

MEETING MATERIALS

HOWARD COUNTY RETIREMENT PLANS

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PRIVATE EQUITY PACING PLAN

NEPC, LLC

PRIVATE EQUITY OVERVIEW

NEPC, LLC

PRIVATE MARKETS THOUGHTS & ACTIONS

Private Markets Thoughts

- **Fundraising has continued to be robust and efficient—and early**
- **Valuations are still at cyclical highs, but capital put to work in 2019 vintage funds may see better buying opportunities**
- **Rising rates, deteriorating credit quality and overall credit levels portend a riskier future for performing credit**
- **Late cycle commitments often outperform mid-cycle ones that have not had the opportunity to de-risk**

Private Markets Actions

- **Actively manage portfolios: continue to deploy capital thoughtfully, with an eye toward preserving liquidity**
- **Prepare for distressed cycles with commitments to control-/influence-oriented managers with flexible mandates**
- **Continue to seek special situations and credit opportunity strategies predicated on flexibility, value and complexity**
- **Consider building venture exposure with both new and established top quartile managers**



NEPC VIEW POINT SUMMARY

Private Equity

US Large & Mega Buyout	US Mid & Small Buyout	Special Situations	European Buyout	US Early Stage Venture	US Mid & Late Stage Venture
US Growth Equity	European Venture	European Growth Equity	Secondaries	Co-Investment	Asia

Private Credit

Distressed Debt	Opportunistic Credit	US Direct Lending	European Direct Lending	Niche Lending	Mezzanine
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Green: Favorable View
Gray: Neutral View
Red: Negative View

STRATEGY IMPLEMENTATION: PRIVATE EQUITY

Strategy		Outlook		Commentary
		North America	Europe	
Venture Capital & Growth Equity	Early Stage	Positive	Positive	<ul style="list-style-type: none"> In US and Europe, target managers with broad and relevant networks and expertise. Due to the lack of scalability at this stage, focus on appropriately sized funds (<\$500 million).
	Mid & Late Stage	Negative	Neutral	<ul style="list-style-type: none"> With US valuations still high, target managers that have a sector-focused strategy whose value-add goes beyond that of a capital provider. In Europe, target managers with strong networks and ample deal flow.
	Growth Equity	Neutral	Neutral	<ul style="list-style-type: none"> Seek managers that can consistently execute a strategy of scaling and professionalizing previously bootstrapped companies. Alternatively, target managers that are well equipped to fuel continued growth in VC-backed companies
Buyouts & Special Situations	Mega & Large	Neutral	Neutral	<ul style="list-style-type: none"> In the large relatively efficient markets, look for managers with some competitive advantage/angle in their deals; sector specialists can still outperform
	Mid & Small	Neutral	Neutral	<ul style="list-style-type: none"> In Europe, look for managers who have local knowledge and presence as well as experience professionalizing a business
	Special Sits & Turnarounds	Positive	Positive	<ul style="list-style-type: none"> Evaluate opportunistic special situations managers with flexible and nimble approaches able to capitalize on market, industry and/or specific company volatility
Secondaries		Neutral		<ul style="list-style-type: none"> Invest with groups demonstrating sourcing advantages to minimize competition for deals



STRATEGY IMPLEMENTATION: PRIVATE EQUITY

Strategy		Outlook	Commentary
Asia	Developed Economies <i>(Australia, South Korea and Japan)</i>	Positive	<ul style="list-style-type: none"> Emphasize buyout strategies with managers that have strong sourcing networks, disciplined capital deployment and ability to drive value Middle market funds provide attractive growth potential while larger funds can invest in industry leaders to drive consolidation or pursue cross-border expansion opportunities
	Developing Economies <i>(China, India and Southeast Asia)</i>	Positive	<ul style="list-style-type: none"> Emphasize growth equity strategies by partnering with strong entrepreneurs to expand businesses and develop management teams Early stage venture capital in China and India shifting from copy-cat business models to technology innovation Control deals are becoming more frequent as PE industry matures and growth slows, providing acquisition targets for buyout groups
Fund of Funds & Co-Investment Funds	Primary FOFs	Neutral	<ul style="list-style-type: none"> Use specialists to gain exposure to difficult to access segments and/or geographies; be aware of how co-investments and secondaries are being used within a primary fund of fund before committing
	Co-Investment Funds	Positive	<ul style="list-style-type: none"> Seek managers with demonstrated access to deal flow from high quality GPs and have a differentiated viewpoint on how they evaluate opportunities



HOWARD COUNTY RETIREMENT PLANS

NEPC, LLC

NEPC RECOMMENDATIONS – PRIVATE EQUITY & CREDIT

- **Private Equity (“PE”) – Howard County should consider \$7 million in commitments to complete 2019 commitments**
 - The Private Equity portfolio is well diversified
 - Consider building venture exposure with both new and established top quartile managers
- **NEPC modelling suggests commitments in the range of \$40-\$45 million per year for private equity to maintain the target allocation of 10%**
- **Note: Pacing recommendations are based on annual forecasts, independent of when the model is run during the year. For example, commitment recommendations based on June 30 data will encompass NEPC recommendations for the time period July 1 of the current year through June 30 of next year.**



PRIVATE EQUITY

NEPC, LLC

CURRENT STRATEGY AND VINTAGE YEAR EXPOSURES

(\$ in millions)

Private Equity NAVs and Exposures				
Investment Strategy	Current Valuation (NAV)	Capital to be Funded	Total Current Exposure	% of Total Exposure
Buyouts	\$60.38	\$10.07	\$70.45	38.7%
Co-Investments	\$8.56	\$2.59	\$11.15	6%
Distressed	\$1.65	\$0.00	\$1.65	0.9%
Fund of Funds	\$37.00	\$10.81	\$47.81	26.2%
Secondaries	\$9.54	\$3.08	\$12.62	6.9%
Venture	\$27.93	\$10.66	\$38.59	21.2%
Total	\$145.05	\$37.21	\$182.27	100.0%

Private Equity Exposures

Investment Strategy	% of Total Exposure
Buyouts	38.7%
Co-Investments	6.1%
Distressed	0.9%
Fund of Funds	26.2%
Secondaries	6.9%
Venture	21.2%

Private Equity Investments by Vintage Year										
Vintage Year	Commitment	Paid In Capital	Capital to be Funded	Cumulative Distributed	Current Valuation (NAV)	Total Value	Net Benefit	Call Ratio	DPI Ratio	TVPI Ratio
2007	\$10.0	\$9.7	\$0.0	\$13.8	\$1.6	\$15.5	\$5.8	97%	1.42x	1.59x
2008	\$4.0	\$3.8	\$0.0	\$4.9	\$4.8	\$9.7	\$5.8	96%	1.28x	2.53x
2010	\$3.0	\$2.0	\$0.0	\$2.5	\$0.7	\$3.2	\$1.2	66%	1.25x	1.58x
2011	\$21.0	\$19.1	\$1.9	\$12.2	\$23.2	\$35.3	\$16.3	91%	0.64x	1.85x
2012	\$17.6	\$14.6	\$3.0	\$9.2	\$11.8	\$21.0	\$6.4	83%	0.63x	1.44x
2013	\$30.0	\$28.9	\$1.1	\$18.1	\$32.4	\$50.5	\$21.5	96%	0.63x	1.75x
2014	\$30.0	\$24.5	\$5.5	\$5.9	\$33.7	\$39.6	\$15.0	82%	0.24x	1.61x
2015	\$28.0	\$17.9	\$10.1	\$0.6	\$21.4	\$22.1	\$4.2	64%	0.04x	1.23x
2017	\$19.4	\$11.0	\$8.4	\$0.6	\$13.1	\$13.7	\$2.7	57%	0.06x	1.25x
2018	\$2.2	\$1.4	\$0.8	\$0.0	\$1.3	\$1.3	(\$0.0)	63%	0.00x	0.96x
2019	\$22.3	\$0.9	\$6.4	\$0.0	\$0.9	\$0.9	\$0.0	4%	0.00x	1.01x
Total Private Equity	\$187.5	\$133.8	\$37.2	\$67.8	\$145.1	\$212.9	\$79.0	71%	0.51x	1.59x



EXISTING COMMITMENTS

Existing Private Equity Investments										
Buyouts										
Fund Name	Vintage Year	Committed	Paid In Capital	Capital To Be Funded	Cumulative Distributions	Current Valuation (NAV)	Total Value	Net Benefit	DPI Ratio	TVPI Ratio
Schroder Adveq Europe V, L.P.	2012	\$7.6	\$7.6	\$0.0	\$4.0	\$7.0	\$11.0	\$3.4	0.52x	1.45x
Aberdeen U.S. Private Equity V, L.P.	2013	\$15.0	\$14.4	\$0.6	\$7.8	\$15.4	\$23.2	\$8.8	0.54x	1.61x
HarbourVest 2013 Direct Fund, L.P.	2013	\$15.0	\$14.5	\$0.5	\$10.3	\$17.0	\$27.3	\$12.7	0.71x	1.88x
Aberdeen U.S. Private Equity VI, L.P.	2014	\$15.0	\$11.9	\$3.2	\$2.5	\$13.3	\$15.8	\$3.9	0.21x	1.33x
Schroder Adveq Europe VI, L.P.	2015	\$6.0	\$4.1	\$1.9	\$0.6	\$4.2	\$4.8	\$0.8	0.15x	1.19x
Aberdeen U.S. Private Equity VII, L.P.	2017	\$5.0	\$1.6	\$3.4	\$0.0	\$2.3	\$2.3	\$0.7	0.03x	1.46x
Schroder Adveq Europe Direct II S.C.S.	2018	\$0.9	\$0.4	\$0.5	\$0.0	\$0.4	\$0.4	(\$0.0)	0.00x	0.97x
Schroder Adveq Europe VII S.C.S.	2018	\$0.7	\$0.7	\$0.0	\$0.0	\$0.8	\$0.8	\$0.0	0.00x	1.03x
Total Buyouts		\$65.2	\$55.2	\$10.1	\$25.3	\$60.4	\$85.6	\$30.4	0.46x	1.55x
Co-Investments										
Fund Name	Vintage Year	Committed	Paid In Capital	Capital To Be Funded	Cumulative Distributions	Current Valuation (NAV)	Total Value	Net Benefit	DPI Ratio	TVPI Ratio
HarbourVest Partners Co-Investment Fund IV, L.P.	2017	\$9.4	\$7.1	\$2.3	\$0.6	\$8.4	\$8.9	\$1.8	0.08x	1.25x
HarbourVest Partners Co-Investment Fund IV AIV, L.P.	2018	\$0.6	\$0.3	\$0.3	\$0.0	\$0.2	\$0.2	(\$0.1)	0.00x	0.77x
Total Co-Investments		\$10.0	\$7.4	\$2.6	\$0.6	\$8.6	\$9.1	\$1.7	0.08x	1.23x
Distressed										
Fund Name	Vintage Year	Committed	Paid In Capital	Capital To Be Funded	Cumulative Distributions	Current Valuation (NAV)	Total Value	Net Benefit	DPI Ratio	TVPI Ratio
Siguler Guff Distressed Opportunities Fund III, L.P.	2007	\$10.0	\$9.7	\$0.0	\$13.8	\$1.6	\$15.5	\$5.8	1.42x	1.59x
Total Distressed		\$10.0	\$9.7	\$0.0	\$13.8	\$1.6	\$15.5	\$5.8	1.42x	1.59x
Fund of Funds										
Fund Name	Vintage Year	Committed	Paid In Capital	Capital To Be Funded	Cumulative Distributions	Current Valuation (NAV)	Total Value	Net Benefit	DPI Ratio	TVPI Ratio
Crown Asia-Pacific Private Equity II PLC	2011	\$14.0	\$12.7	\$1.3	\$6.0	\$14.3	\$20.3	\$7.6	0.47x	1.60x
Crown Asia-Pacific Private Equity III PLC	2014	\$5.0	\$3.7	\$1.3	\$0.3	\$5.5	\$5.8	\$2.1	0.09x	1.57x
57 Stars Global Opportunity Fund 4 (US), L.P.	2015	\$7.0	\$5.0	\$2.0	\$0.0	\$5.4	\$5.4	\$0.5	0.00x	1.09x
NB Crossroads Fund XXI, L.P.	2015	\$15.0	\$8.9	\$6.2	\$0.0	\$11.8	\$11.8	\$2.9	0.00x	1.33x
NB Crossroads Fund XXII, L.P.	2019	\$15.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	NA	NA
Total Fund of Funds		\$56.0	\$30.2	\$10.8	\$6.3	\$37.0	\$43.3	\$13.1	0.21x	1.43x
Secondaries										
Fund Name	Vintage Year	Committed	Capital Funded	Distributions	Valuation	Total Value	Net Benefit	DPI Ratio	TVPI Ratio	
Pantheon Global Secondary Fund IV, L.P.	2010	\$3.0	\$2.0	\$0.0	\$2.5	\$0.7	\$3.2	\$1.2	1.25x	1.58x
Crown Global Secondaries III PLC, L.P.	2012	\$10.0	\$7.0	\$3.0	\$5.3	\$4.8	\$10.1	\$3.0	0.75x	1.43x
Greenspring Secondaries Fund I, L.P.	2014	\$2.5	\$2.4	\$0.1	\$1.2	\$4.1	\$5.3	\$2.9	0.50x	2.20x
Total Secondaries		\$15.5	\$11.4	\$3.1	\$8.9	\$9.5	\$18.5	\$7.1	0.78x	1.62x
Venture										
Fund Name	Vintage Year	Committed	Capital Funded	Distributions	Valuation	Total Value	Net Benefit	DPI Ratio	TVPI Ratio	
Greenspring Global Partners IV, L.P.	2008	\$4.0	\$3.8	\$0.0	\$4.9	\$4.8	\$9.7	\$5.8	1.28x	2.53x
Greenspring Global Partners V-B, L.P.	2011	\$7.0	\$6.4	\$0.6	\$6.2	\$8.8	\$15.0	\$8.7	0.97x	2.36x
Greenspring Global Partners VI, L.P.	2014	\$7.5	\$6.6	\$0.9	\$1.8	\$10.9	\$12.7	\$6.1	0.28x	1.93x
Greenspring Global Partners VIII-B, L.P.	2017	\$5.0	\$2.3	\$2.8	\$0.0	\$2.5	\$2.5	\$0.2	0.00x	1.10x
Greenspring Global Partners IX-B, L.P.	2019	\$7.3	\$0.9	\$6.4	\$0.0	\$0.9	\$0.9	\$0.0	0.00x	1.01x
Total Venture		\$30.8	\$19.9	\$10.7	\$12.9	\$27.9	\$40.8	\$20.9	0.65x	2.05x



