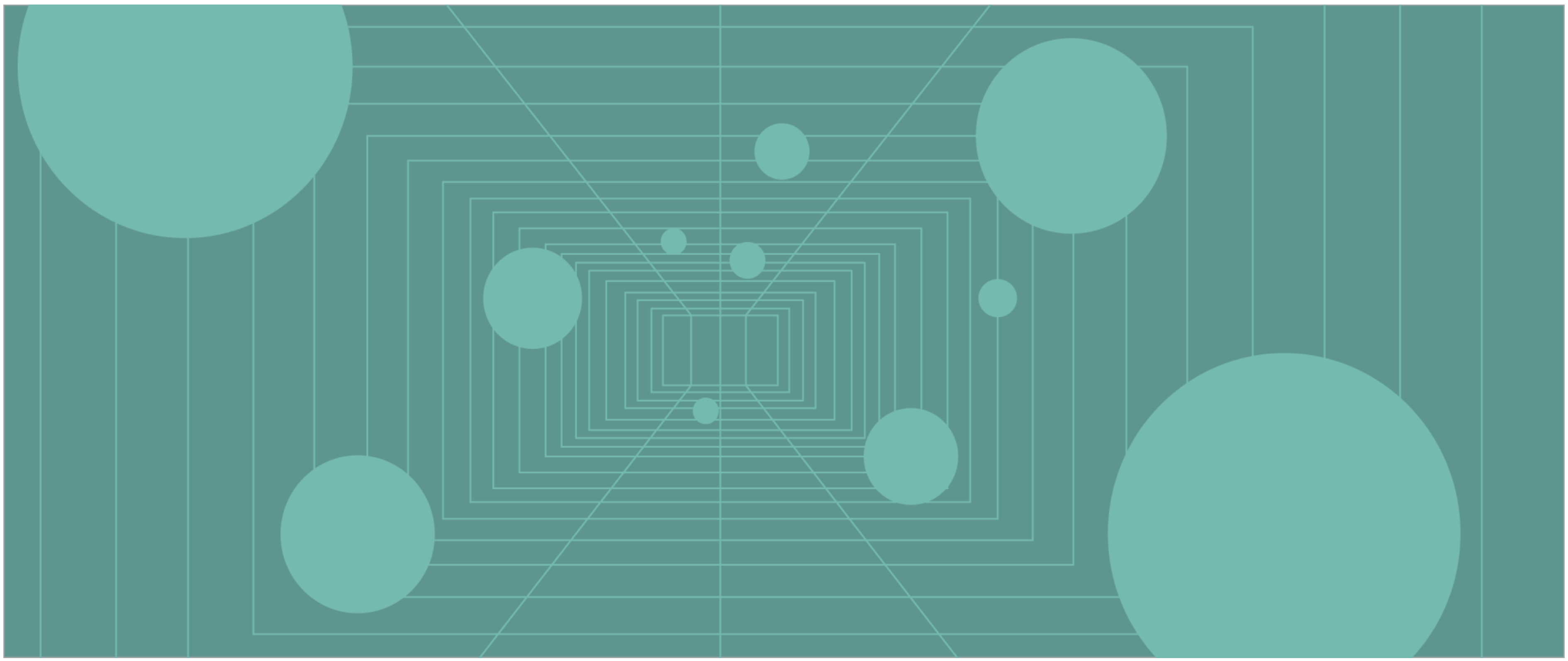
UNDER THE MICROSCOPE

PRIVATE VS PUBLIC COMPANY OPERATING METRICS FOR US COMPANIES



CAMBRIDGE ASSOCIATES

Table of Contents

Introduction to Operating Metrics

- The data in this report on operating metrics provide insights into key parts of the process by which private equity (PE) managers execute their strategy:
  - Purchasing the company and optimizing the capital structure
  - Improving the performance of the company and transforming the business
- PE managers aim to purchase companies at attractive prices and optimize their capital structures and—with operational improvements, revenue growth, and/or other acquisitions—then seek to sell the company at a higher price.
- Similar metrics can be used to evaluate both private and public companies, though public market analysts typically focus on company earnings and price-earnings ratios rather than EBITDA (earnings before interest, tax, depreciation, and amortization) and use EBITDA multiples as their proxy for cash flow.
- Cambridge Associates has now captured and analyzed current and historical data from global PE funds for seven consecutive years. This year's report includes data through the period ending December 31, 2017.
- Our analysis allows for the comparison of private and public companies across industry sectors and company sizes for various parts of the investment process. The data shed light on key levers and value drivers in private equity, as well as the risks and returns of private equity versus public equity.

Notes on the Data

- Cambridge Associates collected information from PE firms of all sizes with broad mandates, as well as specialized and sector-focused strategies. The sample of private investments includes approximately 4,000 US-based companies acquired by PE firms from 2000 through 2017 and is subject to change over time. The companies in the universe range in enterprise value from less than $1 million to larger than $65 billion.
- Within the report, depending on the metric analyzed, the set of companies included will vary. This is due to the acquisition and disposition of companies during the period analyzed. Additionally, this reflects the impact of a statistical tool, an interquartile range, used to screen for outliers as part of each calculation. Lastly, restatements in company data that sometimes occur may lead to changes in historical metrics.
- Operating metrics data were collected directly from investment managers and have not been independently verified.
- Unless specified, the exhibits include unrealized and realized investments.
- For comparisons between the total company universe and public markets, the Russell 2500™ Index was selected based on the market capitalization of the underlying stocks. When breaking down companies by enterprise value, other Russell indexes with more appropriate market cap ranges have been used.
- Sector classifications are based on the Global Industry Classification Standard (GICS). GICS was developed and is the exclusive property and a service mark of MSCI Inc. and S&P Global Market Intelligence LLC and is licensed for use by Cambridge Associates. GICS sector classifications changed in late 2018; however, these changes are not reflected in this report as the analyses are as of December 31, 2017. It should be noted that the GICS changes could have a meaningful impact on future sector analyses.
- Individual company operating metrics (e.g., revenue and EBITDA) have not been adjusted for acquisitions.
- The analyzed holding period for some companies represented in the dataset is short, and thus EBITDA growth rates may be muted initially, as PE owners do not seek to maximize EBITDA in the first several years of ownership.
- Any company with a negative metric for EBITDA, net debt, or revenue was excluded from analysis using that metric.
- Company counts for each analysis reflect all submitted transactions, excluding outliers. Starting with this year's analysis, we have refined our methodology to eliminate "duplicate" transactions completed by the same firm across funds in a given year. As a result, there have been changes to metrics previously published. For a "club" or syndicated deal that involves two or more separate firms, there would still be two or more companies in our universe.
- When the operating metrics information is disaggregated into deal type, enterprise value, and sectors, the sample sizes are smaller and may be biased by one or several data points. Time periods with fewer than 15 observations have been marked NA.
- Past results are not an indication of future results, provide no guarantee for the future, and will not be constant over time.

PURCHASE THE COMPANY AND OPTIMIZE CAPITAL STRUCTURE

- Purchase Price Multiple
- Leverage Multiple

Key Valuation Metric: Purchase Price Multiple

- Equity markets in the aggregate are richly valued. Based on purchase price multiples (PPMs) and public equity EBITDA trading multiples, **private and public equity markets remain very expensive**—trading in the double digits since 2014, which is high versus historical values. Additionally, both jumped more than half a turn of EBITDA in 2017.
- On a relative basis, **private equity (PE) has maintained its discount to publics**; since 2007, it averaged 1.2 turns of EBITDA.
- From a valuation perspective, **public markets have changed more quickly and dramatically than private company PPMs**, which have moved at a more measured pace; appearing to follow the public market shifts. For example, public market valuations dropped 2.4 turns of EBITDA from 2007 to 2008 and then leapt 1.6 turns from 2013 to 2014. Private company valuations moves were less severe.
- **Growth equity** valuations have grown over the last decade. **PPMs averaged 17.9x from 2015 to 2017, versus 14.4x for the prior two years and 11.7x from 2007 to 2012.**
- Reflecting their potential, **growth equity deals command higher valuations based on PPMs** as represented by enterprise value/EBITDA. Since 2007, the average purchase price for growth equity deals was 5.1 turns higher than buyout deals. As we stated in our recent publication, this strategy is better expressed as a revenue multiple because owners and acquirers are focused on topline growth.
- **Revenue purchase price multiples also confirmed an increasingly expensive environment.*** Average LTM (last 12 months) **revenue purchase price multiples increased from 2.9x in 2010 to 4.9x in 2017**, well in excess of valuations of public companies in the Russell 2500™ Index, which generally ranged between 2.0 times and 3.3 times LTM revenue during that time period.

* Please see Peter Mooradian et al., "Growth Equity: Turns Out, It's All About the Growth," Cambridge Associates Research Report, 2019, Figure 6.

Key Valuation Metric: Purchase Price Multiple (cont)

- **Factors that continued to drive valuations for growth equity included aggressive buyers** (financial sponsors and strategics), **attractive characteristics of growth companies** in a slow growth environment, **and strong recent returns**, particularly in IT, which represents more than 35% of the growth equity sample.
- Valuations for control/buyout transactions have also trended higher, hitting a new peak in 2017. At 11.2x EBITDA, 2017 represented the third consecutive year of double-digit PPMs, but year-over-year increases have been more muted than those seen in growth.
- From 2014 to 2017, **large buyouts** (companies with greater than $1 billion of enterprise value) **transacted at a nearly 2 turn discount to their public market equivalents** (Russell MidCap® Index) In the previous seven years (2007–13), they traded more in line with one another.
- Valuations for mid-sized buyouts (companies with enterprise values between $250 million and $1 billion) have averaged 9.6x, which is 1.0x lower than their public counterparts in the Russell 2000® Index and 0.3x lower than their larger private counterparts. **PPMs for mid-sized buyout transactions peaked in 2014 (12.3x EBITDA).**
- **Small private companies** (enterprise values less than $250 million) historically **transacted at a discount of 1.6x EBITDA relative to the largest private segment** and traded at a discount of 2.5x EBITDA relative to their small public counterparts.
- From 2007 until 2013, small private company PPMs remained fairly steady (averaging 7.1x when the same sized public companies traded at 9.8x). **While small buyout PPMs leapt in 2014 and reached double digits in 2017, they still maintained a 2.1x EBITDA discount to similarly sized public companies over that time period.**

Key Valuation Metric: Purchase Price Multiple (cont)

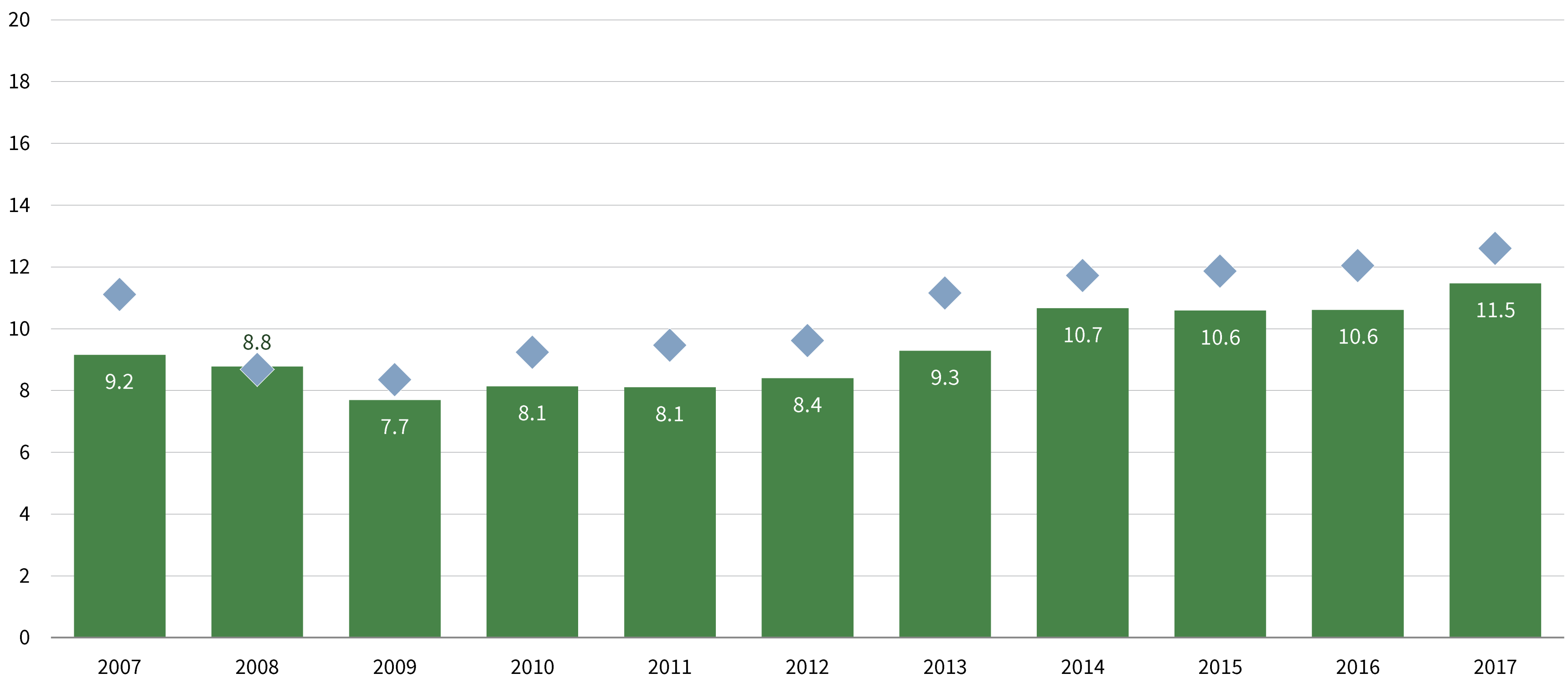
- **Across the four largest sectors** (consumer discretionary, healthcare, industrials, and information technology, which account for approximately three-quarters of the total PE universe), **PE companies have historically traded at a discount to their counterparts in the public markets**. From 2007 through 2017, the average PE PPM across these four sectors was 10.0x, versus 10.7x for the public comparables in the same period.
- While valuations are up for public and private **healthcare companies, the sector remains meaningfully "cheaper" for private acquisitions versus public comparables**. Despite hitting new heights, the private to public discount has been pronounced over the last five years (2013–17), when **it averaged 3.6x EBITDA**, or 11.1x for PE transactions versus 14.6x for public healthcare companies.
- Over the full time period, PPMs for private IT companies were on average lower than their public counterparts (12.7x versus 13.2x). However, **over the last five years, PE-owned IT companies** have transacted at higher than their longer-term average multiples, and **exceeded public market valuations** (15.8x versus 14.4x). **PPMs for both public and private IT companies hit new heights in 2017.**
- Based on long-term averages, valuations of **private consumer discretionary companies** were 0.3x lower than those of publics. The **discount to publics peaked in 2014, declined in the subsequent two years, and evaporated altogether in 2017.**
- **At 8.2x EBITDA, industrial companies typically trade below their public counterparts** (9.2x), **as well as** the **other PE sectors** of consumer discretionary (8.7x), healthcare (10.0x), and IT (12.7x).

Valuations were up universally in this cycle

Private equity discount to publics has been maintained since 2009

AVERAGE EBITDA PURCHASE PRICE MULTIPLES AT ACQUISITION OF PRIVATE EQUITY–OWNED COMPANIES VS PUBLIC COMPANIES

As of December 31, 2017 • Enterprise Value/EBITDA



Number of Companies

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Private Equity–Owned Companies	317	194	117	245	225	283	157	208	185	166	146
Russell 2500™ Index	1,492	1,519	1,495	1,679	1,645	1,689	1,669	1,681	1,665	1,611	1,568

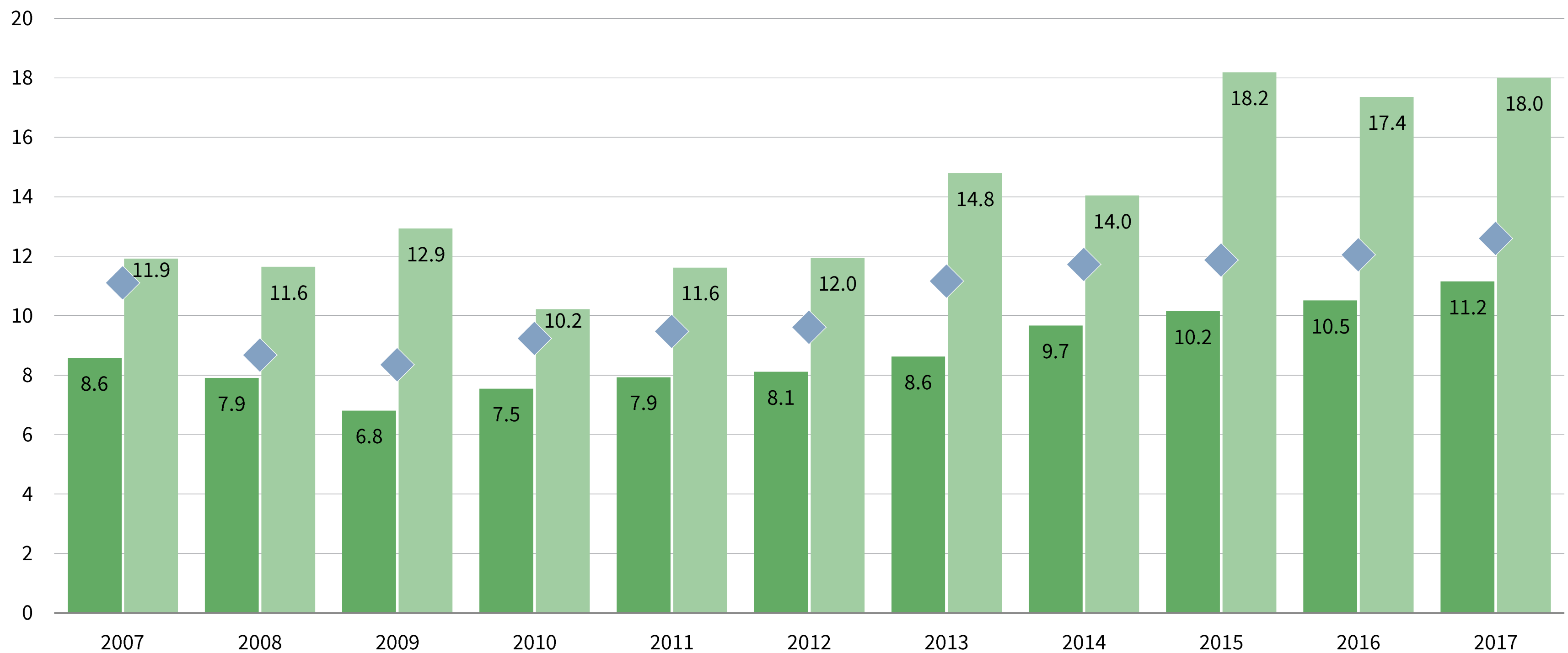
Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Note: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes.

