



# Real Estate Index and Selected Benchmark Statistics

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CAMBRIDGE



ASSOCIATES

**Disclaimer**

Our goal is to provide you with the most accurate and relevant performance information possible; as a result, Cambridge Associates' research organization continually monitors the constantly evolving private investments space and its fund managers. When we discern material changes in the structure of an asset class and/or a fund's investment strategy, it is in the interest of all users of our benchmark statistics that we implement the appropriate classification realignments.

In addition, Cambridge Associates is always working to grow our private investments performance database and ensure that our benchmarks are as representative as possible of investors' institutional-quality opportunity set. As a result we continually add funds to the database (both newly-raised funds and backfill funds) and occasionally we must remove funds that cease reporting. Our private investments performance database is dynamic and will reflect both classification adjustments and changes to the underlying pool of contributing funds. As a result, you may notice quarter to quarter changes in the results of some historical benchmark return analyses.

## Overview

Cambridge Associates' Private Investments Database is one of the most robust collections of institutional quality private fund performance. It contains the historical performance records of over 2,000 fund managers and their over 7,400 funds. In addition, we capture the performance information (gross) of over 80,000 investments underlying our venture capital, growth equity, buyout, subordinated capital and private equity energy funds. This is one of the largest collections of portfolio-level performance information in the world and represents the investments of approximately 76% of these funds on a count basis and 83% on a total commitment basis. This fund and investment-level performance information is drawn from the quarterly and audited annual financial statements of the fund managers and each manager's reported performance numbers are independently recreated from the financial statements and verified by Cambridge Associates.

## Institutional Quality Data

Cambridge Associates strives to include only institutional quality funds in our benchmarks. "Institutional quality" funds, in our definition, tend to meet the following criteria: closed-end funds, commingled funds that invest 3rd party capital (we exclude firms that invest off of their balance sheet, such as a bank's principal investing group or a corporate's venture capital arm), and fund vehicles. This institutional quality screen seeks to provide investors with performance data consistent with their investible opportunity set.

## Sources of Benchmark Data

Our benchmark database utilizes the quarterly unaudited and annual audited fund financial statements produced by the fund managers (GPs) for their Limited Partners (LPs). These documents are provided to Cambridge Associates by the fund managers themselves. Unlike other data providers, Cambridge Associates does not use Freedom of Information Act (FOIA) requests, regulatory filings, manager surveys, or press "scrapings" to obtain information. Our goal is to have a complete historical record of the quarterly cash flows and net asset values for all funds in the benchmarks. We use a number of paths to encourage fund managers to submit their performance data to our database: our clients for whom we provide private investment performance reporting, our research organization's regular meetings with thousands of managers, our special projects designed to enhance existing benchmarks or launch new ones, our exclusive relationships with over ten globally-diverse fund manager associations, and finally, our exclusive relationships with Thomson Reuters and the Institutional Limited Partners Association (ILPA). By leveraging these varied sources and proprietary relationships, Cambridge Associates has constructed a rich and diversified benchmark data set.

## Vintage Year Definition

Vintage year is defined as the legal inception date as noted in a fund's financial statement. This date can usually be found in the first note to the audited financial statements and is prior to the first close or capital call.

## Timing of Final Benchmarks and Data Evolution

The Cambridge Associates' benchmarks are reported on a one-quarter lag from the end of the performance quarter due to the reporting time frame of private investments fund managers.

**Published Data:** When the vast majority of a benchmark group's (organized by asset class, e.g. Venture Capital or Real Estate) performance information is updated for a performance quarter, that benchmark is considered final and the data is "published" via the quarterly benchmark reports.

**Changes to Data:** After a benchmark group is published, any updates to historical data for these funds, which can include adding a fund and its performance history to the database ("backfills") and/or updating past information for an existing fund due to late-arriving, updated, or refined information, would be reflected when that group is published for the next performance quarter.

In addition, Cambridge Associates may change the classification of certain funds; this is often driven by the evolution of private investments and the resulting need to introduce new benchmarks or refine our classification scheme. For example, as growth equity emerged as an asset class we reclassified certain venture capital and buyout funds accordingly.

**Survivorship Bias:** In order to track the performance of a fund in our benchmarks, we require the complete set of financial statements from the fund's inception to the most current reporting date. When an active fund stops providing financial statements, we reach out to the manager and make several attempts to encourage them to continue to submit their data. We may, during this communication period, roll forward the fund's last reported quarter's net asset value (NAV) for several quarters. When we are convinced that the manager will not resume reporting to us, the fund's entire performance history is removed from the database.