PACING MODEL INPUTS AND ASSUMPTIONS

(\$ in millions)

General Portfolio Assumptions

Total Portfolio Assets	\$1,091.9	Portfolio Return Assumptions	2019	2020	2021
Total Private Equity Assets	\$145.1	Target Investment Return %	6.57%	6.57%	6.57%
Private Equity Capital to be Funded	\$37.2	Contributions %	0.00%	0.00%	0.00%
Total Private Equity Exposure	\$182.3	Payouts %	0.00%	0.00%	0.00%
Total Private Equity Assets / Total Portfolio Assets	13.3%	Expenses %	0.00%	0.00%	0.00%
Total Private Equity Exposure / Total Portfolio Assets	16.7%	Reserve for Expenses %	0.00%	0.00%	0.00%
Target Private Equity Allocation % (Current Target)	10.0%	Net Growth Rate %	6.57%	6.57%	6.57%
		Portfolio Data as of:			3/31/2019
		Private Equity Data as of:			6/30/2019

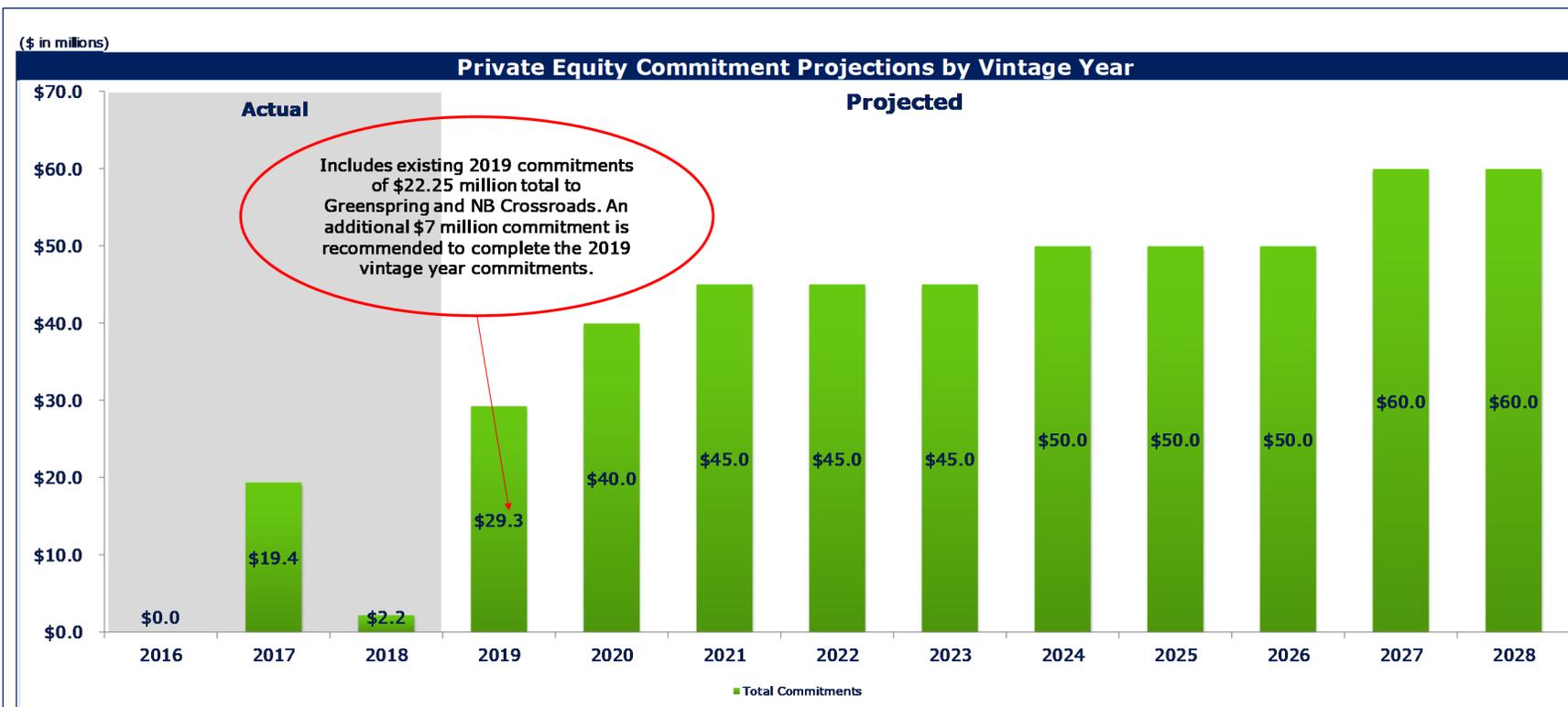
Total Projected Portfolio Assets

	Projected									
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Total Portfolio Net Growth Rate	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%
Total Portfolio Beginning NAV	\$1,091.9	\$1,163.6	\$1,240.1	\$1,321.5	\$1,408.4	\$1,500.9	\$1,599.5	\$1,704.6	\$1,816.6	\$1,935.9
Yearly Net Growth	\$71.7	\$76.4	\$81.5	\$86.8	\$92.5	\$98.6	\$105.1	\$112.0	\$119.3	\$127.2
Total Portfolio Ending NAV	\$1,163.6	\$1,240.1	\$1,321.5	\$1,408.4	\$1,500.9	\$1,599.5	\$1,704.6	\$1,816.6	\$1,935.9	\$2,063.1
Target Private Equity Allocation	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Target Private Equity NAV	\$116.4	\$124.0	\$132.2	\$140.8	\$150.1	\$160.0	\$170.5	\$181.7	\$193.6	\$206.3

Total Projected Portfolio Assets and Target Private Equity Allocation



COMMITMENT PACE GOING FORWARD



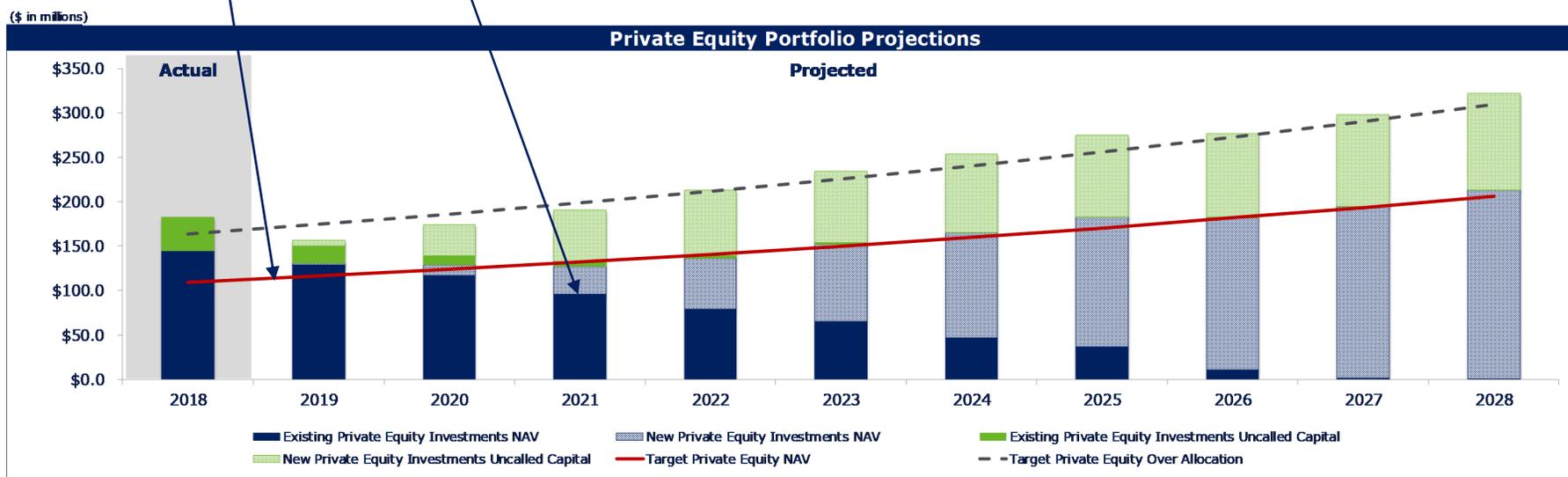
Private Equity Commitments by Vintage Year

Year	Actual			More Certain			Less Certain						
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Total Commitments	\$0.0	\$19.4	\$2.2	\$29.3	\$40.0	\$45.0	\$45.0	\$45.0	\$50.0	\$50.0	\$50.0	\$60.0	\$60.0



ASSET LEVEL PROJECTIONS

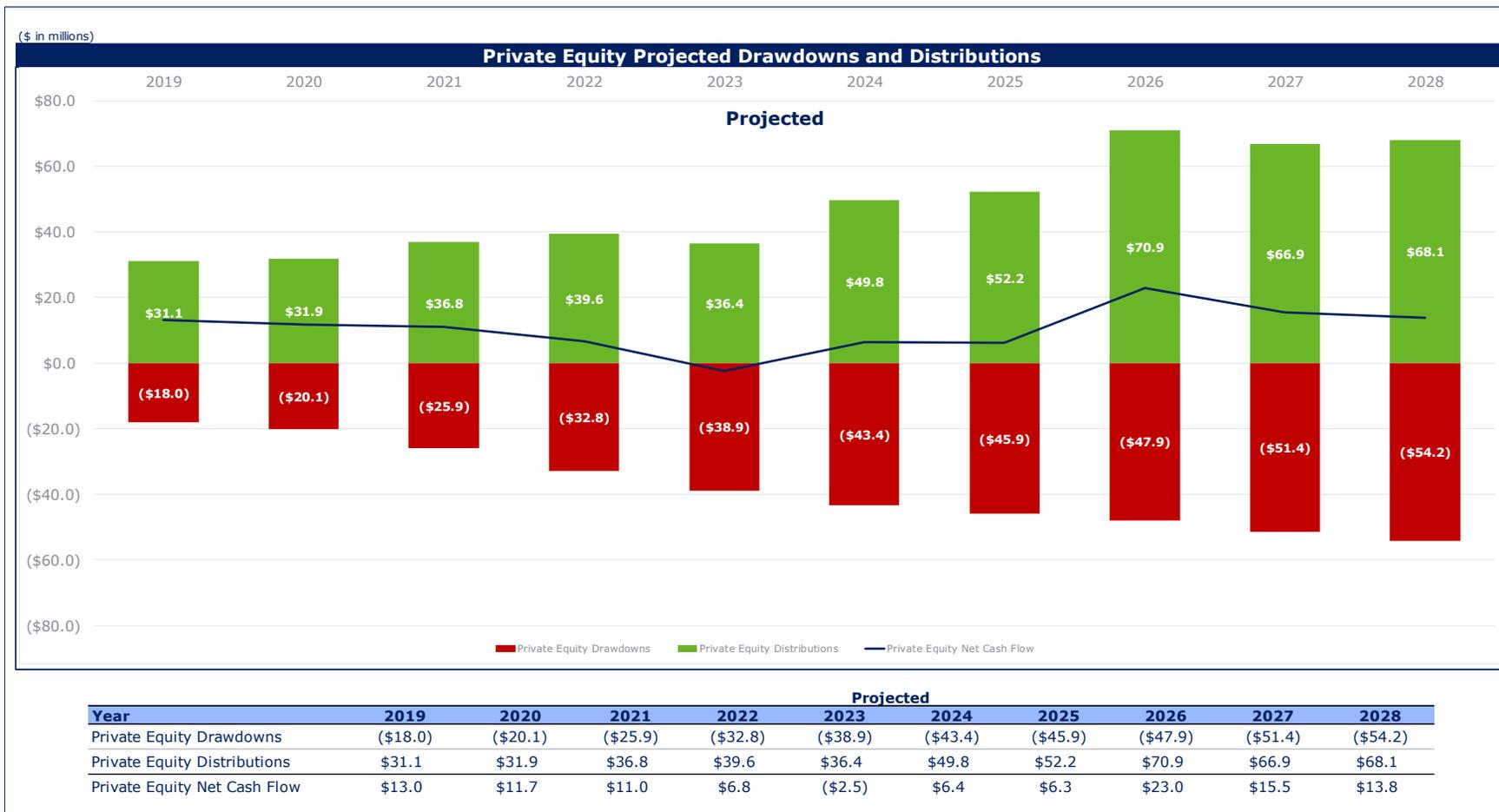
- **Red line** is the **10%** target private equity allocation based on projected plan total NAV; **Black dashed line** is the 1.5x recommended over-commitment.
- Goal is to keep private equity NAV (**blue bar**) plus uncalled capital commitments (**green bar**), between red line and black dashed line while matching the blue bar with the red target line.



