the 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. A PME greater than one indicates the fund outperformed the public market net of fees. The PME can be viewed as a market-adjusted multiple of invested capital. 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). We first calculate the annualized IRR that an investor in a fund would have earned if it had invested the money in the S&P 500 or relevant index. We calculate the annualized excess return as the difference between the actual IRR and the annualized S&P 500 IRR. This excess return measure is positive when the PME is greater than one and negative when the PME is less than one. We do not focus on this measure because it has the 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. We do not attempt to adjust for differences in systematic risk in these basic analyses and thus assume a beta of one. In their study of publicly traded funds-of-funds that invest in unlisted private equity funds, Jegadeesh et al. (2009) provide additional justification for this assumption. They find that these publicly traded funds-of-funds have a market beta of one. Driessen, Lin, and Phalippou (2011) report a beta of 1.3 for buyout and a beta of 2.7 for venture. Korteweg and Sorensen (2010) find betas for VC portfolio investments of roughly 2.5. These results suggest that the assumption of a beta of one for buyout funds is reasonable while the assumption for VC funds is more debatable.

Later in the paper, we report on the sensitivity of PMEs if we use alternative benchmark indices – such as the NASDAQ or growth focused indices – sometimes used by LPs and which partially control for differences in risk. We also report on the sensitivity of PMEs to assuming that private equity funds have betas of 1.5 and 2.0.

Assumptions about residual value have created controversy in the literature and merit discussion. As we do, Kaplan and Schoar (2005) use the stated residual values (i.e. net asset values or NAVs) in their analysis of VE data. Again using VE data, Phalippou and Gottschalg (2009) question the NAVs based on patterns in the data and, in their primary analysis, assume

that for funds beyond their 10th year with no cash flow activity NAVs are zero. However, 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, therefore, is clearly (with hindsight) inappropriate and understates performance.

For buyout funds in the Burgiss data, unrealized investments never exceed 3% of invested capital for the median fund in pre-1999 vintages. Unrealized investments are only 10% of invested capital for the median 1999 fund. The Burgiss results for pre-2000 vintages, therefore, represent largely realized funds. Residual value assumptions cannot affect the results for those vintages. Unrealized investments do become more important for the later vintages, increasing to a median of 38%, 42%, 55% and 71% for 2000 to 2003 vintages, and exceeding 80% for vintages after 2003. The residual value assumptions, therefore, become increasingly important for more recent vintages.

For the Burgiss VC funds, unrealized investments never exceed 3% of invested capital for the median fund in pre-1999 vintages. As with the buyout funds, unrealized investments increase thereafter, moving to 15%, 33%, 39%, 45%, and 58% for 1999 to 2003 vintages, and exceeding 75% of invested capital for vintages after 2003.

The residual values from Burgiss that we use benefit from two features not available to authors of the earlier papers. First, since the end of 2009, topic 820 of the Financial Accounting Standards Board (FASB) requires 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. This has likely had the practical effect of making estimated unrealized values closer to true market values than in the past, particularly for buyout funds. Second, 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.

A. IRRs

(i) Buyouts

Panel A of Table 3 reports the (capital) weighted average, average and median vintage year IRRs for U.S. buyout funds for the different datasets. Figure 2 graphs the weighted average and average returns.

The clearest pattern in the data is the consistently lower returns for VE: VE returns are significantly lower than those derived from the other three commercial sources. This is particularly true for 1990s and 2000s vintages, when all four datasets have a reasonably large number of funds. The VE returns also are significantly lower than the returns for the 1990s vintages in Robinson and Sensoy (2011a) (that make up the bulk of their sample). This pattern is consistent with the finding in Stucke (2011) that VE systematically understates buyout returns, and may help explain why so many funds are able to characterize themselves as top quartile: they likely compare themselves to the VE benchmarks.[5] In fact, the median IRRs from Burgiss, Preqin and CA exceed the top quartile IRRs in VE in roughly 20% of the vintage years. Interestingly, the VE returns are not lower than those of the other datasets for the 1980s vintages, suggesting that problems with the VE methodology surfaced after that.

The returns of Burgiss, Preqin, CA, and Robinson and Sensoy (for 1990s vintages) portray a consistent picture; their mean IRRs are not significantly different from each other overall or for 1990s and 2000s vintages. These results suggest that it is highly likely that VE returns understate buyout fund performance. Furthermore, the consistency of the returns from

[5] This was confirmed anecdotally by a GP who told one of us his firm routinely chose to show VE as a benchmark because the VE benchmark returns were lower.

Burgiss, Preqin, CA, and Robinson and Sensoy (for 1990s vintages) – despite very different sample selection criteria – suggests that they likely represent reliable measures of average buyout fund performance.

(ii) Venture capital

Panel B of Table 3 reports the (capital) weighted average, average and median vintage year IRRs for U.S. VC funds for the different datasets. Figure 3 graphs the weighted average and average returns. Capital weighted IRRs for VC funds are generally consistent across VE, Preqin and CA overall and for 1990s and 2000s vintages. The Burgiss returns also are consistent with these three for 2000s vintages. Burgiss returns are somewhat higher for 1990s vintages where Burgiss has fewer funds than the other three sources. The returns to the generally fewer funds in Robinson and Sensoy are significantly lower than those in the other four datasets strongly suggesting that the Robinson and Sensoy VC sample has a downward bias.

Average and median IRRs for VC funds show VE returns are somewhat lower than those for Burgiss, Preqin and CA. For 1980s vintages, average and median IRRs from VE are lower than those from the three other sources. For the 1990s, the pattern is similar but less pronounced. All four datasets have similar VC results for 2000s vintages.

Overall, the four major datasets are in closer agreement on VC funds than on buyout funds, although VE data, again, produce lower estimates of performance than do the other sources. Again, these patterns suggest that the other datasets are likely to provide more reliable measures of VC performance than do VE data.

B. Multiples

(i) Buyouts

Panel A of Table 4 reports the (capital) weighted average, average and median investment multiples (net of fees) for U.S. buyout funds by vintage year. Figure 4 (Panel A) graphs the

average multiples. We do not have weighted average or median vintage multiples from CA or Robinson and Sensoy (2011a).

The patterns for multiples are similar to those for IRRs. Multiples from VE are consistently and significantly lower than those from Burgiss, Preqin and CA. This is true for 1980s, 1990s, and 2000s vintages. While, on average, Preqin multiples are the highest, this is driven by particularly high multiples for Preqin in the 1980s. Since the mid-90s, the average multiples have ranged largely between 1.0 and 2.0 in all four commercial databases. The multiples for Burgiss, Preqin and CA are very similar in the 1990s and 2000s and suggest, again, that despite different sample selection criteria they are likely to represent reliable measures of average buyout fund performance.

(ii) Venture Capital

Panel B of Table 4 reports the weighted average, average and median investment multiples for U.S. venture funds. Figure 4 (Panel B) graphs the average multiples. The average multiples are well above 2.0 in most of the 1990s and at roughly 1.0 for most of the 2000s.

As with the IRRs, the average and median VE multiples are lower than those from Preqin, Burgiss and CA for 1980s and 1990s vintages, but not for 2000s vintages. The capital weighted averages for VE are also somewhat lower than those of Burgiss and Preqin for the 1980s and 1990s. Again, the Burgiss, Preqin and CA multiples are similar to one another overall and for each of the decades, despite different sample selection criteria.

C. Public Market Equivalents (PMEs)

In this section, we report PMEs calculated using the individual fund-level cash flows from Burgiss. The relatively similar results for Burgiss, CA and Preqin in terms of IRRs and multiples in the previous sections suggest that the Burgiss PMEs are likely to be representative of the PMEs that would be calculated using the other two datasets. We explore this is greater detail in

section 4. For comparison purposes, we also report the analogous PME calculations from Kaplan and Schoar (2005) and Robinson and Sensoy (2011a).

(i) Buyouts

Panel A of Table 5 reports, by vintage year, the (capital) weighted average PMEs for U.S. buyout funds for Burgiss, Kaplan and Schoar, and Robinson and Sensoy, as well as the average and median for Burgiss. Figure 5 (Panel A) graphs the weighted average multiples.

In the Burgiss dataset, the PMEs of buyout funds consistently and significantly exceed 1.0. 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, the average fund in the entire sample has an average PME of 1.20 and a median PME of 1.11.

The average PMEs of at least 1.20 to 1.27 by all three measures – weighted average vintage, average vintage, and sample average – imply outperformance of 20% to 27% over the life of the fund relative to investing in the S&P 500.

We also calculate an annualized excess return measure using the Long-Nickels methodology in Kocis *et al.* (2009). We find that 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%.

These results strongly suggest that the buyout funds in Burgiss have significantly outperformed public markets for a long period of time. Not only have top quartile funds outperformed, but so have average and median funds. The Burgiss results also are largely consistent with those of Robinson and Sensoy on average. While PMEs from Burgiss and Robinson and Sensoy differ for individual vintage years, the overall conclusion that buyout PMEs exceed 1.0 is the same.

The Burgiss results are based on a relatively large number of 1990s and 2000s vintage funds; the Robinson and Sensoy results on a relatively large number of 1990s vintage funds. The 1980s results, in contrast, are based on a smaller number of funds, particularly relative to those in VE. The Kaplan and Schoar results, however, suggest the same conclusion for 1980s vintages. As mentioned before, Stucke (2011) and our earlier results provide strong evidence that VE, and hence Kaplan and Schoar, understate returns to 1980s and 1990s vintage funds. Like Burgiss, Robinson and Sensoy find that PMEs exceed 1.0 for 1980s vintage funds.

Overall then, the Burgiss and Robinson and Sensoy results suggest that 1980s and 1990s buyout fund vintages have average PMEs that exceed 1.0. The Burgiss results suggest that 2000s buyout fund vintages through 2005 have PMEs substantially greater than 1.0 conditional on the valuations of unrealized investments being unbiased or, not overly upward biased estimates of the actual values. Given the scrutiny such valuations receive post-topic 820, this seems a reasonable assumption. The results for the 2000s vintages are buttressed by the consistency of the Burgiss IRRs and multiples with those of CA and Preqin. To invalidate the conclusion of outperformance, all three reliable commercial datasets – Burgiss, CA, and Preqin – as well as the large LP analyzed by Robinson and Sensoy (2011a) would have to be subject to a similar positive selection bias despite very different data collection and reporting methods.

It is worth pointing out again that the eventual performance for the more recent 2000s 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.[6]

(ii) Venture capital

Panel B of Table 5 reports, by vintage year, the weighted average PMEs for U.S. VC funds for Burgiss, Robinson and Sensoy, and Kaplan and Schoar, as well as the average and median for Burgiss. Figure 5 (Panel B) graphs the weighted average multiples.

All three datasets are in agreement that PMEs are less than one for 1984 to 1986 vintages. In the Burgiss data, PMEs for vintages from 1987 to 1998 exceed 1.0 with the 1996 vintage having a weighted-average PME above 4.0. Kaplan and Schoar PMEs also exceed 1.0 for those vintages with the exception of 1987 at 0.98. The Robinson and Sensoy PMEs, like the Robinson and Sensoy IRRs, are appreciably lower over this period although they, too, exceed 1.0 for most of the vintages. As was the case for buyout funds, most of the VC funds in the vintages through 1998 are largely fully realized.

From 1999 to 2008, the pattern reverses in the Burgiss data. 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 weighted average and average PMEs all at 0.90 or below. Vintages from 2003 to 2007 do better with weighted average PMEs close to and not significantly different from 1.0. As with the buyout funds, these vintages are not yet fully realized.

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

[6] See Kocis et al. (2009) for a description of the J-Curve.

2002 vintages. As with the buyout fund results, the venture capital fund results for the more recent vintages are potentially subject to change as unrealized investments are realized.

D. Sensitivity of PMEs to the Choice of Index

So far our PME calculations have used the S&P 500 since it is a widely used proxy for U.S. public market returns and allows direct comparison to past research. To gauge the sensitivity of our results, Table 6 reports vintage-year average, average, and median PMEs using different indices, each of which represents a public market alternative for investing funds.[7] Overall, the results are similar across the indices.

For buyout funds (Panel A), the average vintage-year PMEs exceed one measured against each of the benchmark indices. They are of similar magnitude (1.20 to 1.22) using the S&P500, the Russell 3000, the Nasdaq index, and the (small cap) Russell 2000 index. The average vintage-year PME is slightly lower (1.16), but still positive, using the narrower Russell 2000 Value (small cap value). Average vintage-year PMEs also are consistent across time – they all exceed one 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, the Russell 3000, and the Nasdaq, sample average PMEs are 1.20, 1.18 and 1.17, respectively. They are lower using the Russell 2000 (1.11) and the Russell 2000 Value (1.07), but still 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 are consistent with buyout fund investments having value characteristics.

For venture funds (Panel B), the average vintage-year PMEs exceed one across all indices. At the same time, however, the average vintage-year PMEs all are below 1.0 in the 2000s and well above 1.0 in the 1990s. Sample average PMEs are similar for the different

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

indices with the lowest using the Nasdaq (1.12) and the highest using the Russell 2000 Growth index (1.25).

Overall, Table 6 shows that average PMEs across our sample are robust to a range of public market benchmarks. This reinforces our conclusions about private equity performance from the prior section. In keeping with prior research, we rely on PMEs using the S&P 500 for the remainder of our analysis.

