



What Do We Know About Institutional-Quality Hedge Funds? *

Prof. Gregory Brown
Research Director
gregwbrown@unc.edu

Prof. Christian Lundblad
Distinguished Professor
lundblac@kenan-flagler.unc.edu

William Volckmann
Research Associate
wmvolckmann@unc.edu

April 15, 2025

Abstract

Using publicly available sources such as trade press and Form ADV filings, we compile a list of 649 hedge fund managers that each have at least 1 billion USD in primary hedge fund assets under management. Importantly, our interest lies not in the sheer number of hedge funds found in commercial databases, as many do not meet common investment standards; instead, we emphasize representation by significant, “institutional-quality” hedge funds. We examine the availability of historical return information for funds operated by these managers and find 178 managers (28%) are not represented in commercial databases. Utilizing an alternative data source (PivotalPath) increases the number of analyzable managers substantially. Consistent with recent research based on confidential Form PF filings, we confirm that many better-performing institutional-quality funds are missing from commercial databases. Our augmented data set yields a fund sample with an alpha about 0.4 percentage points higher (using a 7-factor risk model) as well as better time-series coverage and a more recent set of funds. Funds unique to PivotalPath have alpha 4.4 percentage points higher, adjusted R-squared 0.11 lower, and are significantly larger when compared to funds unique to commercial databases – all features consistent with the sample of hedge funds uniquely available in the Form PF data.

1 Introduction

A recent research paper by Barth et al. (2023) evaluates the completeness of commercial hedge fund databases by comparing publicly available information with confidential regulatory data provided by funds on the SEC’s Form PF. The results are striking. It appears that commercial data sets exclude more than 2 trillion USD in AUM from funds that are required to report their performance to regulators. Furthermore these “hidden” hedge funds have higher alphas, lower

*We thank PivotalPath for providing data for this analysis.

exposure to market risk factors, and less flow sensitivity to performance – all of which are desirable characteristics to investors. In addition, the Barth et al. (2023) research finds that the vast majority of funds in the commercial data set do not report on Form PF which suggests that the commercial databases contain many funds not available to outside investors or operated by small firms that are unlikely to be of interest to institutional allocators. This research raises some important questions for those analyzing hedge funds without access to confidential regulatory data – specifically, i) how can those seeking to do analysis of hedge funds limit their sample to funds that are of “institutional-quality” and ii) how might the gaps in commercial databases be filled to generate an appropriate data universe for analysis?

We build a methodology to help answer these two questions. Specifically, we attempt to identify all active institutional-quality fund managers in Form ADV. We then collect returns data from either a commercial data set or PivotalPath, a proprietary hedge fund intelligence and analytics platform. By comparing characteristics of funds that we can observe in ADV through 2023Q2, commercial databases, and PivotalPath, we can gain insights into the feasibility of building a representative database of institutional-quality funds without access to Form PF data.

Our analysis starts by using publicly available sources such as trade press and Form ADV filings to compile a list of asset managers that each have at least 1 billion USD in primary hedge fund assets under management (AUM). While this is an admittedly arbitrary cut-off, our discussions with institutional investors in hedge funds suggest this is a reasonable size cutoff for firms they would consider investing with. We then restrict the sample in two ways. First, we consider only recent ADV-filing funds under the working assumption that all institutional-quality funds will have filed a recent Form ADV. Second, we consider only funds for which we can obtain historical returns data since these are the funds that form the backbone of hedge fund performance analytics. With this set of analyzable ADV-filing hedge funds, we compare gross asset value (GAV) covered, number of monthly of returns covered, mean monthly return, alpha from a 7-factor model, R-squared, and the information ratio among different slices of commercial databases from 2013-2022.¹

It is important to emphasize that the raw count of funds available in commercial databases

¹We utilize gross asset value (GAV) as our measure of fund size because Form ADV filings do not provide estimates of assets under management (AUM) at the fund level. Given the significant differences between GAV and AUM for some funds, we prefer AUM, but that is not possible for much of our analysis.

can be misleading, as many listed entities do not meet the criteria of “institutional-quality” hedge funds. Many funds identified exclusively in commercial databases or Form ADV alone do not constitute unique primary hedge funds; rather, these include various vehicles such as funds-of-one, managed accounts, redundant share classes, feeder funds, and private asset drawdown funds. Many such entities are either significantly smaller in scale or inactive, thus distorting perceptions of database comprehensiveness. Consequently, our approach emphasizes accurately capturing the presence and performance characteristics of genuinely relevant, institutional-quality funds.

2 Identifying Institutional-Quality Funds

Firms. To create our list of institutional-quality funds, we scour the internet for lists of the largest hedge fund managers. We also collect all Form ADV filings and attempt to identify firms with more than 1 billion USD in primary hedge fund AUM.² To date, we have been able to identify 649 active firms meeting the 1 billion USD in AUM threshold.³ Next, we identify whether these firms are represented in a commercial data set, PivotalPath, or Form ADV.⁴ The results are presented in Figure 1, although the diagram omits 4 firms that are not found in any of these sources.

²Our list of managers is provided as an appendix and we welcome feedback on firms that are included and/or excluded.

³We group a primary firm and its subsidiaries into a single firm. For example, we consider Man Group and its subsidiaries like Man-AHL to be a single firm despite being different legal entities in some ways.

⁴We use the same set of commercial databases as Barth et al. (2023). Their paper also provides a detailed discussion of coverage relative to Forms PF and ADV.

