
HOW DO PRIVATE EQUITY INVESTMENTS PERFORM COMPARED TO PUBLIC EQUITY?

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The merits of investing in private versus public equity have generated considerable debate, often fueled by concerns about data quality. In this paper, we use cash flow data derived from the holdings of almost 300 institutional investors to study over 1,800 North American buyout and venture capital funds. Average buyout fund returns for all vintage years but one before 2006 have exceeded those from public markets; averaging about 3% to 4% annually. Post-2005 vintage year returns have been roughly equal to those of public markets. We find similar performance results for a sample of almost 300 European buyout funds. Venture capital performance has varied substantially over time. North American venture funds from the 1990s substantially outperformed public equities; those from the early 2000s have underperformed; and recent vintage years have seen a modest rebound. The variation in venture performance is significantly linked to capital flows: performance is lower for funds started when there are large aggregate inflows of capital to the sector. We also examine the variation in performance of funds started in the same year. We find marked differences between venture and buyout funds leading to a more pronounced impact of accessing high-performing funds in venture investing.



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Despite the large increase in investments in private equity funds, the historical performance of private equity (PE) remains a subject of considerable debate. Fueling that debate has been the difficulty of obtaining high-quality data for research. Private equity is called “private” for a reason. There is no requirement for those running private equity funds—the General Partners, or GPs—to make their data available. Of course,

they provide this data to their current and potential investors—the Limited Partners in their funds, or LPs—but normally under confidentiality agreements that prevent sharing the data. And even if one obtains comprehensive data, measuring returns to illiquid private assets is a complicated task. It thus comes as no surprise that assessments of private equity performance are not easy.

In this paper, we examine private equity performance of over 2000 funds through June 2014. Our data are high-quality fund-level cash flows sourced by Burgiss from almost 300 private equity fund investors. We focus on comparing two ways investors can have residual equity claims on companies: limited partner stakes in a private equity fund or ownership of publicly traded stocks.¹ Despite the real differences between the two forms of ownership (including liquidity and control over cash flow timing), portfolio managers increasingly see them as alternative routes to equity exposure rather than as separate asset classes.

Our new data allow us to update and extend prior research in light of dramatic shifts in public and private markets in recent years. Public equities have surged since the financial crisis, with many market indices up 50% or more. And private equity funds suffered large write-downs during the crisis but these were largely reversed in the following years. Fundraising stalled during 2009–2010 but has since returned strongly. In an earlier study (Harris *et al.*, 2014a) we focused on North American private equity funds using returns through March 2011. In this paper we update and extend this earlier analysis, adding more North American funds, several hundred European funds, and with updated cash flows and asset values that reflect the significant movements in markets in the last few years. In addition to providing a comparison of private equity and public equity performance, we also use this larger data set to examine the role of high-performing

(“top quartile”) funds in determining investment results.

Many of our new findings echo those from earlier research despite the dramatic market shifts of the last few years. Buyout fund returns have exceeded those from public markets in almost all vintage years before 2006. Since 2006, buyout fund performance has been roughly equal to those of public markets. Venture capital (VC) funds started in the 1990s substantially outperformed public equities; however, those started since 2000 have generally underperformed.

The new results uncover a performance rebound for VC funds raised in recent years. This is consistent with a large decline in dollars going into venture capital during the 2000s. We show that for both venture and buyout, fund returns tend to be higher (lower) when smaller (larger) infusions of capital come into that sector. The magnitudes of these relations have been greater for VC funds and may reflect more constraints on the VC industry’s ability to expand in value-creating ways, especially as the cost of many technologies has fallen, thereby reducing the demand for capital. The inverse relationship between fund performance and aggregate capital committed to that sector suggests that a contrarian investment strategy would have been successful in the past. This apparent boom–bust cycle merits future research.

We also explore differences in performance across funds started in the same year. The performance gap between top (first) and bottom (fourth) quartile funds is much more pronounced in venture than in buyout, as would be expected. Moreover, compared to buyout, the highs are much higher in venture and the lows lower. In buyout, even third quartile funds have returns comparable to public markets. In venture, having some top quartile funds in the portfolio is much more important for successful investing, and so our results highlight

that LP selection skills and fund access have been more critical in venture capital than in buyout.

We find that average buyout performance appears quite similar between Europe and North America. On both continents, buyout funds have historically outperformed public market returns and by similar magnitudes. Our sample of European venture funds is limited which precludes strong conclusions. It appears, however, that venture investing in Europe has been less successful than in North America, and has been below that of European public equities. In contrast, buyout investing seems to provide similar average performance in both continents—suggesting a more globalized market for buyout.

Some may find it unsurprising that PE funds have historically provided investors a premium relative to investing in public markets. After all, PE investments are relatively illiquid and LPs bear “commitment risk” reflecting the uncertain timing of capital calls and distributions, which are under the control of the GP. This contrasts with investing in public markets where there is no distinction between capital committed and invested, and trading is continuous. The costs of illiquidity and commitment likely vary across investors. For some, the average return premium we find for buyout funds (3–4% per year over public markets) may well seem attractive; for others who face higher illiquidity costs it may not. On the other hand, the fact that post-2005 buyout vintages have not outperformed public markets leaves open the possibility that the illiquidity premium has declined and/or competition among buyout investors has driven returns down. An important area for research is understanding how to trade off the costs (e.g. illiquidity and commitment risk) against the potential benefits (e.g. a return premium) inherent in private versus public equity investing.

In the next section, we discuss our data and metrics of performance. Section 2 contains our main performance results on North American funds. In Section 3, we analyze European funds. Section 4 investigates whether performance is related to aggregate fundraising. Section 5 concludes.

1 Data and measures of performance

1.1 Data

We use PE fund-level cash flows from Burgiss as of June 2014. Burgiss provides investment decision support tools for the private capital market. Through these tools, and with authorization from its clients, Burgiss accumulates various data on private capital markets, including the Burgiss Manager Universe—a set of detailed, verified and cross-checked histories for almost 6,000 funds with a total capitalization of almost \$4 trillion as of June 2014. According to Burgiss, this dataset “is representative of actual investor experience because it is sourced exclusively from limited partners and includes their complete transactional and valuation history between themselves and their primary fund investments.” As a result we have “check book” data—recording the exact cash outflows made by the LPs to the general partners (GPs) as well as the distributions from the GPs back to the LPs for all of the private equity investments. All the returns we report are net of management fees and carried interest payments received by the GPs. The data are sourced entirely from nearly 300 institutional investors that represent approximately \$0.75 trillion in committed capital. The LPs comprise a wide array of institutions: nearly one-third is represented by small institutional investors, defined by Burgiss as having private capital commitments of less than \$100 million, and of the remaining two-thirds, about 60% are pension funds (a mix of public and corporate) and over 20% are endowments or foundations.

The first academic paper to use the Burgiss data was Harris *et al.* (2014a). In that paper we discuss its advantages and compare it with other leading commercial data sets. As part of their data confidentiality policy, Burgiss does not disclose the identities of the underlying investors or funds, so we cannot formally test how representative the LPs (and their chosen GPs) are. Our earlier results comparing different commercial databases, lead us to doubt that Burgiss data have an overall positive or negative bias in terms of performance.²

We study funds formed between 1984 (the first year with meaningful numbers of funds in the data) and 2010. In total we have data for over 1,800 North American funds: 781 buyout funds and 1,085 VC funds. We also have information on over 300 European funds which we analyze separately. In comparison, our earlier study (Harris *et al.* (2014)) used Burgiss data on 598 buyout funds and 775 VC funds, all focusing on North America.

1.2 Performance measures

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

Neither of these two metrics provides a direct way to assess how PE returns compare with those to public equity. We focus on Kaplan and Schoar's (2005) PME, which directly compares an investment in a PE fund to an equivalently-timed investment in the relevant public market. The PME calculation discounts (or invests) all cash distributions and residual value to the fund at the public market total return and divides the resulting value by the value of all cash contributions discounted (or invested) at the public market total return. The PME can be viewed as a market-adjusted multiple of invested capital (net of fees). A PME of 1.20, for example, implies that at the end of the fund's life, investors ended up with 20% more than they would have if they had invested in the public markets.