Year	Projected										
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Private Equity NAV	\$145.1	\$130.4	\$128.7	\$126.8	\$136.4	\$152.1	\$164.6	\$182.3	\$181.8	\$194.4	\$212.6
Uncalled Capital Commitments	\$37.2	\$25.8	\$45.2	\$64.0	\$76.2	\$82.2	\$88.6	\$92.6	\$94.7	\$103.3	\$109.1
Private Equity NAV + Uncalled Capital Commitments	\$182.3	\$156.3	\$173.9	\$190.8	\$212.5	\$234.2	\$253.2	\$275.0	\$276.6	\$297.7	\$321.7
Target Private Equity NAV	\$109.2	\$116.4	\$124.0	\$132.2	\$140.8	\$150.1	\$160.0	\$170.5	\$181.7	\$193.6	\$206.3
Over-Commitment Pace	1.5x	1.5x	1.5x	1.5x	1.5x	1.5x	1.5x	1.5x	1.5x	1.5x	1.5x
Target Private Equity Over Allocation	\$163.8	\$174.5	\$186.0	\$198.2	\$211.3	\$225.1	\$239.9	\$255.7	\$272.5	\$290.4	\$309.5
Private Equity Percent of Total Portfolio Assets											
Private Equity NAV	13.3%	11.2%	10.4%	9.6%	9.7%	10.1%	10.3%	10.7%	10.0%	10.0%	10.3%
Private Equity Uncalled Capital Commitments	3.4%	2.2%	3.6%	4.8%	5.4%	5.5%	5.5%	5.4%	5.2%	5.3%	5.3%
NAV + Uncalled Capital Commitments	16.7%	13.4%	14.0%	14.4%	15.1%	15.6%	15.8%	16.1%	15.2%	15.4%	15.6%
Target Private Equity Allocation	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%



PROJECTED CASH FLOWS



PRIVATE EQUITY OPPORTUNITY - CONFIDENTIAL

NEPC, LLC

PRIVATE EQUITY APPENDIX

NEPC, LLC

VENTURE AND GROWTH EQUITY

NEPC, LLC

VENTURE & GROWTH EQUITY

General Market Thoughts

- **Early Stage Venture Capital**
 - In US, valuations remain elevated. However, average company age at funding is growing too, making price more commensurate with maturation. In Europe, tech hubs are continuing to develop as is the VC ecosystem.
- **Mid/Late Stage Venture Capital**
 - In US, valuations continue to climb as ample capital pursues deals. In Europe, there is a funding gap resulting in limited competition and attractive valuations. However, capital becomes global at later stages thus resulting in hype and competition for the best companies
- **Growth Equity**
 - Differentiated managers are hard to find, and established firms continue to raise large funds

Implementation Views

Strategy	Outlook		Commentary
	N. Am.	EUR	
Early Stage Venture Capital	Positive	Positive	In US and Europe, target managers with broad and relevant networks and expertise. Due to the lack of scalability at this stage, focus on appropriately sized funds (<\$500 million).
Mid/Late Stage Venture Capital	Negative	Neutral	With US valuations still high, target managers that have a sector-focused strategy whose value-add goes beyond that of a capital provider. In Europe, target managers with strong networks and ample deal flow.
Growth Equity	Neutral	Neutral	Seek managers that can consistently execute a strategy of scaling and professionalizing previously bootstrapped companies. Alternatively, target managers that are well equipped to fuel continued growth in VC-backed companies.



NORTH AMERICA VC & GROWTH: RETURNS

Comments

- **Venture IRRs have rebounded to healthy levels after a depressed period in the mid-2000's**
- **Recent TVPI's are strong**
 - It is yet to be seen if paper returns will translate to realized returns
- **Spreads between 1st and median highlights importance of 1st quartile manager selection**

Net IRR



Net TVPI



Net DPI



Source: Thomson One/Cambridge Associates as of 06/30/2018. Performance for 2015-2018 vintage funds not yet meaningful.

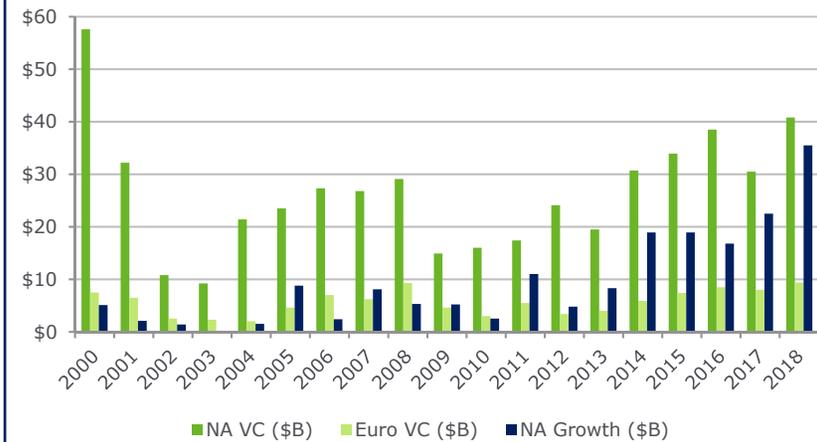


NORTH AMERICA VC & GROWTH: FUNDRAISING AND ACTIVITY

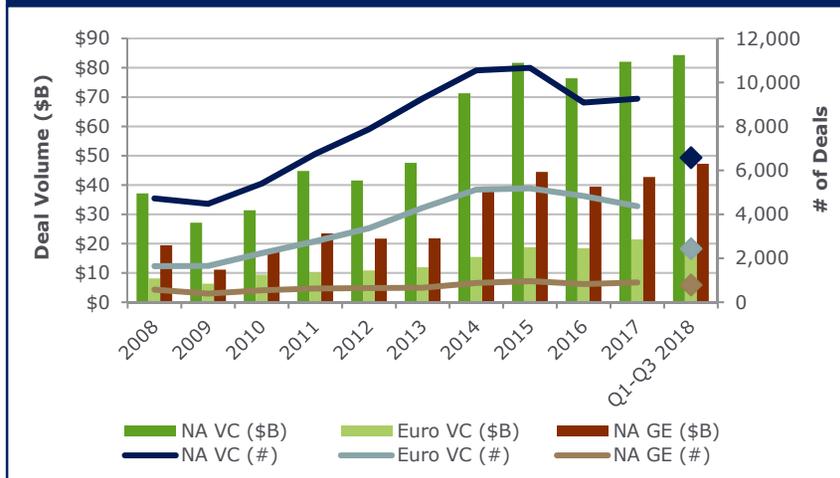
Comments

- **VC and growth equity fundraising highest in recent years**
 - VC still below peak (2000)
 - Growth equity driven by large funds
- **Managers are being selective**
 - 2018 deal levels will surpass recent averages on a \$ basis, but number of deals continues to trend downward; more \$'s in less deals
- **Software continues to attract the most capital**

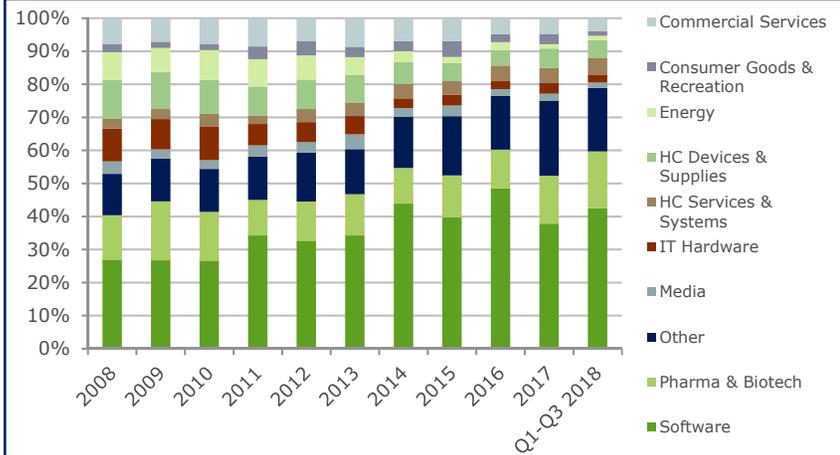
Annual Fundraising



Deal Activity



North American VC Activity as a Percentage of Dollars Deployed by Sector



Source: Fundraising data from Preqin as of 12/31/2018; Deal activity from Pitchbook as of 9/30/2018.

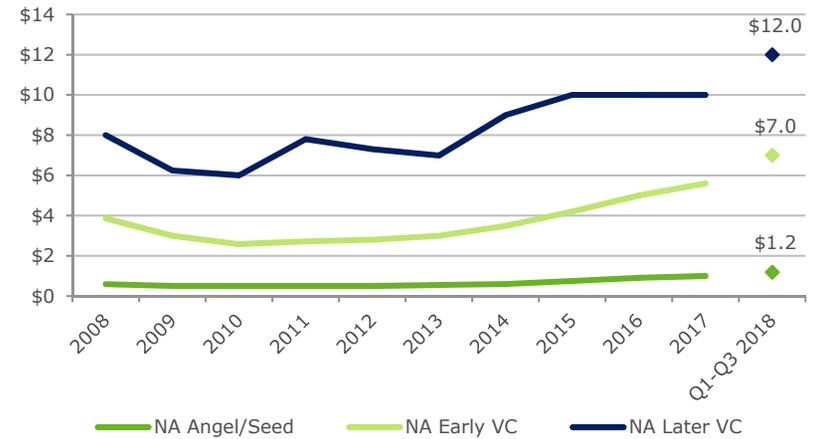


NORTH AMERICA VC & GROWTH: VALUATIONS

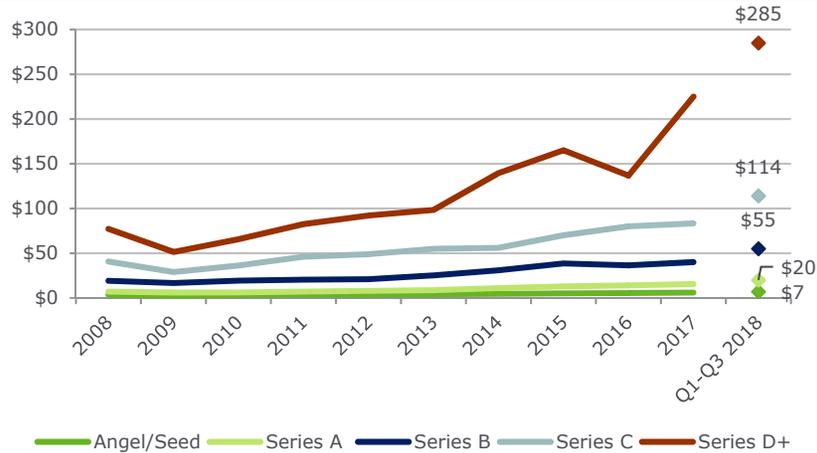
Comments

- **Valuations tick upward**
 - Higher valuations are requiring larger round sizes
 - Later stage values are being skewed by new large market participants
- **More maturation, more money**
 - Age at funding continues to increase as well, and meaningfully at the earlier stages
 - Valuation is commensurate with maturity

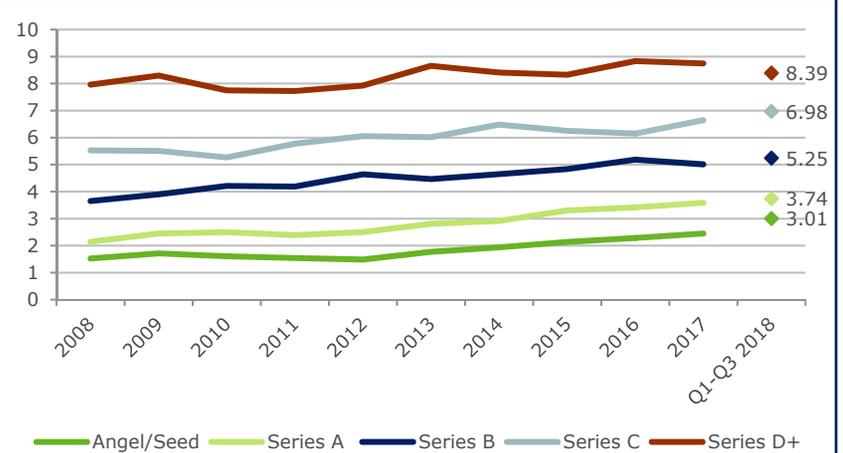
Median Round Size (\$M) by Stage



North American Median VC Pre-Money Valuation (\$M) by Series



North American Median Company Age (Years) by Series



Source: Pitchbook as of 9/30/2018.