Growth equity commanded premium multiples

Buyout companies transacted at lower multiples than public companies in each year

AVERAGE EBITDA PURCHASE PRICE MULTIPLES AT ACQUISITION OF BUYOUT AND GROWTH EQUITY COMPANIES VS PUBLIC COMPANIES

As of December 31, 2017 • Enterprise Value/EBITDA



Number of Companies

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Buyout Companies	223	134	79	175	168	215	108	157	143	124	105
Growth Equity Companies	59	40	24	54	38	52	41	42	31	37	34
Russell 2500™ Index	1,492	1,519	1,495	1,679	1,645	1,689	1,669	1,681	1,665	1,611	1,568

Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Private equity–owned companies were identified by the manager's strategy.

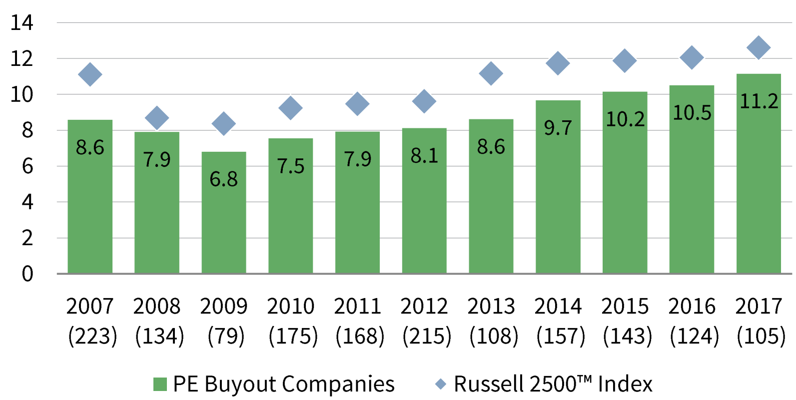
Private discounts held across the size segments . . .

. . . but the largest discount to public companies was in the small-cap companies (2.5x lower over the time period)

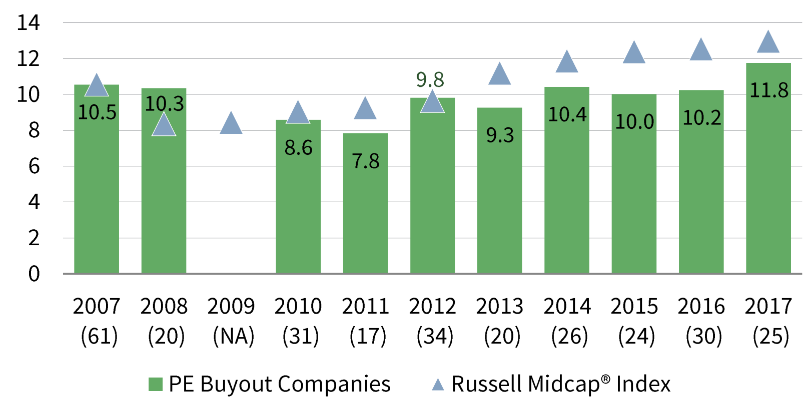
AVERAGE EBITDA PURCHASE PRICE MULTIPLES AT ACQUISITION OF PRIVATE EQUITY BUYOUT COMPANIES VS PUBLIC COMPANIES BY ENTERPRISE VALUE SEGMENT

As of December 31, 2017 • Enterprise Value/EBITDA

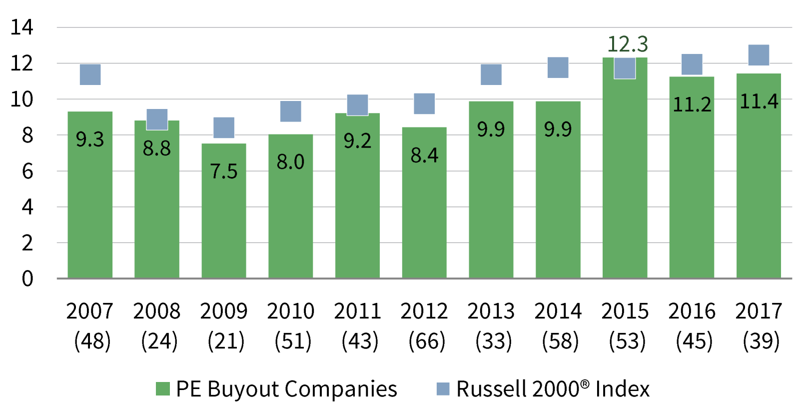
Total Universe



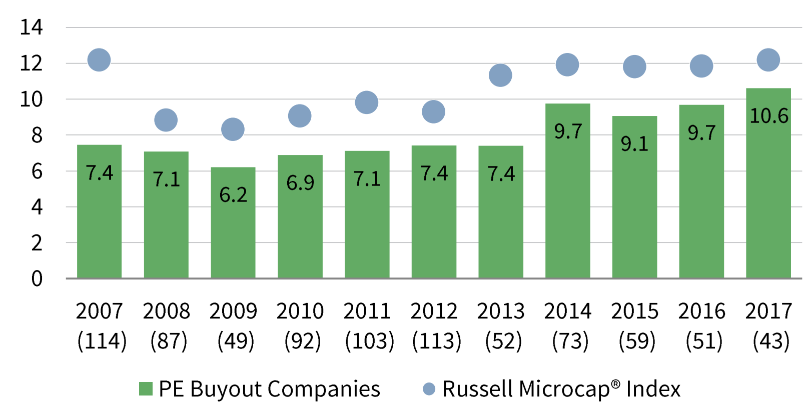
Enterprise Value > $1 B



Enterprise Value $250 M – $1 B



Enterprise Value < $250 M



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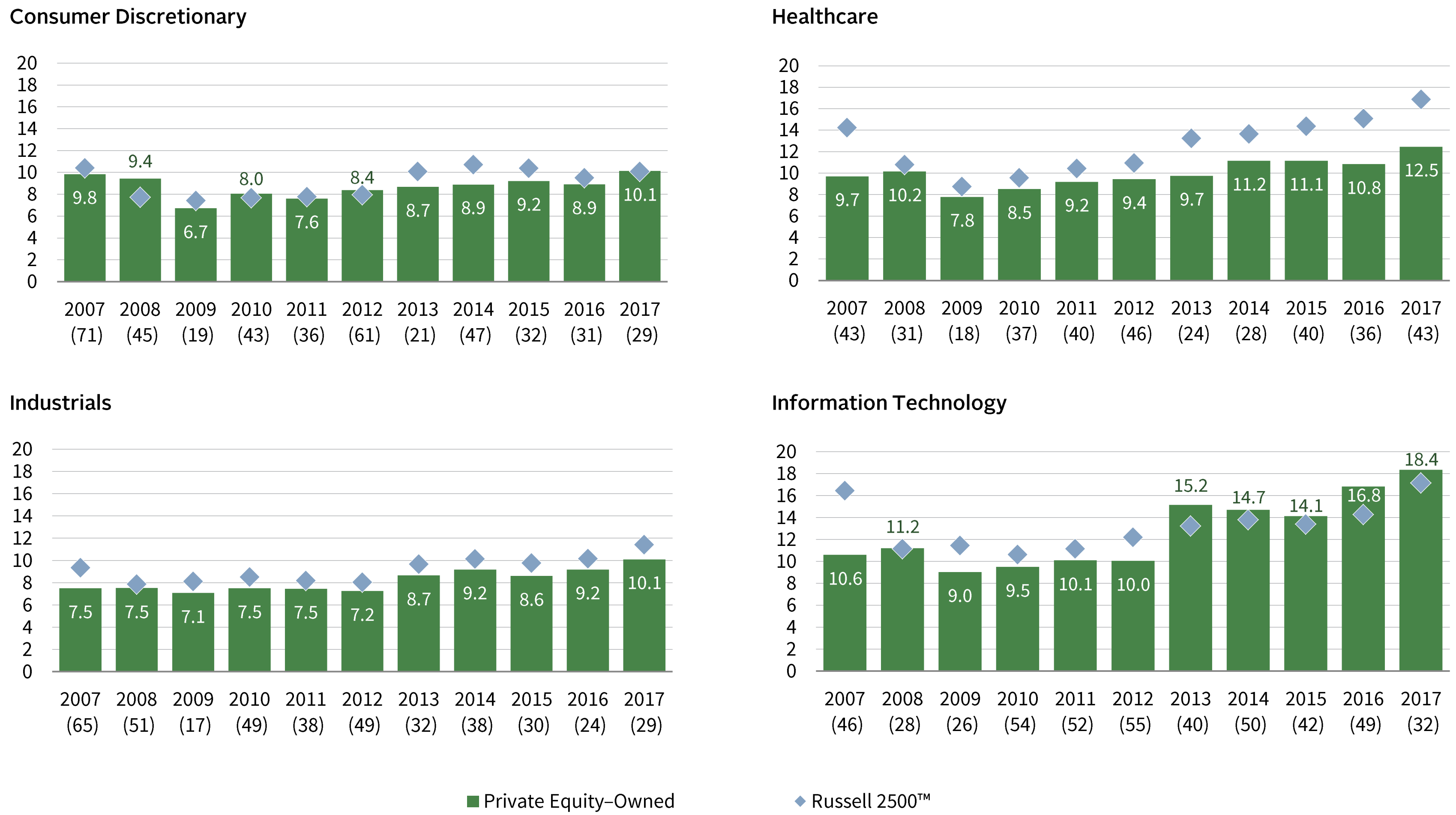
Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Numbers in parentheses represent number of private equity–owned companies in each year.

Over the last five years, technology and healthcare companies' valuations have increased significantly

In IT, private PPMs exceeded public valuations; in healthcare the reverse has been true

AVERAGE EBITDA PURCHASE PRICE MULTIPLES AT ACQUISTION OF PRIVATE EQUITY–OWNED COMPANIES VS PUBLIC COMPANIES BY SECTOR

As of December 31, 2017 • Enterprise Value/EBITDA



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PURCHASE THE COMPANY AND OPTIMIZE CAPITAL STRUCTURE

- Purchase Price Multiple
- **Leverage Multiple**

Key Capital Structure Metric: Leverage Multiple

- From 2007 to 2017, **PE-owned companies were more highly levered than their publicly traded counterparts**, averaging 4.0x net debt to EBITDA at acquisition, versus an average of 2.8x for publics.
- The PE universe is heavily influenced by buyout companies, which have been the predominant deal type and the most levered at 4.3x, on average. Growth equity companies have similar leverage profiles as public ones (2.8x net debt to EBITDA).
- Leverage multiples remained high during the last three years (2015–17). While **buyouts hit a new peak in 2017**, the Russell 2500™ Index and growth equity declined a bit in 2016 and 2017.
- In aggregate, **leverage levels have increased less than purchase prices, reflecting increased equity contributions**. PE funds have more equity at risk in the current vintage of deals.
- Across the full time period, in private markets, **large buyout companies have consistently commanded the highest leverage levels**. In the five years starting in 2013, the average leverage multiple for the large segment reached 6.2x, a significant bump from the previous five-year period's average of 5.0x. While **their public brethren** have slowly increased leverage over time, **on average**, they still **employ less than half the leverage of this segment.**
- There is a similar trend in leverage use in mid-sized companies. Over the five years from 2013 to 2017, leverage increased by more than 25% over the prior five-year period (4.3x to 5.4x). Over the ten-year period, 2008–17, public companies were levered at 2.9x on average, about 2 turns fewer than similarly sized buyouts.

Key Capital Structure Metric: Leverage Multiple (cont)

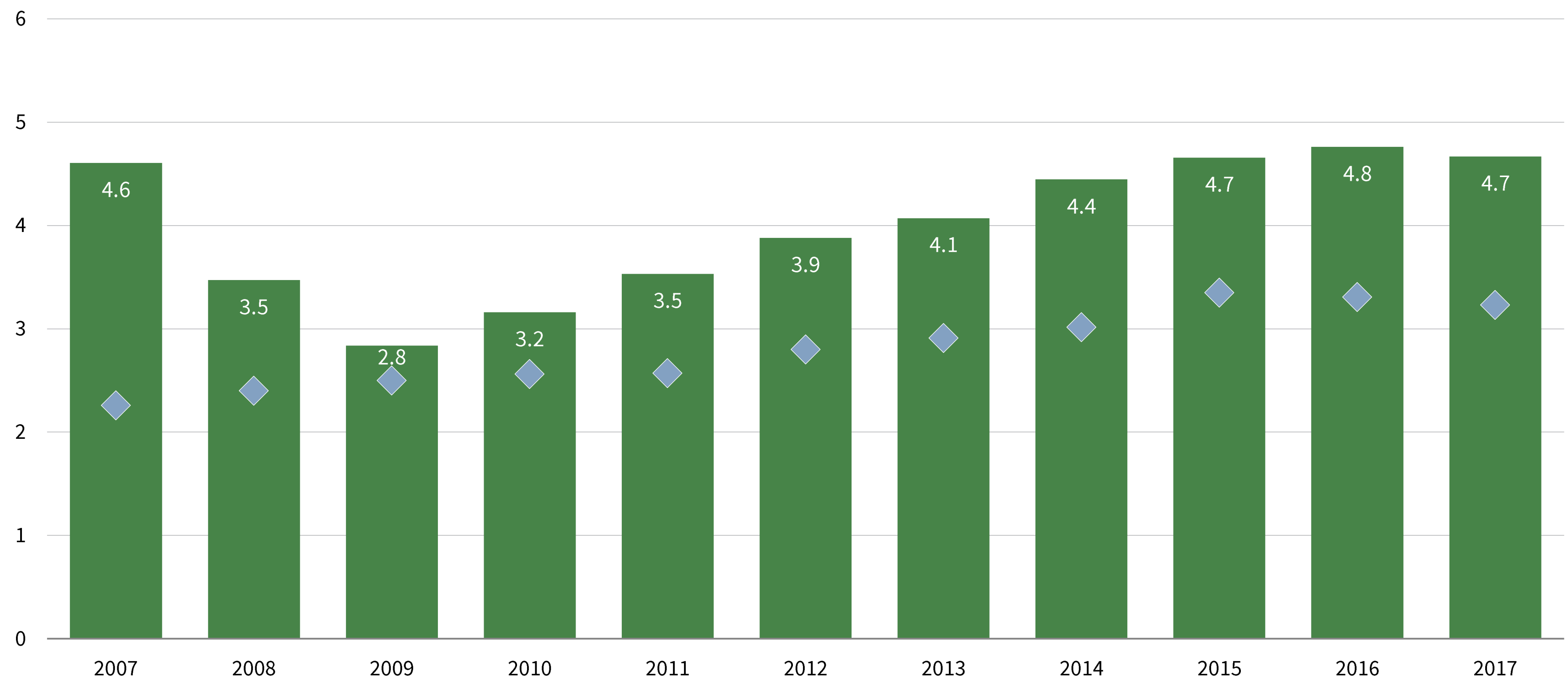
- Versus their large brethren, **small private companies were more conservatively capitalized**, averaging 3.5x EBITDA. The use of **leverage in small companies, whether public or private, is roughly the same** (3.3x for publics).
- Investor interest in the **healthcare sector** has not only driven valuations up but **leverage** has been climbing. It **reached a new peak: 5.5x in 2017**. At the same time, **leverage in other sectors** (consumer discretionary, industrials, and IT) **hit recent highs in 2015 and has fallen since**.
- From 2007 to 2016, the private healthcare companies employed, on average, about 1.8 more turns of leverage; in 2017, the difference was 2.7x.
- Across the other three sectors, **private IT companies have employed much more leverage (4.1x versus 1.7x) than their public counterparts** over the time period, while private and public consumer discretionary companies average a difference of only 1.4x EBITDA in leverage. The industrials sector falls in between the two with an average variation of 1.9x.

PE-owned companies were consistently more levered than public peers

Leverage use in 2015–17 was higher than the previous peak in 2007

AVERAGE EBITDA LEVERAGE MULTIPLES AT ACQUISITION OF PRIVATE EQUITY–OWNED COMPANIES VS PUBLIC COMPANIES

As of December 31, 2017 • Net Debt/EBITDA



Number of Companies

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Private Equity–Owned Companies	295	171	103	230	214	259	149	195	170	154	145
Russell 2500™ Index	955	996	926	1,004	1,013	1,110	1,124	1,181	1,222	1,202	1,217

Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Note: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes.

Leverage for buyout transactions reached a new high in 2017

In six of the last seven years, growth equity has also been more levered than publics

AVERAGE EBITDA LEVERAGE MULTIPLES AT ACQUISITION OF BUYOUT AND GROWTH EQUITY COMPANIES VS PUBLIC COMPANIES

As of December 31, 2017 • Net Debt/EBITDA

Number of Companies

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Buyout Companies	223	124	68	170	168	212	112	155	133	125	106
Growth Equity Companies	42	27	21	42	25	32	27	33	17	22	25
Russell 2500™ Index	955	996	926	1,004	1,013	1,110	1,124	1,181	1,222	1,202	1,217

Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Private equity–owned companies were identified by the manager's strategy.