When fund managers stop reporting before their fund's return history is complete, an element of "survivorship bias" may be introduced to a performance database, which could skew the reported returns upwards if the funds dropping out had poorer returns than those funds that remained. Survivorship bias can affect all investment manager databases, including those for public stock managers and hedge funds. Compared to public stocks and hedge funds, however, the illiquid nature of private investments can actually help limit this survivorship effect. Whereas an underperforming stock manager may simply close up shop or drop out of databases as clients liquidate their positions and fire the manager, private investment partnerships owning illiquid assets continue to exist and require reporting to the limited partners, even if the original manager ceases to exist.

Over the last ten years the number of fund managers that stopped reporting to Cambridge Associates before liquidation represented an average of 0.6% (per year) of the total number of funds in the database during the respective year, and an average of 0.5% (per year) as a percentage of total NAV in the database during that respective year. During that same period the overall number of funds in our database increased by an average of 8% (per year). The performance of the small number of funds that have stopped reporting has been spread amongst all quartiles and has not been concentrated consistently in the poorer performing quartiles.

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# Real Estate: Fund Index Analysis



### Real Estate: Fund Index Summary: Horizon Pooled Return Net to Limited Partners

Index	1-Quarter	YTD	1-Year	3-Year	5-Year	10-Year	15-Year	20-Year	25-Year
<b>Real Estate Index<sup>1</sup></b>	<b>1.23</b>	<b>4.17</b>	<b>11.49</b>	<b>9.69</b>	<b>11.83</b>	<b>4.76</b>	<b>7.07</b>	<b>7.21</b>	<b>7.45</b>
FTSE® NAREIT All Equity Index	8.50	1.27	4.93	9.14	8.88	8.30	10.26	9.47	10.21
FTSE® EPRA/NAREIT Developed Real Estate Index	5.45	0.91	6.70	6.70	6.89	5.73	9.63	8.83	8.85
FTSE® EPRA/NAREIT Developed REITS	7.08	1.13	5.88	7.04	7.58	6.37	—	—	—
FTSE® EPRA/NAREIT North America Index	9.80	1.61	4.36	7.60	7.72	7.45	9.95	9.08	10.95
NCREIF Property Index	1.81	3.54	7.19	8.25	9.77	6.22	8.99	9.19	9.25

The index is a horizon calculation based on data compiled from 1,021 real estate funds (including opportunistic and value-added real estate funds), including fully liquidated partnerships, formed between 1986 and 2017.

<sup>1</sup> Private indexes are pooled horizon internal rate of return (IRR) calculations, net of fees, expenses, and carried interest. The timing and magnitude of fund cash flows are integral to the IRR performance calculation. Public indexes are average annual compounded return (AACR) calculations which are time weighted measures over the specified time horizon, and are shown for reference and directional purposes only. Due to the fundamental differences between the two calculations, direct comparison of IRRs to AACRs is not recommended. For a more accurate means of comparing private investment performance relative to public alternatives, see the analyses in this document using CA Modified Public Market Equivalent (mPME). See Methodology section for more detail.

In terms of total limited partners' fund commitment, the CJA Real Estate benchmark is 71% Opportunistic and 29% Value-Added. In terms of limited partners' total paid-in capital, the CJA Real Estate benchmark is 70% Opportunistic and 30% Value-Added.

Sources: Cambridge Associates LLC, FTSE International Limited, Natl Assoc of RE Investment Trusts, Natl Council of RE Invest Fiduciaries and Thomson Reuters Datastream.

Real Estate: Fund Index Summary: Horizon Pooled Return Compared to CA Modified Public Market Equivalent (mPME)  
Net to Limited Partners

CA Index	1-Year	3-Year	5-Year	10-Year	15-Year	20-Year	25-Year
<b>Real Estate Index<sup>1</sup></b>	<b>11.49</b>	<b>9.69</b>	<b>11.83</b>	<b>4.76</b>	<b>7.07</b>	<b>7.21</b>	<b>7.45</b>
mPME Analysis <sup>2</sup>							
FTSE <sup>®</sup> NAREIT All Equity Index	4.82	9.70	9.36	10.36	10.38	10.20	10.50
Value-Add (bps)	666	-2	247	-560	-331	-299	-304
NCREIF Property Index	7.18	8.39	10.11	7.05	8.12	8.26	8.36
Value-Add (bps)	431	129	172	-229	-105	-105	-90

The index is a horizon calculation based on data compiled from 1,021 real estate funds (including opportunistic and value-added real estate funds), including fully liquidated partnerships, formed between 1986 and 2017.

