The Curious Year-to-Year Performance of Buyout Fund Returns: *Another Mark-to-Market Problem?*

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Many buyout fund papers have examined overall vintage-year (or life-of-fund) returns and compared them to public-market proxies over extended time periods. A few papers have looked at private-equity (PE) return volatility in the context of public-market proxies, whereas others have considered volatility through the use of cash-flow-only estimation (CFOE) risk–return models. This article compares year-to-year buyout-fund returns and volatility to those of a public-market proxy and thus represents a furtherance of these foundational works. By illustrating individual-year buyout returns and volatilities and by outlining the differences with those of the proxy in specific years, this article adds to the existing academic literature.

We construct a public-index proxy for buyout fund investments, and we adjust the index for buyout-type leverage. We compare (1) the leverage-enhanced public index's year-to-year returns to the buyout industry's year-to-year (i.e., times series) returns and (2) the resultant volatilities of these returns. The article also considers public and private merger and acquisition (M&A) prices, which trend with public stock values, over the measured time periods. M&A prices, like public stocks, are a partial barometer of private company values, and the two data sets are often used in tandem to determine a private company's value. Unlike public stocks, which are set as a specific valuation date, M&A prices have a staleness that contributes to smoothing, depending on the weighting of M&A prices in a valuation. This article concludes that buyouts' year-to-year performance results have a higher volatility than previously reported, either by the industry or by academic research.

One notable data point is 2008, when U.S. stocks had a negative 38% return and our proxy index (before added leverage) had a negative 37% return. In contrast, the buyout industry, as recorded by Cambridge Associates, indicated a less negative 26% return (net of fixed fees and performance carry) despite its much higher leverage. The industry's smaller annual loss makes little sense and defies financial theory regarding leverage and volatility, unless one argues that, among other matters, (1) private firm equity values deviate sharply from corresponding public stocks or (2) our proxy is an inaccurate representation of underlying buyout portfolio companies. Indeed, adjusting for buyout leverage, our proxy-index return was negative 75% in 2008.

Unlike investment pools that specialize in publicly traded securities, buyout funds estimate the values of their unsold investments. With 70% reporting no outside input,[1] the general partners (GPs) are the primary arbiters of what their unsold companies are

worth on a year-to-year basis; thus, they determine the one-year returns and the time-series volatility of their fund returns. Only when a buyout fund is near fully liquidated, perhaps 8 to 12 years after its start, are limited partners (LPs) aware of actual cumulative returns over the fund's life, although time-series returns remain uncertain.

The GP evaluation system has few checks and balances. Some of the larger funds employ third-party appraisers to double check internal valuations, and some others contract with appraisal firms to provide the funds with enterprise value/earnings before interest, taxes, depreciation, and amortization (EV/EBITDA) pricing ranges for relevant industries. The ranges supplement the GPs' own valuation efforts. One issue with hiring outside appraisal firms to deliver independent analysis is the cost: $20,000 to $100,000 per portfolio company. The annual bill might be several hundred thousand dollars for a small buyout fund and millions for a larger fund. LPs do not demand independent valuations, so GPs might rightly consider such valuations an unnecessary expense.

In addition to cost, another issue with third-party appraisers is that the appraisers might calculate valuations that conflict with the fund's own opinions, even when the appraiser is paid by the fund. The independent accounting auditor is the final protection against inaccurate residual values and, thus, inaccurate year-to-year returns. The accounting firms review internal fund valuations for reasonableness, but the audit staff are not necessarily expert in these matters.

By using a publicly traded replication index, we eliminate the role of GPs in setting annual unsold asset (or residual) values for their funds. Privately held U.S. businesses and publicly traded companies operate in the same economic environment. It makes sense that their respective equity values should fluctuate more or less in tandem as the capital markets change. Investment bankers and business appraisers generally use comparable companies (public companies and recent acquisitions) as the preferred methodology in estimating the equity values of established privately held businesses with a financial history of positive EBITDA. Although public companies' values are priced as of a specific date, we note that the M&A portion of a private company valuation has some staleness because it represents the moving average of past transaction multiples. Because M&A is just part of the appraisal process for operating firms, the lag effect for buyout funds has less prominence than academics have observed in real estate asset valuations, which have a heavier reliance on transactional data.

Using a replication index of public companies that have attributes similar to buyout-fund-portfolio companies, we conclude that buyout-fund year-to-year returns are smoothed by the GPs. The mark-to-market process for unsold portfolio companies in the funds bears further scrutiny.

LITERATURE REVIEW

Our principal contribution to the literature is the comparison of year-to-year (time-series) buyout returns to those of a public proxy. In compiling such analysis, this article supplements existing research in several areas of study: residual value calculations of PE funds, PE funds' return volatility, mark-to-market issues concerning illiquid fund investments, and replicating fund returns through public proxies.