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

There are additional empirical justifications for this assumption, particularly for buyout funds. In their study of publicly traded funds-of-funds that invest in unlisted PE funds, Jegadeesh *et al.* (2009) find that publicly traded funds-of-funds have a market beta of 1.0. Driessen *et al.* (2012) report a beta of 1.3 for buyout funds, but a higher beta of 2.7 for venture funds. Axelson *et al.* (2013), however, report a beta of greater than 2 for individual buyout fund investments gross of fees. That estimate, however, overstates fund betas net of fees because the total fees, particularly the carried interest, have a negative beta.

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

To provide an annualized measure we also calculate an excess return using the direct alpha methodology of Gredil *et al.* (2014).³ The direct alpha approach sets up a PME calculation and then solves for an excess return (the direct alpha, over and above the index) that forces the PME to be equal to 1. This excess return measure is positive when the PME against the benchmark is greater than 1 and negative when the PME is less than 1. While a useful measure, direct alpha shares some of the drawbacks of any internal rate of return calculation.

2 PE performance

2.1 IRR and investment multiples

Table 1 displays both IRRs and investment multiples for our sample of North American funds. The table also shows what proportion of total value (realized distributions plus remaining value) has been realized for the median fund in each vintage year. For buyout funds the percent realized value is 100% for the median fund in pre-1999 vintages and over 90% for the median fund in the 1999–2001 vintages. The pre-2002 vintages, therefore, represent largely realized funds. The proportion of realized investments naturally falls for the later vintages, and drops below 25% for the 2010 vintage. Similar patterns apply to the VC funds although the more recent vintage VC funds have a smaller fraction of value realized than do buyout funds—reflecting a longer lag between investment and realization in VC. The residual net asset value (NAV) assumptions therefore become increasingly important for more recent vintages.

Assumptions about NAVs have generated controversy in past research. As discussed in Harris *et al.* (2014a), some claim that NAVs are biased upward while more recent research suggests that, on average, residual values have historically been conservative estimates of the ultimate cash returned to investors. Although caution is always warranted before including residual values in return calculations, two factors help mitigate any tendency for reported NAVs to be systematically biased in predicting future realizations. First, the Burgiss figures for both distributions and NAVs are up-to-date because the data are sourced directly from LPs, are subject to extensive cross-checking, and are part of the Burgiss systems used for the LPs' monitoring and record-keeping. Second, since the end of 2008, the Financial Accounting Standards Board (FASB) has required PE 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.⁴ This likely has had the effect of making estimated unrealized values closer to true market values than in the past, particularly for buyout funds.

Table 1 shows the average IRRs and investment multiples, separately for buyout funds and VC funds. The mean, median, and weighted-average (where the weights are capital commitments) figures are shown for each vintage year, as well as averages for the 1980s, 1990s, and 2000s. We find considerable variation in average performance across vintage years, with cycles that appear to lead economic booms and busts. This is due to the convention of classifying funds by vintage year, which is defined as the year of the fund's *first* capital call. Most funds have a five- or six-year investment period, and so deploy most of their capital in the few years after their designated vintage year.

For buyout funds, the average of the mean vintage year IRRs is 15.7%, and the average investment

Table 1 North american private equity fund internal rates of return and investment multiples.

Vintage year	Funds	Median % Realised	Internal rate of return			Investment multiple		
			Average	Median	Weighted-average	Average	Median	Weighted-average
Panel A: Buyout funds								
1984	4	100.0	15.5	14.9	24.8	2.87	2.85	4.09
1985	3	100.0	28.0	15.7	36.9	2.42	2.42	2.39
1986	7	100.0	14.2	16.8	16.8	3.36	2.36	4.47
1987	10	100.0	17.1	15.1	15.0	2.97	2.28	2.28
1988	10	100.0	13.3	11.2	16.5	1.96	1.70	2.24
1989	9	100.0	26.4	27.3	24.8	2.88	3.23	2.85
1990	4	100.0	20.6	17.1	19.1	2.89	2.87	2.72
1991	5	100.0	36.8	37.5	33.2	3.65	2.97	3.48
1992	11	100.0	16.6	18.8	26.4	1.91	1.88	2.20
1993	10	100.0	21.2	18.3	21.4	2.23	1.94	2.29
1994	20	100.0	20.9	19.6	28.2	2.09	1.72	2.65
1995	23	100.0	18.3	10.5	15.8	1.88	1.49	1.74
1996	18	100.0	10.4	8.0	9.1	1.51	1.36	1.40
1997	31	100.0	3.9	3.5	7.1	1.26	1.24	1.47
1998	46	100.0	6.0	8.3	4.7	1.47	1.45	1.38
1999	34	98.4	3.6	7.4	3.5	1.32	1.48	1.29
2000	60	96.4	12.8	13.2	15.3	1.75	1.73	1.86
2001	31	93.1	19.5	17.3	19.2	1.81	1.91	1.97
2002	23	85.6	16.1	14.9	18.8	1.86	1.85	1.97
2003	23	83.4	16.4	13.6	21.2	2.05	1.76	2.00
2004	50	72.6	12.5	11.9	15.3	1.67	1.65	1.84
2005	66	63.9	10.8	9.5	9.8	1.67	1.53	1.63
2006	80	50.4	7.8	8.2	7.4	1.41	1.48	1.42
2007	86	42.8	10.4	10.4	10.5	1.44	1.40	1.43
2008	64	31.7	13.9	13.7	15.8	1.45	1.43	1.52
2009	19	25.9	15.8	14.1	18.2	1.42	1.38	1.52
2010	34	14.8	15.5	13.9	15.5	1.30	1.29	1.29
Average*	781	83.7	15.7	14.5	17.4	2.02	1.88	2.13
Average 2000s	502	64.6	13.6	12.7	15.2	1.65	1.61	1.72
Average 1990s	202	99.8	15.8	14.9	16.9	2.02	1.84	2.06
Average 1980s	43	100.0	19.1	16.8	22.5	2.74	2.47	3.05
All funds*	781	78.6	12.4	11.2	12.4	1.66	1.51	1.61
Panel B: Venture capital funds								
1984	24	100.0	7.3	6.3	7.7	1.69	1.57	1.71
1985	24	100.0	5.5	8.0	7.7	1.97	1.73	2.05

Table 1 (Continued)

Vintage year	Funds	Median % Realised	Internal rate of return			Investment multiple		
			Average	Median	Weighted- average	Average	Median	Weighted- average
1986	18	100.0	10.7	8.6	8.7	2.14	1.78	1.76
1987	30	100.0	12.7	13.9	15.5	2.37	2.04	2.41
1988	26	100.0	13.4	11.6	20.5	2.12	1.94	2.65
1989	28	100.0	16.3	14.4	20.3	2.49	2.03	2.80
1990	17	100.0	20.6	20.4	26.2	2.63	2.24	3.10
1991	8	100.0	21.3	18.1	23.7	2.55	2.14	2.57
1992	19	100.0	22.4	13.4	27.4	2.64	1.78	2.75
1993	21	100.0	45.2	38.6	47.3	5.21	3.11	4.98
1994	23	100.0	37.6	31.0	50.9	4.92	2.91	7.83
1995	28	100.0	57.0	27.7	58.9	5.40	2.53	5.55
1996	23	100.0	67.8	44.9	80.8	5.92	3.21	6.51
1997	42	100.0	60.1	22.6	65.9	3.56	1.76	3.33
1998	58	99.7	15.2	0.7	16.0	1.86	1.04	1.93
1999	88	92.5	-2.1	-2.5	-3.1	0.94	0.82	0.99
2000	109	85.0	-2.0	-2.0	-0.7	0.97	0.87	1.01
2001	58	81.7	2.3	3.1	2.1	1.40	1.18	1.31
2002	21	70.4	0.1	1.8	1.5	1.09	1.11	1.12
2003	30	64.9	1.2	1.4	3.7	1.30	1.08	1.54
2004	49	44.9	3.8	1.8	5.1	1.72	1.12	1.75
2005	59	37.3	4.0	3.4	4.7	1.48	1.18	1.39
2006	70	25.3	3.3	5.0	5.9	1.30	1.27	1.40
2007	84	29.0	10.0	9.9	11.8	1.56	1.41	1.65
2008	58	23.4	10.2	11.7	11.0	1.69	1.38	1.67
2009	33	24.8	15.8	15.4	18.7	1.52	1.39	1.62
2010	37	9.9	22.5	19.7	22.3	1.64	1.45	1.64
Average*	1,085	77.4	17.9	12.9	20.8	2.37	1.71	2.56
Average 2000s	571	48.7	4.9	5.2	6.4	1.40	1.20	1.44
Average 1990s	327	99.2	34.5	21.5	39.4	3.56	2.15	3.96
Average 1980s	150	100.0	11.0	10.5	13.4	2.13	1.85	2.23
All funds*	1,085	85.7	13.0	6.4	10.2	1.97	1.34	1.66

*Average except for number of funds.