<sup>1</sup> Pooled horizon return, net of fees, expenses, and carried interest.

<sup>2</sup> CA Modified Public Market Equivalent (mPME) replicates private investment performance under public market conditions. The public index's shares are purchased and sold according to the private fund cash flow schedule, with distributions calculated in the same proportion as the private fund, and mPME NAV is a function of mPME cash flows and public index returns. "Value-Add" shows (in basis points) the difference between the actual private investment return and the mPME calculated return. Refer to Methodology page for details.

Sources: Cambridge Associates LLC, FTSE International Limited, Natl Assoc of RE Investment Trusts and Natl Council of RE Invest Fiduciaries.



### Real Estate: Fund Index Details: One Quarter Horizon Pooled Return Net to Limited Partners

Quarter Ending	Horizon Return	Quarter Ending	Horizon Return	Quarter Ending	Horizon Return	Quarter Ending	Horizon Return	Quarter Ending	Horizon Return
1986 Q1	1.56	1992 Q4	-8.80	1999 Q3	1.34	2006 Q2	6.37	2013 Q1	2.18
1986 Q2	1.39	1993 Q1	1.63	1999 Q4	2.40	2006 Q3	5.15	2013 Q2	2.84
1986 Q3	0.77	1993 Q2	1.26	2000 Q1	1.52	2006 Q4	16.37	2013 Q3	2.93
1986 Q4	0.69	1993 Q3	0.97	2000 Q2	2.41	2007 Q1	5.82	2013 Q4	6.10
1987 Q1	3.11	1993 Q4	-2.00	2000 Q3	1.46	2007 Q2	7.38	2014 Q1	2.53
1987 Q2	1.17	1994 Q1	2.47	2000 Q4	7.28	2007 Q3	3.70	2014 Q2	2.94
1987 Q3	-5.39	1994 Q2	1.57	2001 Q1	2.20	2007 Q4	1.50	2014 Q3	2.30
1987 Q4	10.20	1994 Q3	1.84	2001 Q2	1.73	2008 Q1	-0.24	2014 Q4	4.89
1988 Q1	0.73	1994 Q4	3.15	2001 Q3	0.65	2008 Q2	-3.03	2015 Q1	1.49
1988 Q2	3.58	1995 Q1	2.05	2001 Q4	1.43	2008 Q3	-9.87	2015 Q2	4.14
1988 Q3	1.74	1995 Q2	2.46	2002 Q1	1.75	2008 Q4	-22.97	2015 Q3	1.66
1988 Q4	4.76	1995 Q3	1.66	2002 Q2	0.63	2009 Q1	-10.86	2015 Q4	2.73
1989 Q1	1.14	1995 Q4	2.93	2002 Q3	1.78	2009 Q2	-9.03	2016 Q1	2.21
1989 Q2	2.06	1996 Q1	2.53	2002 Q4	0.36	2009 Q3	-1.57	2016 Q2	1.31
1989 Q3	1.65	1996 Q2	2.64	2003 Q1	2.26	2009 Q4	-4.35	2016 Q3	1.87
1989 Q4	2.81	1996 Q3	2.93	2003 Q2	2.56	2010 Q1	0.15	2016 Q4	1.37
1990 Q1	1.37	1996 Q4	4.68	2003 Q3	3.15	2010 Q2	1.50	2017 Q1	2.83
1990 Q2	1.21	1997 Q1	2.06	2003 Q4	5.71	2010 Q3	4.62	2017 Q2	3.61
1990 Q3	0.91	1997 Q2	4.03	2004 Q1	2.25	2010 Q4	7.03	2017 Q3	3.11
1990 Q4	-1.31	1997 Q3	2.77	2004 Q2	4.89	2011 Q1	3.56	2017 Q4	3.72
1991 Q1	1.17	1997 Q4	9.68	2004 Q3	3.12	2011 Q2	3.81	2018 Q1	2.84
1991 Q2	0.53	1998 Q1	2.84	2004 Q4	12.45	2011 Q3	-0.18	2018 Q2	1.23
1991 Q3	1.02	1998 Q2	4.53	2005 Q1	4.08	2011 Q4	2.20		
1991 Q4	-6.32	1998 Q3	3.56	2005 Q2	6.91	2012 Q1	2.08		
1992 Q1	1.17	1998 Q4	3.31	2005 Q3	7.26	2012 Q2	0.70		
1992 Q2	0.22	1999 Q1	1.17	2005 Q4	11.84	2012 Q3	2.15		
1992 Q3	1.11	1999 Q2	2.81	2006 Q1	3.42	2012 Q4	3.88		