E. Sensitivity of PMEs to Beta or Systematic Risk

As mentioned above, our PME analyses implicitly assume the private equity funds have a beta of one. This is consistent with previous work on private equity performance. It also is consistent with actual estimates of beta for buyout funds. 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 is particularly consistent with the assumption of a beta of 1.

Nevertheless, to consider the reasonableness 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 for 1990s vintages and 2000s vintages. These PMEs are remarkably insensitive to the multiple of the S&P 500 return. We conclude that systematic risk does not explain our PME results for buyout funds.

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 much closer at 0.90, 0.87 and 0.85. The average 1990s fund has a PME of 1.77, 1.53, and 1.40, respectively. The 2000s fund has a PME of 0.94, 0.95, and 0.99, respectively.

These results suggest that the systematic risk assumption makes a moderate difference, particularly in the 1990s. Venture Capital funds may have had a beta greater than 1.0 in the 1990s, but do not appear to have such a beta in the 2000s. It is important to stress that our basic conclusions are unchanged regardless of systematic risk – VC funds outperformed in the 1990s and underperformed in the 2000s.

4. Relation of Absolute and Relative Performance Measures

Most commercial data providers and practitioners calculate and report absolute measures of private equity performance – IRRs and multiples of invested capital. To our knowledge, only Burgiss calculates and reports performance relative to public markets. Burgiss reports the Kaplan Schoar-based PME as well as the Long-Nickels based market-adjusted IRR.[8]

A logical question is whether the absolute fund IRRs and multiples can be used to predict relative or market-adjusted performance in the absence of having fund cash flows to make that calculation directly. The answer to this question is also relevant for a debate among practitioners as to whether IRRs or multiples are better indicators of performance. Said another way, do IRRs or multiples provide more accurate indicators of market-adjusted performance?

Accordingly, in this section, we use the Burgiss cash-flow data to explore the relation of PMEs to IRRs and multiples. In Table 7, we show 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. Panel A reports results for each vintage year; Panel B summarizes results for 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. We focus on the Panel A regressions which are reinforced by very similar results in Panel B.

[8] See Kocis et al. (2009) for a description of the Long-Nickels calculation.

Columns 1 to 3 of Panel A 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, 88% of the variation; and IRRs, multiples and vintage years explain 90% 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. Multiples explain substantially more of the variation in PMEs than do IRRs.

Columns 4 to 6 of Panel repeat the regressions for VC funds. Again, both IRRs and multiples explain a significant amount of variation in PMEs. And, as with buyout funds, multiples explain substantially more of the variation in PMEs than do IRRs.

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 0.066 for buyout and 0.055 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 100 to 125 basis points per year relative to public markets.

In Table 8, we report regressions of PMEs on IRRs and multiples for individual vintage years from 1993 to 2008. Again, we start with 1993 because from that year onward all VC vintages and all but one vintage for buyout funds have at least ten observations. For both buyout (Panel A) and VC (Panel B) funds, IRRs and multiples explain a large amount of the variation of PMEs within vintage years. There is not one 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 7, multiples typically provide greater explanatory power for PMEs than do IRRs.

5. Estimated PMEs in VE, Preqin and CA Databases.

An important implication of the vintage year regressions in section 4 is that PMEs can be estimated with a great degree of reliability given a fund's (or funds') IRR, multiple and vintage year. This is true even if one does not have a fund's cash flows, but only the (summary) IRR and multiple. We take this implication seriously in Table 9. For each vintage year for each of the three commercial databases (VE, Preqin and CA), we apply the regression coefficients from Table 8 to the multiples and IRRs for the vintage year to estimate PMEs for each vintage year for each database.

A. Buyouts

The estimates in Panel A imply that the weighted average 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. As with the IRRs and multiples, the PME estimates for VE are lower than those of Preqin, CA and Burgiss both in the 1990s and 2000s. The CA PMEs are the highest, but only slightly larger than those from Burgiss and Preqin which are themselves similar in size.

Consistent with the previous section, these PME results indicate that buyout funds in the commercial databases have consistently outperformed public markets for some time. Such outperformance holds despite the different selection criteria and data gathering methods used by the datasets. This alignment of PME results suggests that it is likely that buyout funds as an asset class indeed have outperformed public markets for some time. 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.

B. Venture Capital

Panel B of Table 9 repeats our analysis for VC funds. The results are consistent across all four commercial datasets. VC funds outperformed public markets substantially in the 1990s in all four datasets. Burgiss and CA show somewhat stronger performance than Preqin and VE. This may be driven by problems with VE data that lead to understated returns and Preqin's inability to use publicly available sources to obtain returns for some prominent VC funds. In contrast to the strong VC performance in the 1990s, VC funds with 2000s vintages modestly underperform public markets in all four commercial datasets. The estimated PMEs are similar across all four datasets.

6. Relation of Performance to Fund Flows and Fund Size

In this section, we use Burgiss data to examine two possible determinants of private equity performance which 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.

A. Fund Flows

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.

In our analysis, we report the weighted average performance of all funds in a vintage year. We use Burgiss data because we have consistent measures of all three performance metrics

(IRRs, investment multiples and PMEs) over time. The results are qualitatively and statistically similar using unweighted average performance. To measure fund flows into the industry, we take capital committed to U.S. buyout and VC funds using annual estimates from PEA for the current and previous vintage year. This sum provides a measure of the amount of capital available to fund deals. 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. Our aggregate capital commitment variable, therefore, reflects the amount of fund buying power available relative to the total value of the stock market. 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%).

Panel A of Table 10 reports regressions using all vintages, whereas Panel B employs vintages beginning in 1993 when Burgiss begins to have more substantial fund coverage. Consistent with Kaplan and Stromberg (2009) and Robinson and Sensoy (2011a), buyout fund IRRs and multiples are significantly negatively related to capital commitments both over the entire sample period and in the more recent 1993 to 2008 period. As in the previous papers, this result strongly suggests that an influx of capital into buyout funds is associated with lower subsequent returns. The regression coefficients imply that when capital flows increase from the bottom quartile of years (0.42%) to the top quartile of years (0.87%), IRRs decline by more than 500 basis points or 5% per year while multiples decline by 0.3 to 0.45.

We also find a negative relation between PMEs and capital commitments. This relation is economically, but not statistically significant over the entire period. However, for the more recent period (Panel B) the relation is statistically significant at the 1% level and capital commitments explain 42% of the variation in PMEs. It turns out that the insignificance over the entire sample period is driven by the observations in 1984 and 1985 when Burgiss has relatively few observations. When these two years are excluded, the relation is statistically significant at

the 7% level. The coefficients imply that PMEs decline by 0.08 to 0.14 when capital flows move from the bottom to top quartile.

These results support the conclusion that buyout funds' performance relative to public markets is negatively related to aggregate commitments to those funds. This finding differs from that in Robinson and Sensoy (2011a), likely due to the relatively shorter time series in their data.

Turning to VC funds, IRRs and multiples are significantly negatively related to capital commitments both over the entire sample period (Panel A) and in the more recent vintages (Panel B). This finding is consistent with Kaplan and Stromberg (2009) and Robinson and Sensoy (2011a) and strongly suggests that an influx of capital into VC funds is associated with lower subsequent returns. The regression coefficients imply that when capital flows increase from the bottom quartile of years (0.18%) to the top quartile of years (0.30%), IRRs decline by 780 to 900 basis points per year while multiples decline by 0.65 to 0.75.

As with buyout funds, we find a negative relation between PMEs and capital commitments for VC funds, consistent with Robinson and Sensoy (2011a). The relation is significant (at the 5% level) for the more recent period and is also significant (at the 10% level) over the entire period. The coefficients imply that PMEs decline by 0.23 to 0.33 when capital flows move from the bottom to top quartile.

These results support the conclusion that VC fund returns relative to public markets are negatively related to VC fund capital commitments. The performance sensitivities to flows, both absolute and relative, appear to be substantially larger for VC funds than for buyout funds.

B. Fund Size

Using the VE database, 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.

Most practitioners are concerned with how performance varies with fund size. We address this question by classifying buyout and VC funds into size quartiles by decade. For example, we take all buyout funds in our sample with vintage years in the 1980s and put those funds into size quartiles. We do the same for buyout funds in the 1990s and in the 2000s. We then look at the performance of the different fund quartiles. We do the analogous procedure for VC funds.

Panel A of Table 11 presents the quartile cutoffs for buyout and VC fund size for the three different decades. Buyout fund sizes have increased markedly over time going 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.

Panel A also reports the three measures of fund performance by size quartile for buyout and VC funds. These measures do not control for vintage year. Panel B regresses the three measures of performance against dummy variables for size quartiles, again not controlling for vintage year. Panel C runs the same regressions, but controls for vintage year.

For buyouts, PMEs and multiples are not significantly related to fund size whether vintage year dummies are included or not. PMEs for funds in the smallest size quartile are the lowest, but they are not significantly different from PMEs of the other size quartiles. The only significant relation is for IRRs. Funds in the 2nd and 3rd size quartile have higher IRRs than funds in the first quartile controlling for vintage year. Combined with the insignificant results for multiples and PMEs, this suggests that funds in the 2nd and 3rd size quartile hold their investments for a shorter period of time than those in the other two quartiles. These findings remain

consistent with those in Kaplan and Schoar who find no relation between size and performance for buyout funds.

For VC funds, when we control for vintage year (Panel C), we find a strong positive relation between size and all three measures of performance. Funds in the smallest size quartile significantly underperform funds in the 3rd and 4th size quartiles. Fund performance, however, does not drop off with size. Controlling for vintage year, funds in the 4th size quartile have the best performance albeit not significantly greater than the performance of the 3rd and even 2nd size quartiles.

In unreported regressions, like Robinson and Sensoy, we find a concave relation between PME and the log of fund size for both buyout and VC funds controlling for vintage year. The regression coefficients, however, are significant only at the 12% level for buyout funds and are not at all significant for VC funds.

Overall, then, the results suggest a concave relation between size and performance for VC funds, but one that is driven by lower returns to smaller funds.

7. Summary and Implications

Our research highlights the importance of high quality data to our understanding of private equity and the returns it provides to investors. Many of the existing papers in the academic literature relied upon data whose reliability has recently been questioned, and focused on funds raised up until the mid-1990s. The recent enormous growth in investor allocations to private equity funds has created the need for a re-evaluation of the performance of the asset class, and 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 our paper has several implications.

First, it seems highly likely that buyout funds have outperformed public markets in the 1980s, 1990s, and 2000s. This conclusion is supported not only from our analysis of the Burgiss

data but also using the other existing commercial datasets – Preqin, and CA – as well as Robinson and Sensoy (2011), who rely on data from a single large LP. 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 VE dataset, despite a likely downward bias, also implies that the average buyout fund has outperformed public markets. These conclusions appear to be insensitive to assumptions about benchmark indices and systematic risk. For the more recent vintage funds, however, the eventual performance will depend on the ultimate realization of their remaining investments, which could be higher or lower than the current valuations upon which we rely.

We acknowledge that the different datasets may not constitute complete samples of buyout funds. Accordingly, confirmation of our outperformance result must await the emergence of a complete buyout fund dataset. Nevertheless, for the conclusion of outperformance to turn out to be incorrect, all the various datasets would have to have a substantial positive selection bias. We believe that is unlikely. It is worth adding that all of the performance results are net of fees. The results from Burgiss and the other datasets imply that the buyout funds outperformed public markets much more substantially gross of fees. Nailing down the sources of this large outperformance would seem a fruitful subject for future research.

Second, VC funds outperformed public markets substantially in the 1990s, but have underperformed in the 2000s. All four commercial datasets support that conclusion. These conclusions, too, do not appear sensitive to assumptions about systematic risk.

Third, within a given vintage year, PMEs are reliably related to IRRs and investment multiples for both buyout and VC funds. In vintage year regressions, IRR and investment multiples explain at least 93% of the variation of PMEs in most vintage years. When vintage years are combined, IRR, investment multiples and year dummies explain at least 90% of the variation in PMEs. As a result, researchers and practitioners can use our models to estimate

PMEs without having underlying fund cash flows as long they have access to IRRs and investment multiples.

Fourth, investment multiples generally provide better measures of performance relative to public markets than do IRRs. In regressions to explain PMEs, investment multiples consistently explain substantially more variation than do IRRs. These findings suggests that LPs interested in outperforming public markets should place more weight on investment multiples.

Fifth, vintage year performance for buyout and VC funds, both absolute and relative to public markets, decreases with the level of aggregate capital committed to the relevant asset class. 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.

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 timing of cash flows and the liquidity of holdings that differ from those in public markets. For instance, there is 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, there exists "commitment risk" 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. Estimating plausible ranges[9] for a commitment risk premium is a subject for future research that we hope to explore with the Burgiss cash flow data.

[9] 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 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 commitment risk 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.