Residual Value Pricing and Volatility

Specifically addressing the purported staleness of reported residual values, Woodward [2012] presented an alternative methodology for measuring venture capital and buyout fund volatility. This methodology considers lagging public market returns and autoregressive correction changes to assess private portfolio risk. She concluded the true risk measures for buyout funds were more than double the measures that excluded such staleness.

Emery [2003] provided an early methodology for addressing the lag effect of residual values and their effect on buyout returns. Emery considered long-horizon return data to evaluate diversification's benefits and risk–return characteristics.

Studies that have looked at venture capital fund return volatility, in the context of publicly traded proxies, include those by Gompers and Lerner [2000]; Kerins, Kiholm-Smith, and Smith [2004]; Emery [2003]; and Ljungqvist and Richardson [2003]. These studies considered the internal rates of return (IRRs) of public companies similar to a venture capital portfolio as a proxy for private investments. The studies examined several methodologies for aligning the public stand-in stock returns with those of private venture-backed firms. The evidence seemed to suggest that venture capital returns had a higher correlation

with the stand-in public stock returns than was previously believed.

In reviewing PE returns and volatility, including buyouts, a number of papers have adopted the CFOE risk–return model (see Driessen, Lin, and Phalippou [2012]; Franzoni, Nowak, and Phalippou [2012]; Korteweg and Nagel [2013]; Ang et al. [2013]; and Sorensen and Jagannathan [2013], among others). The CFOE model relies on the analysis of fully liquidated PE funds and those that are quasi-liquidated, thus limiting the data sample. The studies indicated that the median beta for buyout funds is higher than that suggested by Cambridge Associates.

Ewens, Jones, and Rhodes-Kropf [2013] examined the risks and returns of exchange-traded funds (ETFs) that invested in unlisted PE funds. They concluded that the betas of venture capital funds and buyout funds were 1.05 and 0.80, respectively.

Geltner [1991] identified the issue of smoothing in appraisal-based returns for commercial real estate funds, in part due to the lag between appraisal–transaction dates and end-of-period return calculations. Follow-on papers by Geltner (and others) expanded on his initial study and discussed unsmoothing techniques.[2]

Jenkinson, Sousa, and Stucke [2013] used California Public Employment Retirement System data to find that GPs understate buyout fund residual values relative to perceived market value, and this attribute tends to smooth buyout returns (relative to broad equity market movements). However, they did not compare buyout returns to a replicating portfolio of similar public companies. Beath and Flynn [2016] compared to the yearly returns of PE to those of U.S. large- and small-cap stock indexes from 1998 to 2014, after standardizing the year-to-year PE returns for "residual value reporting lag," which they concluded ranged from 3–12 months. They found that, after standardization, the PE category had higher volatility and higher returns. They combined buyout funds, venture capital funds, and distressed investing funds into one category, thus diminishing the traceability of the higher-leverage effects of buyout funds.

Several papers found that LPs are aware of (1) the likely inaccuracy of Cambridge Associates year-to-year buyout returns and (2) the possibility that return volatility is understated (see Brown, Gredil, and Kaplan [2016]; Barber and Yasuda [2017]; and Chakraborty and Ewens [2017]).

Mark to Market

Cumming and Walz [2010] determined that PE funds may overstate the value of their investments to attract investors in new follow-up funds. They also found that the reporting bias depends on the accounting and legal environment in a country and on the degree of information asymmetry between investors and PE fund managers. Anson [2013] concluded that distorted returns due to stale pricing (for residual values) by GPs are not reduced, despite the recent accounting rules that addressed the issues of measuring the fair value of illiquid investments.

Brown, Gredil, and Kaplan [2016] concluded that top-performing funds underestimate the market value of their holdings prior to full fund liquidations. They found that some funds boost net asset values (NAVs) of previous funds' existing residual values to enhance the success of generating investor commitments for new follow-on funds. Welch [2014] stated that buyout funds' (principally Europe based) reported NAVs that understated the economic comovement between buyout fund returns and public market returns. This phenomenon was particularly noticeable before two formal PE valuation regulations, International Accounting Standards (IAS) 39 and Financial Accounting Standards (FAS) 157, were introduced in post-2005 and post-2008, respectively.[3] The correlation increased after the introductions. However, in our discussions with Preqin, a large PE fund data service, researchers suggested that most buyout funds were marking to market long before the formal adoption of FAS 157.