The index is a horizon calculation based on data compiled from 1,021 real estate funds (including opportunistic and value-added real estate funds), including fully liquidated partnerships, formed between 1986 and 2017. Historic quarterly returns are updated in each year-end report to adjust for changes in the index sample.

Real Estate: Fund Index Details: Horizon Pooled Return  
Net to Limited Partners

Multi-Year Returns			
Years	Horizon Return (%)	Years	Horizon Return (%)
1 Year	11.49	16 Years	7.07
2 Years	10.63	17 Years	7.01
3 Years	9.69	18 Years	7.14
4 Years	10.74	19 Years	7.15
5 Years	11.83	20 Years	7.21
6 Years	11.77	21 Years	7.37
7 Years	10.64	22 Years	7.44
8 Years	11.78	23 Years	7.46
9 Years	10.20	24 Years	7.48
10 Years	4.76	25 Years	7.45
11 Years	4.52		
12 Years	5.65		
13 Years	6.31		
14 Years	6.85		
15 Years	7.07		

One Year Rolling Returns			
One Year Ended	Horizon Return (%)	One Year Ended	Horizon Return (%)
6/30/2018	11.49	6/30/2003	7.01
6/30/2017	9.89	6/30/2002	4.35
6/30/2016	8.10	6/30/2001	13.13
6/30/2015	13.29	6/30/2000	7.94
6/30/2014	15.23	6/30/1999	11.21
6/30/2013	11.53	6/30/1998	21.08
6/30/2012	4.89	6/30/1997	14.41
6/30/2011	20.26	6/30/1996	10.15
6/30/2010	-4.10	6/30/1995	9.88
6/30/2009	-43.34	6/30/1994	3.07
6/30/2008	0.60		
6/30/2007	37.56		
6/30/2006	31.20		
6/30/2005	29.50		
6/30/2004	16.20		

The index is a horizon calculation based on data compiled from 1,021 real estate funds (including opportunistic and value-added real estate funds), including fully liquidated partnerships, formed between 1986 and 2017.



# Real Estate: Fund Since Inception Analysis



### Real Estate: Since Inception IRR by Fund Vintage Year Net to Limited Partners

Vintage Year	Pooled Return (%)	Arithmetic Mean (%)	Median (%)	Equal-Weighted Pooled Return (%)	Upper Quartile (%)	Lower Quartile (%)	Standard Deviation (%)	DPI	RVPI	TVPI	Number of Funds
1993	—	—	—	—	—	—	—	—	—	—	2
1994	16.78	17.51	16.85	16.39	21.84	11.29	7.17	1.81	0.00	1.81	18
1995	14.99	17.66	17.41	17.40	21.36	13.31	6.73	1.64	0.00	1.64	15
1996	12.05	16.92	14.15	13.11	19.61	8.32	13.06	1.75	0.01	1.75	18
1997	6.54	12.34	12.33	11.55	16.19	8.23	8.55	1.38	0.00	1.38	15
1998	13.66	13.43	12.48	12.79	15.55	9.82	5.31	1.64	0.01	1.65	21
1999	11.68	13.54	11.72	13.56	18.22	9.23	9.10	1.64	0.00	1.64	20
2000	18.28	15.76	17.53	12.83	22.93	5.12	12.75	1.65	0.06	1.71	23
2001	26.42	22.38	23.91	22.52	28.16	13.91	11.18	1.99	0.02	2.00	22
2002	11.05	16.67	12.11	12.58	20.25	8.81	20.02	1.45	0.05	1.50	23
2003	8.78	12.36	11.55	10.35	19.46	2.38	15.72	1.24	0.05	1.29	38
2004	0.92	0.71	0.33	1.34	7.59	-6.98	10.43	0.95	0.10	1.04	48
2005	-0.16	-1.88	0.26	-0.63	3.74	-4.64	16.88	0.86	0.13	0.99	74
2006	-2.44	-0.46	-1.12	0.57	6.45	-5.98	17.27	0.70	0.15	0.85	78
2007	6.89	4.35	6.37	4.86	10.93	1.02	10.26	1.21	0.17	1.37	107
2008	9.97	8.31	10.23	8.42	14.99	4.77	11.47	1.21	0.23	1.44	63
2009	23.10	18.57	15.26	17.02	19.67	10.92	20.24	1.54	0.16	1.70	26
2010	11.78	11.70	12.71	12.09	19.66	6.07	12.15	1.04	0.40	1.45	47
2011	15.46	13.63	13.33	14.16	21.17	9.22	10.73	0.95	0.62	1.57	65
2012	13.78	12.24	12.00	12.52	15.63	8.09	7.75	0.76	0.69	1.45	59
2013	14.36	12.02	12.52	12.04	16.74	6.68	11.20	0.65	0.72	1.37	64
2014	14.10	12.02	11.40	11.37	15.59	8.06	8.59	0.33	0.92	1.25	65
2015	13.30	9.13	9.63	11.78	15.70	6.04	12.01	0.15	1.01	1.16	49
2016	8.62	1.04	10.81	8.72	15.09	-7.05	24.98	0.05	1.00	1.05	35