NORTH AMERICA VC & GROWTH: EXIT ENVIRONMENT

Comments

- **2018 was a slow year for exits**
 - Exits in dollar terms have been strong albeit driven by fewer companies
- **Companies continue to stay private longer**
 - Capital is available from numerous sources
 - “Unicorn” backlog remains high; however, IPOs have ticked up, creating optimism for more in 2019

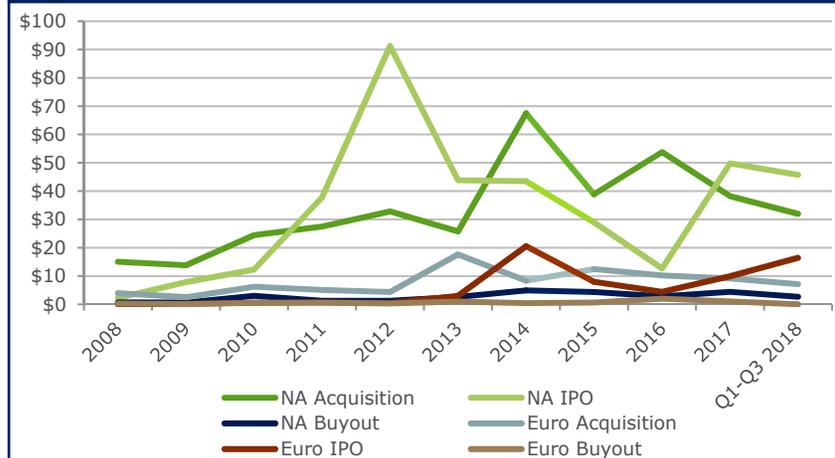
Venture Backed Exit Activity



North American Average Time to Exit (Years) From First VC Financing by Type



Exit Value (\$B) by Type



Source: Pitchbook as of 9/30/2018.



BUYOUTS AND SPECIAL SITUATIONS

NEPC, LLC

US BUYOUTS & SPECIAL SITUATIONS

General Market Thoughts

- **The market remains relatively unchanged over the last few years**
 - High prices persist, driven by the same factors as last few years
 - Based on the late cycle timing, the worst vintages of the cycle are likely in the rearview mirror
- **General Partners are putting capital to work, though not enough to put a dent in the overhang**
 - Anecdotes abound regarding the widespread use of pro-forma EBITDA, which leads to higher valuations than the data suggests
 - Either the capital in these deals is at risk, or it will take longer to grow into returns
- **Exit environment still relatively strong by historical standards, but most of the inventory left to sell is still young**
- **Good GPs have significant leverage with regard to terms and timelines**

Implementation Views

Strategy		Outlook	Commentary
Buyouts & Special Situations	US Mega & Large	Neutral	In these relatively efficient markets, look for managers with some competitive advantage/angle in their deals; sector specialists and managers with operating expertise can still outperform
	US Mid & Small	Neutral	While there is more value available at this end of the market, there still aren't many truly proprietary deals; seek managers with a sourcing edge
	Special Situations	Positive	Evaluate opportunistic special situations managers with flexible and nimble approaches able to capitalize on market, industry and/or specific company volatility



US BUYOUTS & SPECIAL SITUATIONS: RETURNS

Comments

- **Best vintages and greatest outperformance typically follow recessions**
- **Quartile spreads continue to be fairly consistent through this last cycle**
- **Pre-GFC vintages have rebounded nicely from a multiple perspective**
- **Funds prior to 2010 have distributed the majority of their value; significant unrealized holdings in more recent vintages**

Net IRR



Net TVPI



Net DPI



Source: Thomson One/Cambridge Associates as of 06/30/2018. Performance for 2015-2018 vintage funds not yet meaningful.

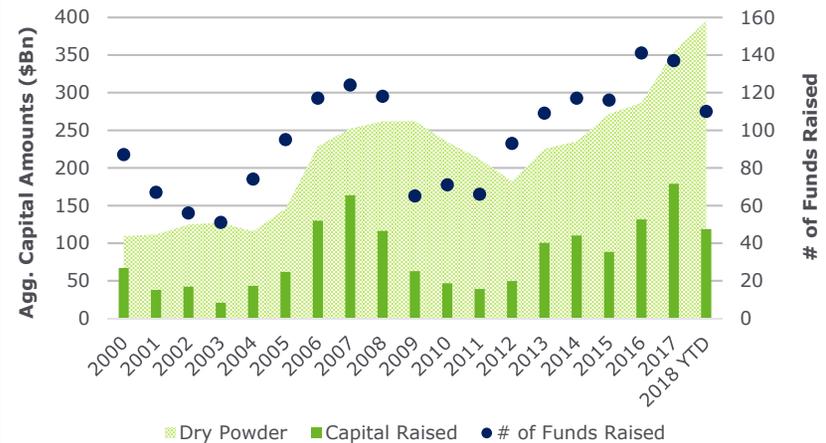


US BUYOUTS & SPECIAL SITUATIONS: FUNDRAISING & DRY POWDER

Comments

- With fewer mega funds in the market, fundraising in 2018 was down from 2017 high, but dry powder continues to accumulate
- Fundraises continue to be efficient, but taking slightly longer than last year
- Over the last few years it felt like firms were coming back to market faster than usual because they were; this trend moderated in 2018

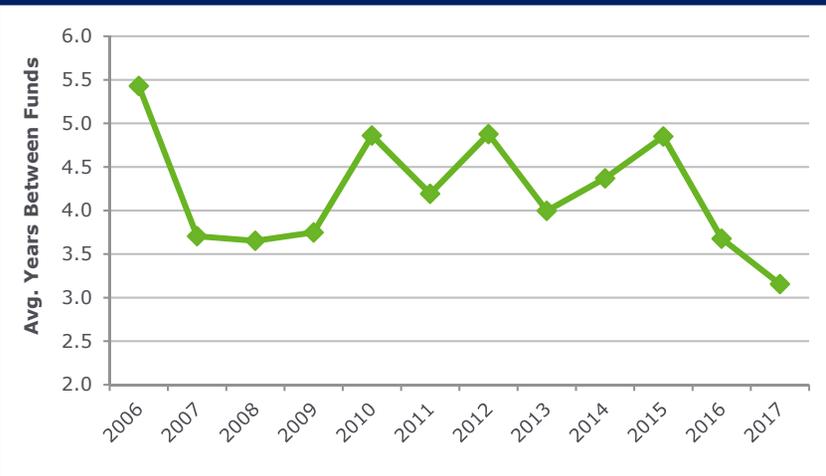
Fundraising & Dry Powder



Fundraising Timing



Mean Time Between Funds



Source: Preqin as of 11/30/2018.



US BUYOUTS & SPECIAL SITUATIONS: DEAL ENVIRONMENT

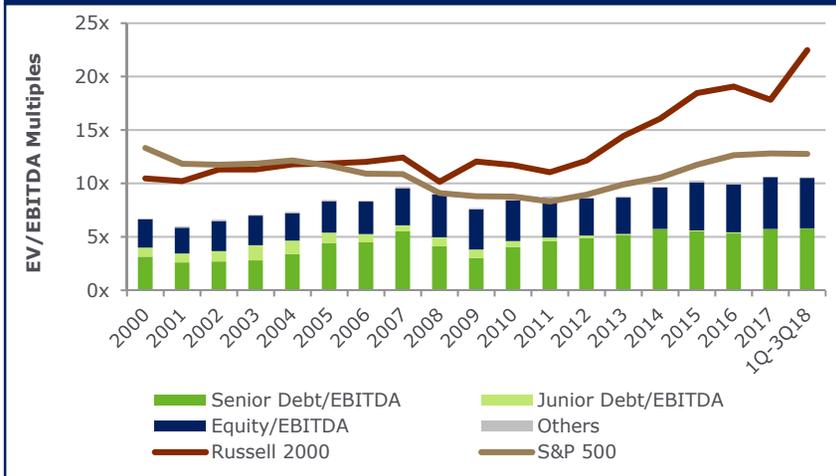
Comments

- **Entry multiples remain at historic highs; these multiples would be even higher if calculated with actual EBITDA**
- **Equity contributions holding steady but don't prevent high debt loads; if pro-forma EBITDA amounts don't hold, many companies will be more levered than they should**
- **Interest coverage is off recent highs; as rates increase, this statistic will worsen**

Deal Volume & Count



Entry Multiples & Capital Structure



Interest Coverage Ratio



Source: S&P Global Market Intelligence and Pitchbook as of 09/30/2018.

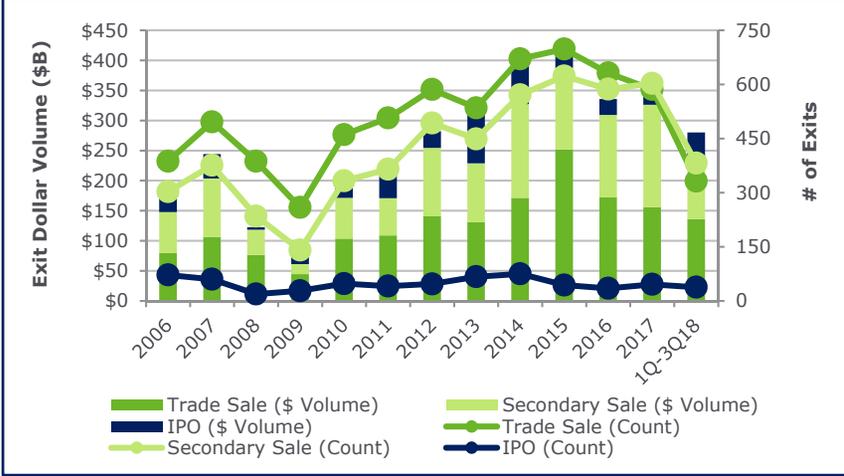


US BUYOUTS & SPECIAL SITUATIONS: EXIT ENVIRONMENT

Comments

- Q4 data could drive totals significantly higher
- The majority of exits were to corporate buyers, as “secondary” buyout volume decreased; IPOs continue not to be an important source of liquidity
- Lack of ready-to-exit inventory and need to achieve more growth is driving hold periods higher

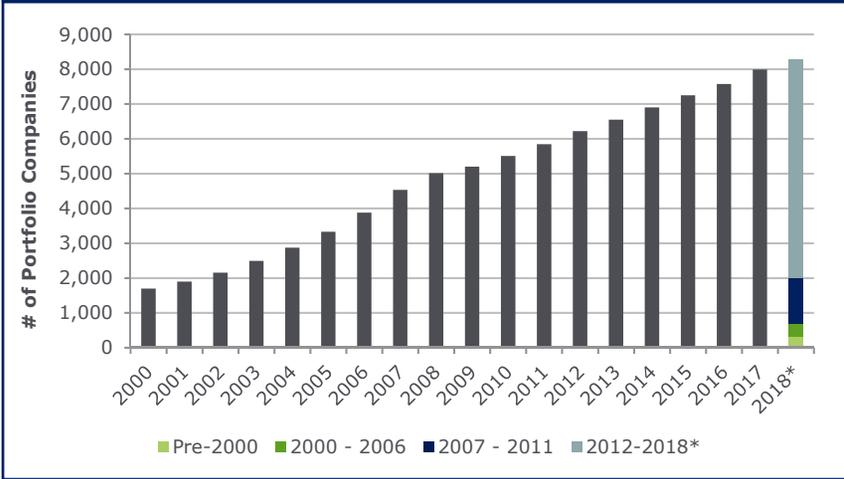
PE-Backed Exits (Count & Volume)



PE-Backed Exits by Size (Volume)



PE-Backed Company Inventory



Source: Pitchbook as of 09/30/2018.