VENN DIAGRAM: FIRMS WITH AT LEAST 1 BILLION USD IN AUM

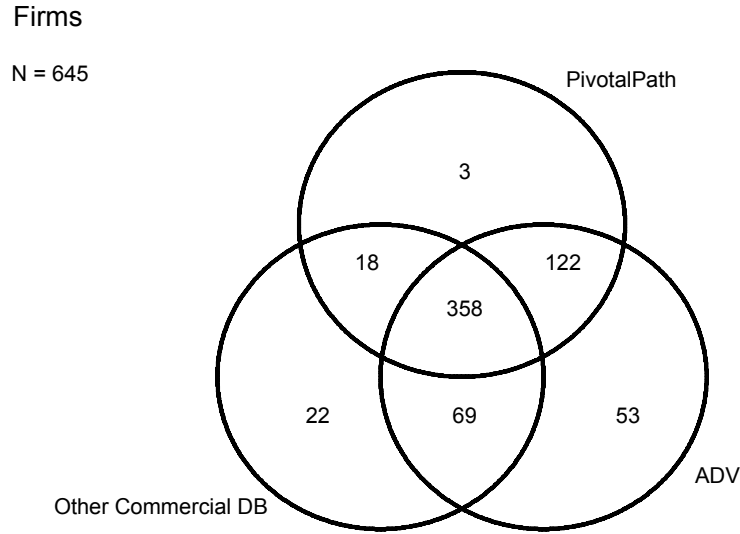


FIGURE 1: PivotalPath covers 480 ADV-filing fund managers compared to 427 for other databases.

Interestingly, 40 out of 467 managers (8.6%) found in commercial databases are not found in Form ADV. These could be foreign firms that are not required to report to the SEC or funds operating under a different name in the U.S. which we were unable to identify. Of these 40, we were able to identify 18 in PivotalPath. 21 out of 501 managers (4.2%) found in PivotalPath are not found in ADV, whereas 125 managers (19.4%) were available in PivotalPath, but not a commercial database. We identify 53 managers (8.2%) that are only observed in ADV. A little over half of the managers (358) are present in all three data sources. Importantly, 178 managers (27.6%) are not represented in the commercial databases.

Funds. We next collect data on the funds associated with these managers, obtaining data on 7,687 hedge funds; we restrict our Form ADV sample to funds with filings since 2022 (i.e. recently “active” funds). The results are shown in Figure 2. Note that any fund we could identify as a UCITS or a fund of funds was removed from the sample.⁵

⁵Specifically, we removed 45 fund of funds from commercial databases, 447 UCITS from commercial databases, and 2 UCITS from PivotalPath.

VENN DIAGRAM: FUNDS OF FIRMS WITH AT LEAST 1 BILLION USD IN AUM

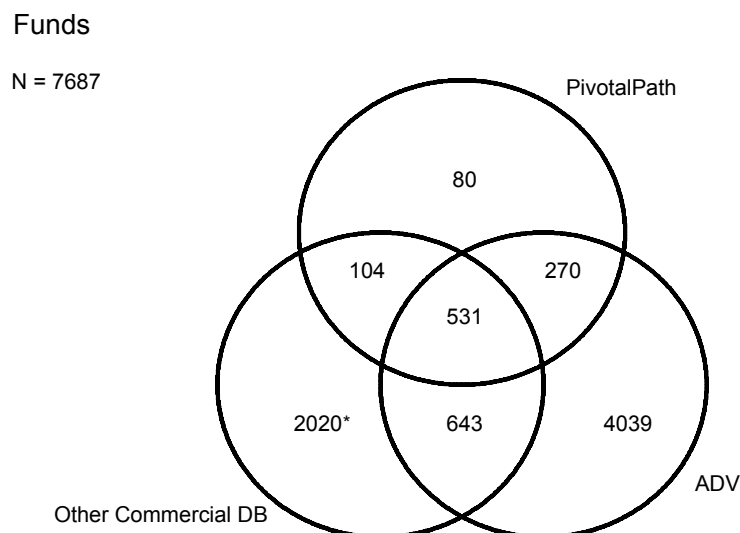


FIGURE 2: PivotalPath covers 801 recent ADV-filing funds from large managers compared to 1,174 for other databases. However, 64% of funds in commercial databases cannot be accounted for in Form ADV which alone suggests that these are unlikely to be institutional-quality funds. More specifically, most of the funds unique to the Other Commercial Databases (2020) and Form ADV (4039) appear to be feeder funds, master-feeder relationships, funds-of-one, or redundant share classes as well as many funds that are notably small or inactive. The asterisk on the 2,020 non-ADV commercial database exclusive funds highlights that many of these entries likely represent fund structures that do not constitute distinct institutional-quality hedge funds.

The small majority of these hedge funds (4,039) are only in Form ADV and not any commercial database or PivotalPath. However, manual inspection of these funds indicates that many are not primary funds available to outside investors. For example, many are master-feeder relationships, “funds-of-one”, special purpose funds, and the like. The PivotalPath data has 985 hedge funds, 801 (81.3%) of which are ADV-filing; whereas commercial databases have 3,298 hedge funds, but only 1,174 (35.6%) are ADV-filing. Of PivotalPath’s 801 ADV-filing hedge funds, 270 are unique to PivotalPath. The other databases have 643 unique ADV-filing funds. These results suggest that a simple count of funds appears to distort more than clarify the picture; consequently, we instead (in the next section) consider only funds for which we can obtain performance data. In fact, this is an essential step because the majority of the funds available in only the commercial databases have no returns data.