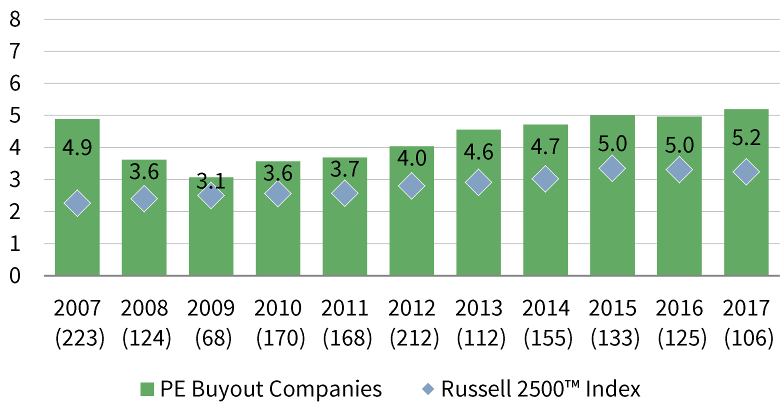
For buyout companies, leverage increased with size

Whether public or private, small companies were levered at roughly the same levels

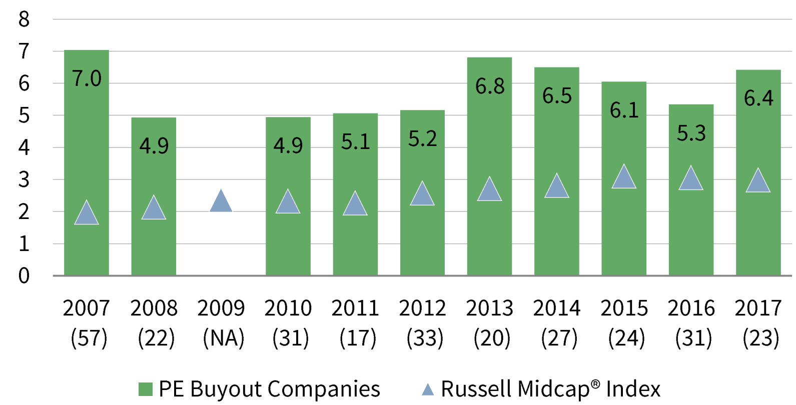
AVERAGE EBITDA LEVERAGE MULTIPLES AT ACQUISITION OF PRIVATE EQUITY BUYOUT COMPANIES VS PUBLIC COMPANIES BY ENTERPRISE VALUE SEGMENT

As of December 31, 2017 • Net Debt/EBITDA

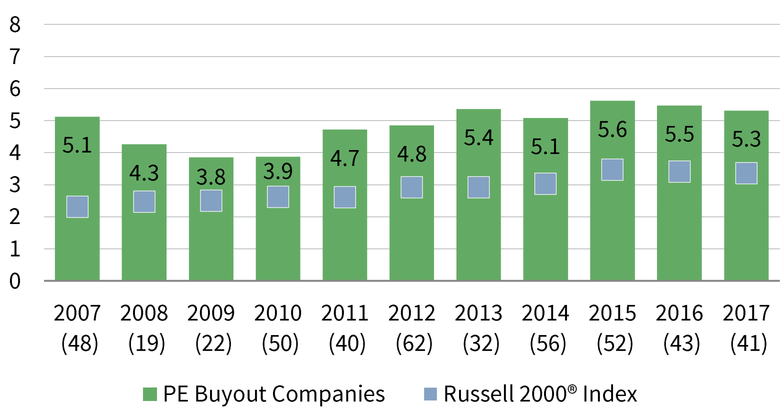
Total Universe



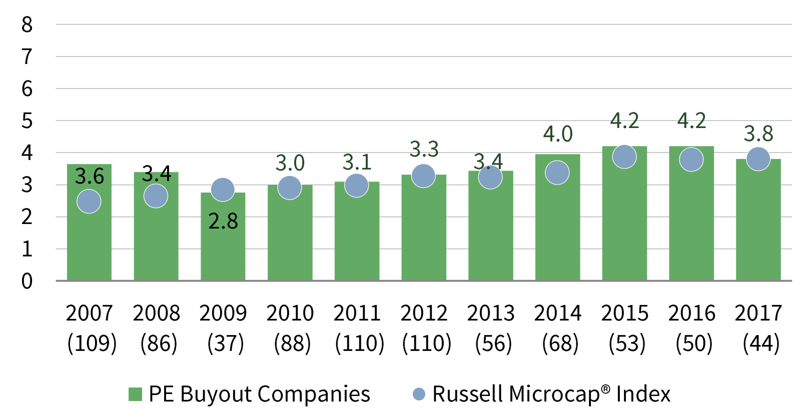
Enterprise Value > $1 B



Enterprise Value $250 M – $1 B



Enterprise Value < $250 M

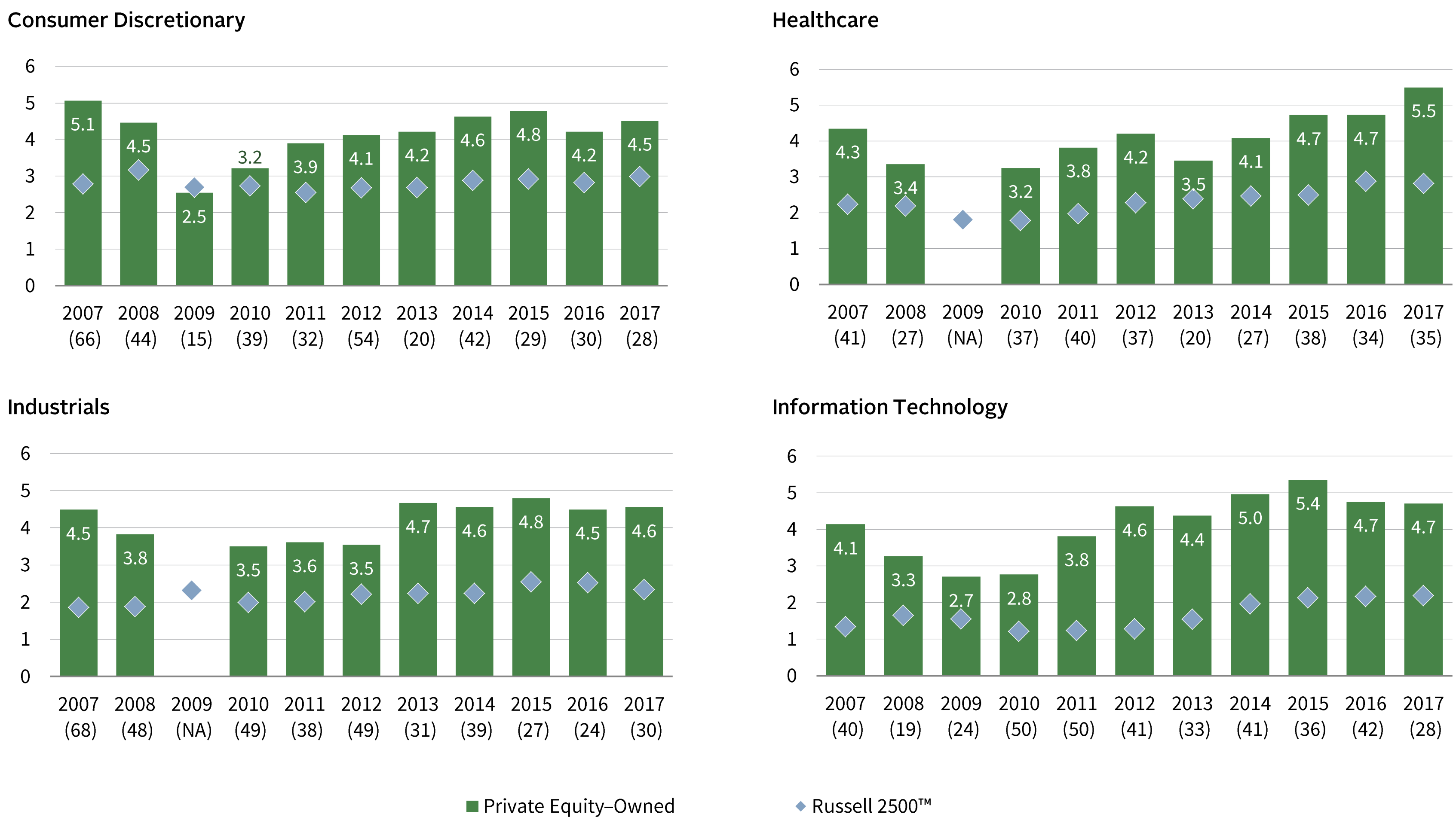


Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Numbers in parentheses represent number of private equity–owned companies in each year.

Healthcare leverage was highest in 2017 across time period and sectors

2015 was a previous peak across sectors

AVERAGE EBITDA LEVERAGE MULTIPLES AT ACQUISTION OF PRIVATE EQUITY–OWNED COMPANIES VS PUBLIC COMPANIES BY SECTOR
As of December 31, 2017 • Net Debt/EBITDA



Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Numbers in parentheses represent number of private equity–owned companies in each year.

IMPROVE THE PERFORMANCE OF THE COMPANY AND TRANSFORM THE BUSINESS

- Revenue Growth
- EBITDA Growth
- EBITDA Margin
- Exit Metrics

Key Company Performance Metric: Revenue Growth

- **PE-owned companies outperformed their public market peers based on revenue growth in every year from 2008 to 2017.**
- **In seven of ten years, growth equity outperformed publics by greater than 10%.** From 2008 through 2011, buyouts and their public counterparts had nearly equal revenue growth. **Since 2012** (the last six years), **buyouts outperformed publics by an average of more than 200 basis points** (bps).
- **In 2017, revenue grew at** 26.1% for growth equity and 10.5% for buyouts, **the fastest rate among the years analyzed**, eclipsing the 2014 peaks of 20.8% and 9.8%, respectively.
- Over the 2008–17 period, **growth equity companies grew revenue at an average annual pace of 16.5%**, while **buyout companies** increased revenue **by 6.6%** and **public companies** increased revenue **by 5.3%.**
- Notably, growth equity companies were able to grow revenue in 2009, while buyouts and public companies experienced declines.
- **Small buyouts produced double-digit revenue growth in five of the last seven years,** and from 2008 through 2017, they averaged 8.6% revenue growth compared to 4.6% for companies in the Russell Microcap® Index.
- **With few exceptions, the smallest buyouts meaningfully outgrew public peers and larger buyouts in every year.**
- From 2008 through 2017, revenue growth for mid-sized buyouts averaged 6.0%, marginally better than similarly sized public companies (5.7%). Revenue growth for mid-sized buyouts peaked in 2017 (12.0%) and nearly peaked for public companies (9.2%).

Key Company Performance Metric: Revenue Growth (cont)

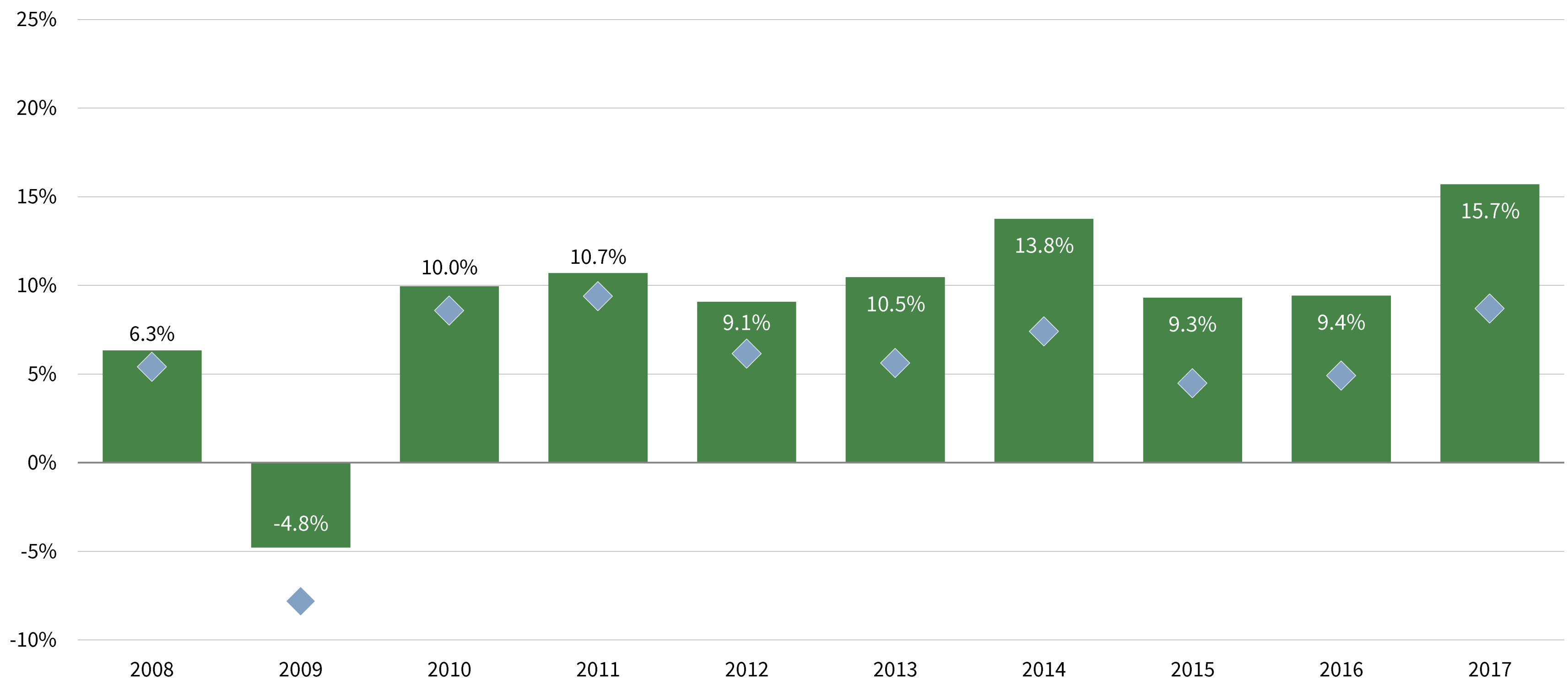
- Since 2008, **large buyouts have grown revenue at the same pace (averaging 3.7% per year) as their public counterparts,** with notable underperformance by buyouts in 2017.
- **By sector, revenue growth by PE-owned companies beats publics,** on average.
- Within the PE-owned universe, IT and healthcare companies produced the fastest revenue growth, followed by industrials, and, lastly, consumer discretionary. Average annual revenue growth in IT and healthcare was more than 13%; the other two were more than 700 bps behind and averaged single-digit growth.
- **From 2008 to 2017, outperformance by PE-owned companies was strongest in the IT sector** as private IT companies grew revenue at an average of 13.7%, a 550 bps advantage over public counterparts. Private IT company revenue growth peaked in 2017 (25.6%) after having averaged 15% growth per annum from 2010 until 2016 (at least 12% per year)—the strong growth profile helps to explain the previously mentioned elevated PPMs.
- **Private healthcare companies bested their public counterparts** in eight of the ten years analyzed **and averaged 240 bps of outperformance** over the full period.
- Similarly, private industrial businesses outperformed public peers in seven of the ten years and averaged 184 bps more growth annually over the full period. Strong relative growth in five of the ten years (2009, 2012–14, and 2017) fueled the outperformance.
- **Private consumer discretionary businesses surpassed public companies in the same sector in all but one of the ten periods** and averaged 110 bps more growth annually over the full period.

Private equity companies grew revenue faster than publics in each year

Revenue growth has averaged 11.1% since the 2009 recession

AVERAGE ANNUAL REVENUE GROWTH OF PRIVATE EQUITY–OWNED COMPANIES VS PUBLIC COMPANIES

As of December 31, 2017 • Annual Growth Rate (%)



Number of Companies

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Private Equity–Owned Companies	295	509	633	765	791	724	747	658	624	552
Russell 2500™ Index	2,026	2,166	2,008	2,072	2,056	2,027	2,030	2,032	1,982	1,914

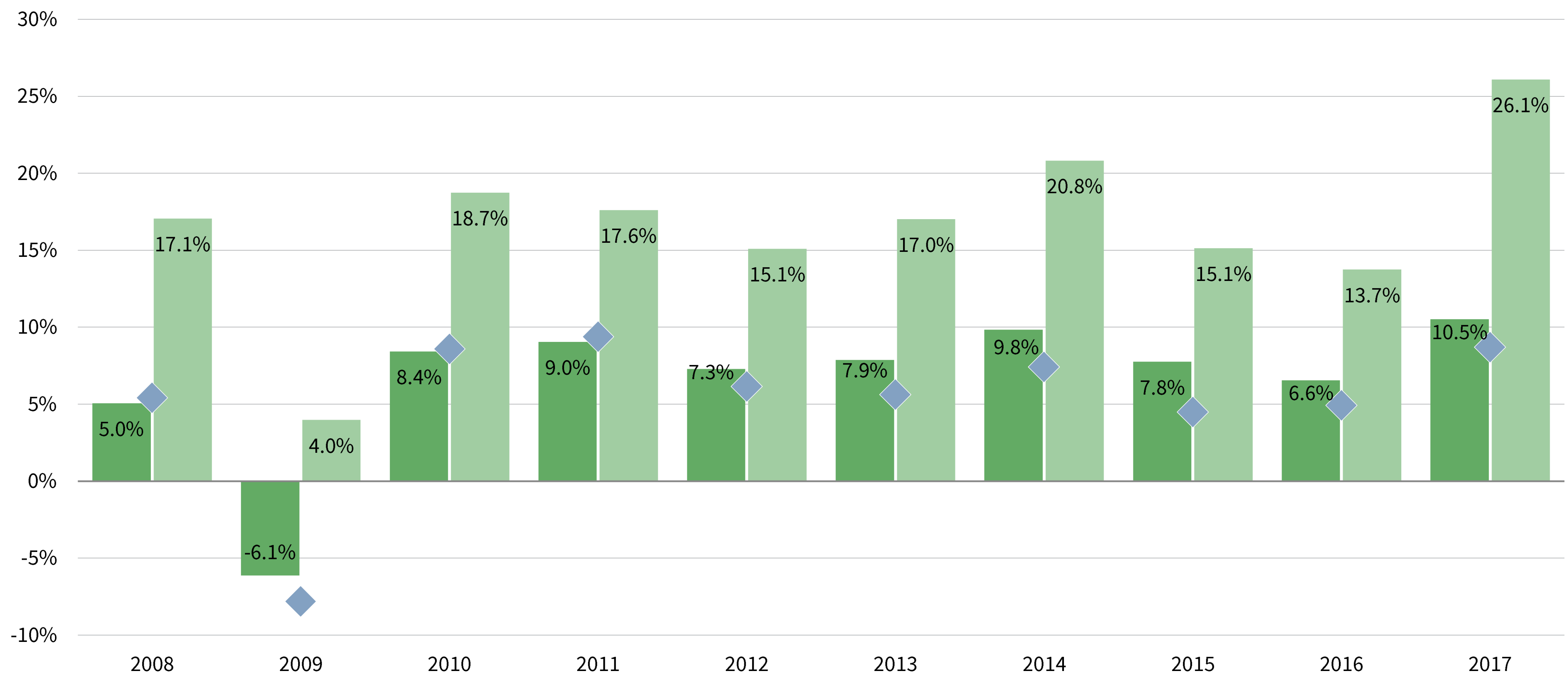
Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Note: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes.