EUROPE BUYOUTS & SPECIAL SITUATIONS

General Market Thoughts

- **The market continues to grow at a tepid pace but overall deal volume is down in 2018**
 - Decrease in overall deal volume is attributed to the larger end of the market but that has not stunted the median deal size which rose primarily due to an increase in M&A
 - The overall buyout market remains just as competitive as the US but European deals are slightly better equitized
 - IT has consistently grown over the past five years in deal volume and exits
- **The European middle market still exhibits relative attractiveness to the US**
 - Middle market LBOs (<\$ /€50 million EBITDA) have exhibited lower overall purchase price multiples (approximately 1x lower)
 - Total debt in the middle market is lower relative to the US by about a 0.5x
- **Geopolitical uncertainty have shown some price softening but not on a consistent basis**
- **The strength of the US dollar has led some GPs to look to the US for add-on investments**

Implementation Views

Strategy		Outlook	Commentary
Buyouts & Special Situations	Europe Mega & Large	Neutral	In these relatively efficient markets, look for managers with some competitive advantage/angle in their deals; sector specialists and managers with operating expertise can still outperform
	Europe Mid & Small	Neutral	Seek managers that can source smaller either founder-owned or local GPs and take local/regional champions and turn them into Pan-European leaders
	Europe Special Situations	Positive	Evaluate opportunistic special situations managers with flexible and nimble approaches able to capitalize on market, industry and/or specific company volatility



EUROPE BUYOUTS & SPECIAL SITUATIONS: RETURNS

Comments

- **Median IRRs of European buyouts have remained on an upward trajectory since 2005**
- **Funds that began investing during the recession, when valuations and competition were lower, have performed well**
- **Given the additional risks of investing in Europe, the bar is high for selecting European strategies**

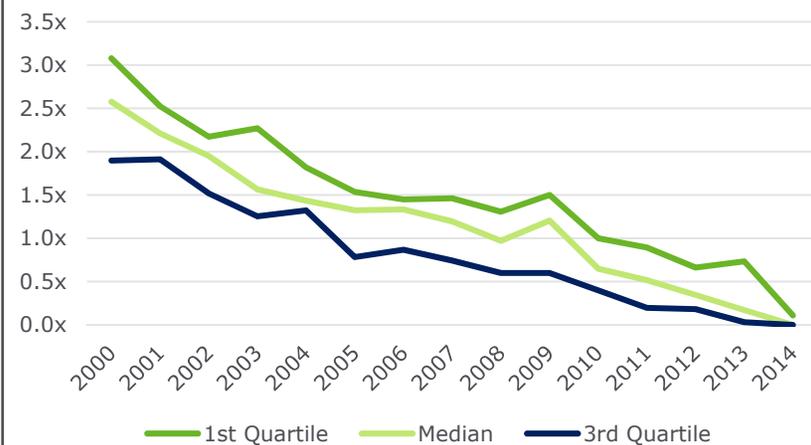
Net IRR



Net TVPI



Net DPI



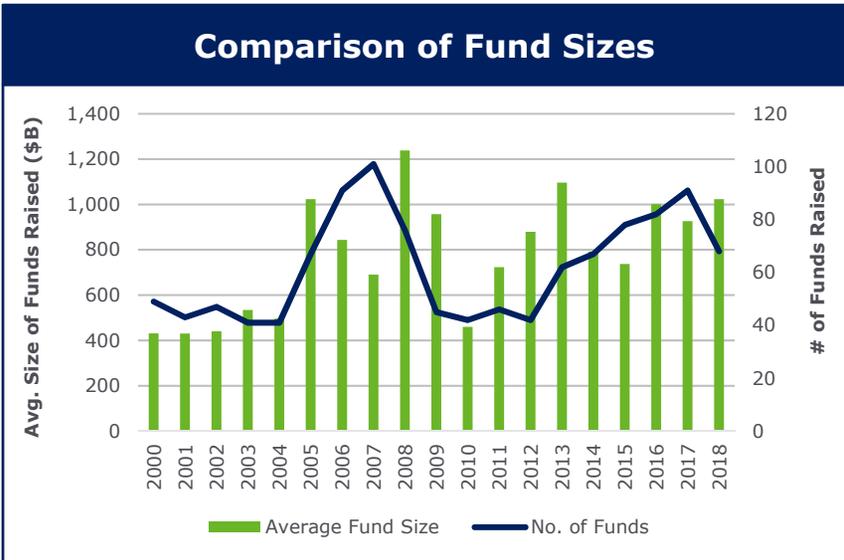
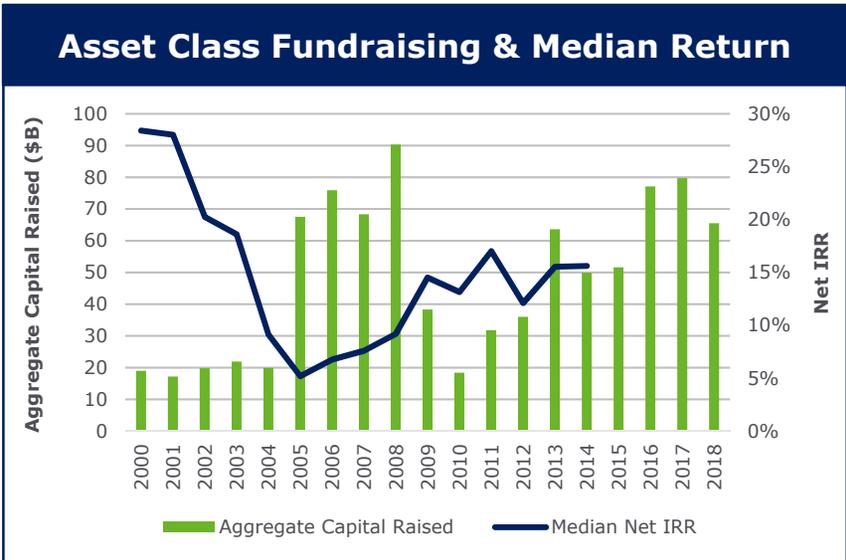
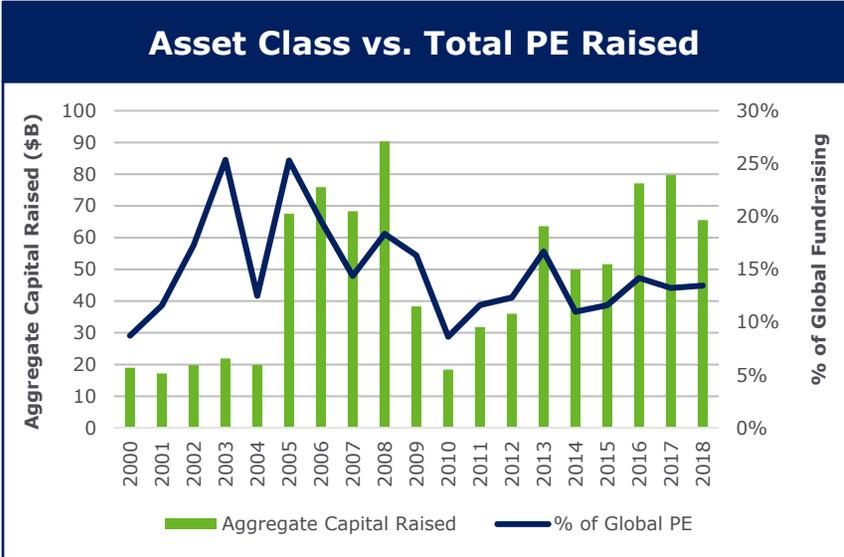
Source: Thomson One/Cambridge Associates as of 06/30/2018 and in \$ USD. Performance for 2015-2018 vintage funds not yet meaningful.



EUROPE BUYOUTS & SPECIAL SITUATIONS: FUNDRAISING

Comments

- **As of September 2018, buyout and special situations funds that are focused on European opportunities represent ~15% of all private equity funds raised globally in 2018**
- **Fundraising appears to be somewhat correlated with both the economic environment and historical fund returns**
 - The number of funds raised has steadily increased in the post-recession period



Source: Fundraising data from Preqin as of 10/31/2018. Thomson One/Cambridge Associates as of 06/30/2018. Performance for 2015-2018 vintage funds not yet meaningful.

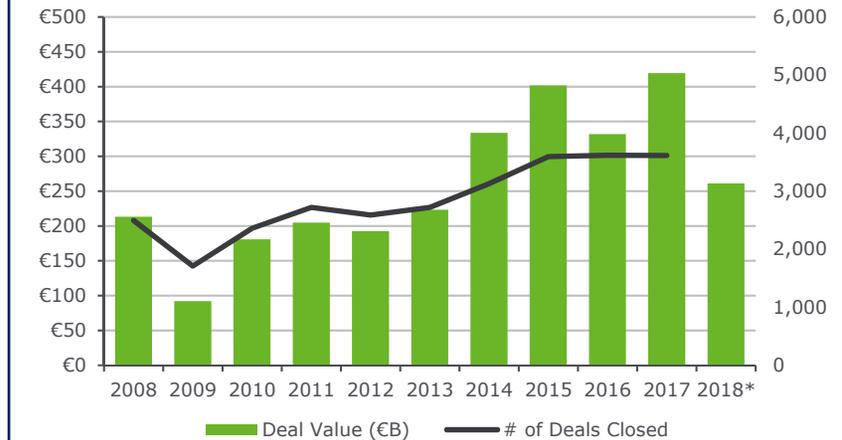


EUROPE BUYOUTS & SPECIAL SITUATIONS: LBO ACTIVITY

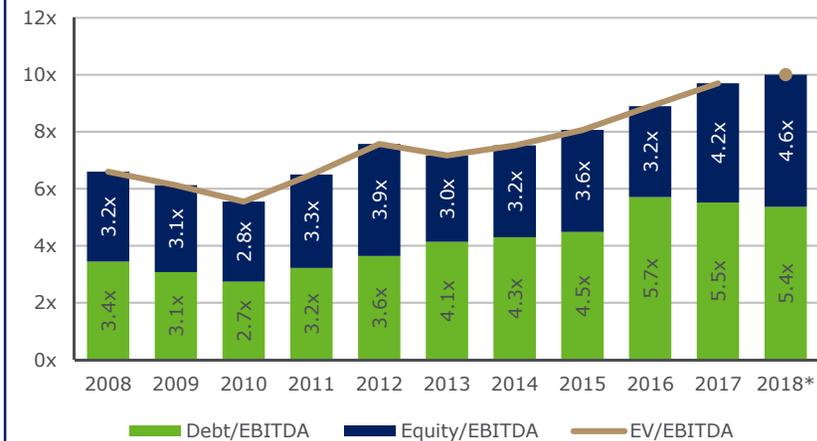
Comments

- Deal activity by value decreased by approximately 15% compared to the first three quarters of 2017
- Overall multiples in Europe continue to increase and are in line with US buyouts
- Add-ons have continued to account for approximately half of all PE buyouts

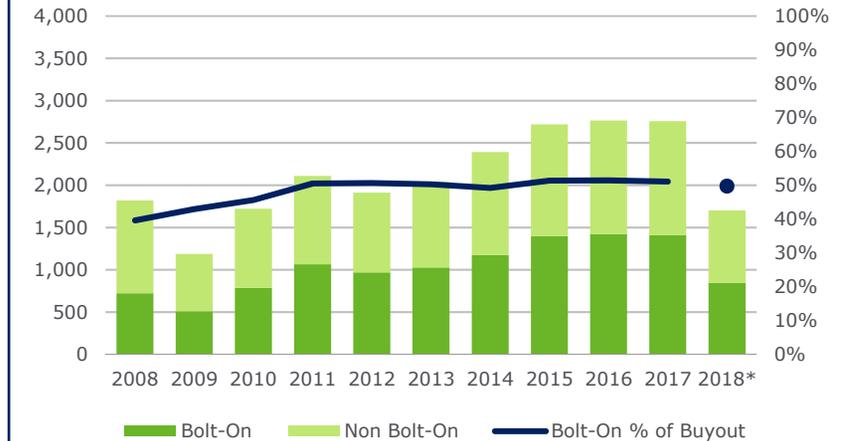
Deal Activity



European Multiples



Add-on Activity



Source: S&P Global Market Intelligence and Pitchbook as of 09/30/2018.

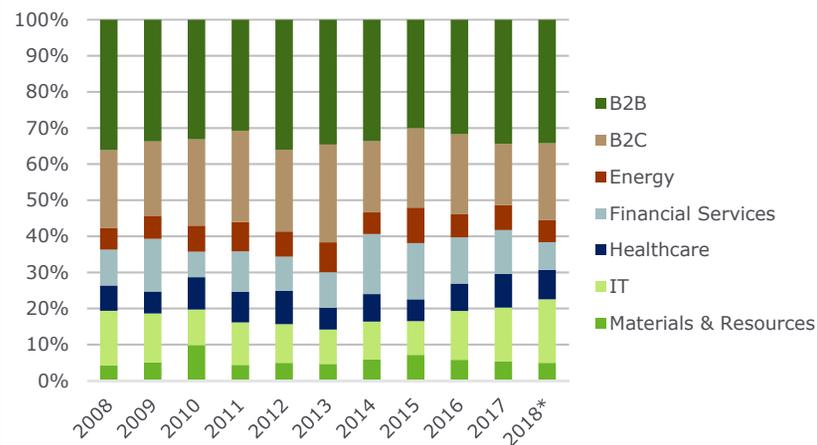


EUROPE BUYOUTS & SPECIAL SITUATIONS: LBO ACTIVITY (CONT.)

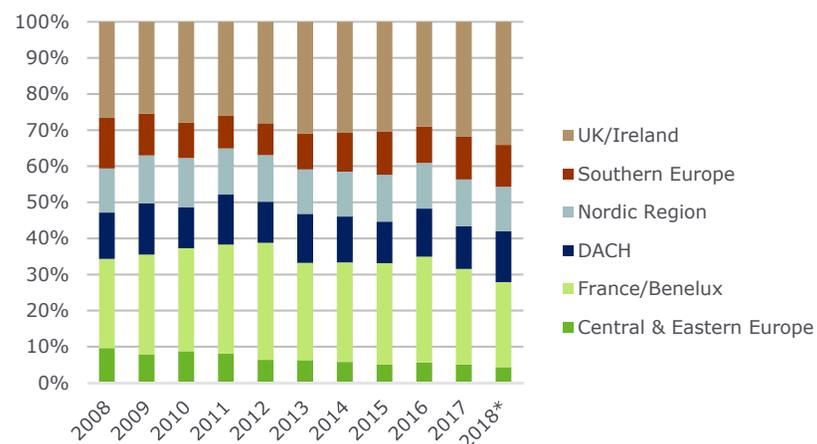
Comments

- **Information Technology activity has grown proportionally for the fifth consecutive year**
- **The UK & Ireland and France & Benelux have seen the majority of deal flow in the past few years – the DACH region which has been historically underpenetrated has increased since last year**
- **Exit activity largely reflects deal making activity – IT continues to grow while other sectors have more variability from year to year**

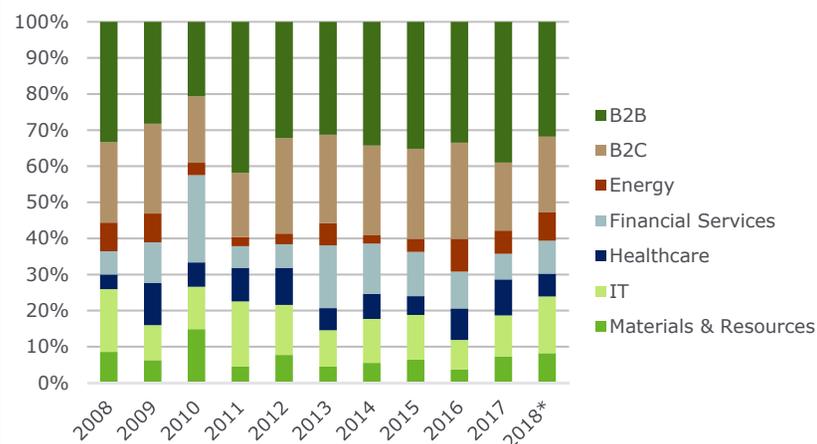
Deal Activity by Sector



Deal Activity by Region



Add-on Activity by Sector



Source: S&P Global Market Intelligence and Pitchbook as of 09/30/2018.