While Figure 2 highlights fund representation across various databases, it is important to recognize that a substantial number of funds identified exclusively in commercial databases or Form

ADV filings are not unique institutional-quality hedge funds. Many of these entries are ancillary structures such as feeder funds, master-feeder relationships, funds-of-one, or redundant share classes. Additionally, many of these funds are notably small (under 50 million USD in GAV) or inactive, undermining their practical relevance to institutional investors. Our approach explicitly filters these entities to ensure that the analytic focus remains on significant institutional-quality hedge funds, thus providing a clearer and more actionable picture for performance analysis.

We illustrate some of the difficulties in identifying primary and unique hedge funds by focusing on Bridgewater Associates, a firm commonly associated with just three primary hedge funds: “Pure Alpha”, “All Weather”, and “Pure Alpha Major Markets”. The Pure Alpha Major Markets fund is listed in every Form ADV entry as a fund of funds, which excludes it from our consideration as a primary hedge fund. Furthermore, in form ADV we find a total of 51 unique entities for Bridgewater. We can collapse these into what appear to be flavors of Pure Alpha and All Weather but are still left with 26 additional unknown funds filing Form ADV. Of Bridgewater’s two known primary hedge fund strategies, PivotalPath has a single entry for each, whereas each commercial database includes between three and seven distinct funds for Bridgewater with a total of 29 different Bridgewater funds across all the databases. Some of these seemingly redundant entries in the commercial databases appear to be funds-of-one while others are apparently flavors of the same primary fund. More generally, we find that the case of Bridgewater is not unique. Spot-checking managers who we believe offer just one or two unique primary funds to outside investors often reveals dozens of reported hedge funds in the commercial databases and Form ADV filings. Accordingly, we mark the 2,020 non-ADV funds found exclusively in commercial databases with an asterisk (as in Figure 2) to indicate that many of these entities are likely ancillary fund structures or otherwise less relevant from an institutional-quality investment perspective.

3 Database Coverage and Returns

Of the 649 recent ADV-filing hedge fund managers in our sample, we have returns data during 2013-2022 for 446 of them, 119 unique to PivotalPath and 44 unique to the other databases.⁶ In terms of funds, we have returns data for 715 of the 7,687 total potential funds we identified. Of

⁶We only count funds that have at least one return since 2022, at least 12 returns overall, and at least as many observations as missing values.

these, 175 are unique to PivotalPath and 229 are unique to the other databases. This slice of data is of particular practical importance because it captures hedge funds that are both “real” and analyzable, thereby forming the set of funds available for detailed performance analysis. GAV coverage for this sample are shown in Table 1, where each fund GAV is the median of its GAV filings (provided the fund has at least one Form ADV filing since 2022 with positive GAV reported).

AVERAGE GAV COVERAGE, 2013-2022

Source	Firms		Funds	
	Number	GAV Coverage	Number	GAV Coverage
ADV	602	100.0%	5,483	100.0%
PP and Comm	358	71.9%	531	44.8%
PP and ADV	480	85.6%	801	58.8%
Comm and ADV	427	83.1%	1,174	53.9%
PP Only	122	13.7%	270	14.0%
Comm Only	69	11.2%	643	9.0%
All PP	501	-	985	-
All Comm	467	-	3,298	-
ADV Only	53	3.2%	4,039	32.2%

TABLE 1: GAV is the gross asset value for funds as reported in Form ADV for subsets of funds that appear in PivotalPath (PP) and Commercial (Comm) databases with ADV activity since 2022.

PivotalPath can account for 85.6% of firm GAV and 58.8% of fund GAV in their database; the other databases can account for 83.1% of firm GAV with 53.9% of fund GAV. The firm/fund discrepancy comes from a typical firm having multiple hedge funds listed in Form ADV, but only having a subset of funds with returns that we can associate with a specific fund. This points out an inherent limitation to the Form ADV data which can be very difficult to associate with a specific fund product or strategy (as noted above we see funds-of-one and cryptic fund names). This issue is further complicated by the difficulty of determining which ADV-filed funds (e.g. feeders, masters, parallel funds, etc) really belong to the same primary hedge fund. Accordingly, we can consider firm GAV coverage to be an upper-bound and fund GAV coverage to be a lower-bound in terms of coverage by the databases.⁷ With commercial data sets and PivotalPath combined, almost all major firms are included with 96.8% of GAV covered, but that number becomes a more sober 67.8% when considering fund coverage (which again includes many entities that are not

⁷The lower-bound/upper-bound interpretation does not hold when considering funds and firms unique to PivotalPath or other databases. For example, GAV of a *fund* unique to PivotalPath might not be GAV of a *firm* that is unique to PivotalPath; that fund GAV becomes part of “PP and Comm” instead of “PP Only” under “Firm GAV Coverage”.

primary institutional-quality funds).

These GAV coverages can be interpreted in light of fund counts in a number of different ways, the importance of which depends on the interests of the reader. First, the other databases have about 3.3 times the number of funds found in PivotalPath, but those extra 2,313 funds still leave the other databases with only 92% of PivotalPath's GAV worth of analyzable ADV-filing hedge funds. To that end, we can directly compare the analyzable GAV per fund, all-inclusive: PivotalPath funds average 3.7 times the analyzable GAV of funds in other databases.

Second, we can consider PivotalPath and the other databases to be substitutes and compare their unique analyzable funds directly: the unique funds found in PivotalPath average 2.0 times the GAV of the unique funds found in the other databases.