Notes: Based on data compiled from 995 real estate funds (including opportunistic and valued-added funds), including fully liquidated partnerships, formed between 1993 and 2016. Internal rates of returns are net of fees, expenses and carried interest. CA research shows that most funds take at least six years to settle into their final quartile ranking, and previous to this settling they typically rank in 2-3 other quartiles; therefore fund or benchmark performance metrics from more recent vintage years may be less meaningful. Benchmarks with "—" have an insufficient number of funds in the vintage year sample to produce a meaningful return.

### Real Estate: Since Inception IRR & Multiples Compared to CA Modified Public Market Equivalent (mPME) Net to Limited Partners

Vintage Year	Number of Funds	Pooled IRR (%) and IRR-Based Value-Add (bps)					Total Value to Paid In (TVPI)			Distributions to Paid In (DPI)		
		CA Benchmark	FTSE® NAREIT All Equity REITs Index		NCREIF Property Index		CA Benchmark	FTSE® NAREIT All Equity REITs Index	NCREIF Property Index	CA Benchmark	FTSE® NAREIT All Equity REITs Index	NCREIF Property Index
			IRR	mPME IRR	Value-Add	mPME IRR						
1993	2	—	—	—	—	—	—	—	—	—	—	—
1994	18	16.78	14.56	222	11.13	565	1.81	1.65	1.49	1.81	1.65	1.49
1995	15	14.99	10.91	408	12.01	298	1.64	1.41	1.45	1.64	1.41	1.45
1996	18	12.05	9.74	231	11.81	23	1.75	1.66	1.75	1.75	1.64	1.74
1997	15	6.54	11.68	-515	10.54	-400	1.38	1.88	1.70	1.38	1.88	1.69
1998	21	13.66	16.38	-272	10.18	348	1.65	1.78	1.42	1.64	1.77	1.42
1999	20	11.68	17.75	-607	10.39	130	1.64	2.02	1.55	1.64	2.02	1.54
2000	23	18.28	17.13	115	10.32	796	1.71	1.75	1.46	1.65	1.66	1.38
2001	22	26.42	18.36	806	11.51	1,492	2.00	1.61	1.39	1.99	1.60	1.38
2002	23	11.05	11.66	-61	9.74	131	1.50	1.66	1.56	1.45	1.56	1.46
2003	38	8.78	11.02	-224	9.81	-103	1.29	1.47	1.42	1.24	1.37	1.33
2004	48	0.92	7.56	-664	6.92	-600	1.04	1.52	1.46	0.95	1.30	1.24
2005	74	-0.16	6.55	-671	6.40	-656	0.99	1.57	1.54	0.86	1.34	1.32
2006	78	-2.44	9.37	-1,180	6.35	-878	0.85	1.80	1.50	0.70	1.44	1.20
2007	107	6.89	11.15	-426	7.89	-101	1.37	1.66	1.45	1.21	1.44	1.25
2008	63	9.97	13.24	-326	10.30	-32	1.44	1.60	1.45	1.21	1.34	1.21
2009	26	23.10	13.35	975	11.06	1,204	1.70	1.36	1.30	1.54	1.24	1.19
2010	47	11.78	11.04	75	10.80	98	1.45	1.41	1.40	1.04	1.03	1.02
2011	65	15.46	10.16	530	10.22	524	1.57	1.35	1.35	0.95	0.84	0.83
2012	59	13.78	9.41	437	9.88	391	1.45	1.29	1.31	0.76	0.70	0.71
2013	64	14.36	8.40	596	9.07	530	1.37	1.20	1.22	0.65	0.59	0.60
2014	65	14.10	6.80	730	7.73	637	1.25	1.11	1.13	0.33	0.30	0.30
2015	49	13.30	6.34	696	7.35	595	1.16	1.08	1.09	0.15	0.14	0.14
2016	35	8.62	7.08	154	7.20	141	1.05	1.05	1.05	0.05	0.05	0.05