Certain hedge funds acquire illiquid investments that have limited price discovery attributes, like many buyout-fund-portfolio companies. A number of studies have considered the impact of illiquid hard-to-value investments on year-to-year returns of hedge funds (rather than PE funds), and several found a serial correlation in the illiquid investments' return series. The correlation is commonly viewed as the result of price smoothing by the hedge fund GP. Lindsay and Weisman [2016] provided a summary of the practice and its ramifications for investors.

Buyout Fund Replication through Publicly Traded Proxies

With respect to replicating buyout-fund returns with public securities, Gompers and Lerner [2000]

examined the investments of a single buyout fund and benchmarked individual buyouts against investments in indexes of public companies operating in the same industries as the respective buyouts. They found that the buyout fund outperformed the industry comparables. However, they neither adjusted the industry indexes for the high leverage used by the buyout fund nor attempted to determine if the specific buyout fund was a better or worse performer than its peers. Groh and Gottschalg [2009] examined the risk-adjusted performance of U.S. buyouts. Returns of the buyouts were compared to a mimicking portfolio of similar public market investments among peer industry stocks, and the public stock selections were leveraged up to match the equity beta factor of corresponding buyouts. They found significant alpha in the buyout investments. Neither Gompers and Lerner nor Groh and Gottschalg considered the issue of smoothing in year-to-year buyout fund returns.

Barnhill and Hooke [2013] analyzed every public company that was taken private via leveraged buyout in the 1984–2012 period. They identified industry categories preferred by buyout funds and a number of financial and valuation ratios that typified those underlying companies. They used those industries and the firm-specific ratios to identify a replicating portfolio of publicly traded stocks each year. Subsequently, they compared the annual returns on the replicating portfolios to the S&P 500. Barnhill and Hooke concluded that a public stock replication index (invested over the 1991–2012 period) would rank in the highest-performing decile of buyout funds over a 21-year period. However, they did not scrutinize year-to-year return volatility. Their data indicated that the range of average net debt to enterprise ratio for the replicating portfolio was 20%–24%.

L'Her et al. [2016] created an industry-, size-, and leverage-adjusted index of publicly traded stocks that was intended to replicate the underlying portfolios of the buyout fund industry. They compared the returns of their index with those of buyout funds on the basis of vintage years and concluded that buyout funds had no significant outperformance.

We note that accounting regulations have required mark-to-market accounting for residual investment since at least 2006 and that, despite a sizable Financial Accounting Standards Board (FASB) document mandating private company valuation methods, such valuation still has an element of subjectivity.

METHODOLOGY

The textbook definition of a leveraged buyout-fund-portfolio company is a small-cap, low-tech, nonfinancial, nonutility, consistent EBITDA generator with moderate cyclicality. These attributes are evident in buyout-fund-portfolio companies because, without such attributes, lenders would decline the high leverage that is necessary for buyout transactions. Publications sponsored by authoritative financial organizations such as the FASB, the CFA Institute, and the American Society of Appraisers indicate that the market approach, often called the comparable companies approach, is highly relevant to valuing the equity securities of privately owned companies with established financial histories, that is, those prevalent in buyout-fund portfolios.

The FASB's "Valuation of Privately-Held-Company Equity Securities Issued as Compensation" provides best practices for the valuation of, and disclosures related to, the issuance of privately held company securities as compensation. Independent public accounting firms often use the publication as a guide when evaluating the accuracy of valuation reports regarding privately held companies.[4]

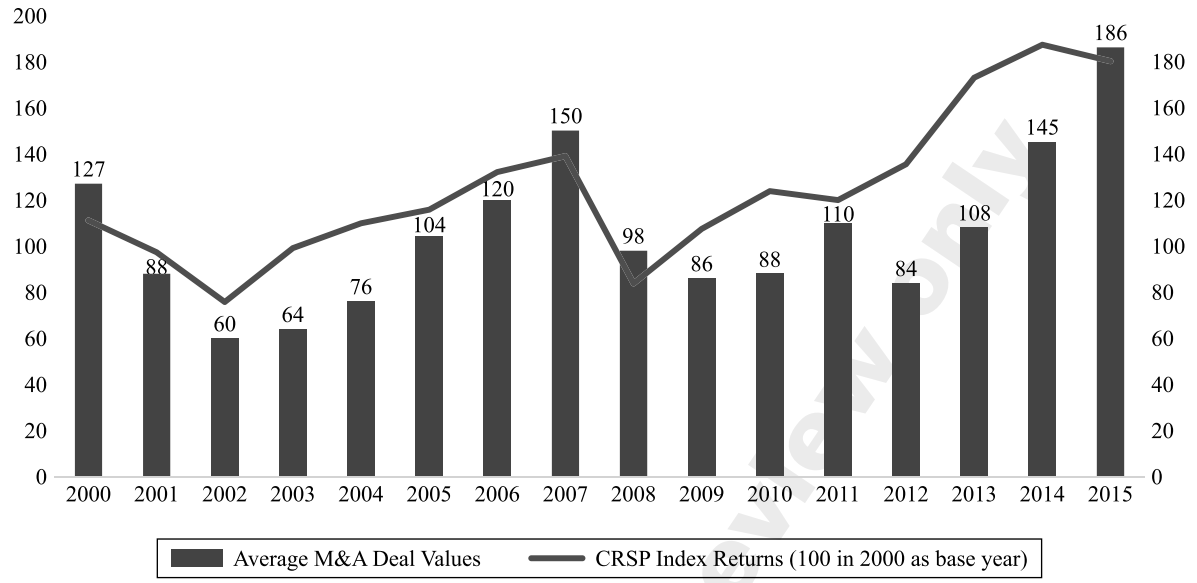
A complement to the public company approach is the comparable M&A transactions approach. Here, the appraiser researches the acquisition prices of similar companies over the preceding 12–24 months. For buyout-type firms, that is, established low-tech businesses with positive EBITDA, the appraiser applies an acquisition median EV/EBITDA multiple to the subject company's EBITDA. This application of the median provides a base EV for Company XYZ. Adjustments are then made for XYZ's unique attributes, and the requisite cash and debt items are added, or subtracted, to obtain an estimated equity value for the XYZ business in a hypothetical sale.[5]