Third, we can consider the additive value of PivotalPath's funds to the total collection of funds already found in the other databases: each PivotalPath fund added contributes 5 times more GAV than if one were to add the other commercial database funds to PivotalPath. These results are all consistent with findings in Barth et al. (2023) that many funds in the commercial databases are small or redundant (e.g., varying only by share class).

We also look at returns and time-series coverage within funds in Table 2. Returns are measured as the mean annualized monthly returns over the full sample period. The average returns for the entire sample of ADV-filing funds is 8.0 percent. Looking at returns conditional on database coverage reveals some important differences and importantly, that funds available in PivotalPath have returns that are about 1.3 percentage points higher than funds in the commercial databases. When examining the unique funds in each data source, we find that those funds unique to PivotalPath outperform those unique to the other databases by 4.0 percentage points. (Returns without filtering on ADV presence are 8.2% for PivotalPath and 6.3% for commercial databases.) We look at risk-adjusted returns below.

Coverage is measured as monthly returns reported over the 120 month window being analyzed. We emphasize that coverage for commercial databases is taken as the combined coverage of all commercial databases, not the coverage of each commercial database in isolation. Overall, PivotalPath funds average 1.7 more months of returns coverage per fund when compared to other databases. PivotalPath does have fewer funds overall, but the preceding GAV coverages suggest that this is because the other databases cover a larger number of less substantial hedge funds:

those in commercial databases are typically smaller than those in PivotalPath by around 37%. When comparing funds covered by both, PivotalPath has returns coverage for 6 more months, on average, which amounts to 2,744 more fund-months covered. When looking at funds unique to each, other commercial databases have 54 more unique funds and returns coverage for 9.5 more months per fund; but again, the funds unique to commercial databases are on average 73% smaller than those unique to PivotalPath in terms of GAV.

FUNDS RETURNS AND TIME-SERIES COVERAGE, 2013-2022

Source	Funds	Months/Fund	Total Months	Coverage/Fund	Return
All Funds					
Combined	815	98.3	80,134	98.4%	8.0%
PP	586	98.0	57,420	98.9%	8.8%
Comm	640	96.3	61,663	98.5%	7.5%
Shared Funds					
Combined	411	105.5	43,374	99.3%	8.3%
PP	410	103.5	42,439	97.7%	8.5%
Comm	407	97.5	39,695	93.3%	8.4%
Unique Funds					
PP-Only Funds	175	85.6	14,975	97.9%	10.0%
Comm-Only Funds	229	95.1	21,785	97.1%	6.0%

TABLE 2: We use fund-month returns available for each category to create an average monthly return for each category and then report the annualized monthly return. PivotalPath tends to cover more months per fund and a larger percentage of fund life, although it has fewer funds in coverage. Shared PP and Comm funds are not 411 because some shared funds (1 for PivotalPath and 4 for Comm), while shared, do not meet our standard for being covered unless combined with the other group.

Monthly coverage might not be the most informative metric, however, because funds younger than 10 years old clearly cannot be covered for all 120 months in the sample; a higher proportion of young funds in coverage would therefore give the impression of worse coverage in terms of months alone. To that end, we calculate months covered as a percentage of the life of a fund, also reported in Table 2. PivotalPath has 98.9% coverage of fund life compared to 98.5% of other databases; combining all of the data yields 98.4% coverage of fund life. Looking at shared funds, PivotalPath covers 97.7% compared to 93.3% from other databases; combining all of the data yields 99.3% coverage of fund life. PivotalPath covers its unique funds for 97.9% of their lifetime compared to 97.1% for other databases. These numbers indicate that PivotalPath has somewhat better coverage per fund in absolute terms and also covers more recent hedge funds on average, which is to say, its sample of funds is more up-to-date.

4 Fund Risks and Alphas

Differences in returns across data sets could be a function of fund riskiness and not representative of differences in risk-adjusted performance. To account for potentially different risk profiles, we also estimate a 7-factor regression model for each group of funds and report results in Table 3. The last two columns are of most interest because they show the differences in risk factors for the funds that report to either just PivotalPath or just a commercial database.

TABLE 3: 7-Factor Regression Results. Dependent Variable: Monthly Returns

	(1) Either	(2) PP and Com	(3) All PP	(4) All Com	(5) PP, not Com	(6) Com, not PP
Global Stocks	0.294***	0.262***	0.276***	0.289***	0.320***	0.335***
Global Bonds	0.065	0.018	0.008	0.085	−0.030	0.195***
Commodities	0.041***	0.039**	0.037**	0.043***	0.030*	0.050***
Small Stocks (SMB)	0.056*	0.046	0.060*	0.046*	0.101***	0.045
Value Stocks (HML)	0.046	0.048	0.033	0.058*	−0.006	0.075**
Momentum	0.040*	0.053**	0.049*	0.041*	0.046	0.019
Illiquidity	0.106***	0.107***	0.114***	0.100***	0.135***	0.088***
Alpha(Annualized)	4.720***	5.310***	5.688***	4.275***	6.930***	2.558***
Adjusted R-squared	0.856	0.813	0.816	0.863	0.791	0.897
Information Ratio	0.628	0.692	0.711	0.590	0.698	0.343

Estimated over 120 months from 2013-2022

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Standard errors are Newey-West HAC-robust with 1 lag

In terms of factor risk loadings, those funds only in the commercial databases have significantly higher exposures to global bonds, commodities, and the equity value factor. The funds reporting only to PivotalPath have somewhat higher loading on the Pastor-Stambaugh illiquidity factor. We also note that the adjusted R-squared for funds only reporting to PivotalPath is about 0.11 lower than for funds only reporting to commercial databases. This suggests that the funds only in PivotalPath have a larger idiosyncratic return component and thus are likely to provide better diversification for broad portfolios. This result is consistent with the findings of Barth et al. (2023) which documents that funds filing form PF and not in commercial databases have lower betas and “tighter exposures to systematic risks.”