Notes: Based on data compiled from 995 real estate funds (including opportunistic and valued-added funds), including fully liquidated partnerships, formed between 1993 and 2016. Internal rates of returns are net of fees, expenses and carried interest. CA research shows that most funds take at least six years to settle into their final quartile ranking, and previous to this settling they typically rank in 2-3 other quartiles; therefore fund or benchmark performance metrics from more recent vintage years may be less meaningful. Benchmarks with "—" have an insufficient number of funds in the vintage year sample to produce a meaningful return.

mPME Note: Refer to Methodology page for further details on Cambridge Associates Modified PME (mPME).

Sources: Cambridge Associates LLC, FTSE International Limited, Natl Assoc of RE Investment Trusts and Natl Council of RE Invest Fiduciaries.

Real Estate: Total Value to Paid In Capital Multiple (TVPI)  
Net to Limited Partners

Vintage Year	Pooled Return	Arithmetic Mean	Median	Upper Quartile	Lower Quartile	Number of Funds
1993	—	—	—	—	—	2
1994	1.81	1.74	1.74	1.97	1.45	18
1995	1.64	1.85	1.70	1.87	1.49	15
1996	1.75	1.68	1.61	1.79	1.32	18
1997	1.38	1.71	1.56	1.76	1.37	15
1998	1.65	1.64	1.53	1.75	1.43	21
1999	1.64	1.74	1.72	2.07	1.42	20
2000	1.71	1.63	1.54	1.88	1.31	23
2001	2.00	1.74	1.71	1.91	1.33	22
2002	1.50	1.59	1.52	1.73	1.40	23
2003	1.29	1.44	1.47	1.76	1.08	38
2004	1.04	1.06	0.99	1.33	0.74	48
2005	0.99	0.97	1.00	1.26	0.71	74
2006	0.85	1.04	0.92	1.39	0.66	78
2007	1.37	1.26	1.34	1.54	1.05	107
2008	1.44	1.40	1.42	1.65	1.24	63
2009	1.70	2.08	1.60	1.88	1.48	26
2010	1.45	1.49	1.48	1.69	1.23	47
2011	1.57	1.55	1.49	1.70	1.34	65
2012	1.45	1.42	1.37	1.48	1.25	59
2013	1.37	1.31	1.33	1.49	1.16	64
2014	1.25	1.22	1.23	1.30	1.15	65
2015	1.16	1.14	1.13	1.20	1.07	49
2016	1.05	1.01	1.07	1.14	0.95	35

Notes: Based on data compiled from 995 real estate funds (including opportunistic and valued-added funds), including fully liquidated partnerships, formed between 1993 and 2016. Internal rates of returns are net of fees, expenses and carried interest. CA research shows that most funds take at least six years to settle into their final quartile ranking, and previous to this settling they typically rank in 2-3 other quartiles; therefore fund or benchmark performance metrics from more recent vintage years may be less meaningful. Benchmarks with "—" have an insufficient number of funds in the vintage year sample to produce a meaningful return.