Many M&A transactions involve privately owned company sellers; thus, the level of available information—on the seller's financial performance and on the transaction's pricing—is less than that available for public M&A deals. Nonetheless, data services provide price discovery on many private M&A transactions. Moreover, the timing of the comparable transactions is not one-date specific, like public-company-trading comparisons. Rather, a listing of M&A transactions reflects a series of deals, spread over the preceding 12–24 months.

There is no M&A price index that corresponds to a broad public stock index, like the S&P 500. Nonetheless,

EXHIBIT 1

Average Public and Private M&A Deal Values (in $millions) Plotted against CRSP Index



Note: Source of average M&A deal values: FactSet Mergers.

M&A value multiples, in their upward and downward moves, correlate well to the stock market. Exhibit 1 illustrates how closely M&A deal values and the CRSP Index move together. The correlation coefficient between those two variables is 0.74. This fact supports the use of a public-replicating index in the valuation of privately held leveraged buyout portfolio firms and tends to corroborate our conclusions. We believe that M&A practitioners would agree with that assessment.

Given the preceding discussion, we conclude that certain publicly held company values can be used as a proxy for buyout-fund-portfolio company values. Then, borrowing from the methodology developed by L'Her et al. [2016], we construct a portfolio of publicly traded stocks that mirrors the underlying buyout-fund portfolios in terms of both industry and size composition.[6] The composition is based on actual buyout transactions.

We examined several key profitability ratios of S&P 1000 Index constituent companies, such as EBITDA profit margin (EBITDA/sales), net profit margin (NI/sales), and return on equity (NI/equity), for the 2010–2015 period (Exhibit 2). The S&P 1000 Index combines the S&P 400 and the S&P 600 to form an investable benchmark for the mid- to small-cap segment of the U.S. equity market. Because the Russell 2000 Index is not available on Compustat, we used the S&P 1000 Index. We believe that the S&P 1000 Index closely tracks the Russell 2000 Index.