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

multiple is 2.02. Capital Weighted-averages are a bit higher. Over the entire sample of buyout funds, the average IRR is lower at 12.4% reflecting the increased number of funds after the early vintages. Average performance peaked in the early 1990s, and then rebounded though to a lower level, for vintage years in the early 2000s. Buyout funds that started investing just before the financial crisis have, on average, lower IRRs and investment multiples.

For VC funds, the pattern of performance over time is more variable. IRRs and investment multiples were extremely high for vintage years in the mid-1990s. For instance, the (weighted-average) IRR for 1996 vintage funds was around 81%, and the investment multiple was over six. However, post-1998 and after the demise of the dot-com boom, the fortunes of VC investors reversed. The vintages with the largest amounts of VC fundraising, 1999 and 2000, have returned negative IRRs. The generally lower average returns for VC persisted through the mid-2000s but have shown a rebound to double digit returns in the last few vintages.

2.2 Does PE outperform public markets?

Neither the IRR nor investment multiple offers a direct comparison to public markets as does PME. Initially we examine performance against the broad equity market as measured by the S&P500. Table 2 presents average PMEs by vintage year for North American funds. Buyout funds consistently outperform the S&P 500. The average of the weighted-average vintage PMEs is 1.25; the average of the averages is 1.20; and the average of the medians is 1.14. 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 buyout PME exceeds 1.0 for 25 of the 27 vintages from 1984 to 2010; the average for 23 and even the median PME exceeds 1.0 for 19 of 27 vintages. And, ignoring vintage

years, the average fund in the entire sample has an average PME of 1.18 and a median PME of 1.09. These results are qualitatively identical to the earlier results in Harris *et al.* (2014a).

We also calculate the direct alpha for each fund to measure the annualized excess return over and above the S&P 500. The average direct alpha for the buyout sample is 3.07%, while the median is 2.40%. The capital-weighted-average excess return is 3.16%. We also calculated direct alpha pooling all the cash flows over all funds. The resulting 4.72% reflects the excess return on a private equity portfolio comprised of all 781 buyout funds. The average PME of about 1.20 and an average annual excess return of roughly 3–4% suggest that the typical duration of a buyout fund is on the order of five-years, a duration lower than the typical fund's legal life of 10–13 years. This reflects the reality that committed capital is drawn down over a five-year investment period (rather than all at the beginning of the fund) and capital is returned through company sales and IPOs over the life of the fund.

These results strongly suggest that North American buyout funds have significantly outperformed public markets—by 20% over the life of the fund, or at least 3% per year—for a long period of time. Not only have top quartile funds outperformed the S&P 500, but so have average and median funds.

At the same time, the performance of more recent vintages—post-2005—have roughly equaled, not exceeded, the performance of public markets. It is worth noting that those more recent vintage funds are not fully realized. Their eventual performance 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.⁵ Alternatively, that performance will not

Table 2 Private equity fund public market equivalent ratios.

Vintage year	Panel A: Buyout fund PME				Panel B: Venture capital fund PME			
	Funds	Average	Median	Weighted-average	Funds	Average	Median	Weighted-average
1984	4	1.01	0.98	1.41	24	0.66	0.57	0.67
1985	3	1.14	1.00	1.25	24	0.68	0.62	0.72
1986	7	1.17	1.11	1.36	18	0.89	0.71	0.78
1987	10	1.24	1.04	1.09	30	1.00	0.92	1.08
1988	10	0.93	0.81	1.07	26	0.97	0.85	1.29
1989	9	1.49	1.61	1.35	28	1.14	0.89	1.36
1990	4	1.19	1.07	1.18	17	1.31	1.10	1.52
1991	5	1.82	1.65	1.63	8	1.13	1.04	1.20
1992	11	1.01	0.99	1.13	19	1.24	0.84	1.35
1993	10	1.11	0.97	1.13	21	2.33	1.45	2.28
1994	20	1.19	1.09	1.46	23	2.24	1.40	3.42
1995	23	1.24	1.01	1.17	28	3.07	1.49	3.14
1996	18	1.13	1.13	1.05	23	3.86	2.16	4.34
1997	31	1.09	1.03	1.27	42	2.86	1.43	2.68
1998	46	1.38	1.40	1.31	58	1.66	0.99	1.74
1999	34	1.15	1.21	1.13	88	0.83	0.67	0.89
2000	60	1.44	1.38	1.48	109	0.75	0.66	0.78
2001	31	1.42	1.49	1.48	58	0.97	0.83	0.91
2002	23	1.38	1.34	1.51	21	0.76	0.76	0.79
2003	23	1.57	1.40	1.55	30	0.92	0.81	1.09
2004	50	1.29	1.29	1.45	49	1.18	0.75	1.23
2005	66	1.25	1.12	1.26	59	1.07	0.80	0.98
2006	80	1.01	1.03	1.02	70	0.87	0.80	0.95
2007	86	1.01	0.97	0.99	84	1.03	0.93	1.08
2008	64	0.97	0.96	1.03	58	1.06	0.85	1.05
2009	19	0.96	0.92	1.01	33	0.99	0.95	1.05
2010	34	0.91	0.90	0.93	37	1.13	1.00	1.13
Average*	781	1.20	1.14	1.25	1,085	1.35	0.97	1.46
Average 2000s	502	1.23	1.19	1.28	571	0.96	0.81	0.99
Average 1990s	202	1.23	1.16	1.25	327	2.05	1.26	2.26
Average 1980s	43	1.16	1.09	1.25	150	0.89	0.76	0.98
All funds*	781	1.18	1.09	1.17	1,085	1.23	0.87	1.13

*Average except for number of funds.

This table shows the average PME ratios by vintage year, comparing PE returns to equivalent-timed investments in the S&P 500 using the Burgiss data. Weighted-averages use the capital committed to the funds as weights. Only funds with a North American geographical focus are included.

improve if competition among buyout funds has reduced the premium for illiquidity.

The performance of North American VC contrasts considerably with that of buyouts. Panel B of Table 2 shows that the PME for early VC vintages were less than 1.0, but then increased sharply after 1986. Weighted-average PMEs exceed 1.0 for the 1987–1998 vintage years, with the 1996 vintage having a weighted-average PME above 4.0.

From 1999 to 2006, the pattern reverses. Except for 2003 and 2004, none of those vintages have a weighted-average or simple-average PME greater than 1.0. The 1999–2002 vintages are particularly low with all PMEs at or below 0.91. Interestingly, VC performance has rebounded somewhat after the 2006 vintage. While not at the high levels of the 1990s, weighted-average PMEs are above 1 for each of the vintage years 2007 through 2010.

We also note that the gap between average (mean) and median performance is much more pronounced in venture than in buyout. This was especially the case when venture was performing well in the 1990s and reflects the highly variable nature of investing in early-stage companies, a few of which have spectacular success.

We also calculate direct alpha as a measure of the annualized excess return over and above the S&P 500. For the entire venture sample, the average direct alpha is 2.07 %, the median is –2.93% and the capital-weighted-average is 0.47%. For sub-periods of vintages, however, the figures are markedly different, mirroring the patterns in venture fund PMEs. Venture fund direct alphas average double digits in the 1990s, fall-off precipitously beginning in 1999 and have a negative average in the 2000s.