The annualized alpha for the entire sample is about 4.7 percentage points with an adjusted R-squared of 0.86. Interestingly, funds unique to PivotalPath have an annualized alpha of 6.9 per-

centage points, which is 4.4 percentage points higher than funds that only report to a commercial database. This difference in alphas is on par with that identified by Barth et al. (2023) which finds that funds filing Form PF, but not in commercial data sets, have an annual difference in median alpha of 2.8 percentage points and a mean of 5.3 percentage points.

The risk and performance results flow through to higher information ratios for funds that only report to PivotalPath versus those only reporting to a commercial database.⁸ Specifically, the information ratio of funds unique to PivotalPath is 0.36 higher than those unique to the other databases. We conclude that on a risk-adjusted basis, funds in PivotalPath outperform those in the other databases in terms of both active return and correlation to the market.

Finally, we consider the results for just the full set of funds in the combined commercial databases (“All Com”) and the smaller, but potentially more representative, set of funds in PivotalPath (“All PP”). We find that the annualized returns and information ratios of the PivotalPath funds are notably higher. In addition, the PivotalPath funds look very similar in terms of risk and performance to the set of funds that are only in both data sources (“PP and Com”) and decidedly better than the set of funds in both data sources (“Either”). These findings closely mirror the analogous results in Barth et al. (2023) for funds that only are observed in Form PF.

5 Conclusion

Combining the results presented in this research note, we can conclude that examining only funds in commercial databases results in a substantial over-counting of “institutional quality” funds and, perhaps more importantly, a biased view of historical hedge fund risk and return. Including proprietary sources of hedge fund data, such as that found on platforms like PivotalPath, can close the gap between performance measured using just commercial data sets and that obtained from confidential regulatory data. In this sense, a careful analysis of institutional-quality hedge funds appears feasible, but requires consideration of which funds comprise the sample under study. Given these important preliminary results, we hope to further refine our definition of institutional-quality funds and expand our set of available performance data in future iterations of this project.

⁸We calculate information ratios as the estimated alphas divided by the standard deviation of the residuals of the 7-factor regression model.

References

Barth, Daniel, Juha Joenväärä, Mikko Kauppila, and Russ Wermers (2023) “A Bias-Free Assessment of the Hedge Fund Industry: A New Evaluation of Total Assets, Alphas, and the Flow-Performance Relation,” *OFR WP*, 20–01, <https://dx.doi.org/10.2139/ssrn.3544181>.

Appendix: Current List of Institutional-Quality Hedge Fund Managers

Our list of hedge fund managers with at least 1 billion USD in AUM follows, although not all listed managers have Form ADV filings and therefore not all listed managers are included in the main analysis. If you have comments on this list, please contact the authors.

36 South Capital Advisors	Anomaly Capital Management
400 Capital Management LLC	Antara Capital LP
59 North Capital	Antipodes
A.R.T. Advisors, LLC	Appaloosa Management LP
Abbey Capital Limited	AQR Capital Management
Abdiel Capital	Arcadia Funds, LLC
Abrams Capital	Ardevora Asset Management LLP
abrdn	Arena Investors, LP
Acadian Asset Management	Arini
ACG Wealth	Aristeia Capital
Adage Capital Management	Arkkan Capital
ADAM CAPITAL	Armistice Capital LLC
Adelphi Capital Partners	ArrowMark Partners
AKO Capital	Arrowstreet Capital, Limited Partnership
Albar Capital Limited	Artemis Investment Management
Alcentra	Artisan Partners
Alken Asset Management	AS Birch Grove LP
Alkeon Capital	Asgard Asset Management
AllianceBernstein	Asia Research & Capital Management
Allspring Global Investments	Aspect Capital
Alpha Wave Global	Aspex Management
Alphadyne Asset Management	Assenagon Asset Management S.A.
AlphaSimplex Group	Astignes Capital Asia Pte. Ltd.
Alpine Associates	Atalan Capital Partners LP
Alpstone Capital	Athos Capital Ltd
Alta Park Capital, LP	Atlantic Investment Management, Inc.
Alua Capital Management	Atreides Management, LP
Alvento Capital Partners	Aurelius Capital Management
Alydar Capital LLC	Autonomy Capital
Alyeska Investment Group	Avenue Capital Group
Amber Capital	Avidity Partners
Amber Hill Group	Aviva Investors
Amia Capital	Avoro Capital Advisors
Amundi	Axonic Capital
Analog Century Management	Ayres Investment Management
Anatole Investment Management	Bahia Asset Management
Anchorage Capital Group, L.L.C.	Bain Capital
ANIMA Holding	Baker Brothers Investments