Real Estate: Distribution to Paid In Capital Multiple (DPI)  
Net to Limited Partners

Vintage Year	Pooled Return	Arithmetic Mean	Median	Upper Quartile	Lower Quartile	Number of Funds
1993	—	—	—	—	—	2
1994	1.81	1.74	1.74	1.97	1.45	18
1995	1.64	1.85	1.70	1.87	1.49	15
1996	1.75	1.67	1.61	1.79	1.29	18
1997	1.38	1.71	1.56	1.76	1.37	15
1998	1.64	1.63	1.53	1.73	1.43	21
1999	1.64	1.74	1.72	2.07	1.42	20
2000	1.65	1.54	1.51	1.75	1.25	23
2001	1.99	1.72	1.71	1.91	1.31	22
2002	1.45	1.53	1.49	1.69	1.35	23
2003	1.24	1.38	1.44	1.69	1.08	38
2004	0.95	0.98	0.91	1.26	0.56	48
2005	0.86	0.85	0.83	1.16	0.57	74
2006	0.70	0.88	0.77	1.26	0.43	78
2007	1.21	1.07	1.12	1.42	0.74	107
2008	1.21	1.11	1.25	1.44	0.72	63
2009	1.54	1.84	1.52	1.82	1.17	26
2010	1.04	1.05	1.19	1.45	0.49	47
2011	0.95	1.09	1.06	1.36	0.80	65
2012	0.76	0.69	0.60	0.91	0.38	59
2013	0.65	0.49	0.36	0.79	0.13	64
2014	0.33	0.27	0.18	0.34	0.06	65
2015	0.15	0.11	0.06	0.19	0.00	49
2016	0.05	0.04	0.00	0.03	0.00	35

Notes: Based on data compiled from 995 real estate funds (including opportunistic and valued-added funds), including fully liquidated partnerships, formed between 1993 and 2016. Internal rates of returns are net of fees, expenses and carried interest. CA research shows that most funds take at least six years to settle into their final quartile ranking, and previous to this settling they typically rank in 2-3 other quartiles; therefore fund or benchmark performance metrics from more recent vintage years may be less meaningful. Benchmarks with "—" have an insufficient number of funds in the vintage year sample to produce a meaningful return.

Real Estate: Residual Value to Paid In Capital Multiple (RVPI)  
Net to Limited Partners

Vintage Year	Pooled Return	Arithmetic Mean	Median	Upper Quartile	Lower Quartile	Number of Funds
1993	—	—	—	—	—	2
1994	0.00	0.00	0.00	0.00	0.00	18
1995	0.00	0.00	0.00	0.00	0.00	15
1996	0.01	0.01	0.00	0.00	0.00	18
1997	0.00	0.00	0.00	0.00	0.00	15
1998	0.01	0.01	0.00	0.00	0.00	21
1999	0.00	0.00	0.00	0.00	0.00	20
2000	0.06	0.09	0.00	0.02	0.00	23
2001	0.02	0.02	0.00	0.01	0.00	22
2002	0.05	0.06	0.00	0.05	0.00	23
2003	0.05	0.06	0.00	0.05	0.00	38
2004	0.10	0.09	0.01	0.10	0.00	48
2005	0.13	0.12	0.02	0.15	0.00	74
2006	0.15	0.16	0.04	0.29	0.00	78
2007	0.17	0.18	0.08	0.27	0.01	107
2008	0.23	0.29	0.18	0.49	0.02	63
2009	0.16	0.24	0.05	0.33	0.00	26
2010	0.40	0.44	0.36	0.63	0.08	47
2011	0.62	0.46	0.38	0.63	0.19	65
2012	0.69	0.73	0.76	0.94	0.45	59
2013	0.72	0.82	0.84	1.05	0.62	64
2014	0.92	0.95	1.00	1.12	0.81	65
2015	1.01	1.02	1.05	1.12	0.90	49
2016	1.00	0.97	1.01	1.09	0.88	35

Notes: Based on data compiled from 995 real estate funds (including opportunistic and valued-added funds), including fully liquidated partnerships, formed between 1993 and 2016. Internal rates of returns are net of fees, expenses and carried interest. CA research shows that most funds take at least six years to settle into their final quartile ranking, and previous to this settling they typically rank in 2-3 other quartiles; therefore fund or benchmark performance metrics from more recent vintage years may be less meaningful. Benchmarks with "—" have an insufficient number of funds in the vintage year sample to produce a meaningful return.