Growth equity companies continued to drive private equity revenue growth

PE buyout companies also outperformed publics in seven of ten years

AVERAGE ANNUAL REVENUE GROWTH OF BUYOUT AND GROWTH EQUITY COMPANIES VS PUBLIC COMPANIES

As of December 31, 2017 • Annual Growth Rate (%)



Number of Companies

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Buyout Companies	239	386	456	537	509	419	431	333	345	300
Growth Equity Companies	49	91	137	172	202	234	241	248	229	198
Russell 2500™ Index	2,026	2,166	2,008	2,072	2,056	2,027	2,030	2,032	1,982	1,914

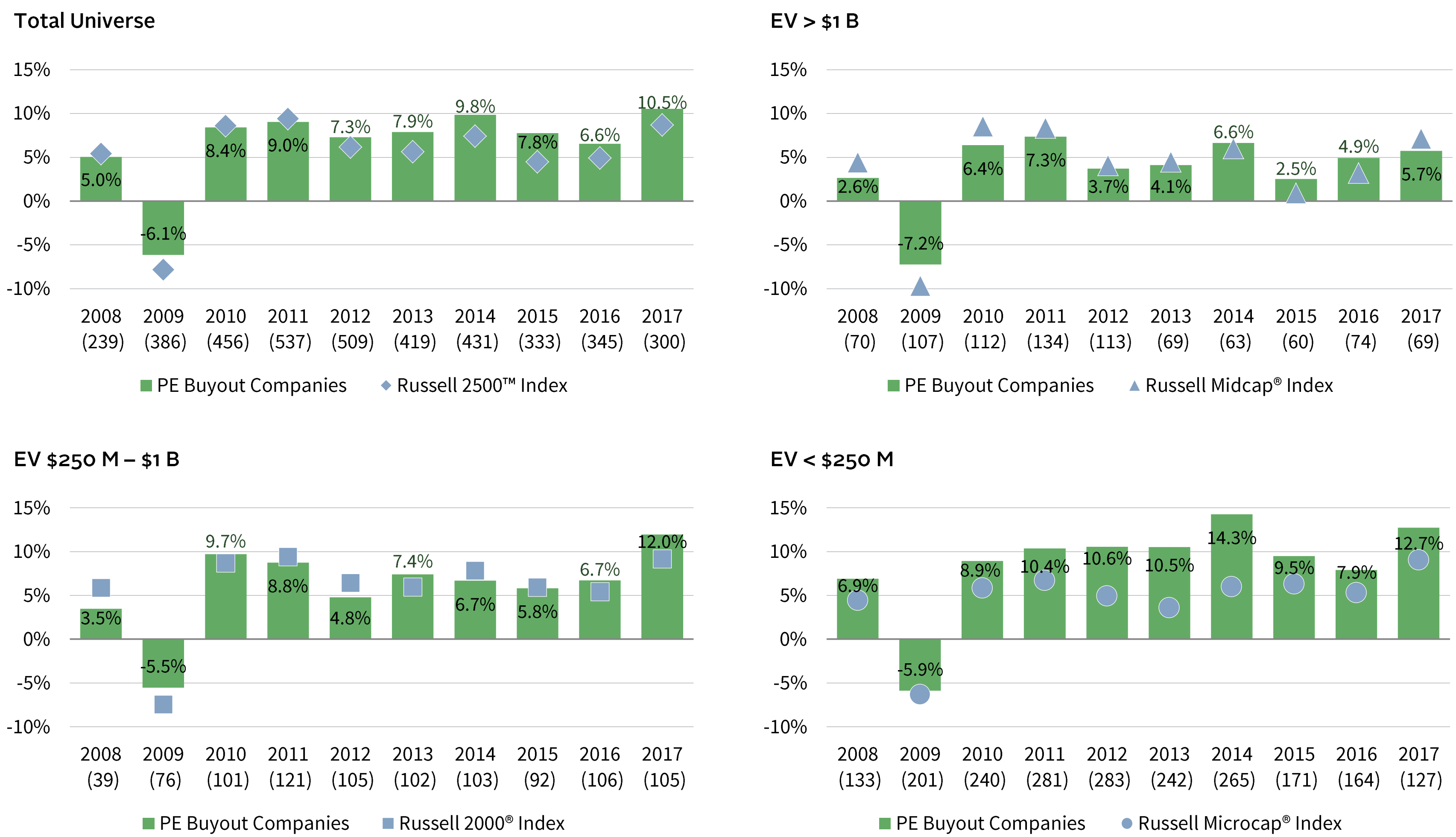
Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Private equity–owned companies were identified by the manager's strategy.

Excepting 2009 and 2010, small buyout revenue growth exceeded all others

Large buyouts were the only size segment to underperform publics in 2017

AVERAGE ANNUAL REVENUE GROWTH OF PRIVATE EQUITY BUYOUT COMPANIES VS PUBLIC COMPANIES BY ENTERPRISE VALUE SEGMENT

As of December 31, 2017 • Annual Growth Rate (%)



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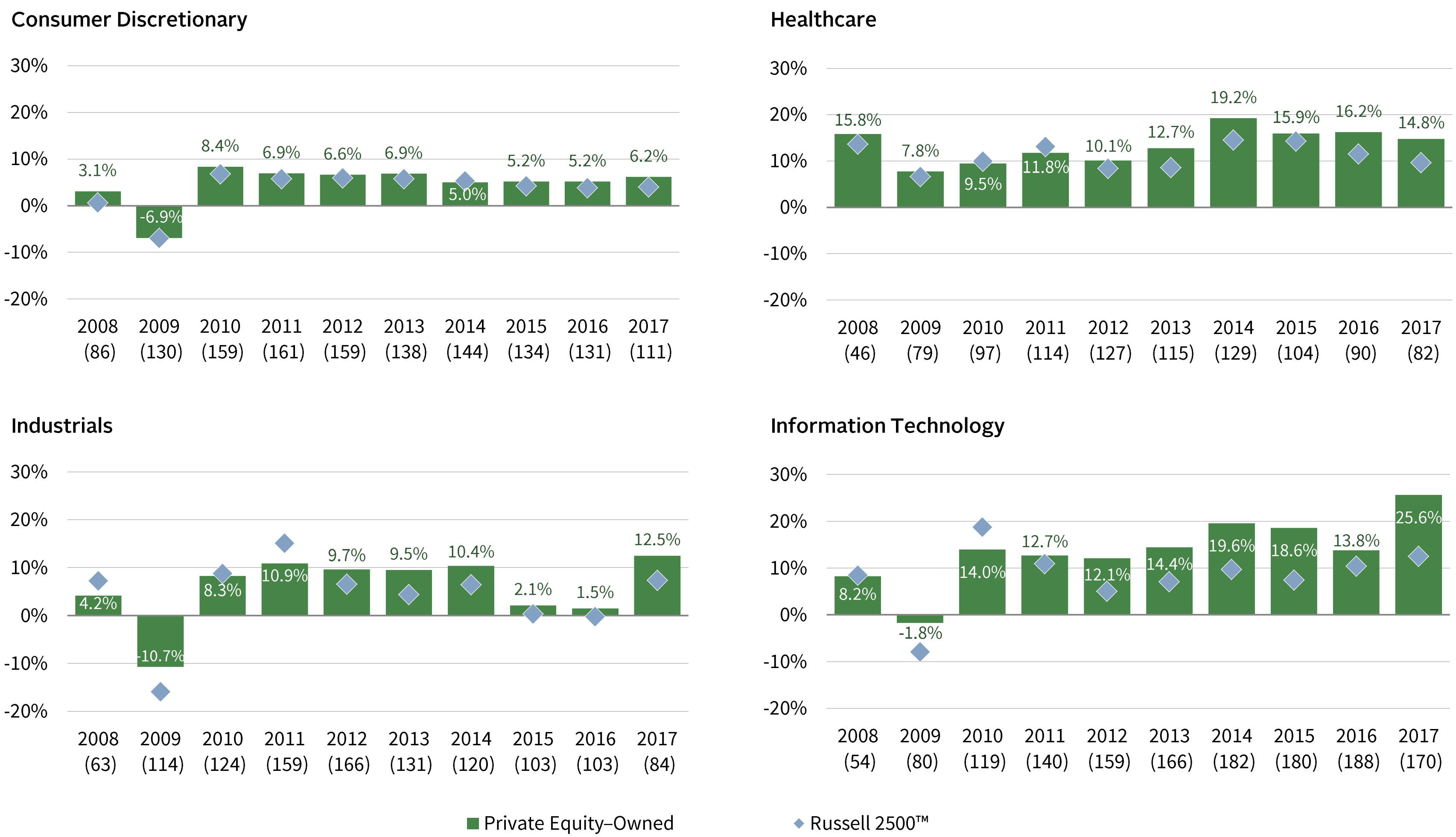
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Numbers in parentheses represent number of private equity–owned companies in each year.

By sector, revenue growth of private equity–owned companies beat that of publics

Private IT and healthcare grew revenue by more than 13% per year, on average

AVERAGE ANNUAL REVENUE GROWTH OF PRIVATE EQUITY–OWNED COMPANIES VS PUBLIC COMPANIES BY SECTOR

As of December 31, 2017 • Annual Growth Rate (%)



Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Numbers in parentheses represent number of private equity–owned companies in each year.

IMPROVE THE PERFORMANCE OF THE COMPANY AND TRANSFORM THE BUSINESS

- Revenue Growth
- **EBITDA Growth**
- EBITDA Margin
- Exit Metrics

Key Company Performance Metric: EBITDA Growth

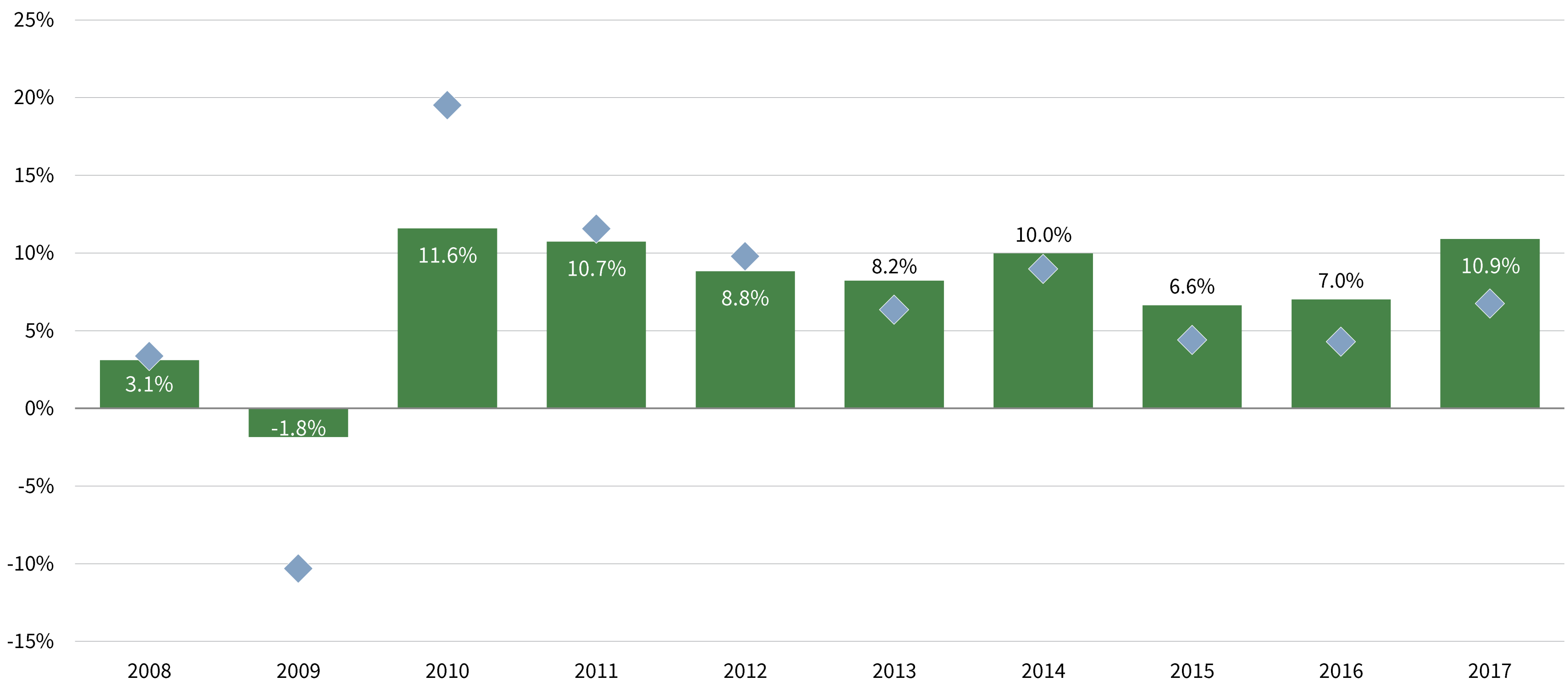
- **The average annual EBITDA growth rate from 2008 to 2017 for PE-owned companies was 7.5%, versus 6.5% for public market companies.** While relative performance was mixed across the ten years analyzed, **PE-owned companies produced better year-over-year EBITDA performance in six years: 2009 and 2013–17.**
- **The only year that public companies materially outperformed PE-owned companies was in 2010, when they rebounded strongly from their double-digit negative performance in 2009** (-10.3%). PE-owned companies also rebounded in 2010 from a less severely negative 2009.
- PE-owned companies have outperformed more recently (2013–17). Similar to revenue growth, EBITDA growth jumped in 2017.
- Disaggregating PE returns to show buyout and growth equity illustrates the strong performance of the latter segment. **Growth equity has averaged annual EBITDA growth of 11.2%** over the last ten years, **besting public markets by 471 bps.**
- **Buyout companies grew EBITDA in all but one of the ten years analyzed,** averaging 6.7% over the time period, **modestly ahead of** the 6.5% average for **the Russell 2500™ Index. The outperformance was strongest in 2009, 2015, and 2017.**
- **Among buyouts, the smallest size segment generated the best EBITDA growth**—averaging 7.3% from 2008 to 2017. This segment **bested its public counterpart**, the Russell Microcap® Index, **by more than 300 bps,** on average, from 2013 to 2017.
- Similar to the total universe, this segment only marginally bested its public counterpart, the Russell Microcap® Index.

Key Company Performance Metric: EBITDA Growth (cont)

- The largest PE-owned companies had by far the lowest average EBITDA growth (5.5% over the ten-year period, versus more than 7% for the other size segments).
- **EBITDA growth by sector shows a wide dispersion in results.** In both the private and public universes, healthcare and consumer discretionary companies exhibit the best and the worst EBITDA growth, respectively, over the ten-year period analyzed.
- **Healthcare companies have demonstrated strong and steady EBITDA growth,** averaging 13.1% and 10.9% for privates and publics, respectively. **Over the last four years, private healthcare companies grew EBITDA at an average of 19.3%.**
- **IT has provided healthy EBITDA growth for both private and public companies (9.7% and 8.4%, respectively).** Public IT EBITDA growth has been more volatile.
- Historically, private and public company EBITDA growth in **the industrial sector** averaged 6.1% and 5.2% respectively. Both **experienced significant slow downs in 2015 and 2016.**
- From 2008 to 2017, **PE-backed consumer discretionary companies delivered below average growth**, providing 3.4% average EBITDA growth while public peers have increased EBITDA at an average pace of 4.8%.
- **Notwithstanding the generally positive comparisons to public markets noted above** (i.e., private company EBITDA growth has been strong relative to publics) **it's notable that the dramatic revenue growth outperformance has not translated to similar EBITDA growth comparisons.**

After trailing for three years, PE-owned companies outgrew their public counterparts from 2013 to 2017

AVERAGE ANNUAL EBITDA GROWTH OF PRIVATE EQUITY–OWNED COMPANIES VS PUBLIC COMPANIES
As of December 31, 2017 • Annual Growth Rate (%)



Number of Companies

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Private Equity–Owned Companies	276	448	542	677	688	602	610	502	465	405
Russell 2500™ Index	1,313	1,372	1,244	1,485	1,473	1,454	1,439	1,424	1,380	1,351

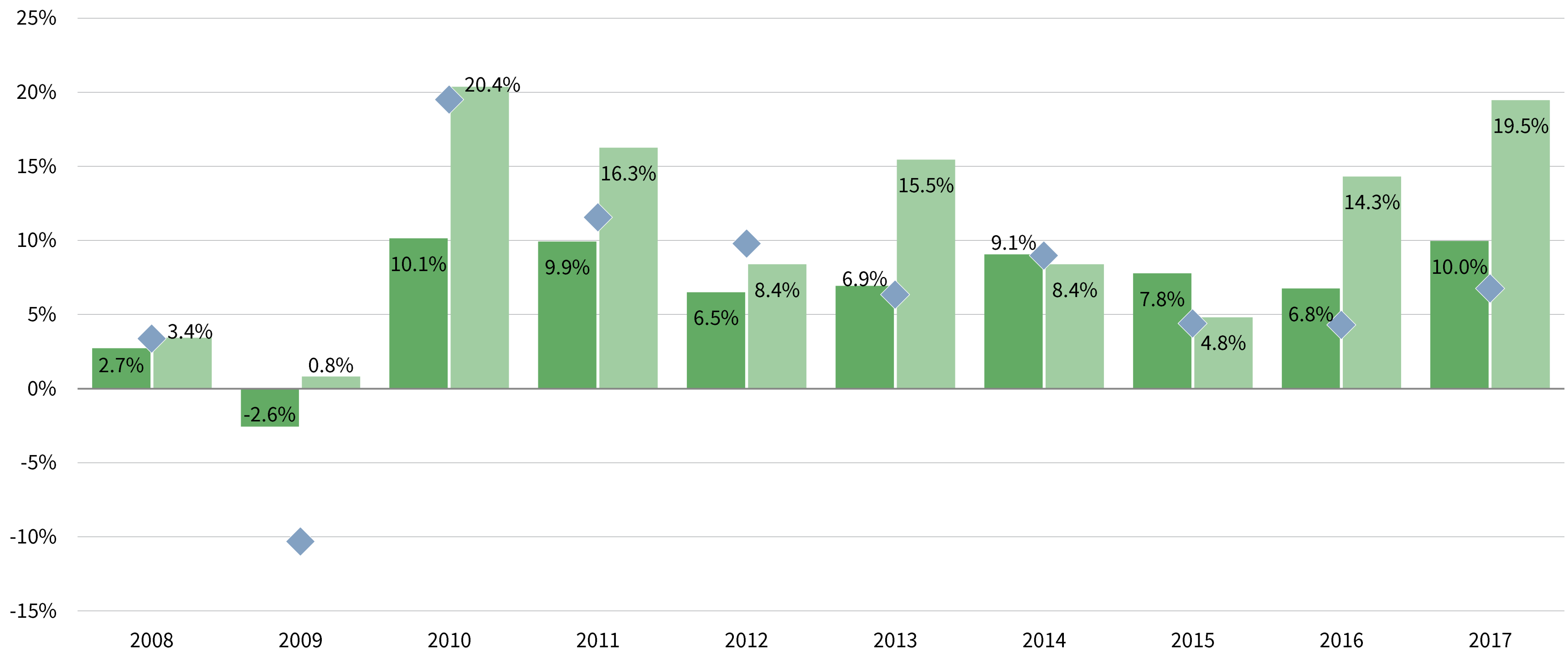
Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Note: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes.