Overall, our findings suggest that North American venture funds delivered returns higher than those from public markets for most of the 1990s, and by a fairly wide margin. Beginning in 1999, venture

performance dropped dramatically and returns underperformed public markets for years. In the most recent vintages, venture performance shows signs of a rebound, though not to the level of the 1990s. Later we examine whether this change in performance is linked to capital flows into venture capital funds.

2.3 Sensitivity of PMEs to the choice of benchmark

So far our PME calculations are based on the S&P 500 because it is a widely used proxy for U.S. public market returns, has a natural asset pricing interpretation, and allows for direct comparison with past research. However, LPs commonly use other investable benchmarks (e.g., Russell 2,000 or other size-related indices) to control for what they perceive as differences in risk or other return characteristics. To gauge the sensitivity of our results, Table 3 reports vintage year average, average, and median PMEs using a number of different indices, each of which represents a different public market alternative for investing funds.

The first four columns of Table 3 calculate PMEs with the S&P 500 and three other commonly used benchmarks. For buyout funds (Panel A), the average vintage year PMEs exceed 1.0 measured using all four benchmark indices. The PMEs are of similar magnitude (1.20–1.23) using the S&P 500, Russell 3,000, and (small-cap) Russell 2,000 indices. The average vintage year PME is slightly lower (1.17) using the narrower Russell 2,000 Value (small-cap value) index. Average vintage year PMEs also are consistent over time—they all exceed 1.0 for each of the indices in each of the three decades for which we have data.

The overall sample average PMEs also exceed 1.0 across all indices. Measured against the S&P 500 and the Russell 3,000 indices, sample average PMEs are 1.18 and 1.16. They are lower using

Table 3 Private equity public market equivalent ratios using alternative public market indices.

Vintage years	S&P 500	Russell indices			Beta (levered S&P 500)
		3000	2000	2000 Value	1.5
Panel A: Buyout funds					
1984	1.01	1.05	1.35	1.24	1.15
1985	1.14	1.19	1.39	1.32	0.99
1986	1.17	1.23	1.55	1.37	0.98
1987	1.24	1.26	1.41	1.30	1.02
1988	0.93	0.93	1.00	0.94	0.81
1989	1.49	1.49	1.56	1.44	1.27
1990	1.19	1.21	1.33	1.20	1.02
1991	1.82	1.85	2.06	1.91	1.59
1992	1.01	1.03	1.19	1.15	0.88
1993	1.11	1.13	1.33	1.26	0.95
1994	1.19	1.21	1.39	1.31	1.03
1995	1.24	1.25	1.35	1.25	1.16
1996	1.13	1.12	1.08	0.99	1.06
1997	1.09	1.04	0.86	0.72	1.10
1998	1.38	1.32	1.03	0.83	1.36
1999	1.15	1.11	0.90	0.74	1.20
2000	1.44	1.40	1.20	1.07	1.29
2001	1.42	1.38	1.27	1.24	1.34
2002	1.38	1.35	1.27	1.28	1.26
2003	1.57	1.54	1.47	1.50	1.39
2004	1.29	1.27	1.24	1.29	1.23
2005	1.25	1.24	1.20	1.27	1.10
2006	1.01	1.00	0.98	1.03	0.93
2007	1.01	1.00	0.97	1.01	0.89
2008	0.97	0.96	0.94	0.97	0.85
2009	0.96	0.96	0.95	0.96	1.00
2010	0.91	0.90	0.90	0.92	0.89
Average	1.20	1.20	1.23	1.17	1.10
<i>Average 2000s</i>	<i>1.23</i>	1.21	1.15	1.16	1.13
<i>Average 1990s</i>	<i>1.23</i>	1.23	1.25	1.14	1.13
<i>Average 1980s</i>	<i>1.16</i>	1.19	1.38	1.27	1.04
Sample average	1.18	1.16	1.11	1.08	1.09
Sample median	1.09	1.08	1.03	1.01	1.00

Table 3 (Continued)

Vintage years	S&P 500	Russell indices			Beta (levered S&P 500)
		3000	2000	2000 Growth	1.5
Panel B: Venture capital funds					
1984	0.66	0.69	0.88	0.94	0.65
1985	0.68	0.71	0.88	0.96	0.66
1986	0.89	0.92	1.09	1.17	0.88
1987	1.00	1.01	1.12	1.19	0.95
1988	0.97	0.97	1.05	1.13	0.90
1989	1.14	1.15	1.23	1.34	1.04
1990	1.31	1.31	1.36	1.49	1.18
1991	1.13	1.15	1.37	1.46	0.97
1992	1.24	1.28	1.51	1.64	1.07
1993	2.33	2.42	3.12	3.18	1.95
1994	2.24	2.32	3.00	3.11	1.91
1995	3.07	3.14	3.84	3.81	2.75
1996	3.86	3.91	4.50	4.40	3.68
1997	2.86	2.84	2.89	2.84	2.95
1998	1.66	1.60	1.39	1.57	1.90
1999	0.83	0.79	0.63	0.79	1.00
2000	0.75	0.72	0.61	0.70	0.85
2001	0.97	0.93	0.84	0.86	1.03
2002	0.76	0.74	0.69	0.69	0.79
2003	0.92	0.90	0.87	0.85	0.95
2004	1.18	1.16	1.13	1.08	1.19
2005	1.07	1.05	1.02	0.98	1.08
2006	0.87	0.85	0.83	0.79	0.81
2007	1.03	1.01	0.98	0.95	0.92
2008	1.06	1.05	1.03	1.00	0.90
2009	0.99	0.98	0.97	0.95	0.83
2010	1.13	1.13	1.13	1.12	0.97
Average	1.35	1.36	1.48	1.52	1.29
<i>Average 2000s</i>	<i>0.96</i>	<i>0.94</i>	<i>0.90</i>	<i>0.88</i>	<i>0.94</i>
<i>Average 1990s</i>	<i>2.05</i>	<i>2.08</i>	<i>2.36</i>	<i>2.43</i>	<i>1.94</i>
<i>Average 1980s</i>	<i>0.89</i>	<i>0.91</i>	<i>1.04</i>	<i>1.12</i>	<i>0.85</i>
Sample average	1.23	1.23	1.26	1.30	1.21
Sample median	0.87	0.86	0.84	0.87	0.85

This table shows vintage year average, average, and median PME ratios calculated with alternative market benchmarks. The Russell 3,000 index is based on the largest 3,000 U. S. companies. The Russell 2,000 measures the performance of small-cap stocks and is based on a 2,000 company subset of the Russell 3,000. The Russell 2,000 Growth and 2,000 Value indices are subsets of the Russell 2,000 chosen on the basis of forecasted growth rates and price-to-book ratios. The final columns calculate PMEs using a levered S&P 500 to approximate the effect of beta of 1.5. Panel A focuses on the 781 buyout funds, and Panel B on the 1,085 VC funds, which have a North American focus and are in the Burgiss data set.

the Russell 2,000 (1.11) and the Russell 2,000 Value (1.08), but again still statistically greater than 1.0. The lower PME's for the Russell 2,000 Value index are driven by PME's below 1.0 for the late 1990s vintages and the more recent 2009 and 2010 vintages. We also calculated direct alphas against each benchmark. Paralleling the reported PME's, the sample average alpha is higher against the S&P 500 (3.07%) and Russell 3,000 (2.7%) than against the Russell 2,000 (1.71%) and 2,000 value (1.15%). Direct alphas from pooled data are higher than the simple sample averages and aligned in the same fashion; similar against the S&P 500 (4.72%) and Russell 3,000 (4.60%) and lower for the Russell 2,000 (4.04%) and Russell 2,000 value (2.86%).

The sample median PME's are also significantly different from 1.0 except against the Russell 2,000 Value. An important question is whether the mean or the median is a more appropriate measure of fund performance. If LP investors can freely choose among different funds and create a diversified portfolio of funds, then the mean is the appropriate standard. If, instead, some LPs can distinguish in advance which funds will outperform and those funds are not available to the typical LP, then the median may be the more appropriate measure.