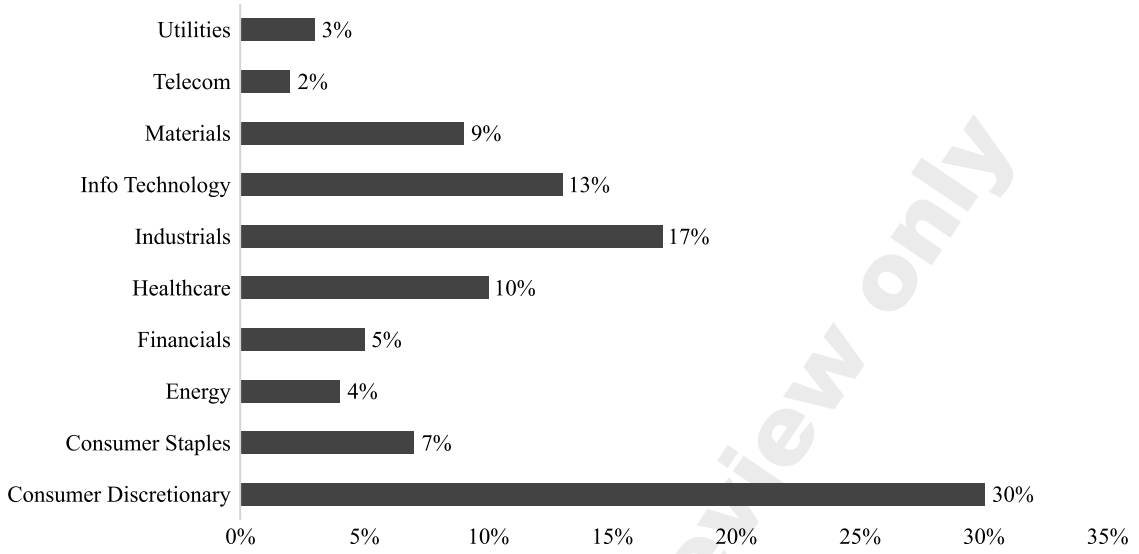
EXHIBIT 2

Selected Financial Ratios of S&P 1000 Companies

Year	EBITDA/Sales	NI/Sales	NI/Equity
2010	13.78%	4.65%	8.60%
2011	13.66%	4.40%	8.49%
2012	13.93%	4.50%	8.68%
2013	14.08%	4.93%	9.22%
2014	13.60%	4.05%	7.82%
2015	12.75%	2.42%	4.64%
Median	13.72%	4.45%	8.55%
Average	13.63%	4.16%	7.91%

Median values derived from the database indicate that the typical S&P 1000 firm is profitable on an EBITDA and net income basis, and it has an appropriate positive rate of return on equity. We presume most buyout portfolio firms share such attributes with these public companies. Otherwise, the firms would not have obtained the high leverage needed to support a buyout. In a study devising a replication index of public companies (that mirrored actual buyouts in

EXHIBIT 3
Industry Sector Weights of Composite Buyout Replication Index



many respects) over 20 years, Barnhill and Hooke [2013] noted that the average debt to EV ratios of their replication firms ranged from 20% to 25% across the time period. In comparison, a reasonable estimate of the same ratio for buyout portfolio firms (mostly privately owned) is 65%.

We duplicated the average industry-sector composition of buyout transactions, as determined by L'Her et al. [2016]. Our composite buyout replication index was derived from the Russell 2000 indexes to reflect the middle market size of most buyouts. The average-industry-sector weight was the same as in L'Her et al., as set forth in Exhibit 3.

Much like buyout funds, the returns from our replication portfolio derive from unrealized capital gains, cash dividends, and sales of the underlying companies. We examined the year-to-year performance of our replication portfolio and adjusted for buyout-type leverage. We then made conclusions regarding the accuracy of buyout funds' self-reported year-to-year returns (see the Appendix for an example of year-to-year return calculations). As explained earlier, we first constructed the replication index and then measured its returns using the Russell 2000 sector indexes and the weights shown in Exhibit 3. Those returns from 2001 to 2014 are reported in the second column of Exhibit 4.

As a company increases leverage, its required return also increases. Chingono and Rasmussen [2015]

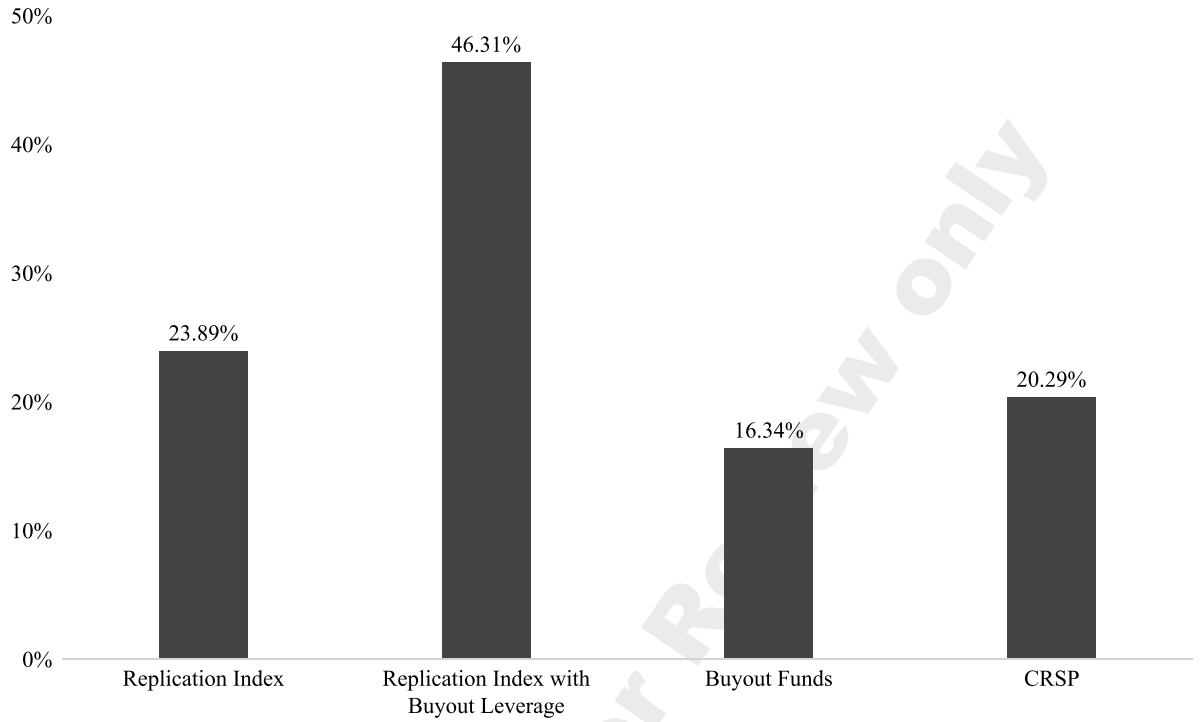
EXHIBIT 4
Year-to-Year Returns (%)