## Description of Performance Measurement Methodology

Cambridge Associates LLC (CA) has established a database to monitor investments made by venture capital and other alternative asset partnerships. On June 30, 2018, 1,021 real estate funds from the years 1986 through 2017 were included in the sample. Users of the analysis may find the following description of the data sources and calculation techniques helpful to their interpretation of information presented in the report:

1. Partnership financial statements and narratives are the primary source of information concerning cash flows and ending residual/ net asset values (NAV) for both partnerships and portfolio company investments.
2. Recognizing the alternative asset community's sensitivity to the distribution of information pertaining to individual fund investments, as a matter of policy CA only releases aggregated figures in its benchmark report.
3. Vintage year is defined as the legal inception date as noted in a fund's financial statement. This date can usually be found in the first note to the audited financial statements and is prior to the first close or capital call.
4. CA uses both the since inception internal rate of return and the end-to-end or horizon performance calculation in its benchmark reports:
  - a. The since inception internal rate of return (SI IRR) is a since inception calculation that solves for the discount rate, which makes the net present value of an investment equal to zero. The calculation is based on cash-on-cash returns over equal periods modified for the residual value of the partnership's equity or portfolio company's NAV. The residual value attributed to each respective group being measured is incorporated as its ending value. Transactions are accounted for on a quarterly basis, and annualized values are used for reporting purposes. Please note that all transactions are recorded on the 45th day or midpoint of the quarter.
  - b. Cambridge Associates uses the end-to-end or horizon internal rate of return calculation to calculate the official quarterly, annual, and multi-year index figures. The horizon IRR performance calculation is a money-weighted return similar to the since inception IRR; however, it is measuring performance between two points in time. The calculation incorporates the beginning NAV (if any, treated as an inflow), interim cash flows and the ending NAV (if any, treated as an outflow). All interim cash flows are recorded on the mid-period date of the quarter. In order for a fund to be included in a horizon IRR calculation, the fund must have at least one quarterly contribution, distribution or NAV during the time frame being measured. Similar to the since inception IRR, the horizon IRR is annualized for time frames greater than one year.

## Description of Performance Measurement Methodology (Continued)

## 5. Additional Calculation Definitions:

In order to provide meaningful statistics, Cambridge Associates has applied minimum fund count thresholds for each calculation. See minimum counts in parenthesis after each calculation.

- a. **Pooled return** aggregates all cash flows and ending NAVs in a sample to calculate a dollar-weighted return. (minimum 3 funds)
  - b. **Arithmetic mean** averages the individual fund IRRs included in a vintage year. (minimum 3 funds)
  - c. **Median** is the middle fund IRR of the group of individual fund IRRs included in a vintage year. (minimum 5 funds)
  - d. **Equal-weighted pooled return** equally weights all cash flows and ending NAVs based on committed capital to calculate a dollar-weighted return. (minimum 3 funds)
  - e. **Upper/ lower quartile** are the thresholds for the upper (top 25%) and lower (bottom 25%) quartiles based on the individual fund IRRs included in a vintage year. Can be used in conjunction with the median to determine quartile placement. (minimum 8 funds)
  - f. **Standard deviation** is measure of the dispersion of the individual returns. The calculation employs the standard methodology for calculating a sample mean (not a population mean). (minimum 8 funds)
6. **Realization ratio exhibits** (TVPI, DPI, RVPI): CA has independently calculated the proper realization ratio for each fund in each vintage year. Please note that each fund has been ranked within its respective vintage year by the corresponding realization ratio, as opposed to being ranked by IRR as they are ranked in the since inception IRR exhibit. As a result a fund's ranking within its vintage year may change. For example, it is possible that a vintage year can have a different median fund when ranked by IRR vs. when ranked by TVPI, DPI or RVPI.
7. **Cambridge Associates Modified Public Market Equivalent (mPME)**: The mPME calculation is a private-to-public comparison that seeks to replicate private investment performance under public market conditions. The public index's shares are purchased and sold according to the private fund cash flow schedule, with distributions calculated in the same proportion as the private fund, and the mPME NAV (the value of the shares held by the public equivalent) is a function of mPME cash flows and public index returns. The mPME attempts to evaluate what return would have been earned had the dollars been deployed in the public markets instead of in private investments while avoiding the "negative NAV" issue inherent in some PME methodologies. "Value-Add" shows (in basis points) the difference between the actual private investment return and the mPME calculated return.
8. Exhibits detailing data for portfolio companies are grouped by year of the fund's initial investment in a company, as opposed to vintage year. Returns are gross returns.

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