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Table 1: 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. 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	11	16	1
1987	7	25	7	12	22	8
1988	7	17	14	17	21	14
1989	8	24	10	18	22	16
1990	2	9	14	8	14	7
1991	4	5	8	11	6	2
1992	5	15	17	14	17	4
1993	11	21	18	25	11	9
1994	13	26	24	21	6	24
1995	17	23	22	33	7	24
1996	9	23	24	38		41
1997	30	40	35	51		40
1998	38	53	50	52		59
1999	28	38	43	55		59
2000	39	46	67	72		68
2001	26	27	25	22		26
2002	21	15	28	32		5
2003	13	13	29	34		8
2004	46	17	35	62		3
2005	57	20	63	78		2
2006	67	26	60	72		8
2007	74	22	65	70		6
2008	68	14	53	54		12
Total	**598**	**543**	**729**	**862**	**160**	**446**
Total 2000-08	*411*	*200*	*425*	*496*		
Total 1990-99	*157*	*253*	*255*	*308*	*61*	*269*
Total 1984-89	*30*	*90*	*49*	*58*	*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	155		55
2001	48	59	66	52		18
2002	18	20	47	32		7
2003	25	17	37	34		
2004	32	22	51	64		
2005	48	20	58	58		1
2006	62	37	77	67		
2007	65	18	71	50		2
2008	45	14	57	55		
Total	**775**	**1114**	**1093**	**1226**	**466**	**260**
Total 2000-08	*423*	*329*	*579*	*567*		
Total 1990-99	*251*	*477*	*372*	*475*	*186*	*138*
Total 1984-89	*101*	*308*	*142*	*184*	*280*	*39*

Table 2: Capital Commitments Represented in Private Equity Performance Datasets

This table shows the estimated total commitments to private equity funds each year, as estimated by Private Equity Analyst. Burgiss, Venture Economics and Preqin report performance data for a subset of funds. We show the size of the funds covered by these databases in dollars and relative to the Private Equity Analyst's estimates of the total size of the market in each year. 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

	Total Fund Commitments as Estimated by Private Equity Analyst ($bn)	Commitments to Funds with Performance Data ($bn)			Funds with Performance Data as a Fraction of Total Fund Commitments		
Vintage		Burgiss	Venture Economics	Preqin	Burgiss	Venture Economics	Preqin
1984	1.8	1.1	1.7	1.2	0.64	0.94	0.68
1985	2.4	1.2	1.3	0.2	0.52	0.55	0.08
1986	6.8	2.0	1.9	1.4	0.29	0.28	0.21
1987	14.7	2.3	13.0	7.1	0.16	0.89	0.49
1988	10.7	2.8	8.7	5.8	0.26	0.82	0.55
1989	11.9	4.3	5.6	4.1	0.37	0.47	0.34
1990	4.8	2.6	2.5	2.1	0.55	0.53	0.43
1991	5.6	2.6	1.6	2.6	0.46	0.28	0.46
1992	8.1	1.6	4.6	6.5	0.19	0.56	0.81
1993	9.9	3.5	9.6	7.7	0.36	0.97	0.78
1994	15.2	6.6	11.3	8.6	0.44	0.75	0.57
1995	22.5	13.2	15.0	12.4	0.59	0.67	0.55
1996	19.7	5.1	10.2	13.1	0.26	0.52	0.67
1997	41.5	21.9	30.7	32.6	0.53	0.74	0.79
1998	61.9	43.6	49.1	44.8	0.70	0.79	0.72
1999	43.4	22.9	30.7	41.5	0.53	0.71	0.96
2000	79.6	42.5	57.6	79.5	0.53	0.72	1.00
2001	51.5	33.0	21.2	19.4	0.64	0.41	0.38
2002	43.1	19.1	8.0	22.6	0.44	0.19	0.52
2003	28.4	17.4	24.9	32.3	0.61	0.88	1.14
2004	57.4	37.2	27.4	29.8	0.65	0.48	0.52
2005	110.8	63.3	48.3	78.2	0.57	0.44	0.71
2006	148.8	124.0	68.2	161.2	0.83	0.46	1.08
2007	244.6	141.1	62.3	135.6	0.58	0.25	0.55
2008	181.0	99.2	45.5	117.3	0.55	0.25	0.65
Total	**1225.9**	**714.2**	**561.1**	**867.8**	**0.58**	**0.46**	**0.71**
Total 2000-08	*945.2*	*576.8*	*363.5*	*676.0*	*0.61*	*0.38*	*0.72*
Total 1990-99	*232.6*	*123.7*	*165.3*	*172.0*	*0.53*	*0.71*	*0.74*
Total 1984-89	*48.2*	*13.7*	*32.3*	*19.9*	*0.29*	*0.67*	*0.41*

Panel B : Venture Capital Funds

	Total Fund Commitments as Estimated by Private Equity Analyst ($bn)	Commitments to Funds with Performance Data ($bn)			Funds with Performance Data as a Fraction of Total Fund Commitments		
Vintage		Burgiss	Venture Economics	Preqin	Burgiss	Venture Economics	Preqin
1984	3.0	1.2	2.6	1.2	0.41	0.85	0.38
1985	1.8	0.8	1.4	0.6	0.46	0.81	0.34
1986	2.0	0.9	2.8	0.7	0.46	1.40	0.32
1987	3.1	1.2	2.8	1.5	0.39	0.91	0.47
1988	2.1	1.4	2.4	1.4	0.70	1.16	0.67
1989	2.8	2.1	4.2	1.3	0.77	1.52	0.47
1990	1.7	0.8	1.3	1.1	0.51	0.77	0.65
1991	1.4	0.5	1.2	0.9	0.38	0.90	0.67
1992	2.6	1.8	2.4	1.6	0.71	0.95	0.64
1993	2.9	1.5	3.2	2.0	0.52	1.12	0.71
1994	4.2	2.2	4.6	2.4	0.52	1.11	0.58
1995	6.1	2.0	4.9	3.0	0.32	0.80	0.49
1996	7.9	3.0	4.7	5.1	0.38	0.60	0.64
1997	14.3	5.0	9.3	6.9	0.35	0.65	0.48
1998	21.0	9.1	18.3	11.9	0.44	0.87	0.56
1999	48.6	21.5	33.2	23.1	0.44	0.68	0.48
2000	72.1	35.4	50.0	41.8	0.49	0.69	0.58
2001	39.4	18.7	27.3	25.1	0.47	0.69	0.64
2002	10.8	5.0	5.6	8.7	0.47	0.52	0.80
2003	9.2	5.5	4.4	6.7	0.59	0.47	0.73
2004	17.9	7.2	8.1	10.9	0.40	0.45	0.61
2005	25.7	16.1	6.2	15.2	0.63	0.24	0.59
2006	25.1	22.6	19.4	28.4	0.90	0.77	1.13
2007	33.1	23.3	4.6	25.2	0.71	0.14	0.76
2008	24.7	17.2	7.8	22.1	0.69	0.32	0.90
Total	**383.3**	**206.1**	**232.8**	**249.8**	**0.54**	**0.61**	**0.65**
Total 2000-08	*258.0*	*151.0*	*133.4*	*184.1*	*0.59*	*0.52*	*0.71*
Total 1990-99	*110.6*	*47.4*	*83.3*	*58.1*	*0.43*	*0.75*	*0.53*
Total 1984-89	*14.7*	*7.8*	*16.2*	*6.6*	*0.53*	*1.10*	*0.45*

Table 3: Private Equity Fund Internal Rates of Return

This table shows average Internal Rates of Return (IRR) by vintage year on the individual funds, for which performance data are available, for each data supplier and author. Weighted averages use the capital committed for each fund as a proportion of the total commitments, as estimated by each source, for each vintage year. Kaplan-Schoar do not report unweighted average or median IRRs. Robinson-Sensoy do not report median IRRs. 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

	Weighted Average IRR						Average IRR					Median IRR			
Vintage	Burgiss	Venture Economics	Preqin	Cambridge Associates	Kaplan-Schoar	Robinson-Sensoy	Burgiss	Venture Economics	Preqin	Cambridge Associates	Robinson-Sensoy	Burgiss	Venture Economics	Preqin	Cambridge Associates
1984	15.8	28.0	30.9	.	29.0	.	10.6	32.5	32.9	.	.	10.6	18.0	23.7	.
1985	13.7	28.0	13.7	.	18.0	.	13.7	26.7	8.9	.	.	13.7	23.2	.	.
1986	16.0	20.8	30.6	12.8	18.0	13.2	13.6	18.0	31.1	13.3	13.2	16.8	15.0	24.0	11.1
1987	15.3	13.3	10.5	13.2	16.0	20.6	17.3	9.8	18.9	12.9	15.7	16.2	9.0	18.9	10.8
1988	18.4	10.1	14.9	14.0	13.0	8.7	14.4	9.9	20.1	14.4	9.3	10.1	9.8	13.5	12.3
1989	21.1	25.5	31.3	20.3	14.0	19.4	20.6	12.8	35.0	23.0	14.8	22.4	12.3	31.8	20.5
1990	52.9	11.4	23.4	15.0	20.0	27.6	31.9	5.1	20.5	14.9	21.5	31.9	7.0	16.3	15.1
1991	27.8	13.2	30.2	32.2	14.0	15.8	25.7	13.6	36.0	30.2	6.3	24.9	13.7	40.7	38.9
1992	15.0	23.8	34.0	27.5	9.0	37.3	11.2	20.0	18.9	26.2	30.5	10.7	18.3	21.2	19.8
1993	26.0	21.1	21.4	19.0	18.0	36.4	31.0	19.3	22.4	23.4	40.2	19.1	17.6	19.9	21.7
1994	34.5	15.8	25.8	11.2	19.0	25.7	29.6	13.9	22.6	10.1	22.8	25.7	11.2	19.8	9.7
1995	16.9	10.7	15.6	16.1	7.0	19.4	20.9	11.1	18.9	18.7	16.2	10.5	6.4	14.6	11.3
1996	2.4	6.6	10.8	10.0	.	8.3	6.0	8.4	16.0	9.1	10.2	5.7	3.6	9.3	8.3
1997	8.8	8.7	5.7	6.7	.	10.7	8.6	6.1	7.0	6.7	5.4	5.5	3.0	6.6	7.3
1998	3.6	1.0	2.6	9.3	.	3.9	6.4	4.4	6.3	11.4	4.8	8.0	3.0	7.0	9.7
1999	4.8	6.2	6.3	12.4	.	-4.1	3.3	1.0	7.3	13.1	2.1	4.3	1.6	9.2	11.5
2000	14.3	10.6	15.9	13.0	.	6.8	12.7	10.2	16.0	13.0	6.6	11.9	4.8	14.5	12.4
2001	15.1	9.3	28.4	25.5	.	3.6	13.7	10.3	25.3	24.9	12.0	14.6	6.9	21.2	22.3
2002	18.4	12.8	17.5	20.7	.	25.1	16.1	10.1	13.9	18.6	17.9	16.4	13.7	15.7	21.4
2003	22.5	17.4	22.6	15.8	.	48.2	19.5	10.7	12.9	15.6	37.5	16.2	10.0	13.7	14.4
2004	15.4	12.2	14.5	9.9	.	18.9	12.8	14.7	13.4	10.5	18.8	11.7	7.5	12.3	8.7
2005	7.1	2.4	5.7	7.1	.	-0.6	6.8	3.4	7.5	7.8	-1.1	7.6	3.5	8.0	7.0
2006	0.5	-3.9	1.5	4.5	.	-4.6	2.6	-0.1	2.4	4.6	-18.3	1.2	1.4	4.5	4.0
2007	4.4	2.4	2.2	3.4	.	-14.6	3.7	5.5	6.1	4.4	-17.6	6.2	7.3	5.6	5.9
2008	1.5	0.5	6.5	7.6	.	-30.3	3.2	6.3	6.3	-0.4	-17.7	2.8	5.8	3.4	0.1
Average	**15.7**	**12.3**	**16.9**	**14.2**	**16.3**	**12.8**	**14.2**	**11.3**	**17.1**	**14.2**	**10.9**	**13.0**	**9.4**	**15.6**	**13.2**
Average 2000s	*11.0*	*7.1*	*12.8*	*11.9*		*5.8*	*10.1*	*7.9*	*11.5*	*11.0*	*4.2*	*9.8*	*6.8*	*11.0*	*10.7*
Average 1990s	*19.3*	*11.8*	*17.6*	*15.9*	*14.5*	*18.1*	*17.5*	*10.3*	*17.6*	*16.4*	*16.0*	*14.6*	*8.5*	*16.5*	*15.3*
Average 1980s	*16.7*	*21.0*	*22.0*	*15.1*	*18.0*	*15.5*	*15.0*	*18.3*	*24.5*	*15.9*	*13.3*	*14.9*	*14.6*	*22.4*	*13.7*