Recent research suggests that the mean is the more appropriate measure for buyout funds. Harris *et al.* (2014b) find that buyout fund persistence has declined post-2000, suggesting that it is difficult to predict which funds will outperform based on previous fund performance. Furthermore, in their study of the performance of LPs, Sensoy *et al.* (2014) do not find that any particular type of investor is able to choose, and access, better performing buyout funds.

For venture funds (Panel B of Table 3), the patterns identified using the S&P 500 also persist across the different indices. Although average

vintage year PME's exceed 1.0 across all indices, they are below 1.0 in the 2000s and well above 1.0 in the 1990s. Sample average PME's are similar for the different indices with the lowest using the S&P 500 and Russell 3,000 (both 1.23) and the highest using the Russell 2,000 Growth index (1.30).

While the overall sample average performance of VC funds is greater than 1.0, the sample median is below 1.0. For VC funds, it is less clear whether the median or mean is the appropriate measure for the typical LP. Harris, Jenkinson *et al.* (2014b) find that VC fund persistence is equally strong before and after 2000. This suggests that it is possible to predict which VC funds will outperform based on previous fund performance. If the typical LP cannot get into such high-performing funds it may not be able to achieve average (mean) returns. Alternatively, Sensoy *et al.* (2014) do not find that any particular type of LP (including endowments) is able to access or choose better performing VC funds after 1998 which suggests that the mean is a more appropriate benchmark.

Overall, Table 3 shows that average PME's across our sample are robust to a range of public market benchmarks. Size (smaller) and value benchmarks reduce the outperformance of buyout funds somewhat, but do not eliminate it. This reinforces our prior conclusions about PE performance.

2.4 Sensitivity of PME's to beta or systematic risk

As Sorensen and Jagannathan (2013) show, there is a strong asset pricing justification for using PME's calculated using the market return (like that of the S&P 500) without making assumptions about systematic risk (or betas). The relatively stable and positive pattern of PME's for buyout funds that we find over the 1980s, 1990s, and 2000s—periods of very different

market returns—suggests this assumption is reasonable.

Nevertheless, to further investigate the sensitivity of our conclusions, we estimate PME with discount rates that approximate assumed betas of 1.5. The higher beta is created by investment strategies that combine the S&P 500 (beta of 1.0) with borrowing. To proxy the public market return from a beta of 1.5, we take 1.5 times the return on the S&P 500 minus a 2% interest cost involved in borrowing to leverage the index.⁶ The PMEs for a 1.5 beta assumption are reported in the last column of Table 3.

For buyout funds, we find that the average fund has a PME of 1.19 and 1.09 assuming public market returns that are levered to betas of, respectively, 1.0 and 1.5. The median PMEs are 1.11 and 1.00, respectively. If we use a 4% interest cost (not reported in the table), the average and median PMEs for a beta of 1.5 are, respectively, 1.13 and 1.02.

Leverage, therefore, leads to a drop in PME, but the PME remains above 1.0, particularly for vintages before 2006. Post-2005, the PMEs drop below 1.0. We conclude that the general patterns for buyout funds remain with different systematic risk assumptions.

For VC funds, we find that the average fund has a PME of 1.35 and 1.29 assuming betas of 1.0 and 1.5. The medians are also close at 0.87 and 0.85. Our basic conclusions are unchanged regardless of our assumption about beta—VC funds outperformed in the 1990s and underperformed in the early 2000s. The apparent recovery of VC in recent vintage years is less pronounced, however, if one uses a higher beta.

Overall, our analysis shows that our main conclusion are robust to an array of assumptions about market indices and beta. In keeping with these results, prior research, and the Sorensen and

Jagannathan (2013) asset pricing interpretation, we rely on PMEs using a broad market index for the remainder of our analysis.

2.5 Selection bias?

In our analysis, we have assumed that the Burgiss data provide an unbiased measure of PE performance. In fact, it is possible that the LPs who provide data to Burgiss are above average and, overall, invest in above average funds. If this were true, the Burgiss data would overstate PE performance. In Harris *et al.* (2014a), we acknowledged that we could not be certain there was no bias, but we concluded that such a bias was highly unlikely. We still come to the same conclusion for two primary reasons.

If the data were biased, Burgiss should overstate performance. However, Harris *et al.* (2014a) find that the Burgiss performance results are qualitatively and quantitatively similar to those in Preqin and Cambridge Associates. Subsequently, we confirmed that the Burgiss performance data are qualitatively and quantitatively similar to those in Pitchbook. Preqin, Cambridge Associates and Pitchbook are the primary competitors to Burgiss. Importantly, both the Preqin and Pitchbook databases rely largely on Freedom of Information Act requests from public pension investors. That is, public pension investors have to report performance (IRRs and MOICs) for all of the funds in which they invest. Particularly for buyout funds, public pension investors invest in virtually all of the large buyout funds. Accordingly, it is highly unlikely that Preqin's buyout results are biased. Preqin's buyout results—both averages and capitalization-weighted-averages—are slightly higher, but qualitatively and quantitatively similar to those in Burgiss. Accordingly, we view a bias in the Burgiss data as highly unlikely. Instead, we view the similar results as more consistent with the conclusion that all

four databases provide unbiased estimates of the overall performance of private equity.

It also is worth pointing out that for a bias to exist, the following would need to be true: (1) there would have to be a group of institutional investors who invested in the worst PE funds, had poor performance, no longer invest in PE funds and do not use Burgiss to measure their fund performance; (2) no other institutional investors who do use Burgiss invested in those same PE funds, so the poorly performing PE funds do not show up in the data set.

This seems highly unlikely, particularly for buyout funds. Sensoy *et al.* (2014) find that LPs have found it difficult to consistently pick outperforming funds, particularly in buyout. Harris, *et al.* (2014b) find that persistence of buyout GPs has declined substantially post-2000. As a result, it is difficult for LPs to consistently pick winners or losers. So, it is almost certain that even the most successful institutional investors invest in many poorly performing PE funds. Even if Burgiss were biased towards more successful institutional investors, the Burgiss data set likely would not have any bias towards more successful PE funds.

2.6 Fund quartiles in buyout and venture investing

A common practice in private equity is to place funds into quartiles based on performance relative to other funds started in the same vintage year. The top quartile label gets special attention, especially since past research has found that the funds raised by the best performing GPs tend to outperform their peers with some consistency over time—and in a way that even the best mutual funds and hedge funds clearly have not. As a result, GPs aim to market new funds based on “top quartile results” from their existing funds. LPs often select funds based on top quartile results. More

recent research suggests that performance persistence may have declined in recent years especially for buyout funds (see Harris, *et al.* (2014b) and the references therein). Our data allow us examine how important having positions in top quartile funds is for overall investment performance.

Table 4 reports PME by quartile. In each vintage year, we use PMEs to group funds into quartiles and report the average PME for that quartile. Averages weighted by capital commitments (not reported) yield similar patterns. We begin with the 1994 vintage since that allows meaningful numbers of funds in each quartile grouping.

For buyout funds, Panel A shows that over the 1994–2010 period, top (1st) quartile funds have average PMEs over two and a half times those of the bottom (4th) quartile. The vintage year average for the 1st quartile is 1.79 and 0.66 for the 4th quartile. The averages across all individual funds for vintages back to 1984 are shown in Panel A’s bottom row and lead to a similar conclusion. The gap between the top and bottom quartiles narrows in more recent vintages. This narrowing may well result from recent funds being largely unrealized (shown in Table 2), so ultimate outcomes are not yet known. While bottom quartile PMEs in buyout are well below 1, third quartile buyout funds have returns roughly on par with the S&P 500; the average of the vintage year 1994–2010 is 1.01 and the average across all funds back to 1984 is 1.00. Second quartile buyout funds have PMEs well above 1, averaging 1.29.

Compared to buyout, venture funds display a much wider gap between top and bottom quartile performance. This is to be expected given the nature of investing in young versus mature companies. As shown in Panel B, the top VC quartile PME averages 3.29 over the vintage years 1994–2010 and is over seven times the bottom quartile average of 0.45. As was true for buyouts, the gap between bottom and top quartile in venture

Table 4 Private equity fund public market equivalent ratios by performance quartile.