Over the last two years, buyout and growth equity companies outperformed public ones

Over the ten-year period, growth equity companies grew EBITDA annually by nearly 5% more than publics, on average

AVERAGE ANNUAL EBITDA GROWTH OF BUYOUT AND GROWTH EQUITY COMPANIES VS PUBLIC COMPANIES

As of December 31, 2017 • Annual Growth Rate (%)



Number of Companies

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Buyout Companies	226	357	401	505	481	402	412	318	308	284
Growth Equity Companies	34	63	104	133	146	146	146	131	113	92
Russell 2500™ Index	1,313	1,372	1,244	1,485	1,473	1,454	1,439	1,424	1,380	1,351

Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Private equity–owned companies were identified by the manager's strategy.

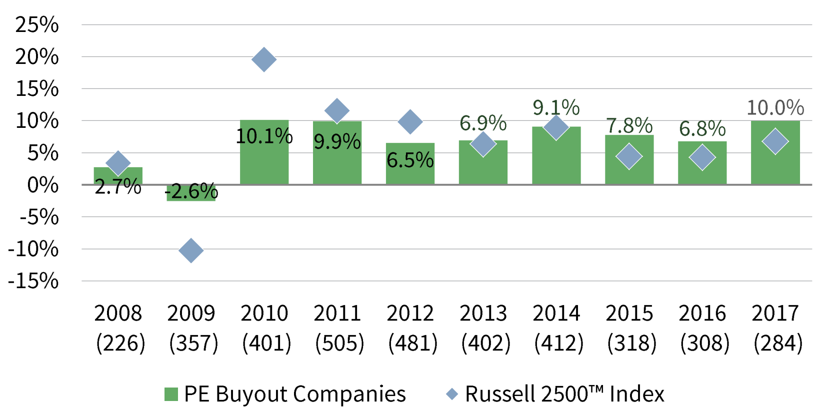
All private size segments bested their respective public peers over the period

Among the private companies, the largest companies had the lowest average EBITDA growth (5.5%)

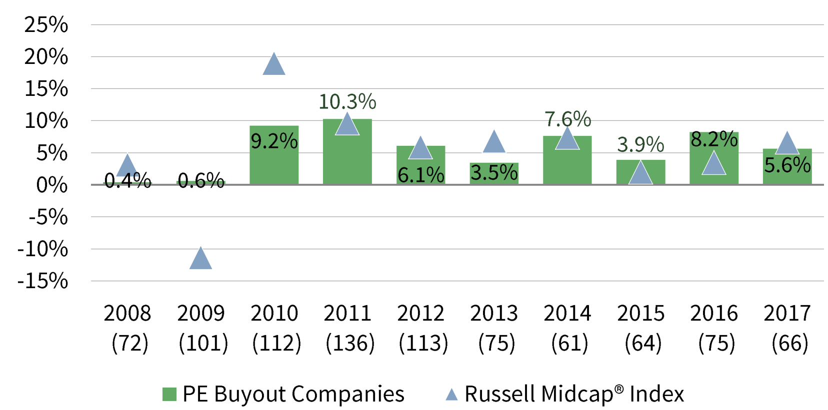
AVERAGE ANNUAL EBITDA GROWTH OF PRIVATE EQUITY BUYOUT COMPANIES VS PUBLIC COMPANIES BY ENTERPRISE VALUE SEGMENT

As of December 31, 2017 • Annual Growth Rate (%)

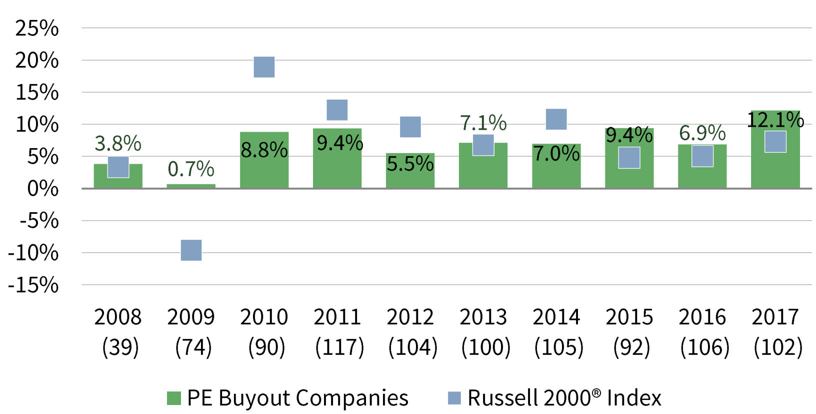
Total Universe



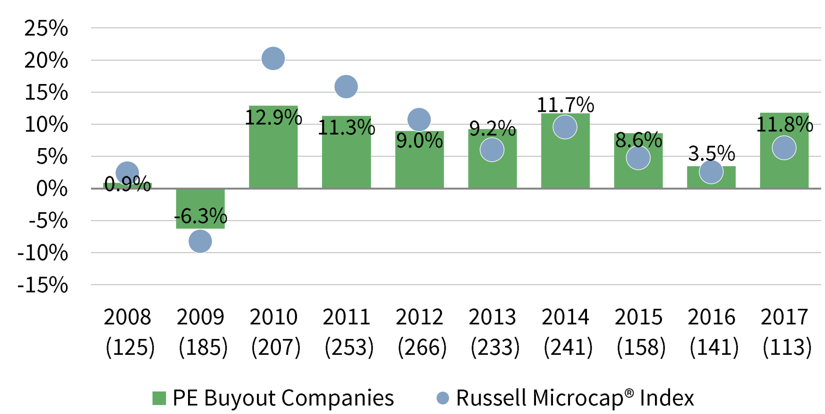
Enterprise Value > $1 B



Enterprise Value $250 M – $1 B



Enterprise Value < $250 M



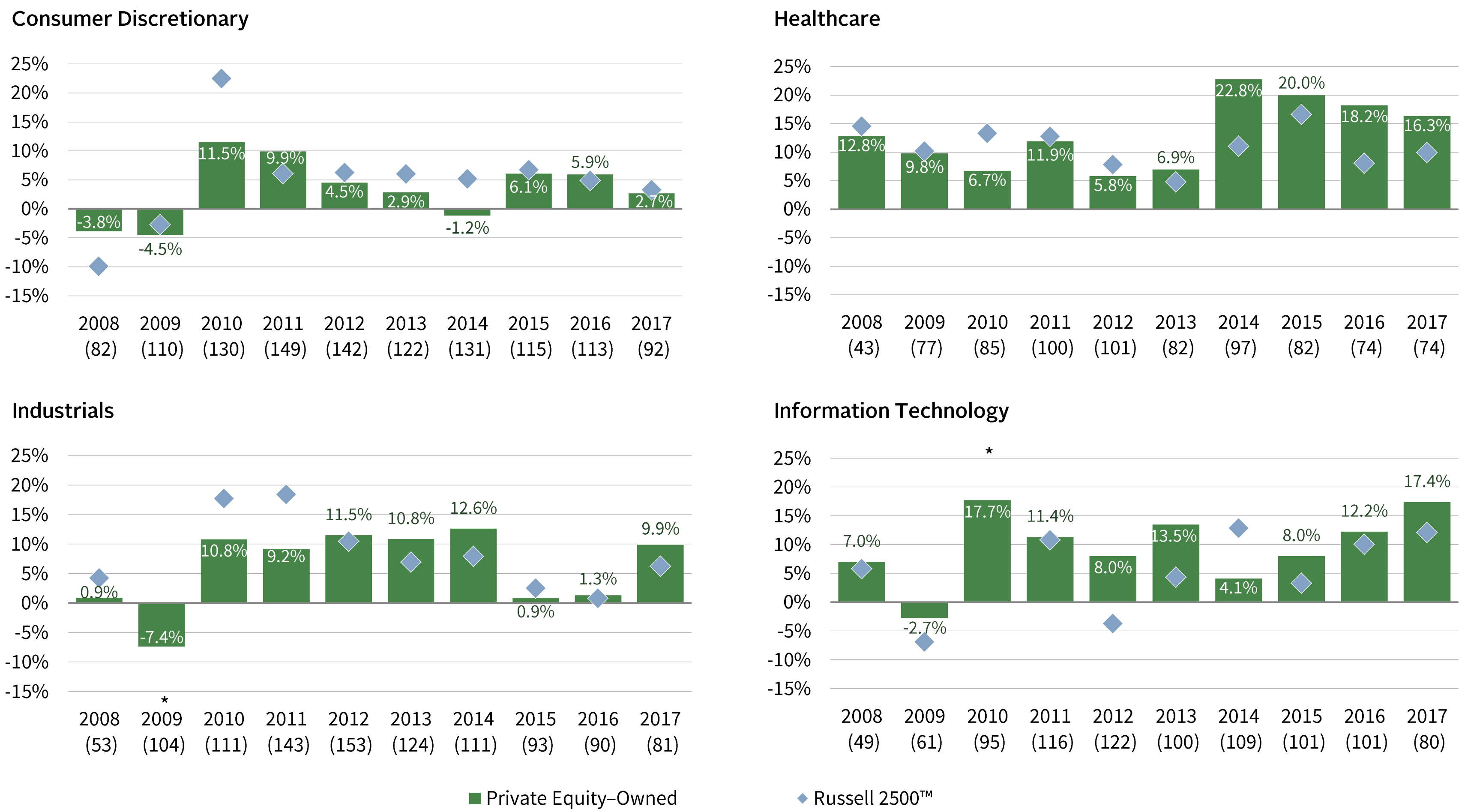
Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Numbers in parentheses represent number of private equity–owned companies in each year.

Since 2014, healthcare growth has been strong at 15% or better each year; IT has increased growth year-over-year

Consumer discretionary was the only sector where publics outgrew PE-owned companies

AVERAGE ANNUAL EBITDA GROWTH OF PRIVATE EQUITY–OWNED COMPANIES VS PUBLIC COMPANIES BY SECTOR

As of December 31, 2017 • Annual Growth Rate (%)



* Axis has been capped at -15% and 25% for scaling purposes. Industrials in the Russell 2500™ saw EBITDA growth of -23.5% in 2009; IT companies in the Russel 2500™ saw EBITDA growth of 35.5% in 2010.

Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Numbers in parentheses represent number of private equity–owned companies in each year.

IMPROVE THE PERFORMANCE OF THE COMPANY AND TRANSFORM THE BUSINESS

- Revenue Growth
- EBITDA Growth
- **EBITDA Margin**
- Exit Metrics

Key Company Performance Metric: EBITDA Margin

- From 2007 through 2017, **PE-owned companies consistently operated at higher EBITDA margin levels than publics**. The difference averaged 315 bps over that time period, with the strongest outperformance occurring in 2007–09. Over the last four years, on average, PE-owned company margins were only 143 bps higher.
- **From 2007 to 2017, buyout company EBITDA margins trailed those of growth equity companies with averages of 19.2% and 21.5%, respectively. However, over the last four years, buyout margins were higher.**
- **Size has a visible impact on margins. Large companies, whether private or public, had the best margins.** Large buyouts and their publicly traded peers in the Russell Midcap® Index have operated at nearly equal margin levels: 21.7% and 22.0%, respectively. **Over the last five years, large buyout companies have fallen behind their public counterparts and in the most recent year stood at 23.1% versus 25.7%, respectively.**
- **Medium-sized buyout companies** also have consistently high margins. They **average 21.1%, which is notably superior to their public market counterparts' 15.3%**, as measured by the Russell 2000® Index.
- **The negative impact of size and scale is notable in the lower margins for private companies and, even more so, their public peers.** Within the smallest size segment, buyout companies had consistently higher margins than their public brethren in the Russell Microcap® Index. This difference averaged 440 bps with margins for the **smallest-sized private companies averaging 17.0%, versus public market comparables at 12.6%.**

Key Company Performance Metric: EBITDA Margin (cont)

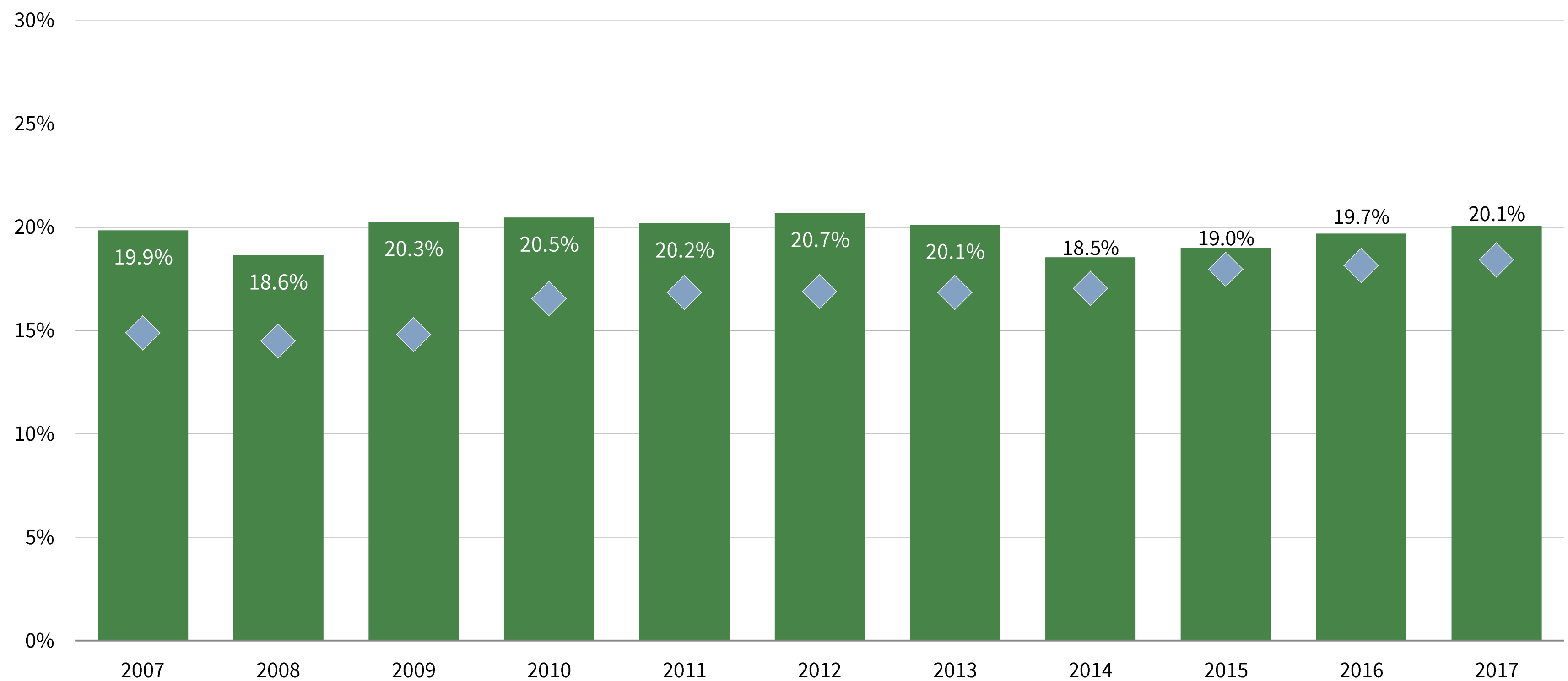
- Across all four sectors analyzed, **PE-owned companies had higher EBITDA margins** than their public market counterparts. By sector, this varied from an **average difference of 144 bps (healthcare) to 1,095 bps (IT).**
- **EBITDA margins for PE-owned IT companies averaged 25.2%** versus public companies at 14.3%, suggesting a different operating philosophy in this segment and, potentially, differences in underlying subsector exposure (e.g., software).
- **Whether public or private, industrials had the lowest margins**, averaging 15.9% for private companies versus 12.7% for publics.
- **The smallest difference between public and private company performance was evidenced in the healthcare sector.** Just 144 bps separated the private company average of 18.3% and the public company average of 16.9%. Margins for PE-owned consumer discretionary companies averaged 16.8%, 408 bps better than the 12.8% average across time for publics.

PE-owned companies operated at higher EBITDA margins than publics

The outperformance diminished over the last four years compared to the seven years prior

AVERAGE ANNUAL EBITDA MARGIN OF PRIVATE EQUITY–OWNED COMPANIES VS PUBLIC COMPANIES

As of December 31, 2017 • EBITDA/Revenue (%)



Number of Companies

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Private Equity–Owned Companies	320	489	654	848	1,046	1,161	886	965	792	798	762
Russell 2500™ Index	1,564	1,562	1,595	1,774	1,752	1,705	1,675	1,699	1,703	1,614	1,589

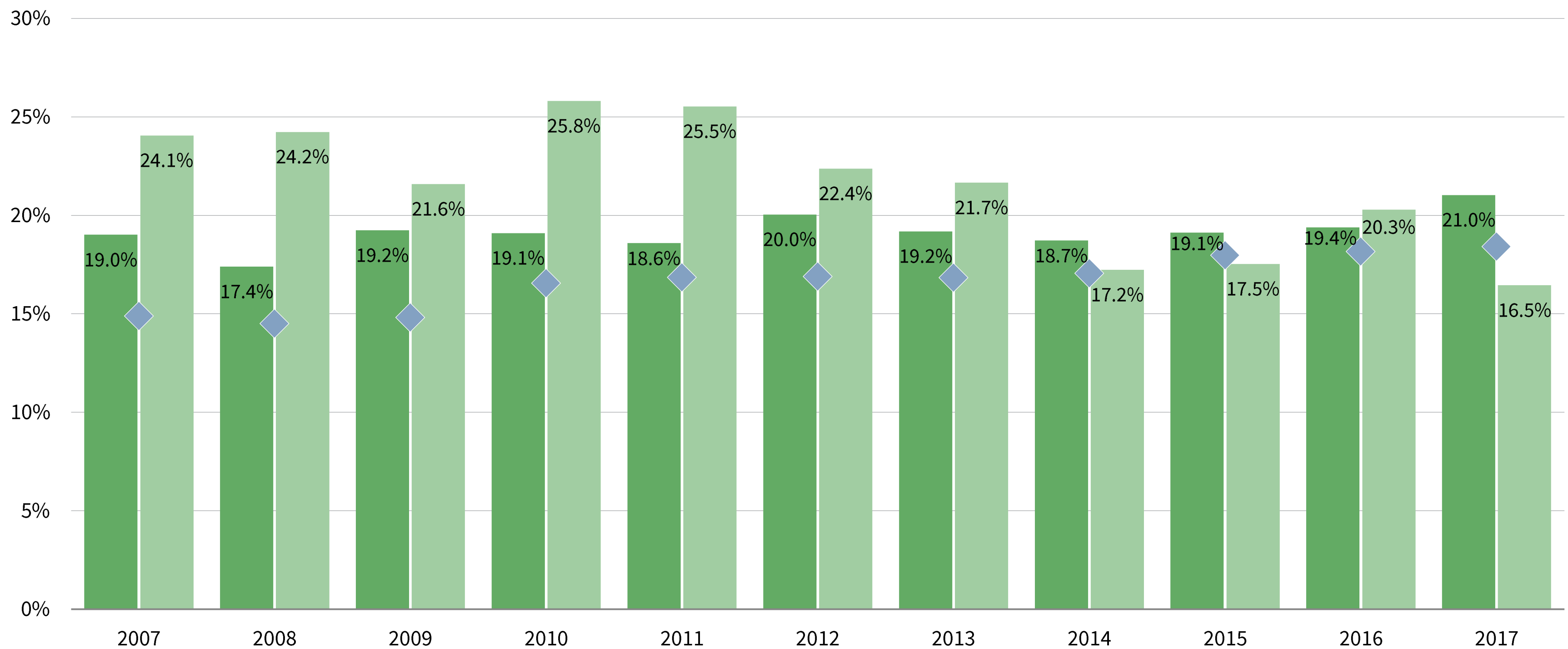
Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Note: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes.