Table 3: Private Equity Fund Internal Rates of Return, continued

Panel B : Venture Capital Funds

	Weighted Average IRR						Average IRR					Median IRR			
Vintage	Burgiss	Venture Economics	Preqin	Cambridge Associates	Kaplan-Schoar	Robinson-Sensoy	Burgiss	Venture Economics	Preqin	Cambridge Associates	Robinson-Sensoy	Burgiss	Venture Economics	Preqin	Cambridge Associates
1984	7.9	6.0	16.7	7.7	7.0	10.2	8.2	5.0	14.7	8.1	10.6	6.9	3.6	12.8	6.3
1985	7.1	9.2	14.6	11.6	10.0	12.2	5.5	8.2	10.4	12.8	11.4	8.7	8.6	13.5	12.7
1986	9.4	11.9	14.3	8.8	10.0	-10.1	9.0	7.3	13.6	9.1	-27.7	9.3	6.3	8.9	9.4
1987	20.2	12.9	12.4	14.5	12.0	5.8	15.8	7.6	23.7	15.8	3.8	16.7	7.2	14.9	15.7
1988	24.4	19.8	28.6	14.3	20.0	15.3	17.9	12.3	21.5	14.7	12.0	21.6	9.5	23.1	11.9
1989	25.7	16.4	25.8	17.1	18.0	18.4	20.5	13.0	16.7	18.9	13.5	15.3	10.9	14.7	13.3
1990	29.5	24.8	20.3	24.3	29.0	14.9	25.3	18.5	55.7	26.5	14.9	21.7	14.3	19.3	21.9
1991	28.5	28.9	36.5	23.0	22.0	.	28.1	18.7	26.7	24.8	.	24.4	17.8	28.7	18.6
1992	24.8	31.5	25.1	28.7	32.0	8.5	21.0	27.8	33.3	37.3	6.8	14.2	13.4	21.5	21.0
1993	51.9	28.5	44.2	29.5	35.0	35.5	47.1	21.7	29.9	39.5	24.5	40.9	12.4	36.5	18.8
1994	41.4	42.9	47.0	34.6	48.0	62.5	41.7	26.9	55.9	45.2	61.8	31.8	23.7	27.1	26.5
1995	46.4	56.6	59.6	56.8	54.0	27.1	49.2	44.4	35.8	76.6	26.9	28.9	19.3	20.0	42.9
1996	76.7	61.2	22.7	61.2	.	24.2	64.5	67.0	48.6	89.2	22.7	25.2	28.2	14.8	37.1
1997	76.1	44.1	58.1	52.8	.	36.8	65.9	48.5	26.1	72.1	31.6	26.3	19.9	22.8	8.6
1998	15.5	24.4	19.8	18.2	.	18.9	16.3	25.8	-4.2	15.2	12.4	-1.2	2.0	4.9	0.4
1999	-4.5	-6.5	-4.4	-3.7	.	-22.6	-7.4	-4.6	-0.2	-1.4	-10.1	-5.6	-5.9	-4.9	-4.6
2000	-1.3	0.4	-0.4	-4.0	.	-9.4	-2.7	-1.5	-1.0	-2.2	-6.6	-2.1	-2.0	-0.5	-3.5
2001	-0.7	4.6	4.0	-1.8	.	-10.4	-1.7	2.0	-2.8	1.5	-8.8	-2.4	0.0	1.2	-0.2
2002	0.6	-0.8	2.1	-0.3	.	7.5	-1.1	-0.7	-1.5	0.4	37.0	-0.2	-1.2	-0.6	-0.4
2003	0.9	3.6	1.7	0.1	.	.	-2.1	3.1	1.5	1.9	.	0.1	1.3	0.1	0.9
2004	0.3	1.9	2.3	1.6	.	.	-1.5	0.7	-0.5	7.6	.	-1.0	-0.3	-0.2	0.8
2005	3.3	2.9	2.0	-1.4	.	-5.9	2.2	2.5	-1.6	1.5	-5.9	0.5	-0.4	0.8	0.8
2006	0.6	0.0	1.1	-1.5	.	.	-1.3	-3.7	3.8	-0.3	.	-2.4	-1.9	-1.4	-0.6
2007	3.2	-0.9	3.9	2.3	.	-6.4	1.7	1.3	-1.3	4.1	-8.9	2.6	-1.7	1.5	2.8
2008	-4.5	-5.2	-2.7	-1.7	.	.	-2.8	-7.1		1.9	.	-1.6	-6.5	-3.9	-3.4
Average	**19.3**	**16.8**	**18.2**	**15.7**	**24.8**	**11.7**	**16.8**	**13.8**	**16.9**	**20.8**	**11.1**	**11.1**	**7.1**	**11.0**	**10.3**
Average 2000s	*0.3*	*0.7*	*1.6*	*-0.7*		*-4.9*	*-1.0*	*-0.4*	*-0.4*	*1.8*	*1.4*	*-0.7*	*-1.4*	*-0.3*	*-0.3*
Average 1990s	*38.6*	*33.6*	*32.9*	*32.5*	*36.7*	*22.9*	*35.2*	*29.5*	*30.8*	*42.5*	*21.3*	*20.7*	*14.5*	*19.1*	*19.1*
Average 1980s	*15.8*	*12.7*	*18.7*	*12.3*	*12.8*	*8.6*	*12.8*	*8.9*	*16.8*	*13.2*	*3.9*	*13.1*	*7.7*	*14.7*	*11.5*

Table 4: Private Equity Fund Investment Multiples

This table shows the average multiple of total value to paid-in capital (TVPI), by vintage year, for each data provider for which performance data are available. 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 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, as estimated by each source, for each vintage year. Cambridge Associates do not report weighted average or median multiples. 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

	Weighted Average Multiples			Average Multiples				Median Multiples		
	Burgiss	Venture	Preqin	Burgiss	Venture	Preqin	Cambridge	Burgiss	Venture	Preqin
Vintage		Economics			Economics		Associates		Economics	
1984	3.28	4.10	5.56	2.44	3.61	3.38		2.44	2.37	3.33
1985	2.66	2.37	2.66	2.66	2.31	1.80		2.66	2.19	
1986	3.27	3.46	8.77	2.40	3.01	4.87	0.96	2.36	2.24	2.71
1987	2.58	1.88	2.21	2.93	1.85	3.21	3.41	2.55	1.69	2.10
1988	2.32	1.72	1.87	2.03	1.74	2.54	1.86	1.74	1.61	1.89
1989	2.75	2.80	3.20	2.55	2.14	4.28	2.00	2.69	1.76	3.38
1990	3.37	1.81	3.03	3.03	1.39	2.72	2.58	3.03	1.42	2.43
1991	2.54	1.93	3.17	2.45	2.18	3.28	1.84	2.54	1.91	3.22
1992	1.88	1.94	1.79	1.68	2.07	1.84	3.27	1.41	1.94	1.89
1993	2.48	2.06	2.35	2.62	1.98	2.35	2.90	2.07	1.75	2.20
1994	3.29	1.54	1.93	2.73	1.55	1.90	2.34	2.18	1.46	1.84
1995	1.82	1.47	1.77	2.08	1.56	1.86	1.52	1.51	1.31	1.75
1996	1.17	1.29	1.45	1.46	1.34	1.81	1.95	1.30	1.24	1.71
1997	1.50	1.43	1.40	1.42	1.20	1.44	1.56	1.28	1.14	1.37
1998	1.28	1.09	1.24	1.42	1.27	1.44	1.37	1.39	1.24	1.42
1999	1.40	1.57	1.43	1.31	1.36	1.43	1.40	1.21	1.09	1.50
2000	1.75	1.54	1.80	2.66	1.48	1.83	1.81	1.58	1.35	1.81
2001	1.67	1.37	2.12	1.58	1.37	1.91	1.70	1.72	1.23	1.90
2002	1.84	1.51	1.73	1.72	1.38	1.57	1.91	1.79	1.44	1.68
2003	1.80	1.67	1.94	1.98	1.42	1.65	1.77	1.75	1.41	1.65
2004	1.64	1.44	1.55	1.53	1.42	1.52	1.66	1.50	1.29	1.45
2005	1.27	1.10	1.22	1.26	1.13	1.27	1.38	1.25	1.09	1.27
2006	1.02	0.91	1.05	1.08	1.01	1.09	1.17	1.03	1.04	1.11
2007	1.09	1.06	1.08	1.11	1.14	1.16	1.06	1.12	1.14	1.10
2008	1.04	1.01	1.09	1.07	1.10	1.13	1.09	1.04	1.09	1.08
Average	**2.03**	**1.76**	**2.30**	**1.97**	**1.68**	**2.13**	**1.85**	**1.81**	**1.50**	**1.91**
Average 2000s	1.46	1.29	1.51	1.55	1.27	1.46	1.51	1.42	1.23	1.45
Average 1990s	2.07	1.61	1.96	2.02	1.59	2.01	2.07	1.79	1.45	1.93
Average 1980s	2.81	2.72	4.05	2.50	2.45	3.35	2.06	2.41	1.98	2.68

Panel B : Venture Capital Funds

	Weighted Average Multiples			Average Multiples				Median Multiples		
Vintage	Burgiss	Venture Economics	Preqin	Burgiss	Venture Economics	Preqin	Cambridge Associates	Burgiss	Venture Economics	Preqin
1984	1.73	1.59	2.74	1.78	1.57	2.35	1.76	1.71	1.37	1.99
1985	1.93	2.08	2.24	1.96	2.02	2.59	2.68	1.81	1.84	2.15
1986	1.82	2.79	2.19	1.83	1.72	1.85	2.90	1.93	1.54	1.67
1987	2.77	2.39	2.54	2.70	2.02	2.51	2.72	2.35	1.65	2.22
1988	2.88	2.59	2.98	2.45	2.04	2.58	2.49	2.55	1.86	2.57
1989	3.09	2.42	2.80	2.92	2.13	2.55	2.59	2.41	1.89	2.27
1990	3.30	2.82	2.81	2.96	2.32	2.50	3.21	2.48	1.81	2.22
1991	2.92	3.26	2.95	3.11	2.47	4.41	3.01	2.70	2.23	2.75
1992	2.72	3.45	2.84	2.69	3.46	3.26	3.13	2.07	2.18	2.07
1993	6.34	3.31	3.38	6.65	2.92	3.86	4.12	3.28	1.67	2.58
1994	6.58	4.65	7.19	5.27	3.32	3.98	5.33	3.05	2.23	2.08
1995	3.55	4.16	6.33	3.64	3.83	5.16	6.20	2.50	2.43	1.89
1996	6.33	4.78	2.81	5.92	4.68	3.49	5.03	2.06	2.14	1.87
1997	3.28	2.38	2.83	3.03	2.49	2.69	3.08	1.87	1.63	1.52
1998	1.60	1.74	1.77	1.55	1.68	1.67	1.48	0.93	1.10	1.08
1999	0.94	0.74	0.87	0.81	0.84	0.93	0.94	0.73	0.72	0.81
2000	0.97	1.06	1.04	0.91	0.94	1.14	0.95	0.88	0.88	0.99
2001	1.01	1.21	1.19	0.97	1.11	1.08	1.05	0.87	1.00	1.04
2002	1.07	0.96	1.12	1.01	0.98	0.98	1.01	0.99	0.93	0.96
2003	1.11	1.16	1.07	0.99	1.13	1.01	1.19	1.00	1.06	1.02
2004	1.07	1.08	1.19	1.01	1.04	1.22	1.30	0.97	0.99	0.98
2005	1.31	1.14	1.11	1.37	1.13	1.04	1.08	1.02	0.98	1.04
2006	1.04	1.01	1.05	1.01	0.93	1.02	1.06	0.95	0.96	0.98
2007	1.09	1.01	1.06	1.06	1.05	1.12	1.11	1.06	0.96	1.01
2008	0.97	0.94	1.00	0.99	0.93	1	1.14	0.98	0.92	0.95
Average	**2.46**	**2.19**	**2.36**	**2.34**	**1.95**	**2.24**	**2.42**	**1.73**	**1.48**	**1.63**
Average 2000s	*1.07*	*1.06*	*1.09*	*1.03*	*1.03*	*1.07*	*1.10*	*0.97*	*0.96*	*1.00*
Average 1990s	*3.76*	*3.13*	*3.38*	*3.56*	*2.80*	*3.20*	*3.55*	*2.17*	*1.81*	*1.89*
Average 1980s	*2.37*	*2.31*	*2.58*	*2.27*	*1.92*	*2.41*	*2.52*	*2.13*	*1.69*	*2.15*

Table 5: Private Equity Fund Public Market Equivalent Ratios (PMEs)

This table shows the average Public Market Equivalent ratios, comparing private equity returns to equivalent 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 Funds

	Burgiss				Kaplan-Shoar		Robinson-Sensoy	
Vintage	♯ Funds	Average	Median	Weighted average	♯ Funds	Weighted average	♯ Funds	Weighted average
1984	2	0.87	0.87	1.09	6	1.30	3	1.56
1985	1	0.91	0.91	0.91	12	1.00	5	1.27
1986	5	1.00	1.11	1.11	16	1.13	1	0.93
1987	7	1.25	1.21	1.20	22	0.84	9	1.28
1988	7	0.98	0.80	1.13	21	0.79	14	0.77
1989	8	1.26	1.28	1.22	22	1.00	15	1.15
1990	2	1.57	1.57	2.34	14	1.05	7	1.35
1991	4	1.23	1.23	1.32	6	0.87	2	0.84
1992	5	0.79	0.87	0.89	17	0.79	4	1.31
1993	11	1.35	1.11	1.24	11	0.84	6	1.49
1994	13	1.48	1.34	1.75	6	0.89	22	1.28
1995	17	1.34	1.00	1.20	7	0.62	24	1.33
1996	9	1.13	1.01	0.90			36	1.07
1997	30	1.23	1.16	1.30			30	1.41
1998	38	1.35	1.32	1.21			54	1.25
1999	28	1.19	1.06	1.27			37	1.20
2000	39	1.42	1.39	1.47			60	1.14
2001	26	1.31	1.43	1.38			22	1.03
2002	21	1.42	1.47	1.53			6	1.25
2003	13	1.75	1.56	1.58			7	1.43
2004	46	1.40	1.35	1.51			2	1.04
2005	57	1.20	1.19	1.23			2	1.04
2006	67	1.03	0.97	0.99				
2007	74	1.03	1.03	1.02				
2008	68	0.91	0.88	0.90				
Average	**598**	**1.22**	**1.16**	**1.27**	**160**	**0.93**	**368**	**1.20**
Average 2000s	*411*	*1.27*	*1.25*	*1.29*	*.*	*.*	*99*	*1.16*
Average 1990s	*157*	*1.27*	*1.17*	*1.34*	*61*	*0.84*	*222*	*1.25*
Average 1980s	*30*	*1.04*	*1.03*	*1.11*	*99*	*1.01*	*47*	*1.16*