Vintage year	Panel A: Buyout funds, average PME per quartile				Panel B: Venture capital funds, average PME per quartile					
	Funds	Bottom (4th) quartile	3rd quartile	2nd quartile	Top (1st) quartile	Funds	Bottom (4th) quartile	3rd quartile	2nd quartile	Top (1st) quartile
1994	20	0.67	0.93	1.31	1.87	23	0.37	0.88	1.92	5.49
1995	23	0.58	0.88	1.27	2.11	28	0.68	1.19	2.12	8.27
1996	18	0.40	0.85	1.26	1.89	23	0.73	1.55	2.61	10.03
1997	31	0.55	0.93	1.17	1.62	42	0.59	1.19	2.16	7.24
1998	46	0.63	1.14	1.55	2.14	58	0.40	0.80	1.23	4.09
1999	34	0.44	0.90	1.37	1.84	88	0.23	0.53	0.81	1.74
2000	60	0.70	1.26	1.57	2.23	109	0.31	0.57	0.82	1.28
2001	31	0.76	1.23	1.57	2.02	58	0.35	0.66	0.98	1.83
2002	23	0.79	1.18	1.60	1.87	21	0.37	0.62	0.86	1.12
2003	23	0.93	1.23	1.43	2.58	30	0.29	0.68	0.94	1.70
2004	50	0.74	1.14	1.34	1.91	49	0.43	0.62	0.91	2.62
2005	66	0.77	1.04	1.29	1.89	59	0.33	0.66	0.99	2.23
2006	80	0.61	0.95	1.10	1.39	70	0.36	0.67	0.91	1.50
2007	86	0.66	0.92	1.05	1.41	84	0.56	0.85	1.08	1.61
2008	64	0.69	0.89	1.03	1.28	58	0.42	0.78	0.98	2.02
2009	19	0.72	0.88	0.97	1.23	33	0.59	0.87	1.01	1.41
2010	34	0.63	0.84	0.95	1.19	37	0.66	0.94	1.13	1.73
Average*	708	0.66	1.01	1.29	1.79	870	0.45	0.83	1.26	3.29
Average 2000-10	536	0.73	1.05	1.27	1.73	608	0.42	0.72	0.96	1.73
Average 1994-99	172	0.54	0.94	1.32	1.91	262	0.50	1.02	1.81	6.14
Average across all funds in vintages 1984-2010	781	0.66	1.00	1.26	1.75	1,085	0.41	0.76	1.12	2.58

*Average except for number of funds.

This table shows the average PME ratios by vintage year, comparing PE returns to equivalent-timed investments in the S&P 500. In each vintage year, a fund is assigned to a quartile based on its PME relative to others in that year. Figures reported are the average PME across funds in that quartile. We start with 1994 when there are meaningful numbers of funds in each quartile group. Averages of vintage year averages are shown after the last vintage year. The final row of numbers report averages over all individual funds in all vintage years 1984-2010 for our full sample. Only funds with a North American geographical focus are included.

narrows in recent vintages of funds whose investments are largely unrealized. Unlike buyout, third quartile venture funds have PME's well below 1 except during the boom venture years of the 1990s. In addition, the gap between second and top quartile venture funds is pronounced, especially in the 1990s when some funds saw spectacular successes. Over the entire period, top quartile venture funds have PME's that average well over two times those of the second quartile. For vintages in the mid-1990s the gaps are even larger.

Comparing Panels A and B, the quartile results reflect the much more dispersed outcomes of venture investing compared to buyout. The bottom quartile of venture (average vintage year PME of 0.45) is lower than the bottom buyout quartile (average of 0.66). At the other end of the spectrum, the top quartile of venture (average vintage year PME of 3.29) has appreciably higher performance than the top buyout quartile (average vintage year of 1.79). Even in the 2000s when venture had years of sub-par average performance, the top quartile of venture often matched or exceeded the top buyout quartile.

The results in Table 4 highlight that fund selection and access are more important (and likely more difficult) in venture than in buyout. To illustrate the impact of top quartile funds for investment performance we compare two polar scenarios over vintage years 1994–2010. In the first scenario, we assume an LP's investments were representative of all venture funds (i.e. equally invested in all four quartiles). In the second scenario, we assume the LP did not select or have access to any top quartile venture funds (i.e., invested in only the remaining three quartiles). Using the data in Table 4, the first scenario provides a vintage year average PME of 1.46; the second provides a PME of 0.85.⁷ The result of

missing top quartile venture funds is a dramatic drop in PME to a level that provides returns well below those of public equities. In contrast, the impact of top funds is much smaller in buyout. Applying the same polar scenarios to buyout, if a buyout investor missed out on all top quartile funds the average PME would be 0.99. This represents a drop from 1.19 if all four quartiles are included but is still almost on a par with public equities.

Of course, these illustrations are extremes. In practice, the issue is not complete exclusion from top quartile funds but rather a reduced probability of being in those relative to other funds. For instance, if we adjust our prior example for venture so that an investor's allocation to top quartile was only 12.5% (half of the random 25%, but not zero) the implied PME is 1.15 rather than 0.85. This is still a substantial drop from the PME with equal investment across quartiles. Our calculations illustrate the substantive differences in the importance of top performing funds in venture versus buyout. In practice, individual LPs likely have different skills and access to funds. Our illustrations show that such differential abilities are much more important in venture than buyout. The challenge, of course, is identifying likely fund performance at the fund's launch in time for investment decisions.

3 Comparison of European and North American funds

In the early years of private equity, the vast majority of investment focused on North America. While the industry has become more global, most research still focuses on North American funds given their larger numbers and longer history. Burgiss data enable us to analyze a sample of 282 European buyout funds. These start with the 1994 vintage when meaningful numbers of observations are available. Table 5 reports PME's for these funds calculated in two ways. The first

Table 5 Private equity fund public market equivalent ratios for North American and European buyout funds.

Vintage year	<i>European funds</i>						<i>North American funds</i>					
	U.S.\$, S&P 500 benchmark			Euros, MSCI Europe benchmark			U.S.\$, S&P 500 benchmark			U.S.\$, S&P 500 benchmark		
	Funds	Average	Median	Weighted-average	Average	Median	Weighted-average	Funds	Average	Median	Weighted-average	
1994	7	1.19	1.12	1.70	1.38	1.31	1.98	20	1.19	1.09	1.46	
1995	2	0.69	0.69	0.61	0.71	0.71	0.63	23	1.24	1.01	1.17	
1996	5	1.25	1.21	1.28	1.16	1.19	1.29	18	1.13	1.13	1.05	
1997	8	2.05	1.71	1.69	1.84	1.48	1.55	31	1.09	1.03	1.27	
1998	12	1.90	1.80	1.89	1.59	1.48	1.59	46	1.38	1.40	1.31	
1999	9	1.40	1.57	1.74	1.13	1.35	1.38	34	1.15	1.21	1.13	
2000	19	1.83	1.61	1.81	1.45	1.31	1.46	60	1.44	1.38	1.48	
2001	13	1.75	1.65	1.67	1.40	1.41	1.37	31	1.42	1.49	1.48	
2002	11	1.72	1.55	1.70	1.46	1.34	1.39	23	1.38	1.34	1.51	
2003	13	1.44	1.48	1.60	1.32	1.36	1.46	23	1.57	1.40	1.55	
2004	17	1.09	0.98	1.26	1.12	1.07	1.29	50	1.29	1.29	1.45	
2005	27	1.10	1.02	1.17	1.22	1.23	1.30	66	1.25	1.12	1.26	
2006	42	0.91	0.78	0.90	1.08	0.92	1.11	80	1.01	1.03	1.02	
2007	43	0.81	0.85	0.87	0.96	1.03	1.05	86	1.01	0.97	0.99	
2008	33	0.86	0.88	0.93	0.99	1.01	1.07	64	0.97	0.96	1.03	
2009	14	0.85	0.82	0.88	0.97	0.91	1.00	19	0.96	0.92	1.01	
2010	7	0.76	0.71	0.77	0.83	0.76	0.83	34	0.91	0.90	0.93	
Average*	282	1.27	1.20	1.32	1.21	1.17	1.28	708	1.20	1.16	1.24	
Average 2000–10	239	1.19	1.12	1.23	1.16	1.12	1.21	536	1.20	1.16	1.25	
Average 1994–99	43	1.41	1.35	1.48	1.30	1.25	1.40	172	1.20	1.15	1.23	

*Average except for number of funds.