Over the last four years, growth equity has seen a notable decline in margins

At the same time, buyouts have shown demonstrable improvement

AVERAGE ANNUAL EBITDA MARGIN OF BUYOUT AND GROWTH EQUITY COMPANIES VS PUBLIC COMPANIES

As of December 31, 2017 • EBITDA/Revenue (%)



Number of Companies

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Buyout Companies	256	384	483	616	735	786	593	673	511	528	527
Growth Equity Companies	48	75	123	187	202	247	217	210	189	211	170
Russell 2500™ Index	1,564	1,562	1,595	1,774	1,752	1,705	1,675	1,699	1,703	1,614	1,589

Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Private equity–owned companies were identified by the manager's strategy.

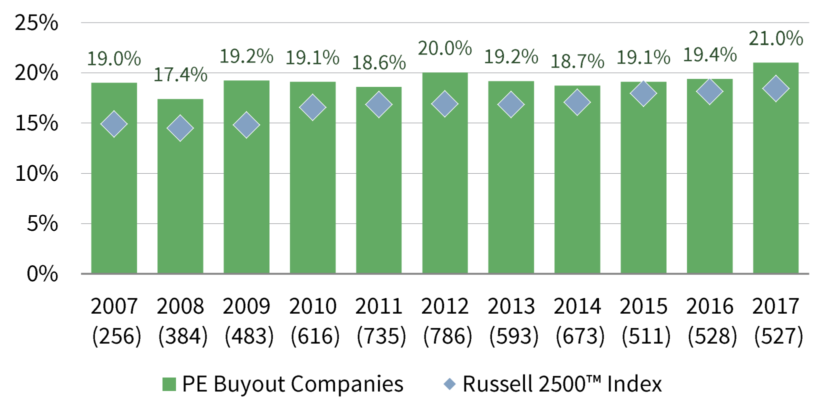
In both private and public universes, the larger the company the better the margins

On the whole, PE-owned companies operate with higher margins

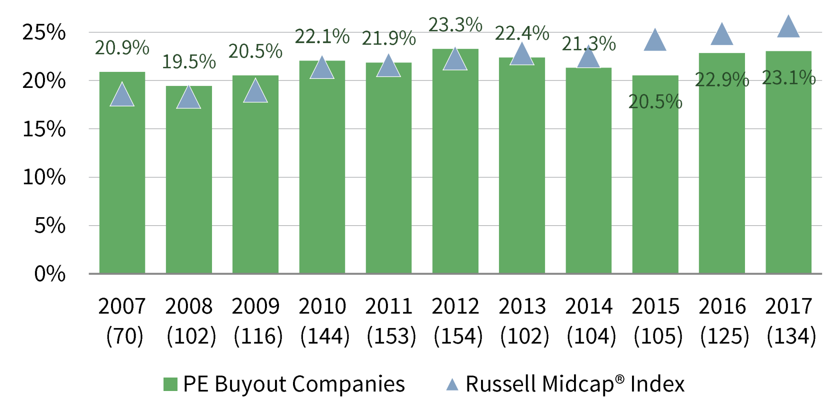
AVERAGE ANNUAL EBITDA MARGIN OF PRIVATE EQUITY BUYOUT COMPANIES VS PUBLIC COMPANIES BY ENTERPRISE VALUE SEGMENT

As of December 31, 2017 • EBITDA/Revenue (%)

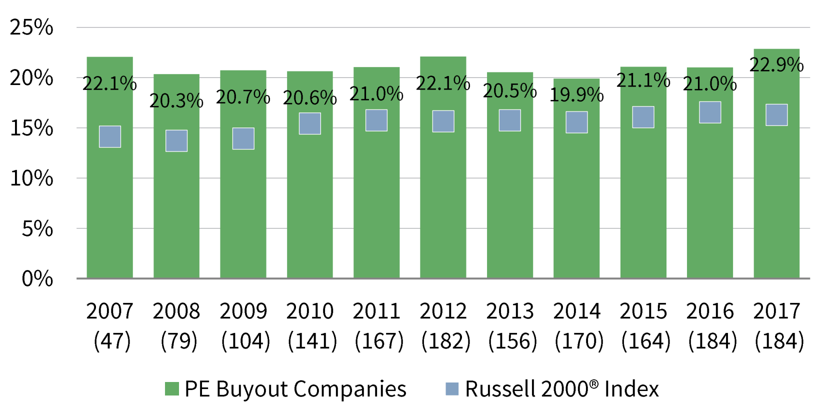
Total Universe



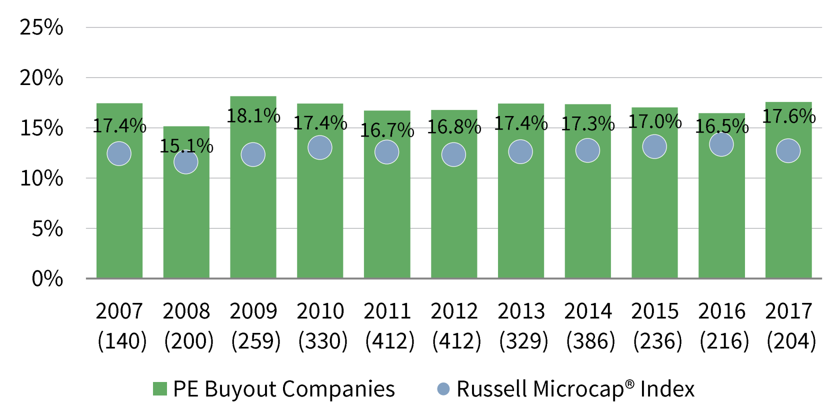
Enterprise Value > $1 B



Enterprise Value $250 M – $1 B



Enterprise Value < $250 M



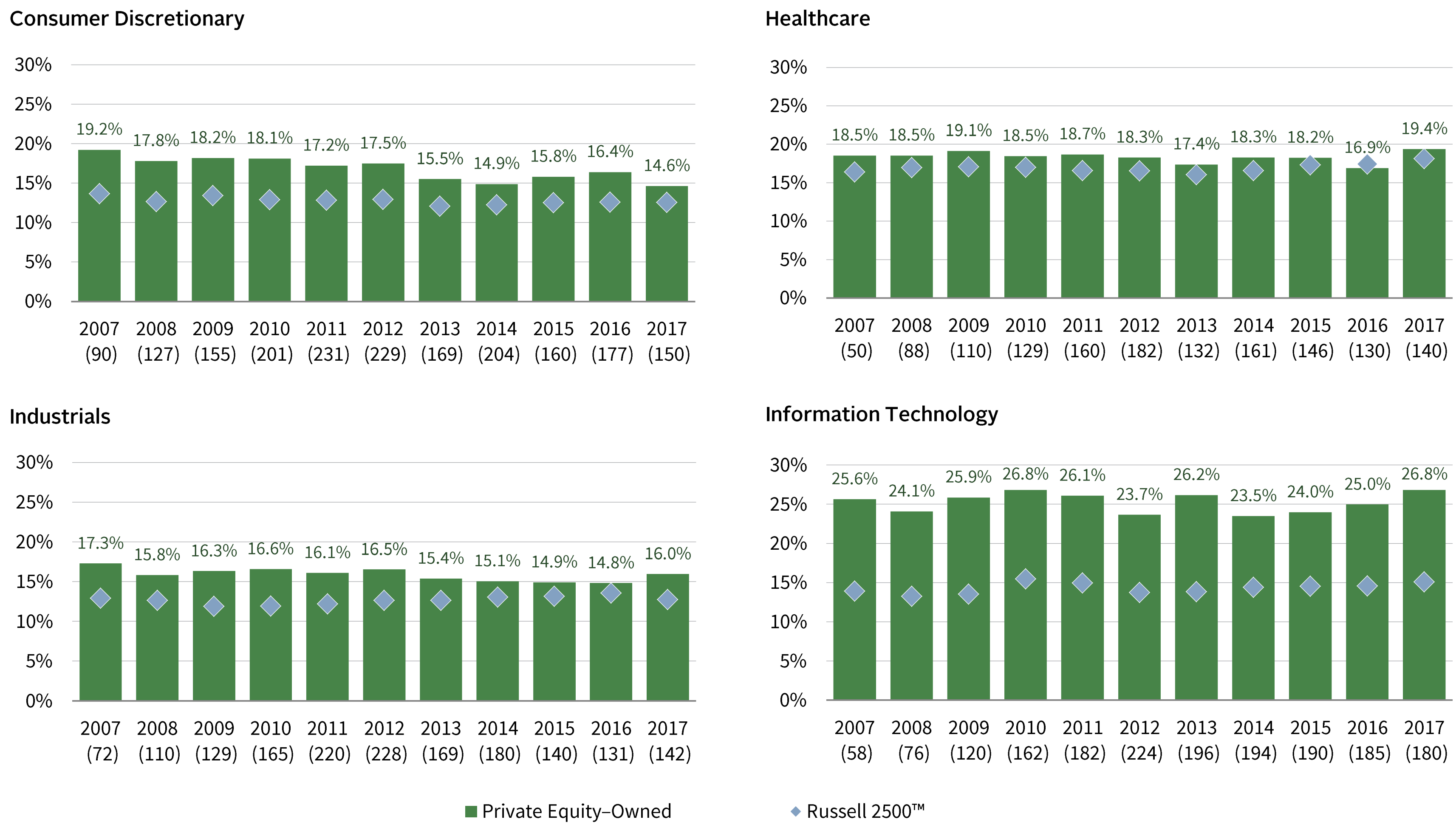
Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Numbers in parentheses represent number of private equity–owned companies in each year.

Across all sectors, private companies averaged better margins than publics

PE-owned IT had, by far, the best margins over the time period

AVERAGE ANNUAL EBITDA MARGIN OF PRIVATE EQUITY–OWNED COMPANIES VS PUBLIC COMPANIES BY SECTOR

As of December 31, 2017 • EBITDA/Revenue (%)



Sources: Cambridge Associates LLC Private Investments Database (as reported by investment managers), FactSet Research Systems, and Frank Russell Company.
Notes: Outliers were identified and excluded, and the same methodology was applied to the private equity and public company universes. Numbers in parentheses represent number of private equity–owned companies in each year.

IMPROVE THE PERFORMANCE OF THE COMPANY AND TRANSFORM THE BUSINESS

- Revenue Growth
- EBITDA Growth
- EBITDA Margin
- **Exit Analyses**

Key Exit Metrics: PPM Expansion and Leverage Compression

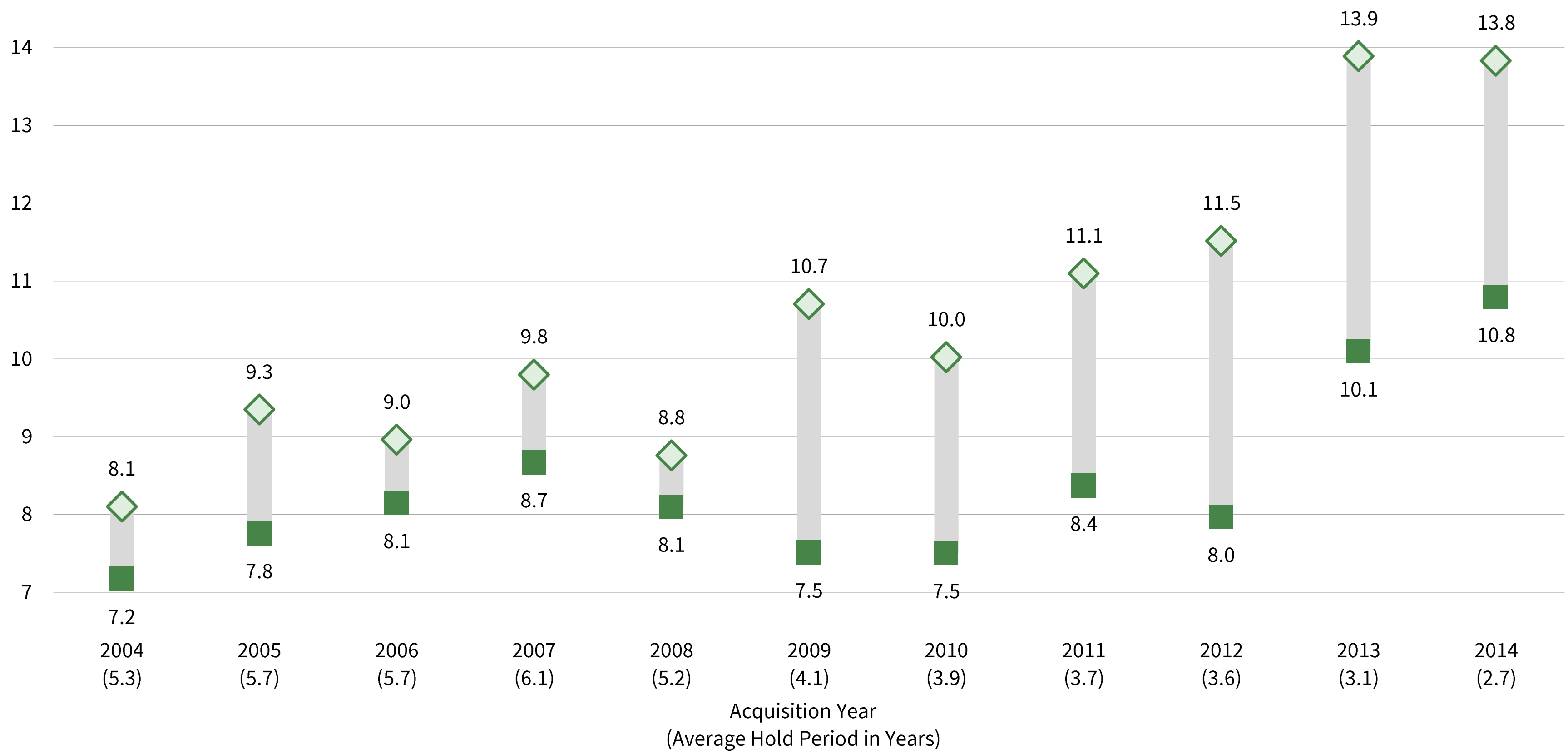
- Data for realized investments indicate two **dramatically different scenarios** and return drivers. For companies acquired from **2004 to 2008, multiple expansion was limited, while deleveraging was significant.** For those acquired from **2009 to 2014, multiple expansion was significant while leverage remained relatively constant between acquisition and exit.**
- Recently, **even as acquisition PPMs escalated**, notably increasing (for exited companies) from 8.0x in 2012 companies to 10.1x in 2013, **managers have successfully achieved a 2.5x valuation increase** at exit.
- An analysis of exited investments for PE acquisitions completed from 2004 to 2008 suggests debt paydown, or deleveraging, contributes to value creation. During that time, the median company reduced leverage by 0.8 turns. For companies acquired since 2009, leverage levels have been maintained.
- **Companies acquired in 2013 and 2014 have seen markedly greater growth during their investment period.** The question remains: Do the higher valuations noted above reflect strong continued growth prospects, or just an overvalued market?

PE managers consistently exited at higher valuation multiples than where they acquired . . .