Panel B: Venture Capital

	Burgiss				Kaplan-Shoar		Robinson-Sensoy	
Vintage	♯ Funds	Average	Median	Weighted average	♯ Funds	Weighted average	♯ Funds	Weighted average
1984	18	0.70	0.63	0.69	57	0.54	6	0.78
1985	20	0.71	0.70	0.73	37	0.73	5	0.92
1986	12	0.75	0.73	0.80	36	0.76	3	0.78
1987	17	1.18	1.09	1.29	63	0.98	6	0.73
1988	16	1.18	1.31	1.44	42	1.16	9	1.02
1989	18	1.34	0.95	1.52	45	1.03	10	1.17
1990	13	1.50	1.18	1.66	20	1.53	1	1.01
1991	6	1.37	1.26	1.35	11	1.13	0	
1992	17	1.27	0.94	1.34	18	1.31	3	0.84
1993	13	2.79	1.54	2.74	45	1.65	5	1.19
1994	20	2.40	1.43	2.86	49	1.81	6	1.87
1995	18	2.16	1.48	2.09	43	2.05	11	1.22
1996	20	3.79	1.75	4.17			6	1.27
1997	33	2.43	1.45	2.65			16	1.80
1998	46	1.43	0.93	1.48			26	1.54
1999	65	0.76	0.65	0.90			30	0.61
2000	80	0.79	0.77	0.85			34	0.71
2001	48	0.80	0.71	0.84			8	0.67
2002	18	0.82	0.79	0.88			6	0.85
2003	25	0.88	0.90	0.99			0	
2004	32	0.90	0.85	0.96			0	
2005	48	1.27	0.95	1.23			1	0.80
2006	62	0.93	0.85	0.97				
2007	65	0.97	0.96	0.99				
2008	45	0.84	0.81	0.84				
Average	**775**	**1.36**	**1.02**	**1.45**	**466**	**1.22**	**192**	**1.04**
Average 2000s	*423*	*0.91*	*0.84*	*0.95*	*.*	*.*	*.*	*.*
Average 1990s	*251*	*1.99*	*1.26*	*2.12*	*186*	*1.58*	*104*	*1.26*
Average 1980s	*101*	*0.98*	*0.90*	*1.08*	*280*	*0.87*	*39*	*0.90*

Table 6: 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 indices and using Burgiss data. 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.

	Panel A:Buyout Funds (N=598), relative to…				
	S&P 500	Russell 3000	Nasdaq	Russell 2000	Russell 2000 Value
1984	0.87	0.90	0.97	1.15	1.07
1985	1.09	0.94	0.98	1.18	1.09
1986	1.00	1.02	1.02	1.18	1.10
1987	1.25	1.27	1.20	1.43	1.32
1988	0.98	0.99	0.90	1.05	0.99
1989	1.26	1.27	1.15	1.34	1.23
1990	1.57	1.57	1.48	1.58	1.43
1991	1.23	1.25	1.15	1.40	1.31
1992	0.79	0.82	0.78	0.97	0.92
1993	1.35	1.38	1.33	1.62	1.56
1994	1.48	1.52	1.45	1.78	1.70
1995	1.34	1.35	1.30	1.50	1.43
1996	1.13	1.12	1.26	1.02	0.83
1997	1.23	1.19	1.30	1.01	0.88
1998	1.35	1.30	1.56	1.01	0.81
1999	1.19	1.15	1.36	0.92	0.74
2000	1.42	1.38	1.48	1.18	1.05
2001	1.31	1.28	1.27	1.15	1.12
2002	1.42	1.39	1.34	1.28	1.29
2003	1.75	1.72	1.66	1.63	1.66
2004	1.40	1.38	1.30	1.32	1.36
2005	1.20	1.19	1.10	1.12	1.17
2006	1.03	1.02	0.94	0.96	0.99
2007	1.03	1.02	0.95	0.94	0.97
2008	0.91	0.91	0.86	0.85	0.87
Average	**1.22**	**1.21**	**1.20**	**1.22**	**1.16**
Average 2000s	*1.27*	*1.25*	*1.21*	*1.16*	*1.16*
Average 1990s	*1.27*	*1.27*	*1.30*	*1.28*	*1.16*
Average 1980s	*1.07*	*1.07*	*1.04*	*1.22*	*1.13*
Average - Overall Sample	1.20	1.18	1.17	1.11	1.07
Median - Overall Sample	1.11	1.09	1.05	1.02	0.99

	Panel B: Venture Capital Funds (N=775), relative to...				
	S&P 500	Russell 3000	Nasdaq	Russell 2000	Russell 2000 Growth
1984	0.70	0.73	0.80	0.92	1.01
1985	0.71	0.73	0.76	0.91	0.98
1986	0.75	0.76	0.73	0.86	0.95
1987	1.18	1.18	1.10	1.32	1.42
1988	1.18	1.18	1.07	1.26	1.34
1989	1.34	1.35	1.18	1.45	1.57
1990	1.50	1.50	1.32	1.55	1.68
1991	1.37	1.40	1.23	1.64	1.75
1992	1.27	1.32	1.24	1.56	1.68
1993	2.79	2.92	2.38	3.88	3.90
1994	2.40	2.50	2.10	3.23	3.35
1995	2.16	2.21	1.89	2.59	2.67
1996	3.79	3.85	3.01	4.46	4.34
1997	2.43	2.42	2.05	2.45	2.42
1998	1.43	1.38	1.52	1.15	1.37
1999	0.76	0.73	0.89	0.57	0.72
2000	0.79	0.77	0.83	0.64	0.73
2001	0.80	0.78	0.76	0.69	0.72
2002	0.82	0.80	0.76	0.73	0.73
2003	0.88	0.87	0.82	0.82	0.80
2004	0.90	0.89	0.82	0.83	0.80
2005	1.27	1.26	1.16	1.18	1.13
2006	0.93	0.92	0.85	0.85	0.82
2007	0.97	0.95	0.89	0.88	0.86
2008	0.84	0.83	0.78	0.77	0.75
Average	**1.36**	**1.37**	**1.24**	**1.49**	**1.54**
Average 2000s	*0.91*	*0.90*	*0.85*	*0.82*	*0.82*
Average 1990s	*1.99*	*2.02*	*1.76*	*2.31*	*2.39*
Average 1980s	*0.98*	*0.99*	*0.94*	*1.12*	*1.21*
Average - Overall Sample	1.20	1.19	1.12	1.21	1.25
Median - Overall Sample	0.88	0.87	0.86	0.83	0.85

Table 7: The Relationship Between PME, IRR and Multiples

This table reports regressions where PME is the dependent variable. Panel A includes all vintage years; Panel B includes vintages from 1993 onwards. 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.

	Panel A: All Vintage Years, 1984 - 2008					
	Buyout Funds			VC Funds		
IRR	2.57***		0.76**	3.50***		1.23***
	[0.07]		[0.08]	[0.09]		[0.06]
	{0.42}		{0.32}	{0.52}		{0.23}
Multiple		0.66***	0.52***		0.55***	0.43***
		[0.01]	[0.02]		[0.01]	[0.01]
		{0.05}	{0.08}		{0.06}	{0.06}
1985	-0.04	-0.10	-0.09	0.10	-0.09	-0.04
1986	0.06	0.16	0.13	0.03	0.03	0.02
1987	0.21	0.06	0.08	0.21	-0.03	-0.01
1988	0.02	0.39	0.30	0.14	0.11	0.07
1989	0.13	0.32	0.26	0.21	0.01	-0.01
1990	0.16	0.32	0.24	0.20	0.15	0.08
1991	-0.03	0.36	0.25	-0.03	-0.06	-0.15
1992	-0.09	0.44	0.32	0.12	0.07	0.02
1993	-0.04	0.37	0.24	0.73	-0.59	-0.50
1994	0.13	0.42	0.32	0.53	-0.21	-0.22
1995	0.20	0.71	0.58	0.02	0.44	0.15
1996	0.38	0.92	0.81	1.12	0.81	0.60
1997	0.41	1.04	0.91	-0.29	1.05	0.48
1998	0.59	1.16	1.04	0.44	0.86	0.73
1999	0.51	1.08	0.97	0.60	0.59	0.67
2000	0.50	1.07	0.94	0.47	0.57	0.60
2001	0.36	1.02	0.87	0.45	0.55	0.58
2002	0.41	1.03	0.88	0.44	0.54	0.56
2003	0.65	1.19	1.05	0.54	0.61	0.65
2004	0.47	1.14	0.99	0.54	0.63	0.66
2005	0.43	1.12	0.98	0.78	0.80	0.83
2006	0.37	1.07	0.93	0.56	0.66	0.68
2007	0.34	1.05	0.91	0.49	0.66	0.66
2008	0.24	0.96	0.82	0.52	0.57	0.62
Constant	0.59	-0.75	-0.48	0.41	-0.28	-0.17
N	598	598	598	775	775	775
R-squared	0.75	0.88	0.90	0.72	0.91	0.94
	Panel B: Vintage Years 1993 - 2008					
Sample:	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}
Dummies Included	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 8: The Relationship Between PME, IRR and Multiples, by Vintage Year

This table reports regressions for each vintage year where PME is the dependent variable. Given the small sample sizes in early vintages, only funds raised from 1993 onwards are included. 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.

Vintage	Buyout Funds					VC Funds				
	IRR	Multiple	Constant	N	R^2	IRR	Multiple	Constant	N	R^2
1993	1.08**	0.32***	0.18	11	0.99	1.43***	0.30***	0.11	13	0.99
	[0.22]	[0.04]	[0.05]			[0.31]	[0.02]	[0.10]		
1994	0.80**	0.37***	0.22	13	0.99	1.07***	0.36***	0.05	20	0.99
	[0.30]	[0.05]	[0.06]			[0.16]	[0.01]	[0.06]		
1995	1.04**	0.37***	0.34	17	0.99	0.58***	0.48***	0.14	18	0.99
	[0.45]	[0.08]	[0.08]			[0.10]	[0.02]	[0.05]		
1996	3.04	0.38	0.39	9	0.89	1.44***	0.46***	0.13	20	0.99
	[2.84]	[0.38]	[0.18]			[0.26]	[0.03]	[0.12]		
1997	-0.53	0.95***	-0.08	30	0.98	0.26***	0.72***	0.09	33	0.99
	[0.33]	[0.09]	[0.10]			[0.09]	[0.03]	[0.04]		
1998	0.08	0.91***	0.05	38	0.95	-0.13***	0.96***	-0.03	46	0.99
	[0.50]	[0.10]	[0.12]			[0.04]	[0.01]	[0.02]		
1999	0.25	0.81***	0.13	28	0.99	-0.20**	1.03***	-0.09	65	0.99
	[0.34]	[0.07]	[0.08]			[0.09]	[0.02]	[0.02]		
2000	-1.11**	1.03***	-0.16	39	0.96	0.22	0.84***	0.03	80	0.96
	[0.45]	[0.09]	[0.10]			[0.45]	[0.10]	[0.10]		
2001	0.56	0.70***	0.14	26	0.98	0.19	0.79***	0.04	48	0.99
	[0.42]	[0.11]	[0.11]			[0.30]	[0.07]	[0.07]		
2002	0.28	0.76***	0.07	21	0.98	1.33**	0.42**	0.41	18	0.95
	[0.34]	[0.08]	[0.09]			[0.60]	[0.15]	[0.16]		
2003	0.13	0.94***	-0.14	13	0.97	0.30	0.80***	0.09	25	0.98
	[0.64]	[0.09]	[0.11]			[0.25]	[0.07]	[0.08]		
2004	-0.52*	1.04***	-0.12	46	0.98	0.30	0.79***	0.11	32	0.99
	[0.27]	[0.07]	[0.07]			[0.25]	[0.07]	[0.07]		
2005	0.04	1.00***	-0.06	57	0.96	0.14	0.92***	0.01	48	0.99
	[0.29]	[0.08]	[0.08]			[0.09]	[0.01]	[0.01]		
2006	-0.25	1.00***	-0.03	67	0.93	-0.10	1.00***	-0.08	62	0.98
	[0.14]	[0.14]	[0.14]			[0.16]	[0.06]	[0.06]		
2007	-0.34***	1.12***	-0.20	74	0.94	-0.36*	1.07***	-0.16	65	0.97
	[0.12]	[0.06]	[0.07]			[0.19]	[0.10]	[0.10]		
2008	-0.01	0.72***	0.14	68	0.87	-0.16	0.96***	-0.12	45	0.86
	[0.10]	[0.08]	[0.08]			[0.24]	[0.19]	[0.20]		

