Beneficial Ownership Concentration and Fund Outcomes for Qualifying Hedge Funds

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Abstract

This White Paper provides statistics describing the relationship between beneficial ownership concentration and fund outcomes for qualifying hedge funds ("QHFs") and their advisers from 2013 to 2023. The outcomes we calculate by concentration status are types of beneficial owners, fund portfolio liquidity, investor liquidity, capital restrictions on the fund, fund leverage, performance, and margins. The relationship between beneficial ownership concentration and fund margins is explored in greater detail using a linear regression analysis. All statistics are calculated using information reported by private fund advisers on Form PF. We also discuss certain caveats and limitations to this analysis, based on variations in typical reporting practices by fund advisers.

[1] This white paper is provided in the authors' official capacity as economists in the Commission's Division of Economic and Risk Analysis but does not necessarily reflect the views of the Commission, the Commissioners, or other members of the staff. All authors were members of Commission staff when they contributed to this paper.

Introduction

Form PF complements the basic information about private fund advisers and private funds reported on Form ADV.[2] Generally, investment advisers registered (or required to be registered) with the SEC with at least $150 million in private fund assets under management must file Form PF.[3]

This white paper provides statistics on the relationship between beneficial ownership concentration and fund outcomes for QHFs[4] and their advisers from 2013 to 2023, focusing in particular on types of beneficial owners, fund portfolio liquidity, investor liquidity, capital restrictions on the fund, fund leverage, performance, and margins.[5] We specifically analyze how these outcomes vary between concentrated QHFs and unconcentrated QHFs. To identify whether a QHF is concentrated or unconcentrated, we use the percentage of a reporting fund's equity that is beneficially owned by the five beneficial owners having the largest equity interests in the reporting fund.[6] We define a QHF as concentrated if the top five beneficial owners have greater than 70% ownership of the fund, and as unconcentrated otherwise.[7] We also conduct a regression analysis to assess the relation between fund performance and margins across fund concentration groups.[8]

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[2] *Form PF; Reporting Requirements for All Filers and Large Hedge Fund Advisers*, Investment Advisers Act Release No. 6546 (Feb. 8, 2024), 89 FR 17984, 18033 (Mar. 12, 2024) ("February 2024 Form PF Adopting Release"). Investment advisers to private funds report on Form ADV, on a public basis, general information about private funds that they advise, including basic organizational, operational information, and information about the fund's key service providers. Information on Form ADV is available to the public through the Investment Adviser Public Disclosure System, which allows the public to access the most recent Form ADV filing made by an investment adviser. *See, e.g.*, Form ADV, *available at* https://www.investor.gov/introduction-investing/investing-basics/glossary/form-adv; *see also* Investment Adviser Public Disclosure, SEC, *available at* https://adviserinfo.sec.gov/.

[3] For more detailed background on Form PF, *see, e.g.*, DIVISION OF INVESTMENT MANAGEMENT, PRIVATE FUND STATISTICS, *available at* https://www.sec.gov/files/investment/private-funds-statistics-2024-q1.pdf ("2024 Q1 Private Fund Statistics"); February 2024 Form PF Adopting Release; 2020 ANNUAL STAFF REPORT RELATING TO THE USE OF FORM PF DATA (Nov. 3, 2020), *available at* https://www.sec.gov/files/2020-pf-report-congress.pdf. Certain advisers qualify for an exemption from registration under section 203(l) of the Investment Advisers Act of 1940 (the "Advisers Act") or 17 CFR 275.203(m)-1 (rule 203(m)-1) under the Advisers Act, and such advisers are not required to file Form PF. *See Exemptions for Advisers to Venture Capital Funds, Private Fund Advisers With Less Than $150 Million in Assets Under Management, and Foreign Private Advisers*, Investment Advisers Act Release No. 3222 (June 22, 2011), 76 FR 39645 (July 6, 2011). Because this includes investment advisers that solely advise venture capital funds, many venture capital fund advisers do not file Form PF, and so venture capital funds are not included in this paper's analysis.