Year Ending Dec. 31	Replication Index[1]	Leverage-Adjusted Replication Index	Buyout Fund-CA[2]	CRSP Index
2001	5.21	3.21	–11.08	–11.27
2002	–22.77	–46.19	–6.80	–20.84
2003	46.07	85.97	24.20	33.14
2004	17.75	33.02	26.30	12.99
2005	3.74	5.06	27.60	7.31
2006	18.73	31.78	28.91	16.21
2007	0.75	–3.91	17.05	7.27
2008	–37.41	–75.03	–26.10	–38.21
2009	39.59	74.53	14.97	31.29
2010	29.00	54.42	21.57	17.71
2011	–5.04	–9.87	10.68	–1.07
2012	16.89	31.85	15.70	15.76
2013	41.43	78.19	22.80	30.45
2014	3.94	7.26	13.92	10.51
Mean	11.28	19.31	12.84	7.95
Std Dev	23.89	46.31	16.34	20.29
Serial Correlation	–0.2356	–0.2000	0.2196	–0.1551

[1]*Our composite buyout replication index was derived from the Russell 2000 indexes using the average industry-sector weight reported in Exhibit 3.*

[2]*Annual returns of buyout-fund-portfolio companies reported by Cambridge Associates.*

EXHIBIT 5
Standard Deviation of Returns



presented the theory that leverage enhances the average returns of a small-value investment strategy. They argued that the excess returns of PE can be explained through the use of leverage to finance acquisitions of cheap companies. Therefore, the required equity return for buyout-portfolio companies would be higher than other companies. We estimate the leverage-adjusted returns for buyout-fund-portfolio companies by applying the standard capital asset pricing model (CAPM).

Assuming that the replication index earns fair market returns, we calculated the levered beta of the replication index each year using the CRSP return as a proxy for the market return and the one-year Treasury rate as a proxy for the risk-free rate during the year. Each year's levered beta (derived from the CAPM) was unlevered using (1) the Hamada equation and the debt/equity (D/E) ratio of 0.25/0.75 and (2) the effective tax rate of 27% to get the unlevered beta. The unlevered beta is relevered using the D/E ratio of 0.65/0.35.[7] Finally, the leverage-adjusted returns are calculated using the relevered beta, which are reported in the third column of Exhibit 4.

Also presented in Exhibit 4 are annual returns of buyout-fund-portfolio companies reported by Cambridge Associates and the annual returns of the CRSP Index. Cambridge is a top provider of PE returns. Its year-to-year buyout fund performance does not have a lag in residual values.