Table 9: 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, using the regressions reported in Table 8. 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 Burgiss	Actual PME Robinson-Sensoy	Implied PME Venture Economics	Implied PME Preqin	Actual PME Burgiss	Implied PME Venture Economics	Implied PME Preqin	Implied PME Cambridge Associates
1984	1.09	1.56			0.87			
1985	0.91	1.27			0.92			
1986	1.11	0.93			1.00			
1987	1.20	1.28			1.27			
1988	1.13	0.77			0.99			
1989	1.22	1.15			1.26			
1990	2.34	1.35			1.53			
1991	1.32	0.84			1.23			
1992	0.89	1.31			0.73			
1993	1.24	1.49	1.07	1.16	1.35	1.02	1.17	1.36
1994	1.75	1.28	0.91	1.14	1.30	0.91	1.10	1.17
1995	1.20	1.33	1.00	1.16	1.34	1.04	1.23	1.10
1996	0.90	1.07	1.08	1.27	1.12	1.15	1.56	1.41
1997	1.30	1.41	1.23	1.22	1.22	1.03	1.25	1.37
1998	1.21	1.25	1.04	1.18	1.33	1.21	1.37	1.31
1999	1.27	1.20	1.42	1.30	1.16	1.23	1.31	1.30
2000	1.47	1.14	1.31	1.52	1.40	1.25	1.55	1.56
2001	1.38	1.03	1.15	1.78	1.28	1.16	1.62	1.47
2002	1.53	1.25	1.25	1.43	1.39	1.15	1.30	1.57
2003	1.58	1.43	1.46	1.71	1.73	1.21	1.43	1.54
2004	1.51	1.04	1.31	1.42	1.37	1.28	1.39	1.55
2005	1.23	1.04	1.04	1.16	1.20	1.07	1.21	1.32
2006	0.99		0.89	1.02	1.03	0.98	1.05	1.13
2007	1.02		0.98	1.00	1.03	1.06	1.08	0.97
2008	0.90		0.87	0.92	0.92	0.93	0.95	0.92
Average 2000s	*1.29*	*1.16*	*1.14*	*1.33*	*1.26*	*1.12*	*1.29*	*1.34*
Average 1993-99	*1.27*	*1.29*	*1.11*	*1.21*	*1.26*	*1.08*	*1.29*	*1.29*

Panel B: Venture Capital Funds

	Weighted Average				Unweighted Average			
Vintage	Actual PME Burgiss	Actual PME Robinson-Sensoy	Implied PME Venture Economics	Implied PME Preqin	Actual PME Burgiss	Implied PME Venture Economics	Implied PME Preqin	Implied PME 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				1.29			
1992	1.34	0.84			1.29			
1993	2.74	1.19	1.51	1.76	2.82	1.30	1.70	1.91
1994	2.86	1.87	2.18	3.14	2.44	1.53	2.08	2.45
1995	2.09	1.22	2.47	3.52	2.17	2.24	2.82	3.56
1996	4.17	1.27	3.21	1.75	3.89	3.25	2.44	3.73
1997	2.65	1.80	1.92	2.28	2.41	2.01	2.09	2.50
1998	1.48	1.54	1.61	1.64	1.43	1.55	1.58	1.37
1999	0.90	0.61	0.69	0.81	0.77	0.79	0.87	0.88
2000	0.85	0.71	0.92	0.90	0.80	0.82	0.98	0.82
2001	0.84	0.67	1.00	0.99	0.81	0.92	0.89	0.87
2002	0.88	0.85	0.80	0.91	0.84	0.81	0.80	0.84
2003	0.99		1.03	0.95	0.89	1.00	0.90	1.05
2004	0.96		0.97	1.06	0.91	0.94	1.07	1.16
2005	1.23	0.80	1.07	1.03	1.27	1.05	0.96	1.01
2006	0.97		0.93	0.97	0.93	0.86	0.94	0.98
2007	0.99		0.93	0.96	0.97	0.96	1.04	1.01
2008	0.84		0.85	0.89	0.87	0.78		0.97
Average 2000s	*0.95*		*0.94*	*0.96*	*0.92*	*0.90*	*0.95*	*0.97*
Average 1993-99	*2.41*	*1.36*	*1.94*	*2.13*	*2.28*	*1.81*	*1.94*	*2.34*

Table 10: 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 Table 2) 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 from Burgiss, where the weights are the proportion of capital committed in each vintage year to the total capital committed over the vintages including in the regression. Panel A includes all vintages, from 1984 to 2008. Given the small sample sizes in early vintages, Panel B restricts the sample to funds raised from 1993 onwards. See Tables 3, 4 and 5 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

	Panel A: All Vintages from 1984-2008					
	Buyout Funds			VC Funds		
Dependent variable:	IRR	Multiple	PME	IRR	Multiple	PME
Capital Commitments to	-12.49***	-101.9***	-18.8	-65.2**	-542.3***	-191.7*
Total Stock Market Value	[4.27]	[25.6]	[13.2]	[27.0]	[191.4]	[100.8]
Constant	0.26	2.83	1.42	0.37	3.93	1.97
	[0.04]	[0.23]	[0.12]	[0.08]	[0.60]	[0.32]
N	25	25	25	25	25	25
R-squared	0.27	0.41	0.08	0.20	0.26	0.14
	Panel B: Vintages from 1993 to 2008					
	Buyout Funds			VC Funds		
Dependent variable:	IRR	Multiple	PME	IRR	Multiple	PME
Capital Commitments to	-12.23***	-71.9***	-31.7***	-75.0*	-625.8**	-278.9**
Total Stock Market Value	[3.97]	[23.9]	[9.9]	[37.9]	[268.8]	[128.6]
Constant	0.24	2.30	1.58	0.43	4.39	2.48
	[0.04]	[0.25]	[0.10]	[0.14]	[0.98]	[0.47]
N	16	16	16	16	16	16
R-squared	0.40	0.39	0.42	0.22	0.28	0.25

Table 11: 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 IRR, Multiple and 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 performance, and the explanatory variables are time quartiles. Vintage years are not included in the Panel B regressions but are included in the regressions in Panel C. 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	N	Bottom quartile	Median	Top quartile	Mean	N
Size Cutoffs ($ Millions)										
1980s	85	215	425	390	30	34	55	90	77	101
1990s	200	485	998	782	157	81	137	250	191	251
2000s	284	700	1530	1420	411	137	278	475	358	423
IRR (%)										
Small Funds	-1.4	6.5	15.1	7.5	151	-7.5	2.1	12.1	5.4	195
2nd Quartile Funds	2.8	8.9	19.5	11.1	150	-8.5	2.8	15.6	12.8	196
3rd Quartile Funds	2.2	9.2	15.0	9.3	149	-5.2	3.4	16.0	13.4	192
Large Funds	0.3	8.5	16.6	9.0	148	-4.7	2.1	9.5	8.7	192
Multiple										
Small Funds	0.95	1.23	1.75	1.47	151	0.76	1.08	1.73	1.67	195
2nd Quartile Funds	1.07	1.34	1.78	1.51	150	0.76	1.07	1.74	1.91	196
3rd Quartile Funds	1.06	1.26	1.71	1.49	149	0.84	1.10	2.14	1.90	192
Large Funds	1.01	1.26	1.70	1.44	148	0.84	1.06	1.36	1.59	192
PME										
Small Funds	0.80	1.02	1.37	1.16	151	0.57	0.78	1.08	1.03	195
2nd Quartile Funds	0.90	1.16	1.49	1.23	150	0.61	0.90	1.24	1.25	196
3rd Quartile Funds	0.93	1.14	1.40	1.21	149	0.69	0.96	1.30	1.34	192
Large Funds	0.91	1.14	1.43	1.19	148	0.70	0.90	1.14	1.18	192

Panel B: Regressions of Performance Measures, without Vintage Year Dummies

	Buyout Funds			Venture Capital Funds		
Dependent variable:	IRR	Multiple	PME	IRR	Multiple	PME
2nd Size Quartile	0.036*	0.048	0.065	0.074**	0.235	0.219
	[0.020]	[0.093]	[0.059]	[0.037]	[0.266]	[0.149]
3rd Size Quartile	0.018	0.024	0.042	0.080**	0.229	0.314**
	[0.020]	[0.093]	[0.059]	[0.037]	[0.267]	[0.150]
4th (Highest) Size Quartile	0.015	-0.029	0.027	0.033	-0.078	0.149
	[0.020]	[0.093]	[0.059]	[0.037]	[0.267]	[0.150]
N	598	598	598	775	775	775
R-squared	0.01	0.00	0.00	0.01	0.00	0.01

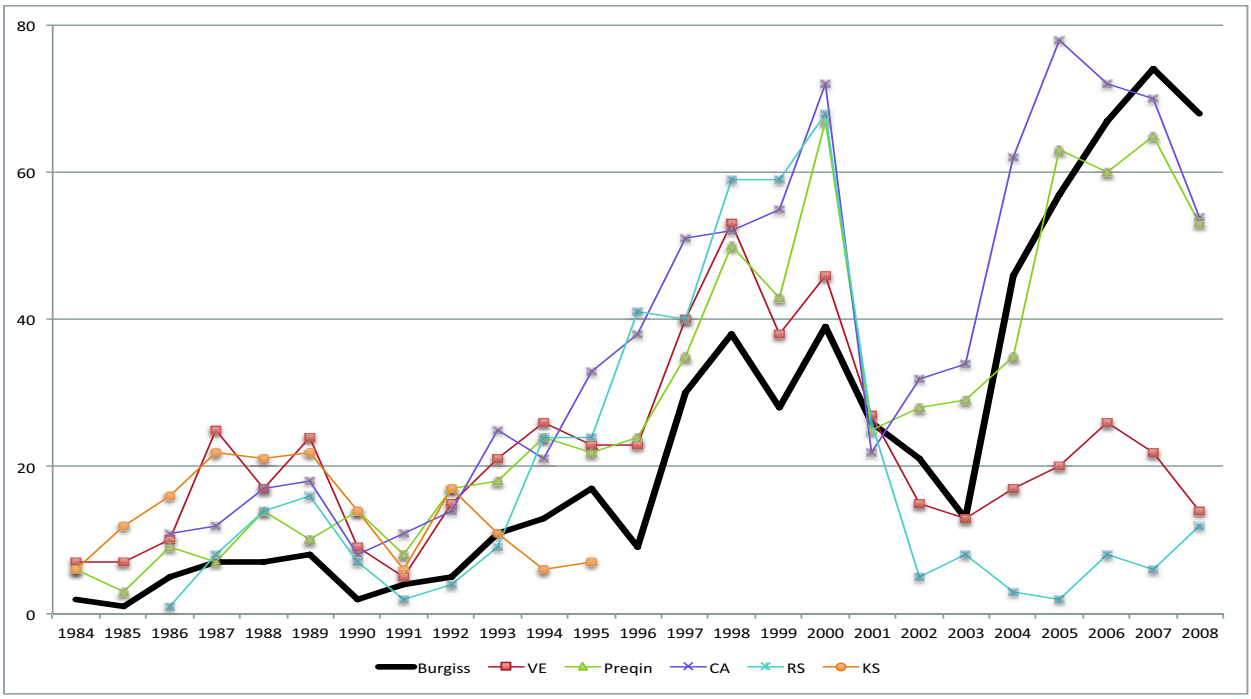
Panel C: Regressions of Performance Measures, including Vintage Year Dummies

	Buyout Funds			Venture Capital Funds		
Dependent variable:	IRR	Multiple	PME	IRR	Multiple	PME
2nd Size Quartile	0.035*	0.026	0.039	0.053*	0.251	0.138
	[0.019]	[0.080]	[0.057]	[0.032]	[0.239]	[0.140]
3rd Size Quartile	0.034*	0.099	0.059	0.090***	0.439*	0.318**
	[0.019]	[0.080]	[0.057]	[0.032]	[0.242]	[0.141]
4th (Highest) Size Quartile	0.028	0.036	0.031	0.106***	0.518**	0.349**
	[0.019]	[0.080]	[0.057]	[0.033]	[0.248]	[0.145]
N	598	598	598	775	775	775
R-squared	0.18	0.33	0.15	0.32	0.27	0.21

Figure 1: Number of funds with performance data

This figure shows the number of funds in the various private equity datasets for which performance data are available. 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