ASIA PRIVATE EQUITY

NEPC, LLC

ASIA PRIVATE EQUITY

General Market Thoughts

- **PE in Asia is maturing, but still much smaller than in the US or Europe**
 - Illiquidity premium for PE investments in Asia much higher than in US or Europe historically
 - Availability of control buyouts is on the rise, particularly in China and India
- **Heterogeneous region – economic, social and political factors differ from country to country**
 - Fund of funds or pan-regional direct funds can provide diversification benefits and provide PE managers with the flexibility to re-direct capital deployment as country factors change
- **Rising middle class income and domestic consumption investment themes are prevalent across Asia Private Equity funds**
 - Private equity is an attractive complement to public equity strategies

Implementation Views

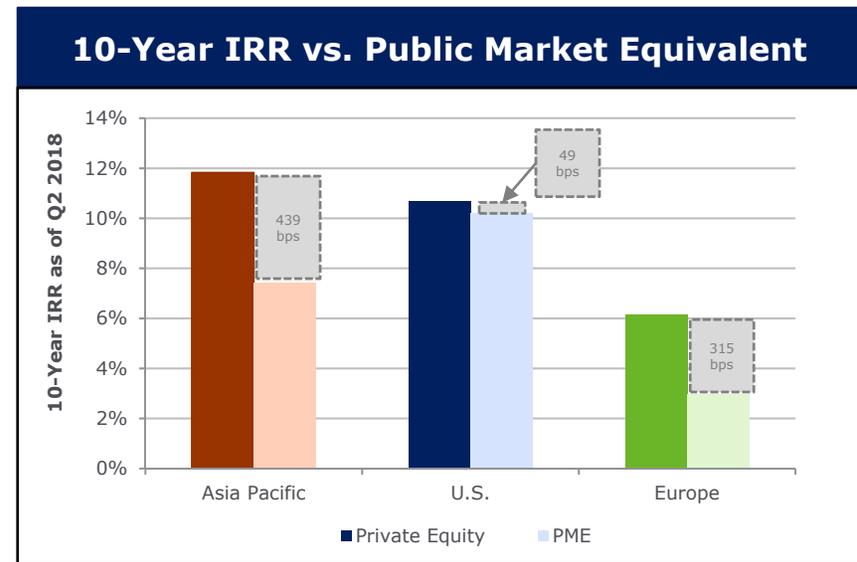
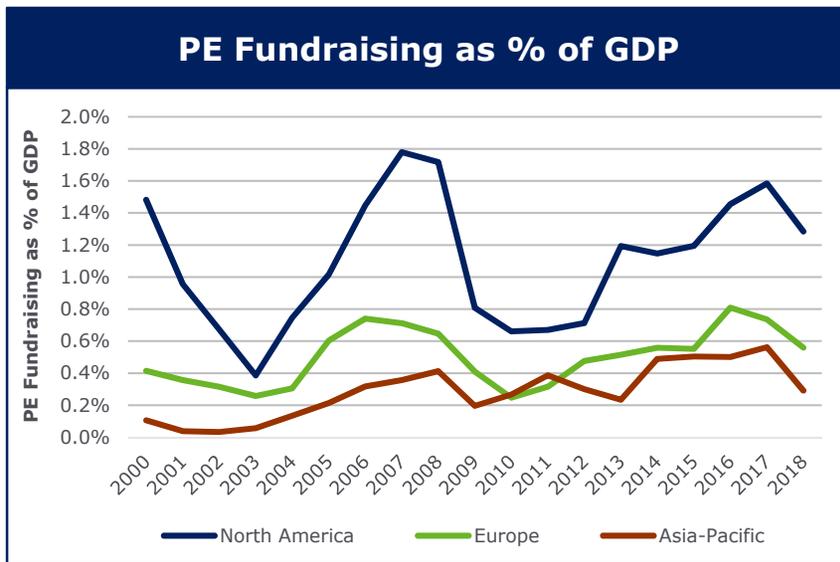
Strategy		Outlook	Commentary
Asia Private Equity	Developed Economies <i>(Australia, South Korea, Japan)</i>	Positive	<ul style="list-style-type: none"> • Emphasize buyout strategies with managers that have strong sourcing networks, disciplined capital deployment and ability to drive value • Middle market funds provide attractive growth potential while larger funds can invest in industry leaders to drive consolidation or pursue cross-border expansion opportunities
	Developing Economies <i>(China, India, SE Asia)</i>	Positive	<ul style="list-style-type: none"> • Emphasize growth equity strategies by partnering with strong entrepreneurs to expand businesses and develop management teams • Early stage venture capital in China and India shifting from copy-cat business models to technology innovation • Control deals are becoming more frequent as PE industry matures and growth slows, providing acquisition targets for buyout groups



ASIA PACIFIC PRIVATE EQUITY: ATTRACTIVE CONDITIONS

Comments

- On an annual basis, private equity fund commitments in Asia-Pacific generally account for approximately 10-20%, while the GDP of the Asia-Pacific region is larger than that of North America or Europe
- Annual private equity fundraising as a percentage of GDP for the Asia-Pacific region has historically been 3-4x less than in North America and 1-2x less than in Europe
- These factors point to two considerations of the attractiveness of the Asia-Pacific private equity landscape:
 - Less capital competing for transactions in Asia-Pacific relative to the size of the economies in the region
 - Ample opportunity for private equity to expand in the Asia-Pacific region before capital markets become saturated
- As a result of these factors, private equity returns in the Asia-Pacific have outperformed public market equity returns by a significantly larger margin than in North America and in Europe



Source: GDP data from the IMF. Fundraising data from Preqin as of 09/30/2018. Historical returns and PME data from Thomson One/Cambridge Associates as of 06/30/2018 (Asia Pacific – MSCI EM; U.S. – S&P 500; Europe – MSCI Europe).



ASIA PACIFIC PRIVATE EQUITY: RETURNS

Comments

- **High dispersion of returns across fund managers**
 - Allocating to top performing groups critical
- **Strong IRR and TVPI multiples in recent years, but distributions have lagged**
 - 1st Quartile funds take 6-7 years for DPI = 1x
 - Median funds take 10-11 years for DPI = 1x
- **Buyouts can provide new exit options to IPOs or strategic sales**

Net IRR



Net TVPI



Net DPI



Source: Thomson One/Cambridge Associates as of 06/30/2018. Performance for 2015-2018 vintage funds not yet meaningful.



ASIA PACIFIC PRIVATE EQUITY: FUNDRAISING

Geography Comments

- **Over the past 10 years, China focused funds average 61% of all Asia-Pacific PE**
- **Pan-Regional funds have averaged 21% of all Asia-Pacific funds**
- **Developed markets have averaged 13% of all Asia-Pacific funds**
 - Includes funds focused on Japan, South Korea and Australia/NZ
- **India & Southeast Asia combine for 5%**

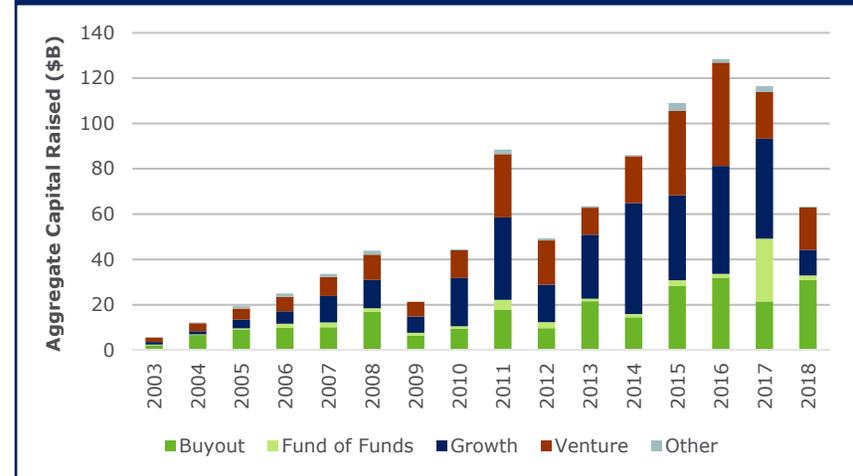
Strategy Comments

- **Growth equity strategies have been the most prominent in Asia-Pacific, averaging 38% of all funds in past 10 years**
- **Venture strategies have averaged 28% of all Asia-Pacific funds**
- **Buyout strategies have averaged 25% of all Asia-Pacific funds**
- **Fund of funds, secondaries and debt strategies combine for 9%**

Asia Pacific Fundraising by Geography



Asia Pacific Fundraising by Strategy



Source: Fundraising data from Preqin as of 12/31/2018.



ASIA PACIFIC PRIVATE EQUITY: INVESTMENT ACTIVITY

Comments

- **Deal Activity**

- Over the past 8 years, China private equity deal volume has annually accounted for half of the private equity deals being made in the Asia-Pacific region
- While annual volumes fluctuate, Japan, Korea, Australia & New Zealand and India provide a consistent presence for deals made outside of China
- Buyout or special situation deals are more frequent in South Korea, Japan and Australia/NZ
- Growth equity and venture capital deals are more frequent in China, India and SE Asia, although buyouts are becoming more prominent

- **Exit Activity**

- Annual exit activity for PE deals can change significantly from year to year, especially for initial public offerings, where macroeconomic and governmental factors can impact IPO windows
- Private sales (strategic & financial sales) have been more consistent options for exits, but without the additional gains that can come from public market multiples



Source: Deal volume and exits data from AVCJ as of 09/30/2018.



MULTI-MANAGER PRIVATE EQUITY

NEPC, LLC

MULTI-MANAGER PRIVATE EQUITY

General Market Thoughts

- **Primary Fund of Funds**
 - Declining investor allocations, shift toward separate account for large investors, specialized groups offering targeted products, expanding co-investment and lending products to monetize GP relationships
- **Secondaries**
 - Lack of investor distress and readily available inexpensive leverage are keeping discounts low
 - Portfolio management and GP/Fund restructurings pushed 2018 close to record level of transactions
- **Direct Co-Investment Funds**
 - Provides multi-manager diversification and access to deals from capacity constrained GPs with the benefit of fee efficient vehicles
 - Competition for deal flow is increasing as fund of funds expand co-investment programs

Implementation Views

Strategy		Outlook	Commentary
Multi-Manager Private Equity	Primary Fund of Funds	Neutral	Use specialists to gain exposure to difficult to access segments and/or geographies; be aware of how co-investments and secondaries are being used within a primary fund of fund before committing
	Secondaries	Neutral	Invest with groups demonstrating sourcing advantages to minimize competition for deals
	Direct Co-Investment Funds	Positive	Seek managers with demonstrated access to deal flow from high quality GPs and have a differentiated viewpoint on how they evaluate opportunities

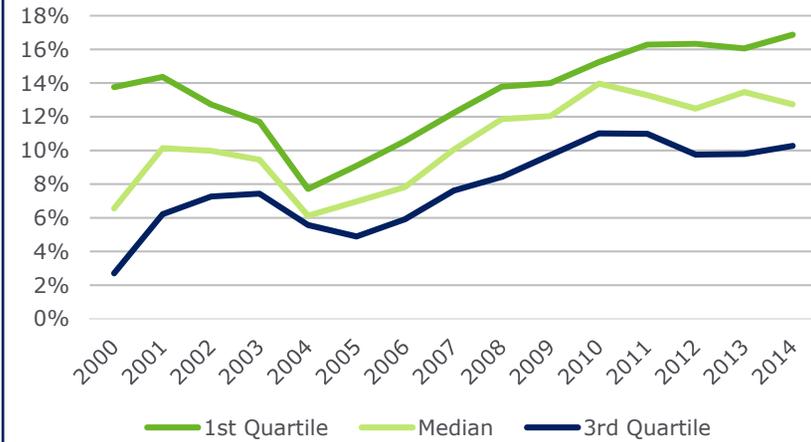


FUND OF FUNDS: RETURNS

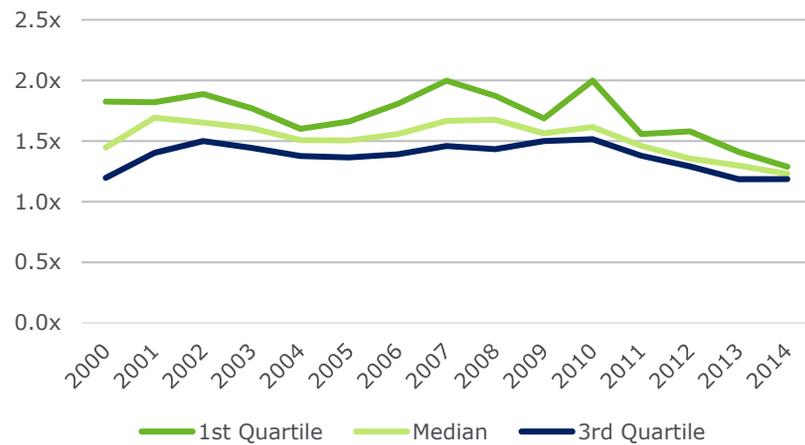
Comments

- **Relatively narrow performance range between median and top quartile fund of fund returns**
- **Strong IRR and TVPI multiples in recent years, but distributions have lagged**
 - 1st Quartile funds take 7-8 years for DPI = 1x
 - Median funds take 9-10 years for DPI = 1x
- **Across cycles, the median fund of funds have generated a 10% annual net IRR**