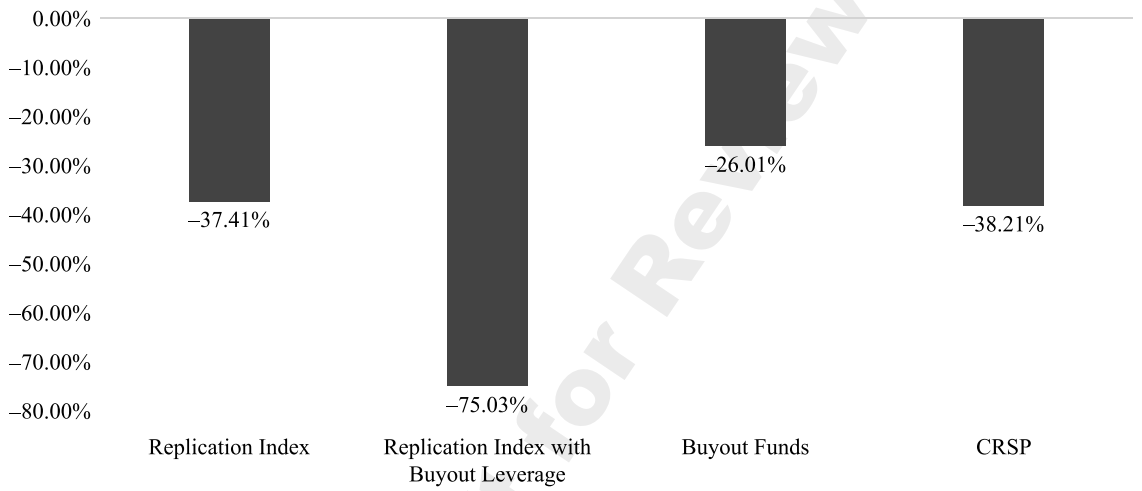
As reported in Exhibit 4, the average return, the standard deviation of return, and the serial correlation of return for the replication index (versus the CRSP Index) during the 2001–2014 period are 11.28% (7.95%), 23.89% (20.29%), and −0.2356 (−0.1551), respectively. The average return and the standard deviation of return for the leverage-adjusted replication index are certainly much higher at 19.31% and 46.31%, respectively, but the serial correlation is similar at −0.2000. However, the buyout-fund-portfolio performance reported by Cambridge Associates presents surprisingly dissimilar results: The average return is 12.84%, which is larger than the return of the replication index, but the standard deviation of return is 16.34%, which is much lower than the standard deviations of all three indexes (the replication index, the leverage-adjusted replication index, and the CRSP Index). Furthermore, the serial correlation is positive 0.2196.

The buyout funds reported annual returns that are less volatile than all indexes, as illustrated in Exhibit 5,

EXHIBIT 6
Correlation Coefficients

	Replication Index	Leverage-Adjusted Replication Index	Buyout Fund-CA	CRSP Index
Replication Index	1.0000	0.9992	0.7320	0.9539
Leverage-Adjusted Index		1.0000	0.7395	0.9587
Buyout Fund-CA			1.0000	0.8583
CRSP Index				1.0000

EXHIBIT 7
2008 Returns (year of stock market crash)



even though we believe that private company values should track public company values. This lower volatility occurs despite the high leverage of the underlying portfolio companies, when compared to the low leverage of public companies. This finding is a direct contradiction of modern portfolio theory related to leverage and its impact on equity returns. We find that that buyout-fund-portfolio company returns do not track public-company returns well. Because unrealized gains/losses are a significant part of year-to-year returns, results in Exhibit 4 also suggest that end-of-year buyout-fund-portfolio equity values (i.e., residual values of unsold assets) do not track public-company year-end equity values well.

In addition, Exhibit 6 presents correlation coefficients among the returns of three indexes and the buyout-fund-portfolio. All three indexes are highly correlated, with higher than 0.95 correlation coefficients. However, buyout fund returns have 0.7320 and 0.8583 correlation coefficients with our basic replication index and the CRSP Index returns, respectively. These statistics imply that buyout fund returns reported by Cambridge Associates are less correlated on a year-to-year basis with indexes.

Of particular note in Exhibit 4 is 2008, the year of the stock market crash (see Exhibit 7). As illustrated in Exhibit 5, buyout funds reported that the equity returns (i.e., dividends and value change) of their levered-portfolio companies declined 26.1%, when our model index (unadjusted for buyout-type debt) and the CRSP Index fell 37.4% and 38.2%, respectively. The M&A deal value index fell 34% before any leverage adjustment, and our leveraged-adjusted-replication index dropped 75.0%. The sizable differences between buyout-portfolio equity returns and public equity returns in 2008 seem unrealistic, based on the implication of fundamental finance theories.

Results in Exhibit 4, particularly the returns of 2008, in general support the notion that buyout funds' year-to-year returns exhibit smoothing.

CONCLUSIONS

Unlike investment pools that specialize in publicly traded securities, buyout funds determine the residual values, one-year returns, and the volatility of their fund returns, while having few checks and balances. In this study, we eliminate the possible bias of GPs in setting annual residual values for their funds by using a publicly traded replication index. Creating a replication index of public companies that have attributes that are similar to buyout-fund-portfolio companies, we compare the returns of the replication index to the returns reported by the buyout-fund industry and conclude buyout fund returns are more volatile than public equity market returns.

In contrast, the self-reported results of buyout funds indicate that their year-to-year equity returns are less volatile than those of the public stock market, despite the high leverage of buyout-fund-portfolio companies. These results contradict fundamental theories of finance, which stipulate that the use of leverage increases equity return volatility.

Alternative explanations for this disparity include (1) public and/or private markets are inefficient; (2) public company values have little relation to private firm values, and thus our benchmarking to a public index is irrelevant; (3) the involvement of buyout-fund managers in a private firm materially lowers its risk or adds to its value, vis a vis its public market counterpart; and (4) our replication index contains more idiosyncratic (or nondiversifiable) risk than the buyout industry because our index contains several hundred firms, whereas the buyout industry comprises several thousand.