Panel B: VC funds

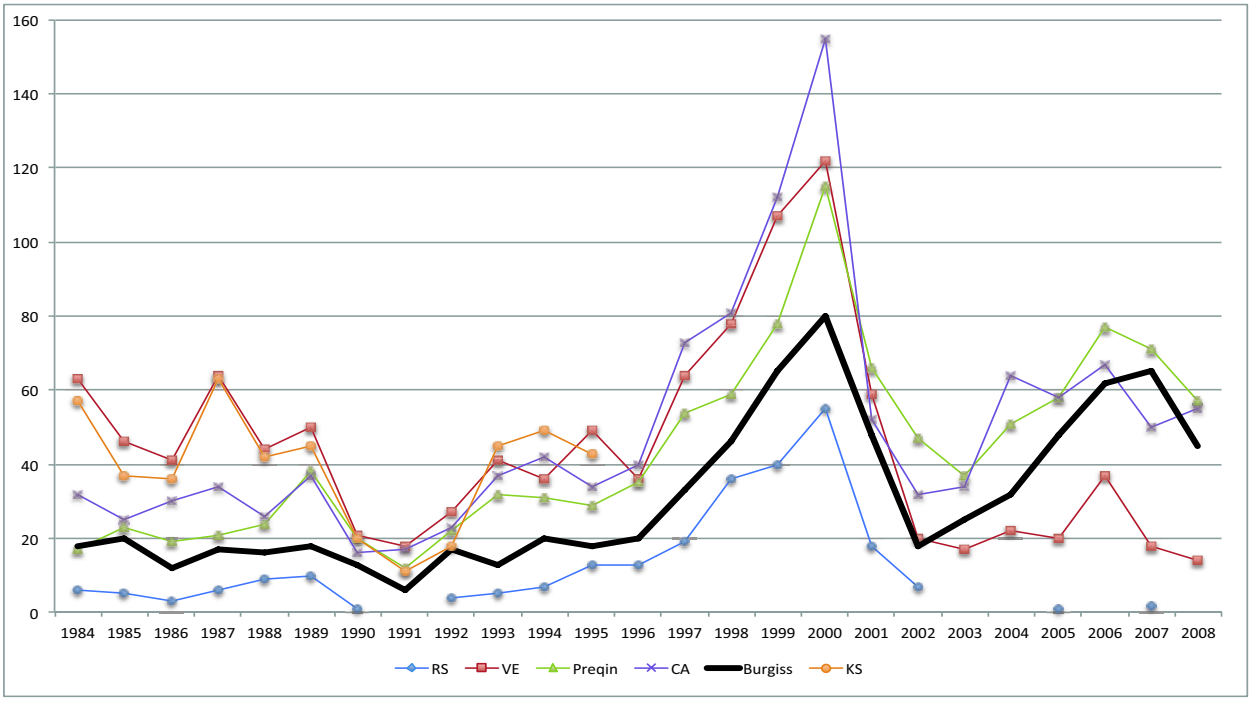
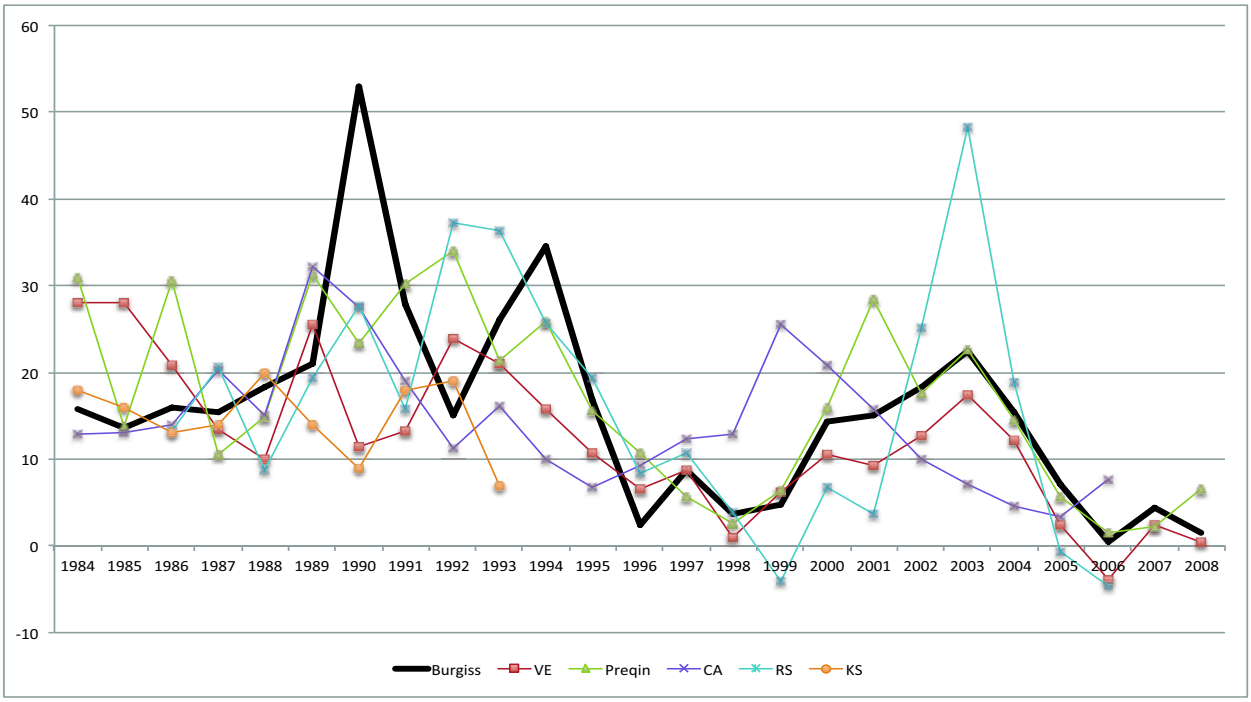


Figure 2: Buyout fund IRRs

This figure shows average Internal Rates of Return (IRRs) by vintage year for buyout funds for which performance data are available, for each data supplier and author. Panel A displays weighted averages using the capital committed for each fund as a proportion of the total commitments, as estimated by each source, for each vintage year. Panel B provides un-weighted averages. Kaplan-Schoar do not report an un-weighted average. The data use the classifications provided by the suppliers or authors. Only funds with a North American geographical focus are included.

Panel A: Buyout fund IRRs, capital weighted average



Panel B: Buyout fund IRRs, unweighted average

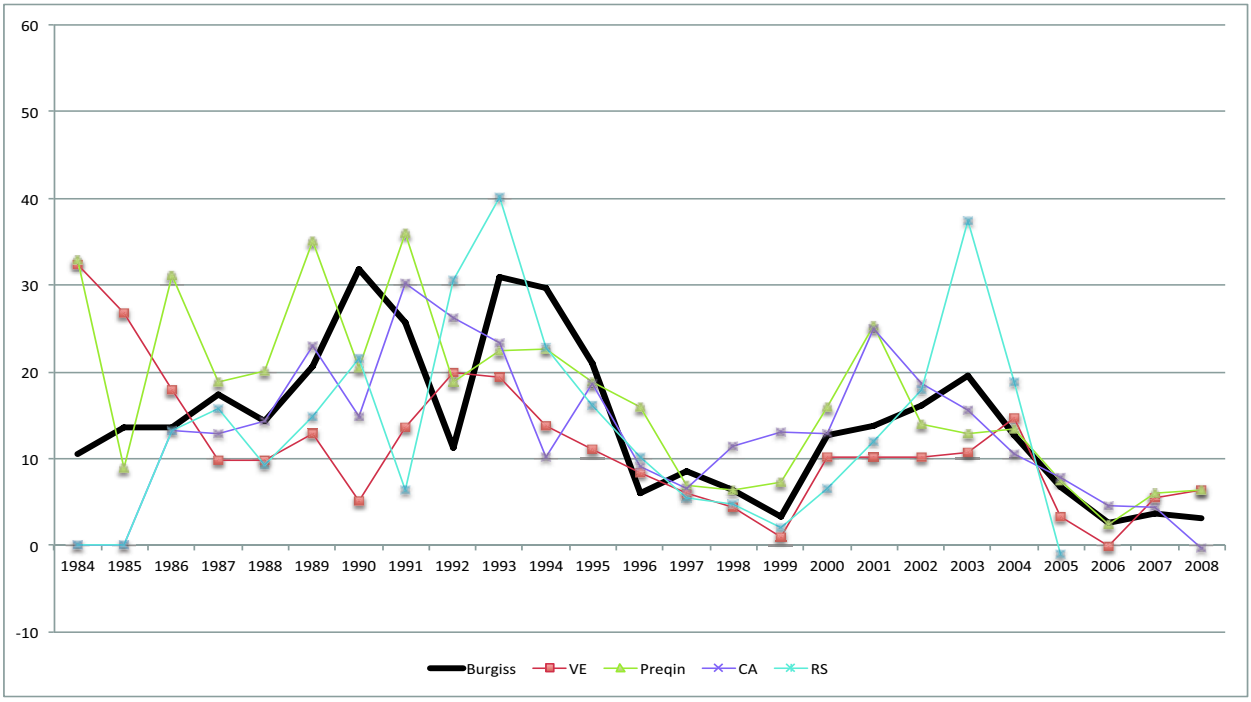
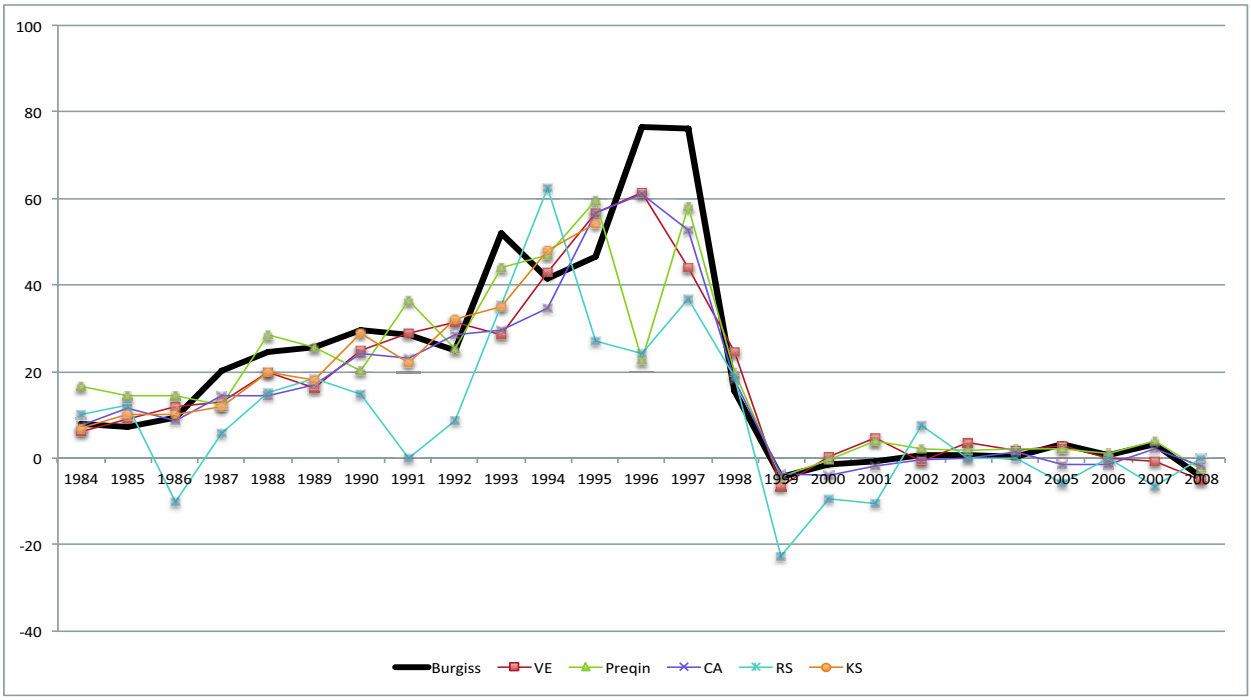


Figure 3: VC fund IRRs

This figure shows average Internal Rates of Return (IRRs) by vintage year for venture capital funds for which performance data are available, for each data supplier and author. Panel A displays weighted averages using the capital committed for each fund as a proportion of the total commitments, as estimated by each source, for each vintage year. Panel B provides un-weighted averages. Kaplan-Schoar do not report an un-weighted average. The data use the classifications provided by the suppliers or authors. Only funds with a North American geographical focus are included.