Balyasny Asset Management L.P.
 Bardin Hill Investment Partners LP
 Basswood Capital Management, LLC
 Bayview Asset Management, LLC
 BDT & MSD Partners
 Beach Point Capital Management
 Benefit Street Partners
 BFAM Partners (Hong Kong) Limited
 Black Diamond Capital Management
 BlackGold Capital Management LP
 BlackRock
 Blackstone / GSO Capital Partners
 Bloom Tree Partners LLC
 Blue Diamond Asset Management AG
 BLUESPRUCE INVESTMENTS
 Boothbay Fund Management LLC
 Boundary Creek Advisors
 Boussard & Gavaudan
 Bracebridge Capital, LLC
 Bradesco Asset Management
 Braidwell
 Brasil Capital
 Brevan Howard
 Brevet Capital Management
 Bridger Capital LLC
 Bridgewater Associates
 Brigade Capital Management, LP
 Brilliance Capital Management
 Broad Bay Capital Management
 Broad Peak Investment Advisers Pte Ltd
 Broad Reach Investment Management LLP
 Bronte Capital Management Pty Ltd
 Brummer & Partners
 BTG Pactual
 Bybrook Capital LLP
 Cadian Capital Management
 Camden Asset Management, L.P.
 Campbell & Co.
 Candlestick Capital
 Candriam
 Canyon Partners, LLC
 CapeView Capital LLP
 Capital Fund Management
 Capstone Investment Advisors
 Capula Investment Management LLP
 Carlisle Management Company
 Carlson Capital, L.P.
 Carmignac
 Casdin Capital, LLC
 Caspian Capital LP
 Castle Hook Partners
 CastleKnight Management LP
 Cat Rock Capital Management LP
 Caxton Associates
 Centerbridge Partners, L.P.
 Central Asset Investments
 Cerberus Capital Management
 Cevian Capital
 Chatham Asset Management
 Chenavari Investment Managers
 Cheyne Capital Management
 Chilton Investment Company, Inc

China Orient Asset Management Corporation
 CIFC Asset Management
 Cinctive Capital
 Citadel
 Clean Energy Transition LLP
 Clear Sky Advisers
 CloudAlpha Capital Management Limited
 Clough Capital Partners L.P.
 Coast Asset Management
 Coatue
 Columbia Threadneedle Investments, US
 Columbus Hill Capital Management
 Complus Asset Management Limited
 Connor, Clark & Lunn Investment Management
 Conservative Concept Portfolio Management
 Contour Asset Management
 Contrarian Capital Management
 Corbin Capital Partners, L.P.
 Cormorant Asset Management, LP
 CORUM BUTLER
 Corvex Management, LP
 COVALIS CAPITAL
 CQS
 Crabel Capital Management, LLC
 Crake Asset Management LLP
 Credit Suisse
 Crestline Investors, Inc.
 Crestwood Capital Management, L.P.
 Cryder Capital Partners LLP
 Cyrus Capital Partners
 D1 Capital Partners L.P.
 Danske Invest
 Darsana Capital Partners LP
 Darwin Global Management
 Davidson Kempner Capital Management
 Deer Park Road Management Company
 Deerfield Management
 DG Partners LLP
 Diameter Capital Partners LP
 Discovery Capital Management LLC
 DLD Asset Management, L.P.
 DNCA Finance
 dormouse Limited
 Dorsal Capital Management, LLC
 DoubleLine
 Driehaus Capital Management LLC
 DW Partners, LP
 Dymon Asia Capital
 Eagle Point Credit Management
 East X LLP
 Echo Street Capital
 EcoR1 Capital, LLC
 EcoR1 Capital, LLC
 EDL Capital
 Egerton Capital
 Eisler Capital
 EJJF Capital LLC
 Elan Capital Management
 Electron Capital Partners, LLC
 Element Capital Management
 ELEVA Capital
 Ellington Management Group

Elliott Investment Management L.P.	Helikon Investments Limited
Eminence Capital	Hengistbury Investment Partners
Empyrean Capital Partners	HG Vora Capital Management
EMS Capital LP	Highbridge Capital Management
Emso Asset Management	Hildene Capital Management, LLC
Encompass Capital Advisors LLC	Hill City Capital
Endeavour Capital Advisors Inc.	Himalaya Capital
Engaged Capital LLC	Hitchwood Capital Management LP
Engineers Gate	HMI Capital Management L.P.
Episteme Capital	Holocene Advisors, LP
Eton Park	Holowesko Partners Ltd.
ExodusPoint Capital Management, LP	Horizon Asset
Farallon Capital Management	Hound Partners LLC
FengHe Fund Management Pte Ltd	Hudson Bay Capital Management LP
Field Street Capital Management, LLC	Hudson Structured Capital Management Ltd.
FIFTHDELTA	Ibiuna Investimentos
Finepoint Capital LP	Ichigo Asset Management
Fir Tree Partners	III Capital Management
First Beijing	Immersion Capital
First Quadrant	Impactive Capital
FJ Capital Management	Indaba Capital Management, L.P.
Formuepleje	Indus Capital Partners
FORT L.P.	Intrinsic Edge Capital Management
Foundation Credit	Investcorp–Tages
FRANCHISE CAPITAL MANAGEMENT LIMITED	ION Asset Management
Freestone Grove Partners	Ionic Capital Management
Fulcrum Asset Management	iSAM
Gabelli Funds	Ishana Capital Limited
Galena Asset Management	J Safra Asset Management Corporation
GAM Investments	Janchor Industrialist Investing
Garda Capital Partners	Janus Henderson Investors
Gates Capital Management, Inc	Jericho Capital Asset Management L.P.
Gavea Investimentos	JGP Global Gestao de Recursos Ltda
Gavekal Capital	JHL Capital Group LLC
GCI Asset Management, Inc.	JJJ Capital Management LLP
GEMSSTOCK LIMITED	JNE Partners LLP
Gen2 Partners Limited	John Street Capital
Ghisallo Capital Management LLC	JUNTO CAPITAL MANAGEMENT LP
Gillson Capital LP	Jupiter Asset Management
Gladstone Capital Management LLP	Kadensa Capital Limited
Glazer Capital, LLC	Kayne Anderson Capital Advisors, L.P.
Glen Point Capital	Kensico Capital Management
Glenview Capital	Kepos Capital, L.P.
GMO	KEY SQUARE CAPITAL MANAGEMENT (UK) LLP
GMT Capital	Keystone Investors
GoldenTree Asset Management	King Street Capital Management
Gotham Asset Management, LLC	Kingdon Capital Management, LLC
Governors Lane LP	Kintbury Capital LLP
Graham Capital Management, L.P.	KIRKOSWALD ASSET MANAGEMENT LLC
Gramercy Funds Management LLC	Kite Lake Capital
Graticule Asset Management Asia	KLS Diversified Asset Management LP
Greenlight Capital	Knighthead Capital Management, LLC
Greenvale Capital LLP	Kora Management LP
Greenwoods Asset Management	Kuvari Partners
Gresham Investment Management	L1 Capital
GSA Capital	Lake Bleu Capital (Hong Kong) Limited
Guggenheim Investments	Lakefront Asset Management
Haidar Capital Management	Lakewood Capital Management, LP
Hao Advisors Management Limited	Lancaster Investment Management
Hawk Ridge Capital Management	Laurion Capital Management LP
HBK Capital Management	Lazard Asset Management
Hein Park Capital Management LP	Leadenhall Capital Partners LLP