. . . particularly for companies sold into the recent bull market

MEDIAN EBITDA MULTIPLE EXPANSION OF EXITED PRIVATE EQUITY–OWNED COMPANIES BY ACQUISITION YEAR

As of December 31, 2017 • Enterprise Value/EBITDA



Number of Companies

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
■ Multiple at Acquistion	89	109	159	183	109	73	123	80	76	41	22
◇ Multiple at Exit	89	109	159	183	109	73	123	80	76	41	22

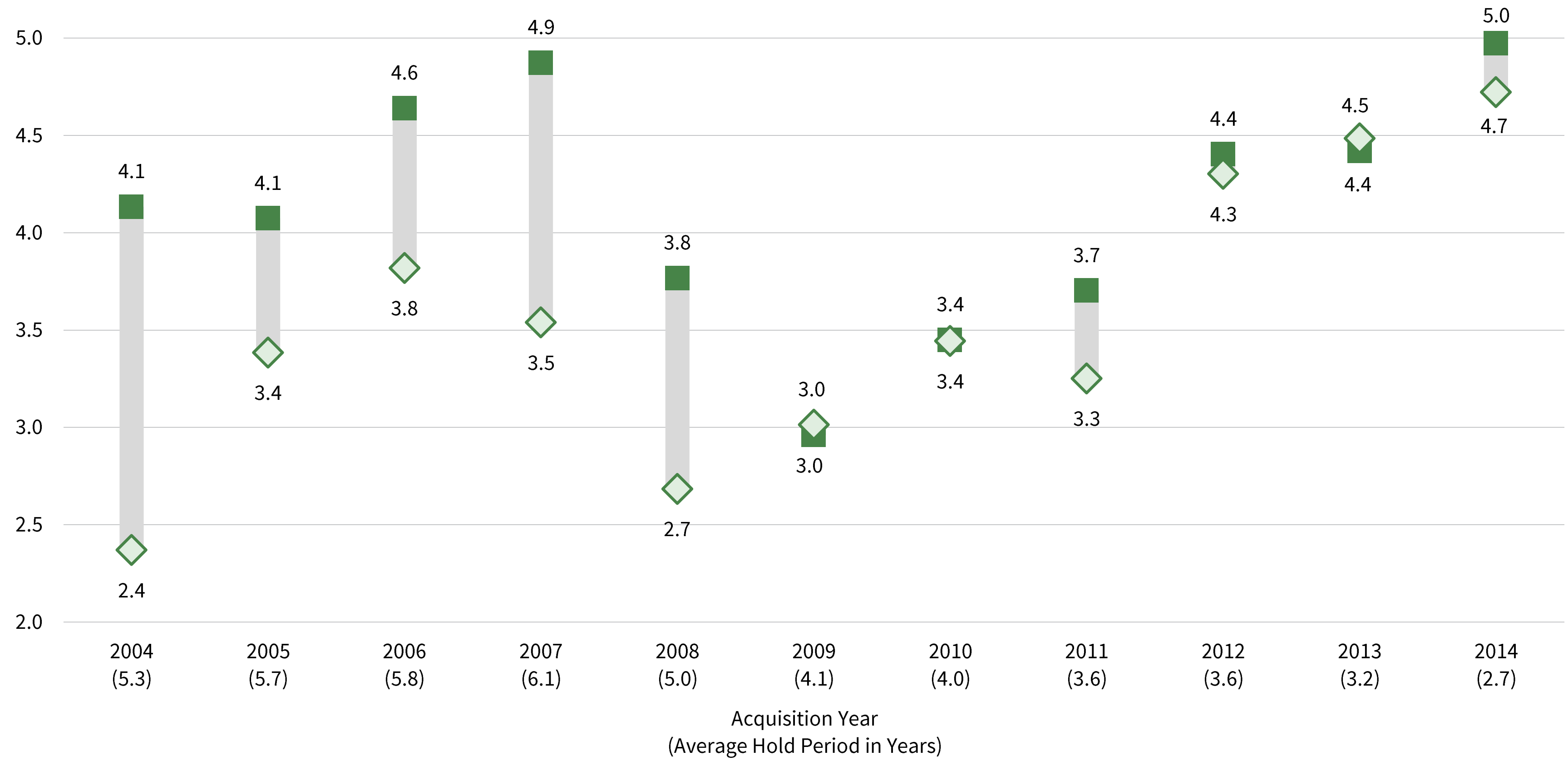
Source: Cambridge Associates LLC Private Investments Database (as reported by investment managers).

The acquisition years with largest multiple expansion and shortest hold periods had the least amount of delevering at exit

It appears that historically cheap financing has minimized the incentive to delever (and encouraged investment in growth)

EBITDA LEVERAGE MULTIPLE COMPRESSION OF PRIVATE EQUITY–OWNED COMPANIES BY ACQUISITION YEAR

As of December 31, 2017 • Net Debt/EBITDA



Number of Companies

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
■ Multiple at Acquistion	85	101	140	171	91	55	107	67	66	33	20
◇ Multiple at Exit	85	101	140	171	91	55	107	67	66	33	20

Source: Cambridge Associates LLC Private Investments Database (as reported by investment managers).

Key Exit Metrics: Revenue CAGR, EBITDA CAGR, and Margin Expansion

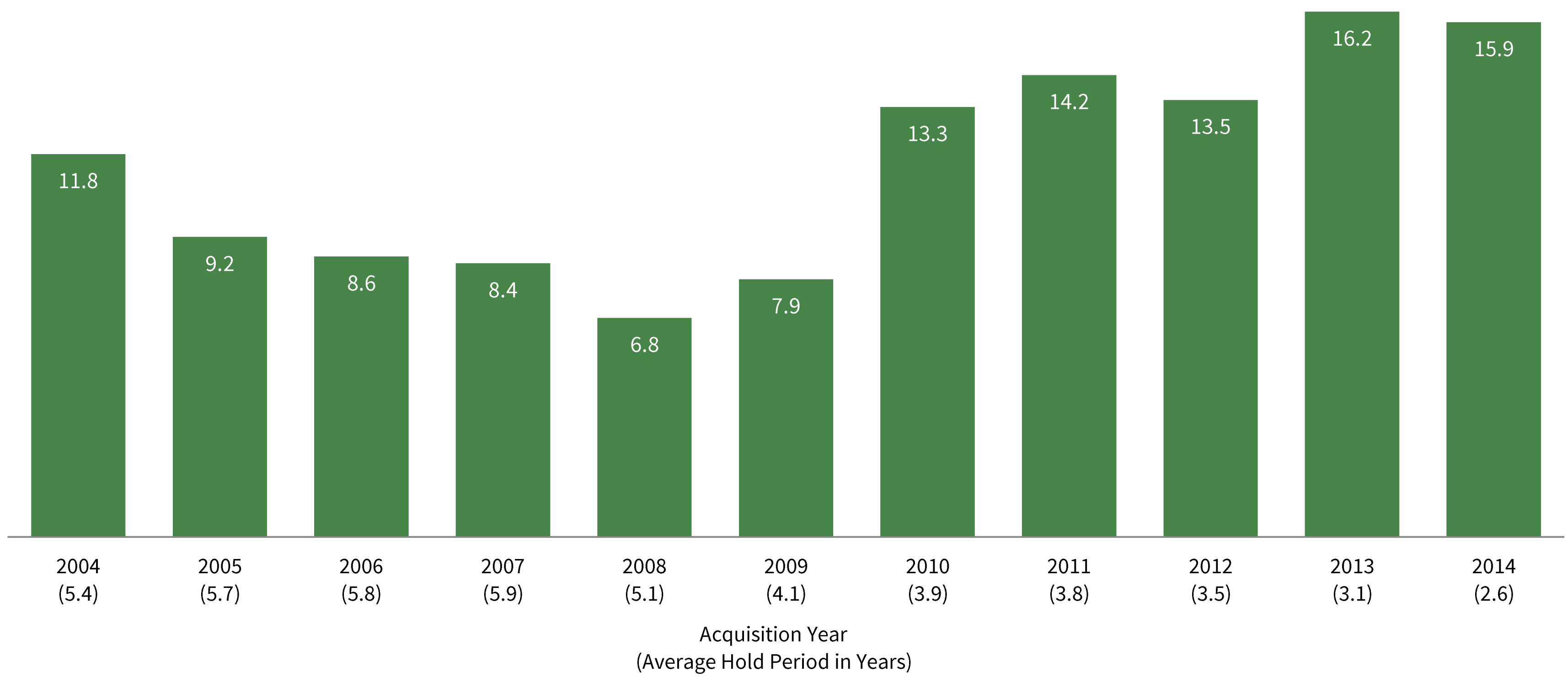
- **Companies acquired between 2010 and 2014, demonstrated strong median revenue growth of 14.0% during the period of PE ownership.**
- **Similarly, PE-owned companies increased EBITDA substantially during the period of ownership.** The median compound annual growth rate (CAGR) across this universe of companies acquired in this same time period **was 15.6%**, driven, in large part, by companies acquired in 2013 and 2014.
- **For exited companies, EBITDA margins only improved in about half of the time periods analyzed.**

Exited companies averaged double-digit growth

Companies bought and sold during the recent bull market have performed best

MEDIAN REVENUE CAGR OF EXITED PRIVATE EQUITY–OWNED COMPANIES BY ACQUISITION YEAR

As of December 31, 2017 • Compound Annual Growth Rate (%)



Number of Companies

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
PE-Owned Companies	114	131	195	226	133	96	149	92	85	49	30

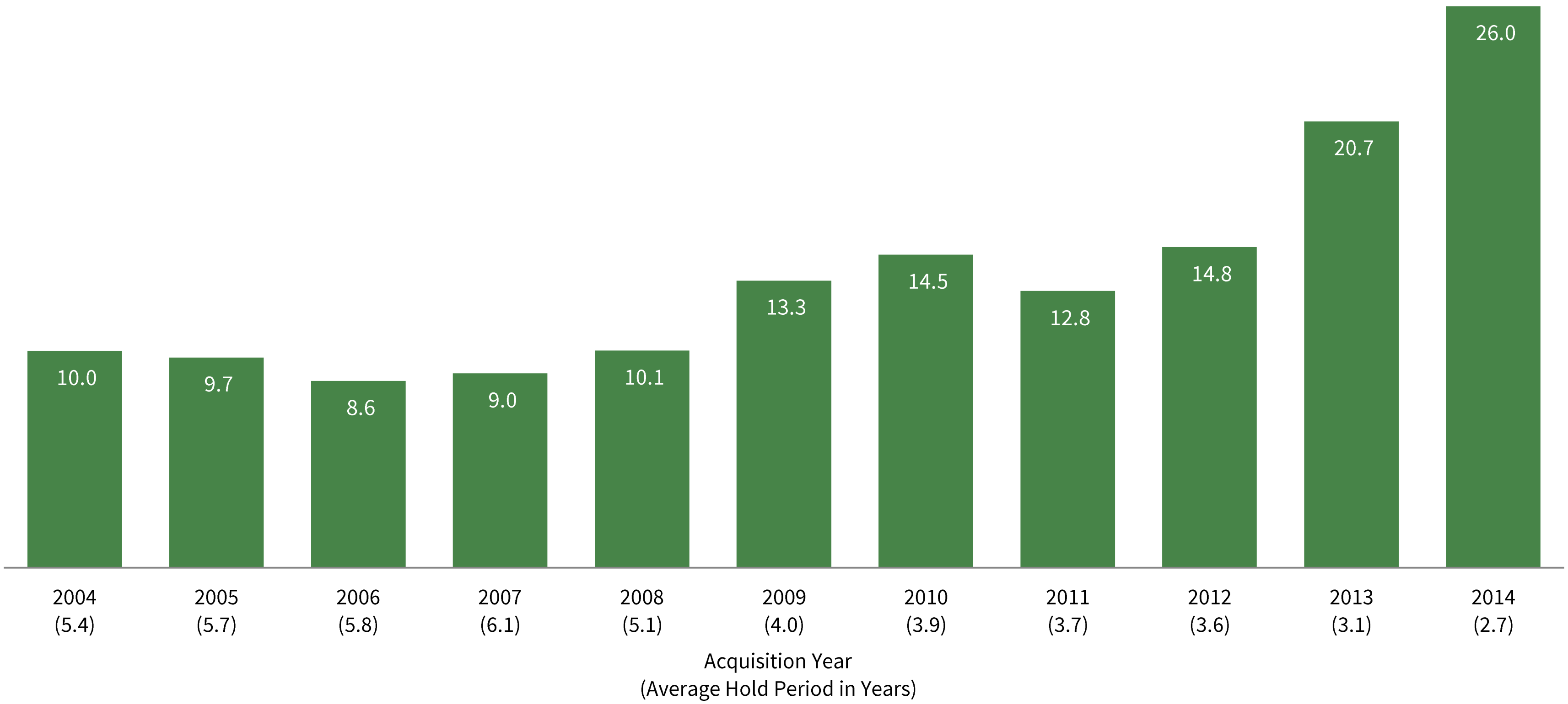
Source: Cambridge Associates LLC Private Investments Database (as reported by investment managers).

Exited companies acquired between 2009 and 2014 produced a median EBITDA CAGR of 12.8% or better

Companies with the shortest hold periods expectedly had the strongest growth, likely driving quick exits

MEDIAN EBITDA CAGR OF EXITED PRIVATE EQUITY–OWNED COMPANIES BY ACQUISITION YEAR

As of December 31, 2017 • Compound Annual Growth Rate (%)



Number of Companies

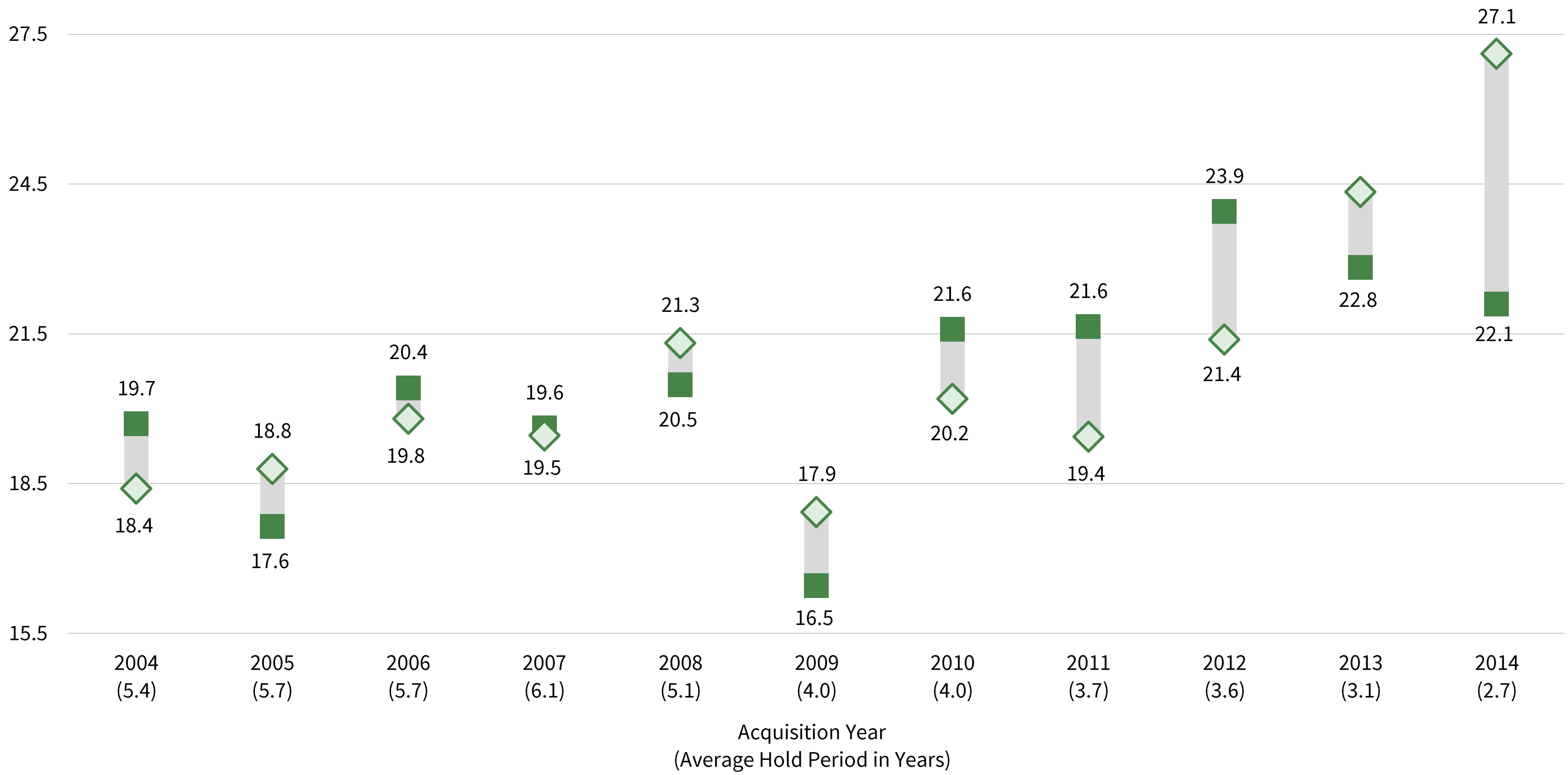
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
PE-Owned Companies	98	119	168	201	119	78	127	82	77	41	23

Source: Cambridge Associates LLC Private Investments Database (as reported by investment managers).

No consistent theme with respect to EBITDA margins

MEDIAN EBITDA MARGIN EXPANSION OF EXITED PRIVATE EQUITY–OWNED COMPANIES BY ACQUISITION YEAR

As of December 31, 2017 • EBITDA/Revenue (%)



Number of Companies

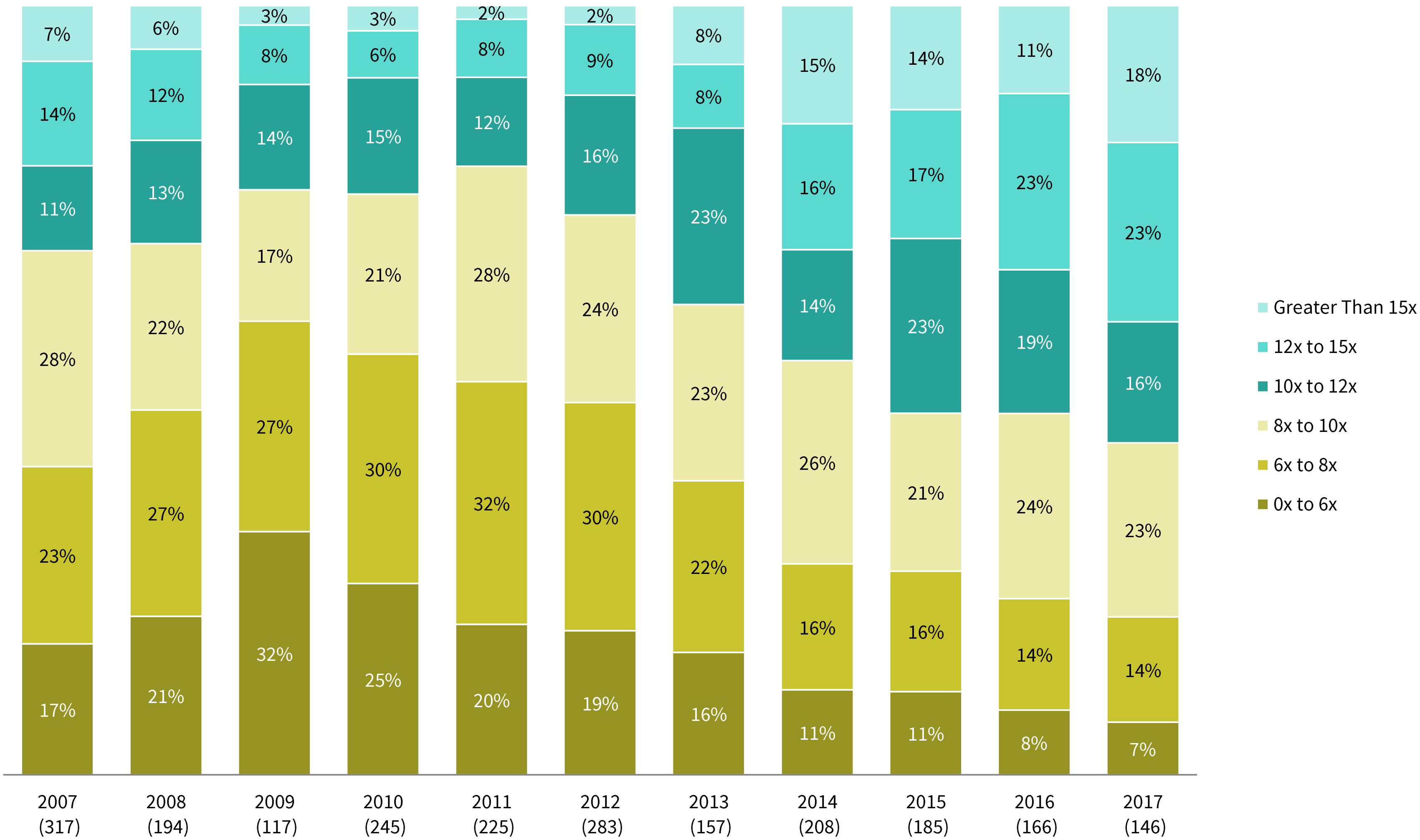
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
■ Margin at Acquisition	95	115	161	191	117	76	126	83	76	42	22
◇ Margin at Exit	95	115	161	191	117	76	126	83	76	42	22

Source: Cambridge Associates LLC Private Investments Database (as reported by investment managers).