This table shows the average PME ratios by vintage year, comparing PE returns with equivalent-timed investments in a market index. Weighted-averages use the capital committed to the funds as weights. Funds with a North American geographical focus are benchmarked against the S&P 500. Funds with a European focus are benchmarked in U.S.\$ against the S&P 500 and in Euros against the MSCI Europe index. Averages across a span of vintage years are averages of the values for each vintage year.

converts all cash flows to US dollars and then uses the S&P 500 as an index, paralleling our analysis of North American funds. The second uses cash flows in Euros and the MSCI Europe as the benchmark. The last columns of the table show our earlier North American results for comparison.

While European buyout coverage is limited in the early vintages, it is significantly larger by the 2000s. Over all vintage years (1994–2010), the European buyout sample of 282 has about 40% as many funds as our North American sample.

Over the entire time period, the average of the vintage year mean PME is 1.27 against the S&P 500 and 1.21 against the MSCI. The average of the capital-weighted average is 1.32 against the S&P 500 and 1.28 against the MSCI Europe. Thus, European buyout funds have also outperformed public markets over the time span of our sample. Moreover, over the entire period, estimates of the size of this outperformance are very similar whether we calculate PMEs in dollars versus the S&P 500 or in Euros versus the MSCI Europe.⁸

A striking finding in Table 5 is that the European buyout funds have had performance very similar to that delivered by their North American counterparts. This is especially true in the 2000s when average PMEs are almost identical for the two continents. The 1990s vintages of European funds have higher PMEs than do European funds from the 2000s. Moreover, in the 1990s European PMEs are higher than those for North America. We urge caution, however, in interpreting these time trends given the small number of observations in the early years of our European sample.

Overall, European buyout funds show similar performance to those in North America, especially in the 2000s.⁹ On both continents, buyout funds have, on average, provided higher returns than have public equities.

Unfortunately, we do not have enough European venture funds for detailed analysis across vintages. Our sample of 87 European venture funds has very limited coverage in many vintages since 1994—double digit coverage in only three vintage years and five or fewer funds in more than half of the vintages. As a consequence, we provide only high level averages shown in Table 6.

Unlike European buyout funds, European venture funds do not outperform public equities over the sample period. Using the S&P 500 as a benchmark, the average of the vintage year average PMEs is 0.95 over the full sample period; the corresponding figure for capital-weighted averages is 1.05. PMEs in Euros against the MSCI Europe provide almost identical averages. PMEs are appreciably lower across vintages from the 2000s.

Moreover, European venture funds appear to perform worse than their North America counterparts. In the 2000s European funds have an average PME of 0.80 compared to 0.97 for North American funds. The gap is even more pronounced in the 1990s when North American venture funds had exceptional performance leading to an average PME of 2.42. During the 1990s, the European average is 1.29 which, though above 1, falls far short of the North American results.

In summary, average buyout performance appears quite similar between Europe and North America. On both continents, buyout funds have historically outperformed public market returns and by similar magnitudes. In contrast, venture performance in Europe has not been on a par with that in North American and has not outperformed public equities. Given the small size of our European venture sample, especially in the 1990s, strong conclusions on venture await further research with more data. Our findings do suggest, however, that venture investing has been more successful in North America than in Europe. Buyout investing

Table 6 Private equity fund public market equivalent ratios for North American and European venture funds.

Vintage years	<i>European funds</i>						<i>North American funds</i>			
	U.S.\$, S&P 500 benchmark			EUROs, MSCI Europe benchmark			U.S.\$, SP500 benchmark			
	Funds	Average	Median	Average	Median	Weighted-average	Funds	Average	Median	Weighted-average
<i>Average* 1994–2010</i>	87	0.95	0.94	1.05	0.96	0.94	870	1.48	1.02	1.60
<i>Average 2000–10</i>	69	0.80	0.77	0.88	0.83	0.81	608	0.97	0.83	1.00
<i>Average 1994–99</i>	18	1.29	1.29	1.43	1.24	1.21	262	2.42	1.36	2.70

*Averages except for number of funds.

This table shows PME ratios which compare PE returns with equivalent-timed investments in a market index. Weighted-averages use the capital committed to the funds as weights. Funds with a North American geographical focus are benchmarked against the S&P 500. Funds with a European focus are benchmarked in U.S.\$ against the S&P 500 and in Euros against the MSCI Europe index. Averages across a span of vintage years are average of the vintage year values.

seems to provide similar average performance in both continents—suggesting a more globalized market for buyout.

4 PE performance and capital flows

As shown earlier, VC funds have displayed dramatic shifts in performance over time. In this section we examine this issue in more detail. Prior research has found that increased aggregate capital commitments (or fund flows) to buyout and VC funds are related to subsequent performance, especially for VC funds. In essence, large infusions of capital into private equity may challenge the ability of funds to create value for their investors.

To examine this issue with our data we follow prior research (see Harris *et al.* (2014) for past studies) and measure fund flows into the industry using capital committed to U.S. buyout and VC funds. We use annual estimates for capital commitments from Private Equity Analyst for the

current and previous vintage years. This sum provides an (imperfect) estimate of the amount of capital available to fund deals.¹⁰ 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 (CRSP total market index) at the beginning of the vintage year. We limit the analysis to vintage years from 1993 onwards when our data have more substantial fund coverage. In a typical year, the two-year capital commitments to buyout funds average 0.99% (median of 0.77%) of the stock market value. The two-year capital commitments to VC funds average 0.31% (median of 0.28%). There are quite different patterns in buyout and VC. For instance, buyout capital commitments peaked at over 2% in the vintage years 2007 through 2009. VC, on the other hand, peaked in vintages 2000 and 2001 at about 0.7% and plummeted thereafter.

We regress weighted-average vintage year performance, as measured by PME returns, IRRs and investment multiples, on aggregate capital flows. The results are qualitatively and statistically

Table 7 The relationship between aggregate flows into private equity and performance.

Dependent variable:	Buyout funds			VC funds		
	PME	IRR	Multiple	PME	IRR	Multiple
Capital commitments to	−21.67**	−2.38	−31.85**	−297.55**	−77.55**	−635.51**
Total stock market value	[7.91]	[2.92]	[14.89]	[135.65]	[32.51]	[259.98]
Constant	1.45***	0.17***	2.02***	2.57***	0.47***	4.61***
	[0.09]	[0.03]	[0.17]	[0.48]	[0.12]	[0.92]
<i>N</i>	18	18	18	18	18	18
<i>R</i> -squared	0.32	0.04	0.22	0.23	0.26	0.27

This table reports regressions where the dependent variable is fund performance—as measured by IRR, investment multiple, or PME—and the explanatory variable is an estimate of capital flows into PE. We measure capital flows by summing the capital commitments as estimated by Private Equity Analyst 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 PE deals. The performance measures are weighted-averages, where the weights are the proportion of capital committed in each vintage year to the total capital committed over the vintages included in the regression. Only funds with a North American Focus are included. Given the small sample sizes in early vintages, only vintage years from 1993 onwards are included. Separate regressions are estimated for buyout funds and VC funds. Standard errors are reported in brackets. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

similar using unweighted-average performance. Table 7 shows that buyout fund performance is negatively related to capital commitments and significantly so for PME and investment multiples. When capital commitments increase from the bottom quartile of years (0.66%) to the top quartile of years (1.01%), multiples decline by around 0.11. The regression coefficients imply that PMEs decline by 0.075 when capital flows move from the bottom to top quartile. Overall, these results suggest that an influx of capital into buyout funds is associated with lower subsequent performance. The impacts, however, are not as large as found in prior research (see Harris *et al.* 2014a).