Panel A: VC fund IRRs, capital weighted average



Panel B: VC fund IRRs, unweighted average

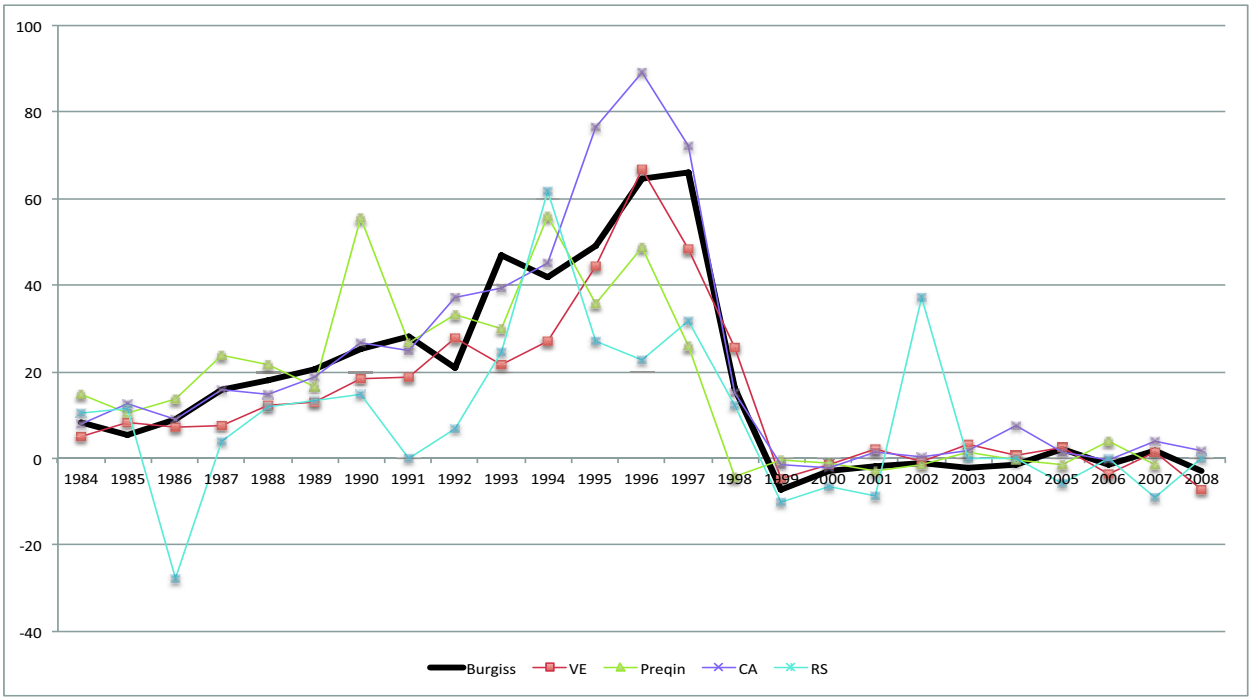
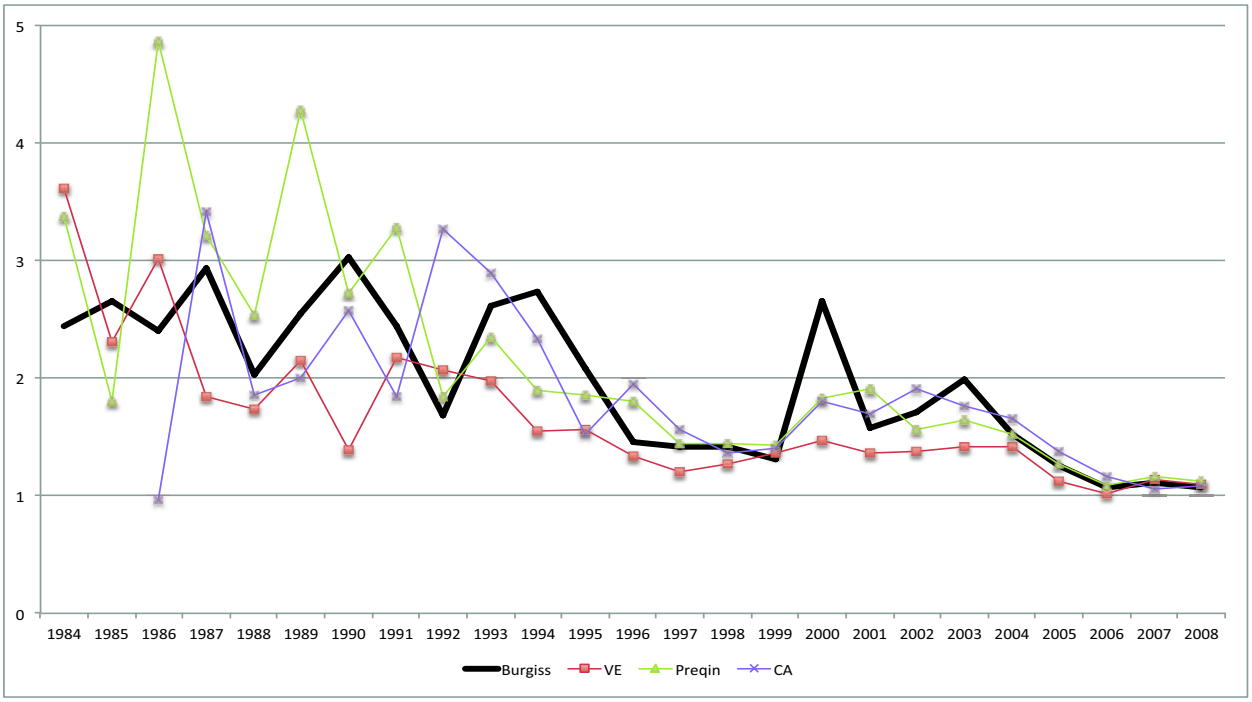


Figure 4: Buyout and VC fund multiples

This figure shows average investment multiples by vintage year for private equity funds for which performance data are available, for each data supplier and author. Panel A displays un-weighted averages for buyout funds. Panel B provides un-weighted averages for venture capital funds. Kaplan-Schoar do not report an un-weighted average. The data use the classifications provided by the suppliers or authors. Only funds with a North American geographical focus are included.

Panel A: Buyout fund investment multiples, unweighted average

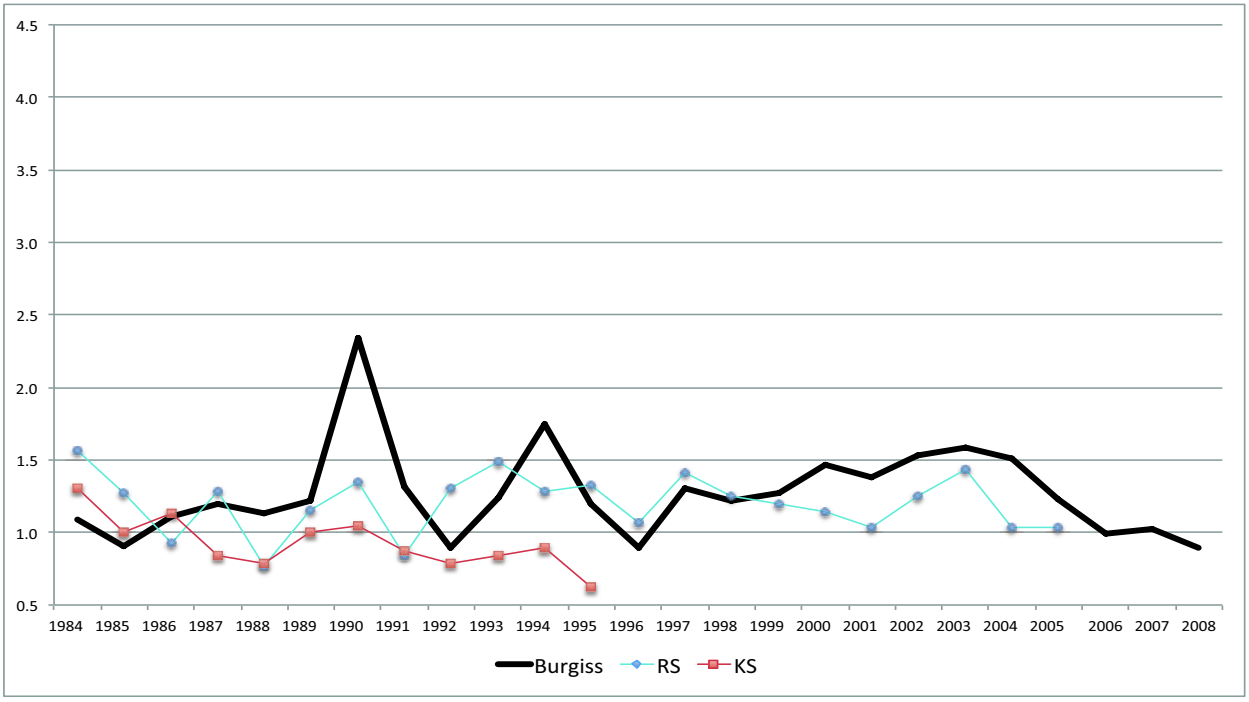


Panel B: VC fund investment multiples, unweighted average

Figure 5: 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

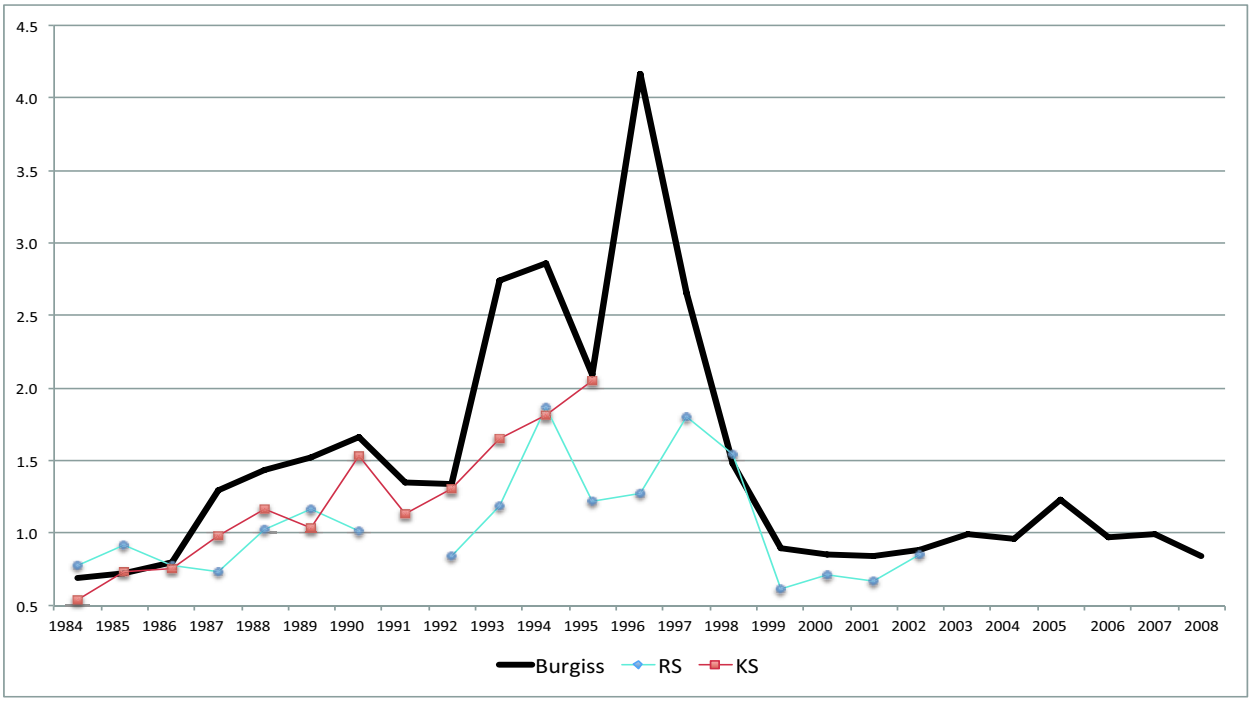
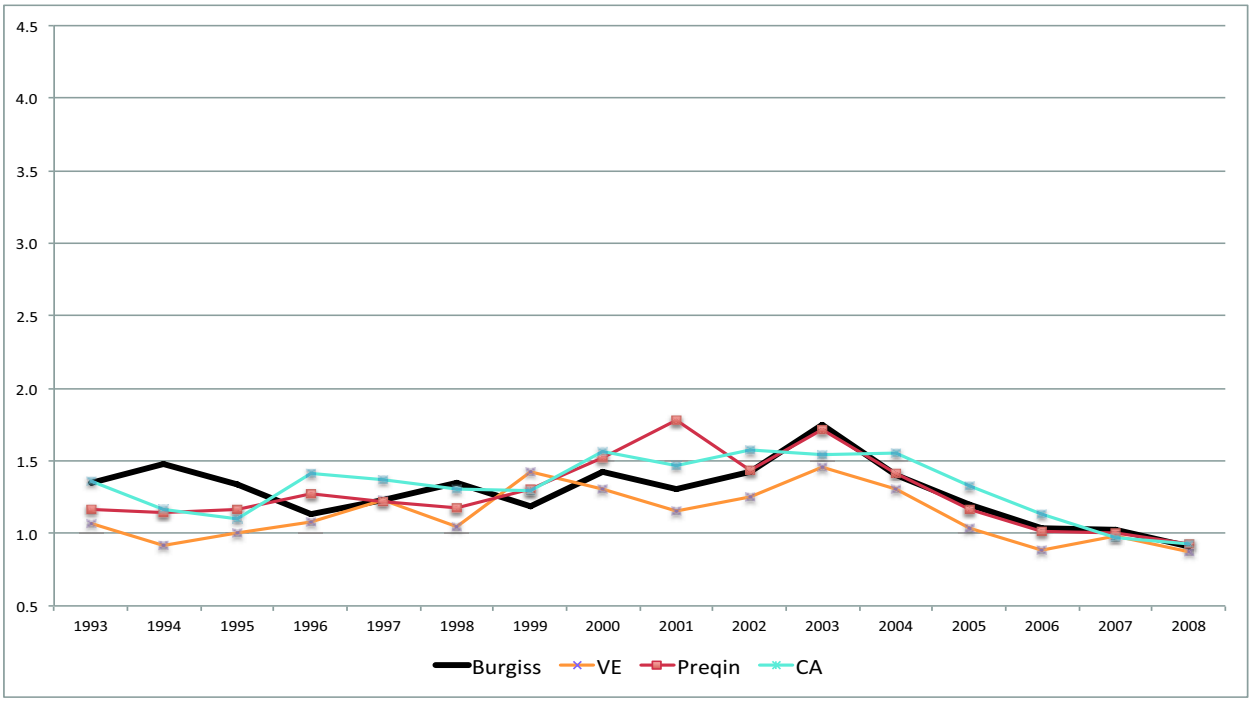


Figure 6: Actual and simulated PMEs

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 the regressions results reported in Table 8. 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 A: VC fund PMEs