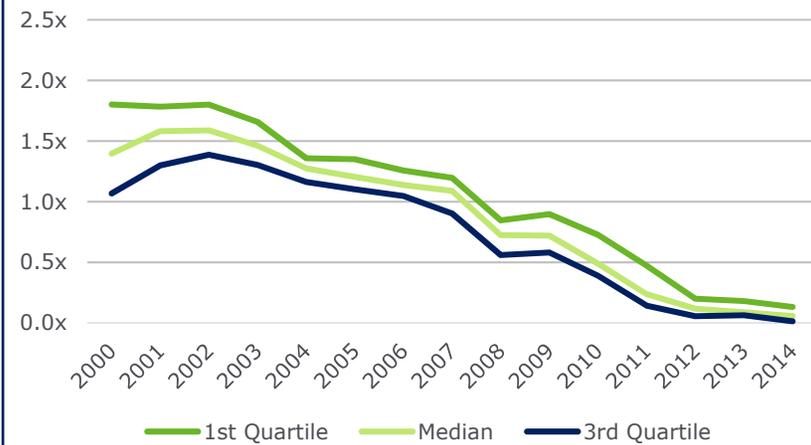
Net IRR



Net TVPI



Net DPI



Source: Thomson One/Cambridge Associates as of 06/30/2018. Performance for 2015-2018 vintage funds not yet meaningful.

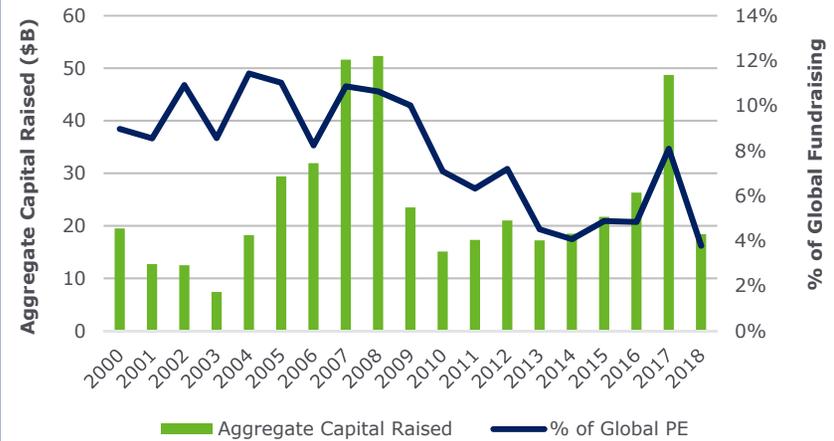


FUND OF FUNDS: FUNDRAISING

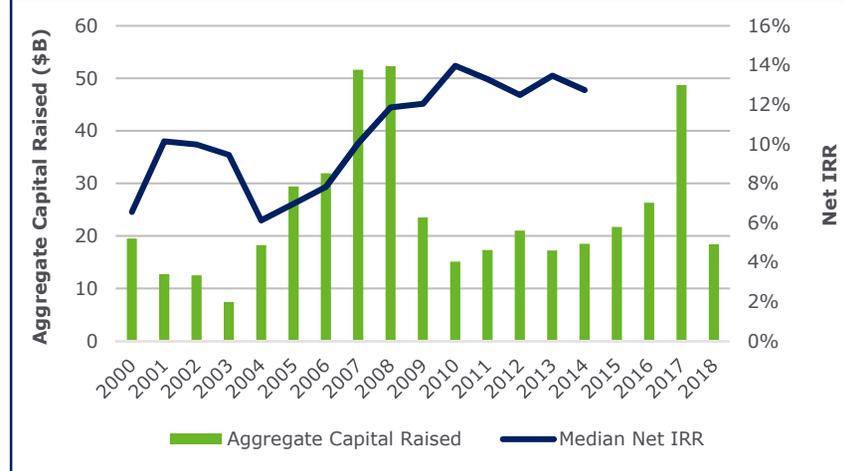
Comments

- **Over the past 10-15 years, PE Fund of Funds have declined from 10-12% of global private equity to 5-6%**
 - Does not capture large investors who are using separate accounts or Fund of One vehicles instead of Fund of Funds
- **Over past 10 years, FOFs have raised \$15-\$25 billion annually**
 - Excludes 2017 volume spike due to \$24B raised by two Chinese State-Owned FOFs
- **Average FOF size has generally stayed in the \$200-\$300 million range**

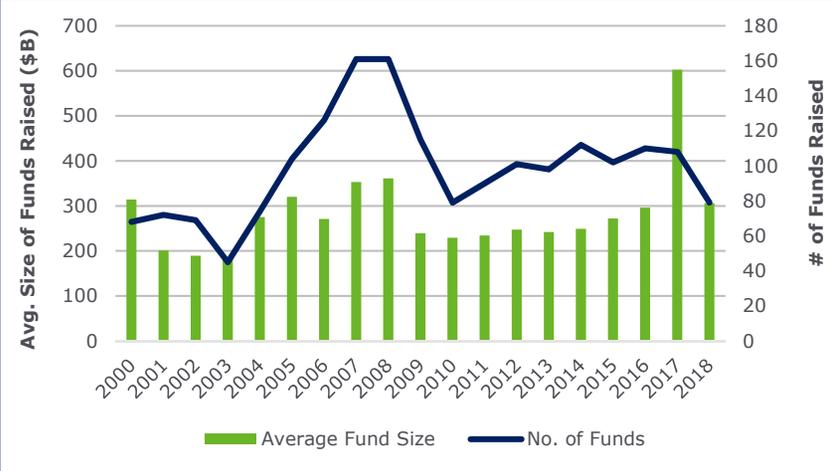
PE Fund of Funds vs. Total PE Raised



Fund of Funds Fundraising vs. Median Return



Comparison of Fund Sizes



Source: Fundraising data from Preqin as of 12/31/2018. Thomson One/Cambridge Associates as of 06/30/2018. Performance for 2015-2018 vintage funds not yet meaningful.



SECONDARIES: RETURNS

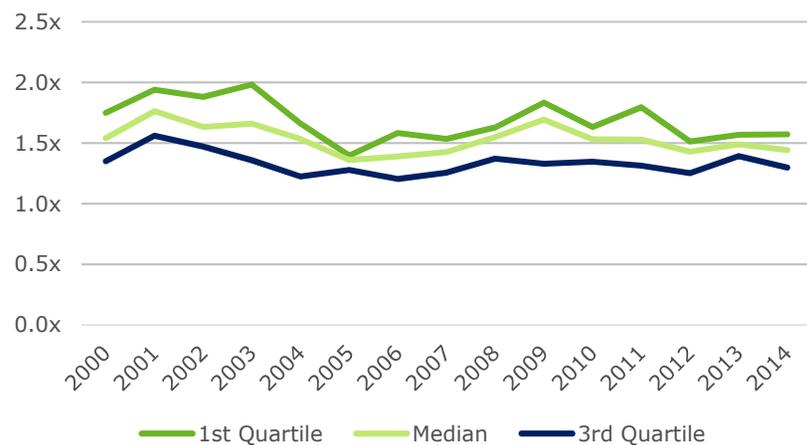
Comments

- **Relatively narrow performance range between median and top quartile fund of fund returns**
 - Top quartile funds consistently generate 1.5x-1.7x investment multiples
- **Purchase discounts and fail value reporting standards result in an inverted J-curve**
 - High IRRs in early years that decline over time
 - Investment multiples generally above 1.0x for the entire life of each fund

Net IRR



Net TVPI



Net DPI



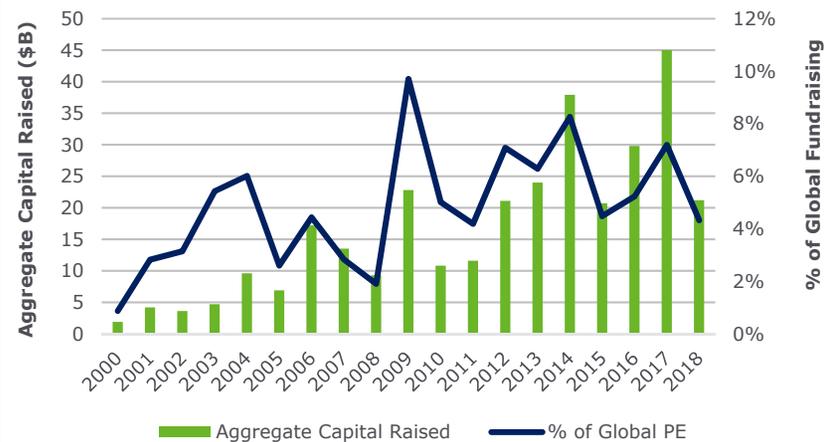
Source: Thomson One/Cambridge Associates as of 06/30/2018. Performance for 2015-2018 vintage funds not yet meaningful.

SECONDARIES: FUNDRAISING

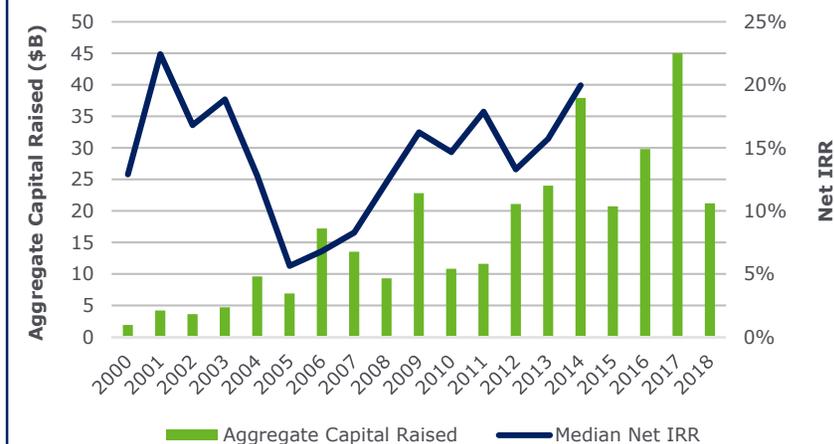
Comments

- **Secondary fundraising has increased from 3% of global private equity prior to the financial crisis to 6% of global private equity since**
 - More secondary brokers
 - Transaction innovations (e.g. tender offers, structured & GP-Led deals)
 - Improved transfer rights
- **Average secondary fund size has increased from \$400 million prior to the financial crisis to \$750 million since**

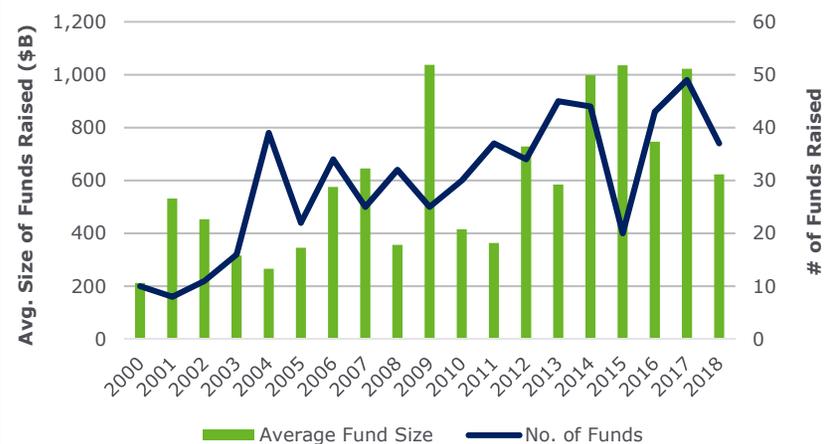
Secondary Funds vs. Total PE Raised



Secondary Fundraising vs. Median Return



Comparison of Fund Sizes



Source: Fundraising data from Preqin as of 12/31/2018. Thomson One/Cambridge Associates as of 06/30/2018. Performance for 2015-2018 vintage funds not yet meaningful.