For VC funds, Table 7 shows a significant negative relation between capital commitments and performance for all three measures of performance. The regression coefficients imply that when capital flows move from the bottom to top quartile, IRRs decline by 10% per year, multiples decline by 0.83, and PMEs decline by 0.39. These results are much more pronounced than those for buyout and show larger impacts (though in the same direction) than found in earlier research (e.g. see Harris *et al.* 2014a, and research cited therein). The roller coaster ride of VC performance in the last two decades seems highly related to the sector's difficulties in absorbing large amounts of capital.

5 Conclusions

The enormous growth in investor allocations to private equity funds since the late 1990s has created a need for a re-evaluation of how these funds have performed. This paper measures buyout and venture capital fund performance through mid-2014 taking advantage of high-quality cash flow data from Burgiss. Some key conclusions emerge.

First, it seems likely that buyout funds have outperformed public markets, particularly the S&P

500, net of fees and carried interest, in the 1980s, 1990s, and 2000s. Our estimates imply that each dollar invested in the average buyout fund returned at least 20% more than a dollar invested in the S&P 500. This works out to an outperformance of at least 3% per year. The conclusion that there has been outperformance is relatively insensitive to assumptions about benchmark indices and systematic risk. For the more recent and less fully realized post-2005 vintage funds, however, performance has been roughly equal to public markets. Eventual performance will depend on the ultimate realization of their remaining investments. Our results imply that buyout funds outperformed public markets more substantially gross of fees including the post-2005 vintages. Nailing down the sources of this outperformance seems a fruitful subject for future research.

Second, venture capital funds outperformed public markets substantially until the vintages of the late 1990s, but then had a period of underperformance. Only in the last few vintage years, has VC performance appeared to rebound though not to the heady levels of the early 1990s. Although VC returns were disappointing for periods, this relative underperformance is less dramatic than the more commonly quoted absolute return measures (internal rates of return and investment multiples). Much prior research focuses on the earlier vintage years and inevitably obtains more positive results. Again, the qualitative conclusions do not appear sensitive to assumptions about systematic risk.

Third, the performance gap between top and bottom quartile funds in the same vintage year is much more pronounced in venture than in buyout. Moreover, compared to buyout, the highs are much higher in venture and the lows lower. In buyout, even third quartile funds have returns comparable to public markets. In venture, having

some top quartile funds in the portfolio is much more important for successful investing. Our results highlight that LP selection skills and fund access are much more critical in venture capital than in buyout.

Fourth, average buyout performance appears similar between Europe and North America. On both continents, buyout funds have historically outperformed public market returns and by similar magnitudes. In contrast, venture performance in Europe has not been on a par with that in North America and has not outperformed public equities. While firm conclusions on venture await further research with more data, our findings are consistent with venture investing being more successful in North America than in Europe to date. Buyout investing seems to provide similar average performance in both continents—suggesting a more globalized market.

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

Some may find it unsurprising that buyout funds have historically provided investors a premium relative to investing in public markets. After all, private equity investments are relatively illiquid, and investor commitments to funds face uncertain timing of capital calls and distributions that are under the control of the GP. This contrasts with investing in public markets where there is no distinction between capital committed and invested, and trading is continuous. The costs of illiquidity and commitment risk likely vary across investors. For some, the average return premium we find for buyout funds (3–4% per

year) may well seem attractive. For those facing higher illiquidity costs it may not. On the other hand, the fact that post-2005 buyout vintages have not outperformed public markets leaves open the possibility that the illiquidity premium has declined and/or competition among buyout investors has driven returns down. An important area for future research is to understand the forces that operate here and how to trade off the costs (e.g. illiquidity and commitment risk) against the potential benefits (e.g. a return premium) inherent in private versus public equity investing.

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Notes

- ¹ Harris *et al.* (2014a) discuss prior research on private equity performance. Cornelius (2011) provides an overview of issues related to illiquid assets such as limited partner interests in private equity funds.
- ² We compare the Burgiss, Cambridge Associates, and Preqin data sets. The article introduces a regression approach to estimate performance measures for last two

data sets even in the absence of fund-level cash flow information.

- ³ Gredil *et al.* (2014) discuss the specifics of the direct alpha method as well as alternative approaches to assessing private equity relative to public market returns. Kocis *et al.* (2009) discuss difficulties in interpreting internal rates of return.
- ⁴ This was formalized in the Statement of Accounting Standards 157, known as FAS 157, relating to topic 820 on Fair Value Measurement. FAS 157 was first proposed in September 2006 and required as of December 15, 2008.
- ⁵ See Kocis *et al.* (2009) for a description of the *J*-curve.
- ⁶ Specifically, the 1.5 beta return would be calculated as 1.5 times the S&P 500 return minus 0.5 times the 2% (or 4%) interest rate. The interest costs comes from incurring \$50 of borrowing to add to each \$100 supplied.
- ⁷ For the first scenario we weight each of the four quartile average PME's equally—reflecting a hypothetical portfolio spread equally across the quartiles. For the second, we give one-third weight to each of quartiles 2–4 and no weight to quartile 1. The averages across all four quartiles are essentially the same as the average performance shown in Table 2 over the same set of vintages. There are minor differences due to rounding. Harris *et al.* (2012) discuss some of the issues practitioners face in allocating funds to quartiles when they use IRRs and multiples that come from different sources.
- ⁸ There is also highly significant correlation across time. For European funds with vintages 1994–2010, the simple correlation between the vintage year average PME (S&P 500) and vintage year average PME (MSCI Europe) is 0.93. The corresponding correlation for weighted-average PME's is 0.88.
- ⁹ The correlation over time is also very high: for instance, the correlation between the weighted-average PME's by vintage year for European funds and the equivalent for North American funds is 0.95 (whether using the S&P 500 for each, or the MSCI Europe).
- ¹⁰ Ideally we would use an estimate of the “dry powder”—capital committed that has not been invested—for buy-outs and VC separately, by year back to the mid-1990s. However, such estimates are only available for recent years.

References

- Axelson, U., Sorensen, M., and Stromberg, P. (2013). “The alpha and beta of buyout deals,” Working paper, Columbia University.
- Cornelius, P. (2011). *International Investments in Private Equity: Asset Allocation, Markets, and Industry Structure* (Academic Press, London, UK).
- Driessen, J., Lin, T., and Phalippou, L. (2012). “A new method to estimate risk and return of non-traded assets from cash flows: The case of private equity funds,” *Journal of Financial and Quantitative Analysis* **47**, 511–535.
- Gredil, O., Griffiths, B., and Stucke, R. (2014). “Benchmarking private equity: The direct alpha method,” SSRN number 2403521.
- Harris, R., Jenkinson, T., and Kaplan, S. (2014a). “Private equity performance: What Do We Know?,” *Journal of Finance* **69**, 1851–1882.
- Harris, R., Jenkinson, T., Kaplan, S., and Stucke, R. (2014b). “Has persistence persisted in private equity?,” Working paper, University of Chicago. SSRN number 2304808.
- Harris, R., Jenkinson, T., Kaplan, S., and Stucke, R. (2012). “Are too many private equity firms top quartile?,” *Journal of Applied Corporate Finance* **24**(4).
- Jegadeesh, N., Kraussl, R. and Pollet, J. (2009). “Risk and expected returns of private equity investments: Evidence based on market prices,” Working paper No. 15335, NBER.
- Kaplan, S. N., and Schoar, A. (2005). “Private equity returns: Persistence and capital flows,” *Journal of Finance* **60**, 1791–1823.
- Kocis, J. M., Bachman, J., Long, A., and Nickels, C. (2009). *Inside Private Equity* (Hoboken, N.J., USA, John Wiley & Sons).
- Sensoy, B., Wang, Y., and Weisbach, M. (2014). “Limited partner performance and the maturing of the private equity market,” *Journal of Financial Economics* **112**, 320–343.
- Sorensen, M., and Jagannathan, R. (2013). “The strong case for the public market equivalent as the premier measure of private equity performance,” Working paper, Columbia University.

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