APPENDIX: DISTRIBUTION OF ANALYZED METRICS FOR US COMPANIES

The last five years have seen an increasing number of high PPM transactions

AVERAGE EBITDA PURCHASE PRICE MULTIPLE BREAKDOWN OF PRIVATE EQUITY–OWNED COMPANIES
As of December 31, 2017

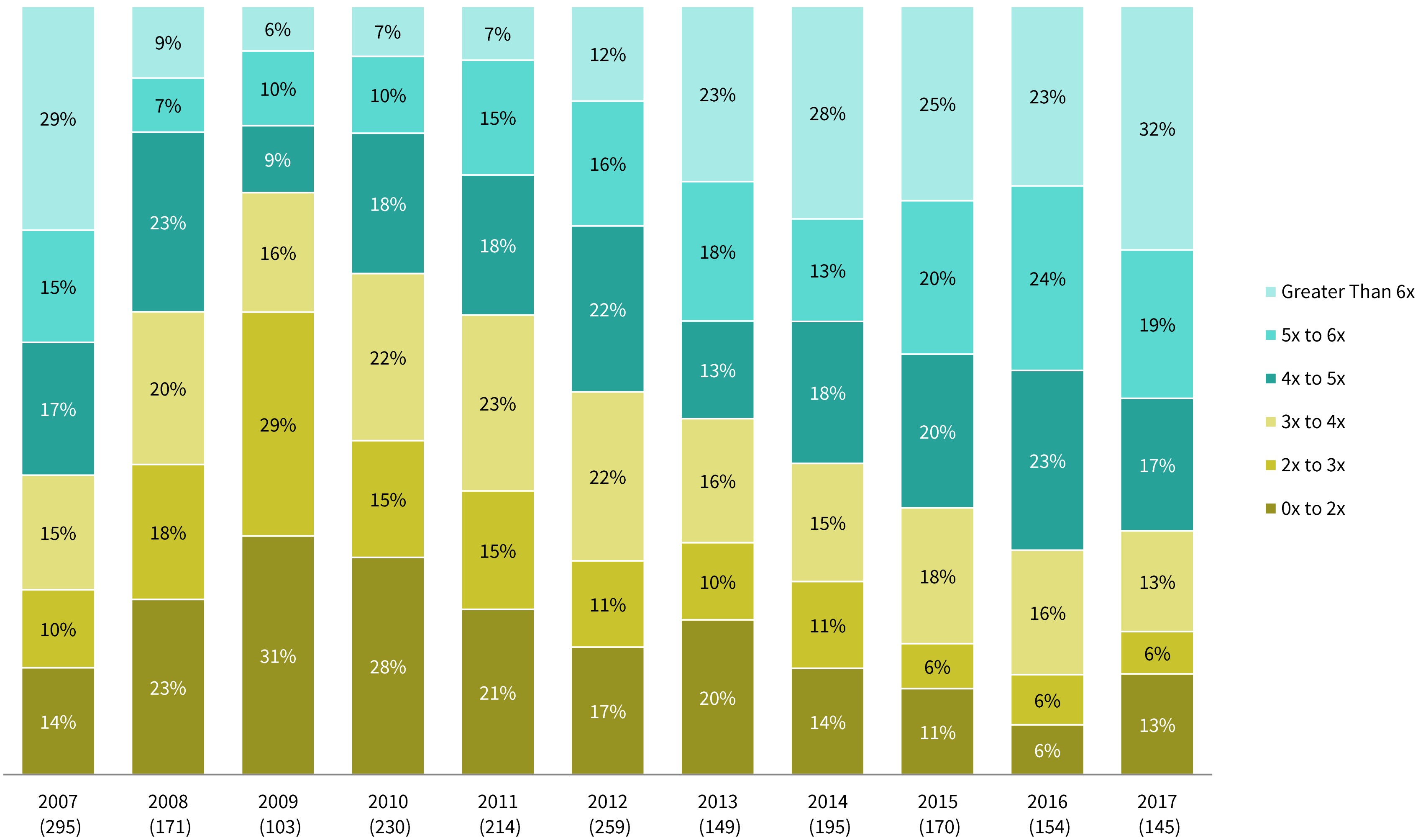


Source: Cambridge Associates LLC Private Investments Database (as reported by investment managers).
Notes: Outliers were identified and excluded. Numbers in parentheses represent total private companies in a year. Each range includes the lower bound value. For example the "6x to 8x" range includes companies with reported EBITDA purchase price of exactly 6x.

Since 2012, more than half of acquisitions were levered at 4x or more

AVERAGE LEVERAGE MULTIPLE BREAKDOWN OF PRIVATE EQUITY–OWNED COMPANIES

As of December 31, 2017

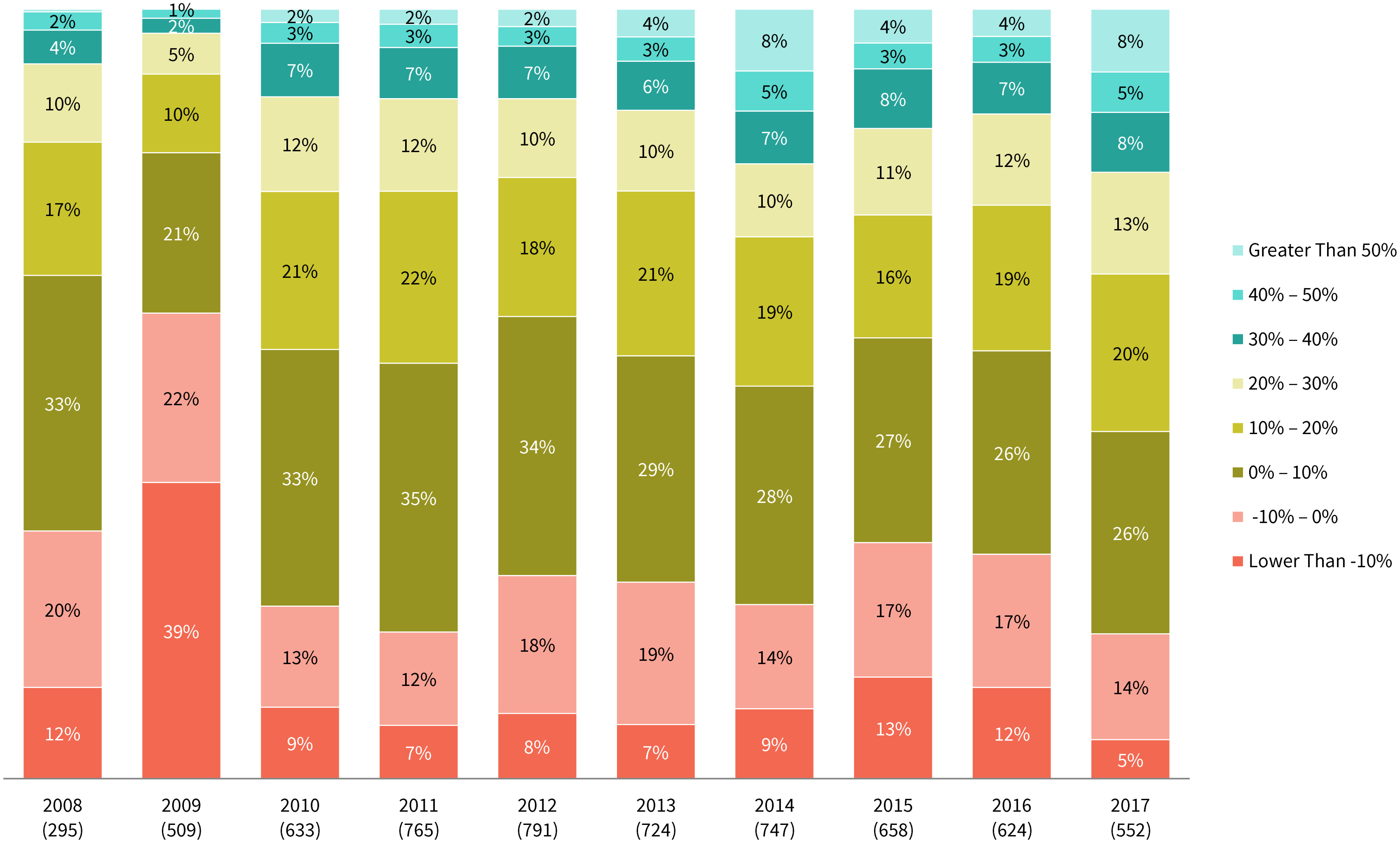


Source: Cambridge Associates LLC Private Investments Database (as reported by investment managers).
Notes: Outliers were identified and excluded. Numbers in parentheses represent total private companies in a year. Each range includes the lower bound value. For example the "2x to 3x" range includes companies with reported EBITDA purchase price of exactly 2x.

Revenue growth has remained strong

AVERAGE ANNUAL REVENUE GROWTH BREAKDOWN OF PRIVATE EQUITY–OWNED COMPANIES

As of December 31, 2017

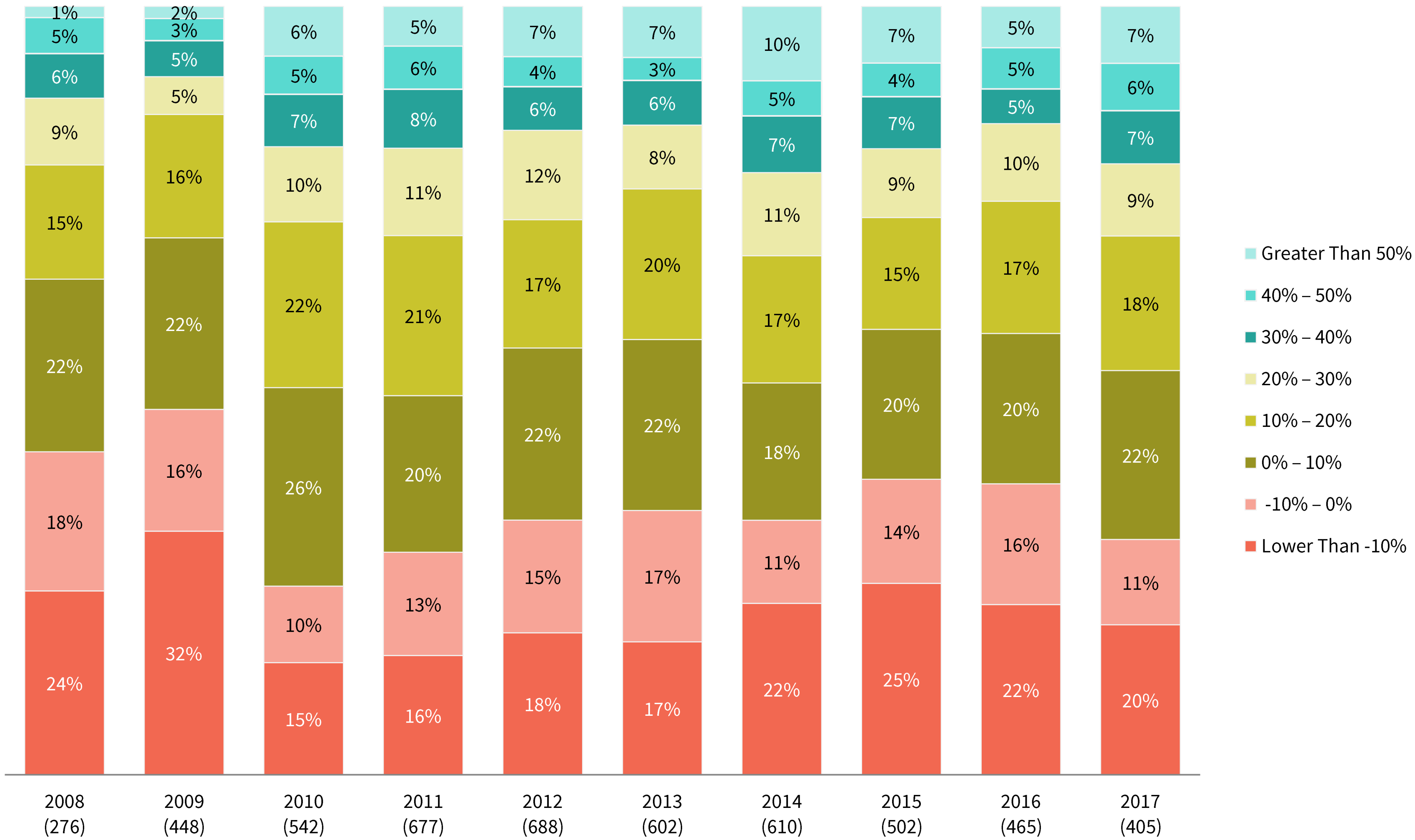


Source: Cambridge Associates LLC Private Investments Database (as reported by investment managers).
Notes: Outliers were identified and excluded. Numbers in parentheses represent total private companies in a year. Each range includes the lower bound value. For example the "0% – 10%" range includes companies with reported growth of exactly 0%.

EBITDA growth has been more variable

AVERAGE ANNUAL EBITDA GROWTH BREAKDOWN OF PRIVATE EQUITY–OWNED COMPANIES

As of December 31, 2017

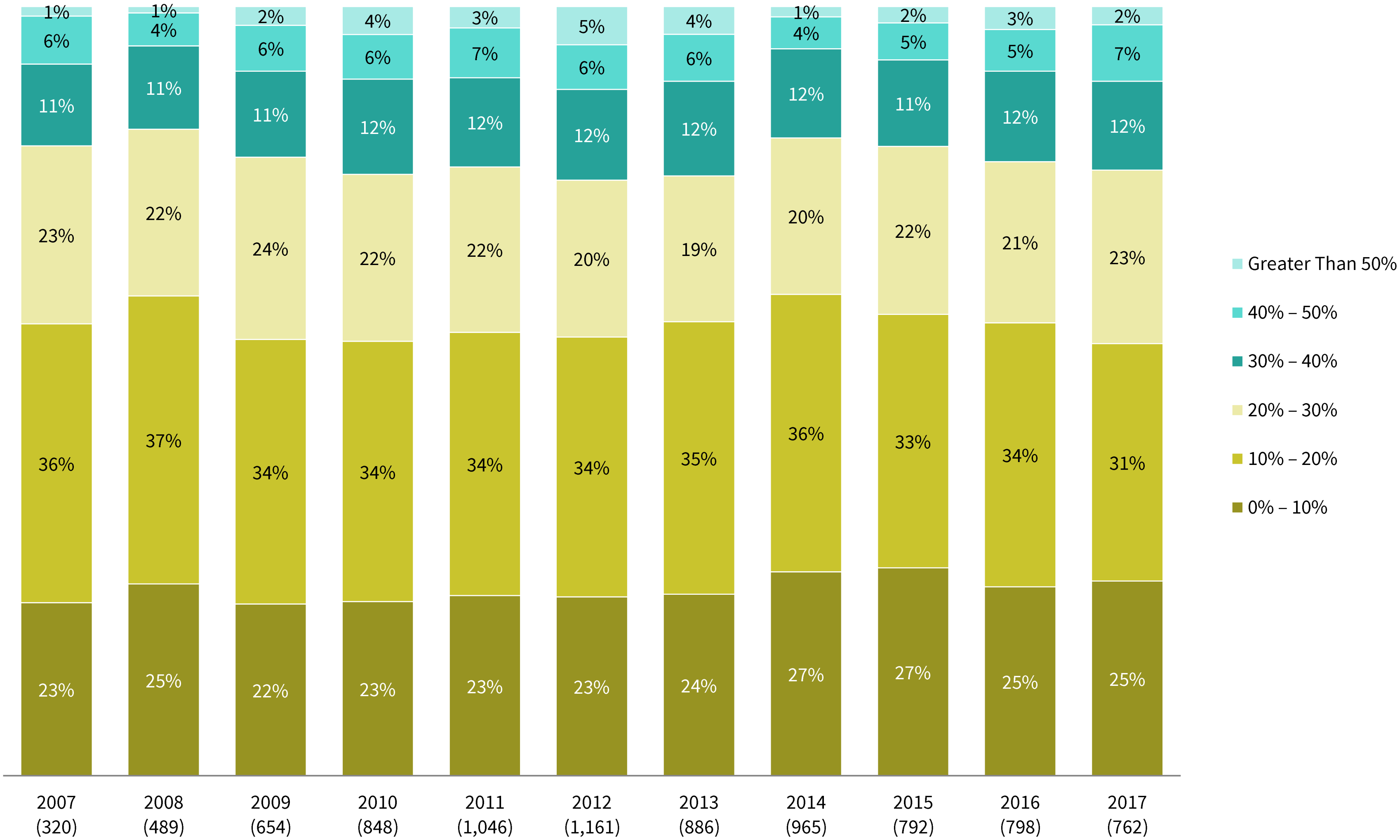


Source: Cambridge Associates LLC Private Investments Database (as reported by investment managers).
Notes: Outliers were identified and excluded. Numbers in parentheses represent total private companies in a year. Each range includes the lower bound value. For example the “0% – 10%” range includes companies with reported growth of exactly 0%.

Distribution of margins were relatively stable across the time period

AVERAGE ANNUAL EBITDA MARGIN BREAKDOWN OF PRIVATE EQUITY–OWNED COMPANIES

As of December 31, 2017



Source: Cambridge Associates LLC Private Investments Database (as reported by investment managers).
Notes: Outliers were identified and excluded. Numbers in parentheses represent total private companies in a year. Each range includes the lower bound value. For example the "0% – 10%" range includes companies with reported growth of exactly 0%.

Contributors to this report include Andrea Auerbach, Jimmy Crivella, Jacob Gilfix, Sarah Grifferty, Keirsten Lawton, and Caryn Slotsky.