LFIS Capital
 LGT Capital Partners
 LibreMax Capital, LLC
 Light Sky Macro LP
 Light Street Capital
 Lighthouse Investment Partners, LLC
 Linden Advisors
 Lingotto Investment Management LLP
 Litespeed Management
 LMR Partners
 LOCUST WOOD CAPITAL LP
 Lodbrok Capital LLP
 Lombard Odier Investment Managers
 Lone Pine Capital LLC
 Long Pond Capital, LP
 LTS One
 Luminus Management
 Luxor Capital Group LP
 Lynx Asset Management
 M&G Investments
 MacKay Shields LLC
 Magellan Financial Group
 Magnetar Capital
 Man Group
 Mangrove Partners
 Maniyar Capital
 Marathon Asset Management
 Marble Bar Asset Management LLP
 Mariner Investment Group, LLC
 Marshall Wace
 Mason Capital Management LLC
 Massar Capital Management, LP
 Matrix Capital Management Company, L.P.
 Maverick Capital
 Medalist Partners
 Melqart Asset Management (UK) Ltd
 Menta Capital LLC
 Meritage Group LP
 MFN Partners
 MidOcean Partners
 MIG Capital LLC
 Millburn Ridgefield Corporation
 Millennium
 Millstreet Capital Management
 Mingshi Investment Management
 Miura Global Management
 MKP Capital Management, L.L.C.
 Modular Asset Management
 Monarch Alternative Capital LP
 Morgan Stanley
 Mt. Lucas Management
 Mudrick Capital Management
 Multicoin Capital
 Munro Partners
 MY.Alpha Management
 Myriad Asset Management US LP
 Nantahala Capital Management
 Napier Park
 Naya Capital Management UK
 Neo-Criterion Capital Limited
 Nephila Capital
 Neuberger Berman

New Holland Capital, LLC
 Newbrook Capital Properties
 Nine Masts Capital
 Nitorum Capital, L.P.
 Nordea Funds Ab
 Nordkinn Asset Management
 Norron Asset Management
 North Peak Capital
 North Rock Capital Management, LLC
 North Run Capital LP
 Nut Tree Capital Management
 NWI Management LP
 Oaktree Capital Management, L.P.
 Oasis Management Company Ltd.
 Obra Capital
 Ocean Arete Limited
 Oceanic Investment Management
 Oceanwood Capital Management
 OCP Asia
 Odey Asset Management
 Old Orchard Capital Management LP
 Olympus Peak Asset Management
 One River Asset Management
 One William Street Capital
 Onex
 Optimas Capital Limited
 Optimus Prime Fund
 OrbiMed
 Orbis Investments
 Orchard Global
 Oribel Capital Management, LP
 Ortus Capital Management Limited
 Owl Creek Asset Management
 OxFORD Asset Management LLP
 P. Schoenfeld Asset Management
 P/E Investments
 P2 Capital Partners, LLC
 PAG
 Palestra Capital Management LLC
 Palmer Square Capital Management LLC
 Palmerston Capital Management LLP
 Palo Alto Investors
 PALOMA PARTNERS MANAGEMENT COMPANY
 PanAgora Asset Management
 Pantera Capital
 Panview Capital
 PAR Capital Management
 Parallax Volatility Advisers, LP
 Park West Asset Management LLC
 Parsifal Capital Management, LP
 Parvus Asset Management
 PDT Partners
 PELHAM CAPITAL LTD
 Pental
 Penso Advisors LLC
 Pentwater Capital Management LP
 Perceptive Advisors
 Permian Investment Partners, LP
 Perpetual Investments
 Perseverance Asset Management
 Pershing Square Capital Management, L.P.
 Pertento Partners LLP