Some observers might also suggest the following: A large institutional investor, like a pension fund or a sovereign wealth fund, has a long-term investment horizon, and as a result, the annual return variability, or risk, for buyout funds, an illiquid asset class that comprises a fraction of its total portfolio, is unimportant. Accordingly, our implied difference between (1) reported buyout return volatility and (2) actual risk is immaterial, particularly if the asset class consistently demonstrates a greater return than a public benchmark. With over $600 billion of buyout funds' investments being unsold as of 2017, such returns are uncertain, and we believe a rigorous examination of residual values is appropriate.

If this article's conclusions are correct, future investors may have second thoughts about purchasing buyout funds instead of listed securities. Moreover, past buyout-fund investors may have been unfairly induced to place monies into these investment vehicles, in part through (1) faulty mark-to-market residual values, (2) improper year-to-year return estimates, or (3) inaccurate volatility calculations. Furthermore, many buyout fund return studies rely, by necessity, on residual value estimates of the fund GPs. If these estimates are inaccurate, the validity of these studies' conclusions may be called into question.

APPENDIX

ANNUAL RETURN CALCULATION OF BUYOUT FUNDS

We began our research by examining year-to-year global buyout returns on the Cambridge Associates Database. Cambridge, along with Burgiss and Preqin, is the premiere provider of PE return data. It collects its information from hundreds of buyout funds (GPs) and LPs. Preqin supplements its GP and LP database with an assortment of Freedom of Information Act (filings (with state pension funds). AQ1

Formula for Calculating One-Year IRR of a Buyout Fund

The databases use the following formula:

$$\text{One-year IRR for buyout fund} = \frac{B - C + (D - A)}{A}$$

where:

A = the estimated net market value of fund assets less liabilities (usually called residual value) at a particular date (e.g., at December 31, 2005).
B = cash distributions to fund investors in a particular year (e.g., calendar 2006). Dividends are paid out of fund cash balances, which reflect investment sales, plus cash dividends from underlying portfolio companies, plus capital calls, less fund investments, management fees, and expenses.
C = cash capital calls from investors.
D = estimated net market value of fund assets less liabilities at a particular date (e.g., December 31, 2006), which reflects, among other things, the remaining (or unsold) investments from the start of the year (e.g., December 31, 2005) and new investments made during the year in question (e.g., calendar 2006).

Note that the deduction of capital calls, if any, eliminates much of the impact of the addition of the new investments, if any, from the annual buyout portfolio return calculation.

For example, the estimated market value (or residual value) of a Sample Buyout Fund investment portfolio (10 companies) at December 31, 2011 is $1 billion (*A*).[8] Over calendar 2012, the portfolio companies distribute $50 million in cash dividends, and one portfolio company is sold for $50 million. Total cash distributions are $100 million ($50 million plus $50 million). To acquire two businesses and collect its fees, the fund called $75 million from its limited partners (*C*). On December 31, 2012, the estimated market value of the fund (which now includes 11 companies—9 from the 2011 portfolio and 2 new 2012 acquisitions) is $1.1 billion (*D*). The fund's 2012 IRR is 12.5%.

ENDNOTES

[1]Mercer Capital, Private Equity Valuation Survey, December 30, 2009.

[2]Private real estate appraisals are different from operating company appraisals, partly because private corporate appraisals are heavily influenced by publicly traded comparable firms. Such firms have price discovery on a daily basis.

[3]IAS 39 outlines the requirements for value measurement of financial assets. FAS 157 defines fair value and the appropriate measurement practices for illiquid assets. IAS is used principally by non-U.S. firms and FAS by U.S.-based firms.

[4]The paper states: "The market approach uses direct comparisons to other enterprises and their equity securities to estimate the fair value of common shares of private issuers. It is conceptually preferable to the other two approaches (i.e., (1) income (discounted cash flow) approach; and (2) asset approach) because it relies on, and uses, data generated by actual market transactions."

[5]A detailed review of the market approach is provided in *Security Analysis and Business Valuation on Wall Street: A Comprehensive Guide to Today's Valuation Methods* by Jeffrey C. Hooke (John Wiley & Sons, 2010, 2nd Ed.).

[6]Not necessarily in financial performance, but, as noted, we presume that the average public-company performance record is a reasonable facsimile of the average buyout-fund-portfolio company.

[7]The average of our annual implied betas from 2001 to 2014 before buyout leverage is 0.86; after buyout leverage, our average is 1.63.

[8]For purposes of this example, we assume that the fund has zero liabilities.

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