SECONDARIES: DEAL VOLUME & PRICING

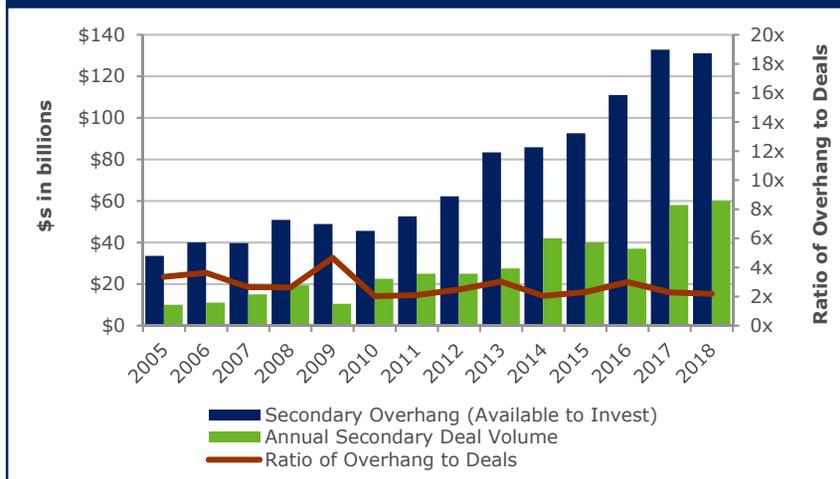
Comments

- **Buyers are increasing capital available for deals (overhang) to keep pace with record deal levels**
- **Transaction pricing remains high**
 - Buyouts have been pricing at 95% on average for last 5 years
 - Venture pricing has risen to 85% as fewer “unicorn” funds are being sold
- **67% of deals use intermediaries**

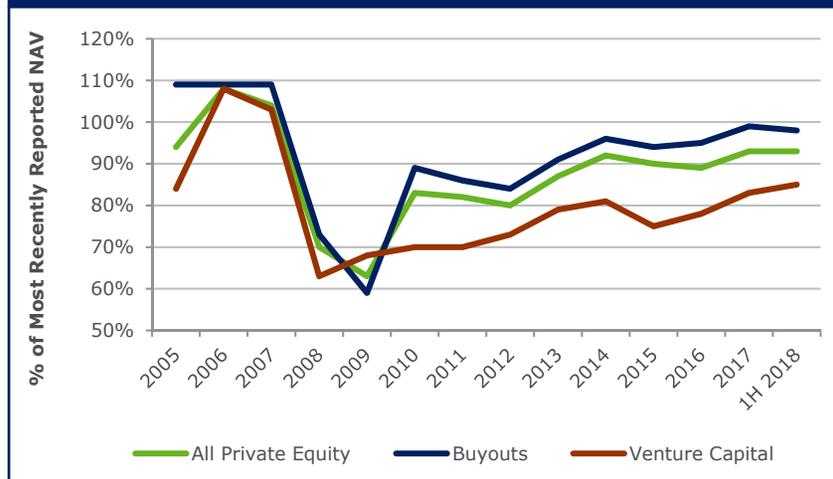
Buyer Trends

- **Leverage being used by more secondary fund buyers**
 - Using leverage to enhance return profile of purchases
- **Concentrated investments in GP-Led restructurings of older funds**
- **Most deals target a 1.4x gross return**
 - Generally higher expected returns for venture capital or secondary directs

Secondary Overhang & Deal Volume



Average Secondary Purchase Prices



Source: Setter Capital, NEPC Analysis, Thomson Reuters/Cambridge Associates and Greenhill Cogent as of 09/30/2018.

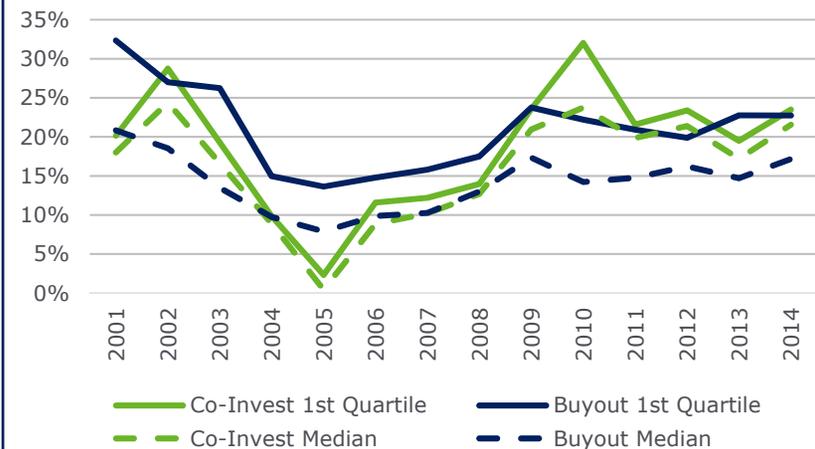


DIRECT CO-INVESTMENTS: RETURNS

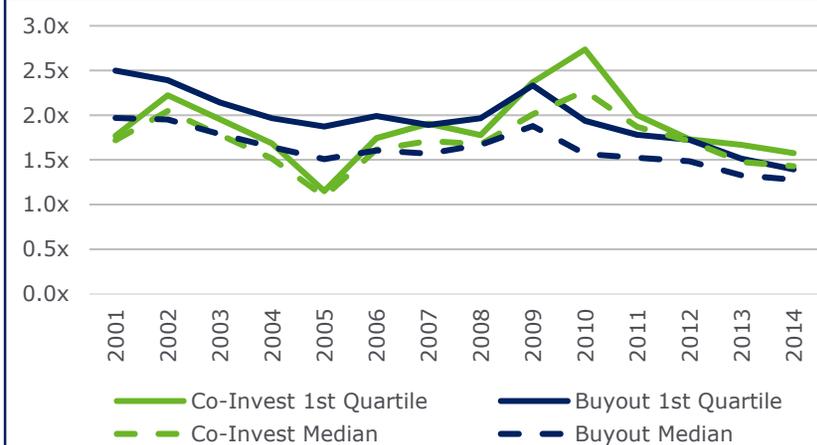
Comments

- **Over the last 10 years, co-investment fund returns have compared favorably to buyout funds**
 - This suggests that co-investment fund managers are effective in deal selection
 - No evidence of negative selection bias in deals made available for co-investment
- **As buyout fund sizes increase and co-investment fundraising expands, competition for co-investment deals could negatively impact returns**

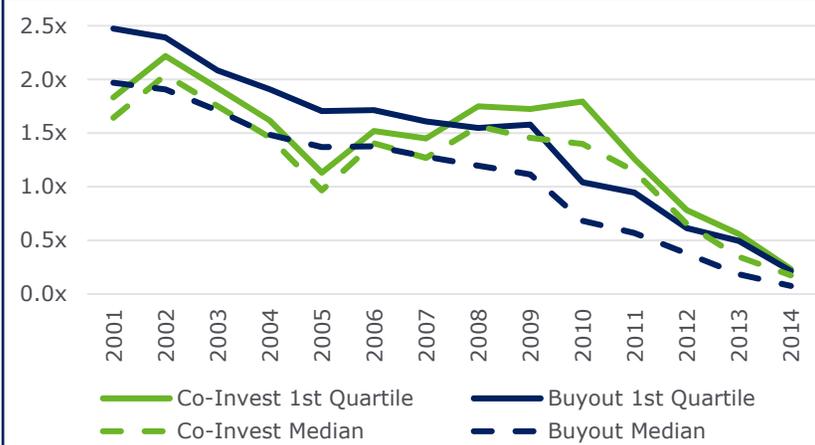
Net IRR



Net TVPI



Net DPI



Source: Preqin as of 06/30/2018 (no asset class in Thomson One/Cambridge Associates).
Performance for 2015-2018 vintage funds not yet meaningful.

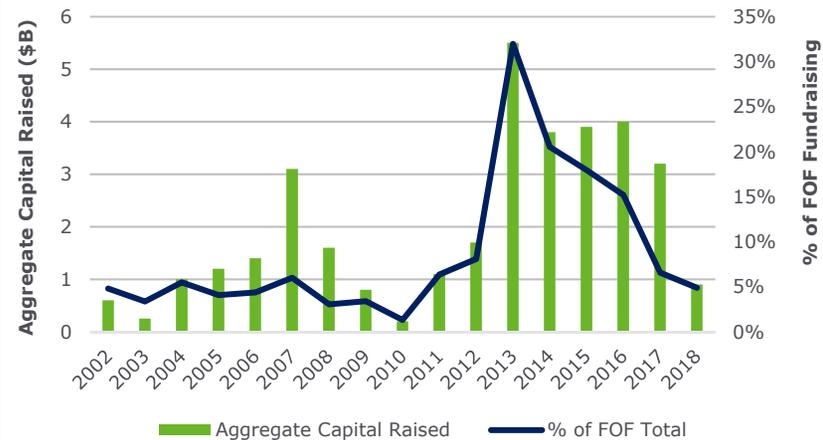


DIRECT CO-INVESTMENTS: FUNDRAISING & FEES

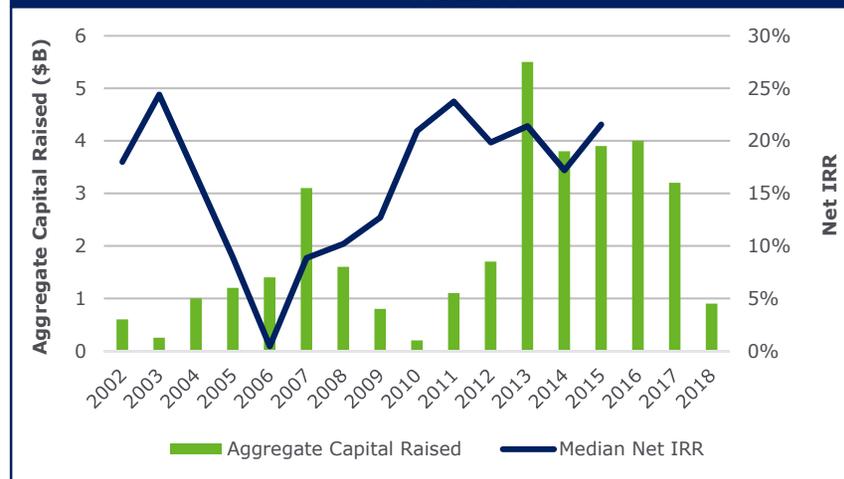
Comments

- **Annual fundraising for co-investment funds has increased 3-4x over the last 5 years**
 - Co-Investment funds as a % of PE FOFs has increased from 5% to 10%-15% over the past 5 years
 - Co-investment amounts don't include the 10%-15% of most fund of funds and FOF-like separate accounts that is invested into co-investment deals

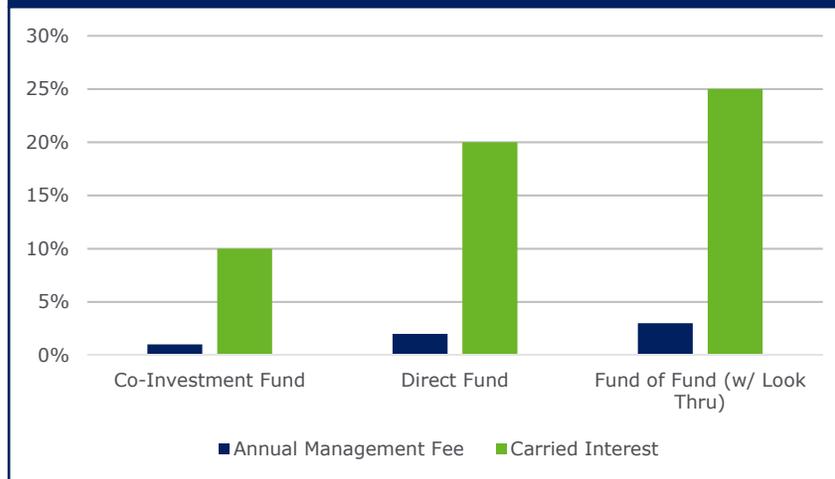
Co-Investment Funds vs. Total Fund of Funds Raised



Co-Investment Fundraising vs. Median Return



Comparison of Fund Fees



Source: Preqin as of 06/30/2018 (no asset class in Thomson One/Cambridge Associates).
Performance for 2015-2018 vintage funds not yet meaningful.



Information Disclaimer

- Past performance is no guarantee of future results.
- All investments carry some level of risk. Diversification and other asset allocation techniques are not guaranteed to ensure profit or protect against losses.
- NEPC's source for portfolio pricing, calculation of accruals, and transaction information is the plan's custodian bank. Information on market indices and security characteristics is received from other sources external to NEPC. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.
- Some index returns displayed in this report or used in calculation of a policy, allocation or custom benchmark may be preliminary and subject to change.
- This report is provided as a management aid for the client's internal use only. Information contained in this report does not constitute a recommendation by NEPC.
- This report may contain confidential or proprietary information and may not be copied or redistributed to any party not legally entitled to receive it.

Reporting Methodology

- The client's custodian bank is NEPC's preferred data source unless otherwise directed. NEPC generally reconciles custodian data to manager data. If the custodian cannot provide accurate data, manager data may be used.
- Trailing time period returns are determined by geometrically linking the holding period returns, from the first full month after inception to the report date. Rates of return are annualized when the time period is longer than a year. Performance is presented gross and/or net of manager fees as indicated on each page.
- For managers funded in the middle of a month, the "since inception" return will start with the first full month, although actual inception dates and cash flows are taken into account in all Composite calculations.
- This report may contain forward-looking statements that are based on NEPC's estimates, opinions and beliefs, but NEPC cannot guarantee that any plan will achieve its targeted return or meet other goals.