PFM Health Sciences	Schonfeld
PGIM	Schroders
Pharo Management	Scopia Capital Management LP
Pictet Asset Management	Sculptor Capital Management
Picton Mahoney Asset Management	Sector Asset Management
PIMCO	Securis Investment Partners LLP
Pine River Capital Management	Segantii Capital Management
PineBridge Investments	Select Equity Group, L.P.
Pinnacle Asset Management	Selwood Asset Management
Pinpoint Asset Management Limited	Senator Investment Group LP
Platinum Asset Management	Senvest Management, LLC
Pleiad Investment Advisors	Sequoia Capital Global Equities
Plenisfer	Shellback Capital
Point72	Shenkman Capital Management, Inc.
PointState Capital LP	Silver Point Capital, L.P.
Polar Asset Management Partners Inc.	Silver Rock Financial
Polar Capital	Simplex Asset Management
Polus Capital Management	SIR Capital Management LP
Polychain Capital	Sirios Capital Management
Polygon Global Partners LLP	Skye Global Management
Portman Square Capital	Slate Path Capital LP
Prime Capital Management	SoMa Equity Partners
PRIMESTONE CAPITAL LLP	Sona Asset Management
Prologue Capital	Soroban Capital Partners LP
Prophet Capital Asset Management LP	Sound Point Capital Management, LP
Prudence Financial Group	Southern Ridges Capital
PSQUARED ASSET MANAGEMENT AG	SOUTHPAW ASSET MANAGEMENT LP
QMS Capital Management LP	SouthPeak Investment Management
Quantedge	Southpoint Capital
Quantitative Investment Management	SPF Investment Management, L.P.
Qube Research & Technologies	Sphera Funds Management
Quest Partners LLC	SPX Capital
RA Capital Management	SQN Investors
Radcliffe Capital Management	Squarepoint Capital
RBC BlueBay Asset Management	SRS Investment Management, LLC
Red Cliff Asset Management	Starboard Value LP
Redmile Group	Statar Capital LLC
Redwood Capital Management, LLC	Steadfast Financial LP
Regal Funds Management	Steadview Capital
Renaissance Technologies LLC	Stevens Capital Management LP
RGM Capital	Strategic Value Partners
Rhenman & Partners Asset Management	Suvretta Capital Management, LLC
Rimrock Capital Management, LLC	Sylebra Capital
Rivulet Capital, LLC	Symmetry Investments
Rock Springs Capital	Symphony Financial Partners
Rockhampton Management	Syquant Capital
Rokos Capital Management	Systematica Investments
Rose Grove Capital Management, LLC	Taconic Capital Advisors
Route One Investment Company, LP	Tairen Capital
ROW Asset Management	TCI FUND MANAGEMENT LIMITED
RPIA	Teleios Capital Partners LLC
RTW Investments, LP	Teng Yue Partners, L.P.
Rubric Capital	Tenor Capital Management Company
RV Capital Management	Tensile Capital Management
S.W. Mitchell Capital	The Baupost Group
Saba Capital Management, L.P.	The D. E. Shaw Group
Sachem Head Capital Management LP	THE TUDOR GROUP
Samlyn Capital, LLC	The Voleon Group
Sand Grove Capital Management LLP	Theleme Partners LLP
Sandbar Asset Management LLP	Think Investments
Sandler Capital Management	Third Point LLC
Sarissa Capital Management LP	Thunderbird Partners

TIG Advisors, LLC
 Tiger Eye Capital LLC
 Tiger Global Management
 Tiger Pacific Capital LP
 Tilden Park Capital Management LP
 Tor Investment Management
 Torq Capital Management
 Toscafund Asset Management LLP
 TPG
 TPG Angelo Gordon
 Transtrend
 Tree Line Advisors (Hong Kong) Ltd
 Tremblant Capital
 Trend Capital Management LP
 Tresidor Investment Management LLP
 Trexquant Investment LP
 Trian Fund Management, L.P.
 Trinity Street Asset Management LLP
 Trivest Partners
 True Partner Holding Ltd
 TRUXT Investimentos
 TT International
 Turiya Capital
 TwentyFour Asset Management LLP
 Twin Tree Capital Management
 Two Creeks Capital Management, LP
 Two Sigma
 Tybourne Capital Management
 Tyrus Capital
 UBS O'Connor
 UG Investment Advisers
 Universa Investments L.P.
 Valiant Capital Partners
 Valley Forge Capital Management
 Value Partners Group
 ValueAct Capital
 Van Hulzen Asset Management
 VARADERO CAPITAL, L.P.
 Varde Partners

Varenne Capital Partners
 Verde Asset Management
 Verition Fund Management LLC
 Versor Investments
 Versus Capital Advisors
 Vestal Point Capital
 VGI Partners
 Viking Global Investors
 Voloridge Investment Management, LLC
 Vontobel
 Vor Capital
 VR Capital Group
 Waha Capital
 Walleye Capital
 Water Street Capital, LLC
 Waterfall Asset Management LLC
 Weiss Asset Management
 Weiss Multi-Strategy Advisers
 Wellington Management
 Wexford Capital LP
 Whale Rock Capital Management LLC
 White Oak Capital Partners
 Whitebox Advisors
 Whitehaven Asset Management, LP
 William Blair
 Willowbridge Associates Inc.
 Wilson Asset Management
 Winton
 Wolverine Asset Management, LLC
 Woodline Partners LP
 WT Asset Management
 XAIA Investment GmbH
 XN Capital
 York Capital Management
 ZAIS Group
 Zebedee Capital Partners LLP
 Zimmer Partners LP
 Zweig-Dimenna Associates