[4] In Form PF, a qualifying hedge fund is defined as any hedge fund that has a net asset value (individually or in combination with any feeder funds, parallel funds and/or dependent parallel managed accounts) of at least $500 million as of the last day of any month in the fiscal quarter immediately preceding the reporting fund's most recently completed fiscal quarter.

[5] Some funds that the adviser holds out as a private equity fund may be required to report on Form PF as a hedge fund. This is because Form PF requires that an adviser to a fund to complete the sections of Form PF for hedge funds if the fund is permitted by its fund documents to borrow an amount in excess of one-half of its net asset value (including any committed capital) or have gross notional exposure in excess of twice its net asset value (including any committed capital); or to sell securities or other assets short or enter into similar transactions (other than for the purposes of hedging currency exposure or managing duration); even if the fund never actually engages in either of these practices. *See* February 2024 Form PF Adopting Release, 89 FR at 18046-18047. Thus, certain portions of hedge fund fees and allocations may have actually accrued to advisers of private equity funds. Accordingly, some funds may report since-inception internal rates of return (IRRs) for each quarter/year instead of quarterly/annual performance.

[6] Form PF, Question 15. References to specific Form PF questions in this white paper refer to the questions as they existed prior to the amendments to Form PF that the Commission and the Commodity Futures Trading Commission adopted on February 8, 2024. *See* February 2024 Form PF Adopting Release.

[7] This threshold was selected because it is the approximate median beneficial ownership share of the top five beneficial owners for qualifying hedge funds in recent years. We observe slightly lower median values in earlier years. Our reqults are qualitatively similar if we use a 60% ownership threshold to define concentrated funds *See* 2024 Q1 Private Fund Statistics.

[8] Form PF information provided in this white paper is aggregated, rounded, and/or masked to avoid potential disclosure of proprietary information of individual Form PF filers. Masked data in this report is denoted by "***".

Sample Counts

Table 1 provides number of QHFs, number of concentrated QHFs, and number of unconcentrated QHFs for each year.[9] We observe a positive trend in the number of QHFs for all groups. For example, our sample includes 1,369 QHFs in 2013 and 2,108 QHFs in 2023. When we compare the number of funds in concentrated and unconcentrated QHF buckets, we find that the increase in number of concentrated funds is greater than that of unconcentrated funds.[10] The number of concentrated QHFs has almost doubled over the sample period. Our sample includes 533 concentrated QHFs in 2013 and 1,012 QHFs in 2023.[11]

Table 1. Number of Qualifying Hedge Funds

Year	All QHFs	Concentrated QHFs	Unconcentrated QHFs
2013	1,369	533	836
2014	1,538	596	942
2015	1,642	661	981
2016	1,652	695	957
2017	1,797	802	995
2018	1,828	831	997
2019	1,820	818	1,002
2020	1,795	802	993
2021	2,070	950	1,120
2022	2,078	1,008	1,070
2023	2,108	1,012	1,096

Beneficial Ownership

Table 2 provides beneficial ownership statistics classified by investor type for QHFs from 2013 to 2023.[12] We report each investor type's beneficial ownership in QHFs as percentages of QHFs' aggregate NAV.

Panel A shows beneficial ownership statistics classified by investor type for all QHFs and documents that Private Funds have the largest ownership in QHFs in each year, with ownership levels ranging from 16.2% to 21.2%.[13] Private Funds' ownership shares have decreased from 2013 to 2018, then increased moderately after that.

[9] A qualifying hedge fund files Form PF at the end of each quarter. In our yearly calculations, we use the filings in the last quarter of each year.

[10] This pattern could be explained by the entrance of new concentrated funds or by private funds with an unconcentrated investor base splitting into multiple funds with higher investor concentration.

[11] Number of observations may slightly change in the following tables due to data cleaning procedures.

[12] To calculate total ownership statistics in Table 2, we use responses to Question 9 and Question 16 in the Form PF. Question 9 asks the fund's net asset value, and Question 16 asks the approximate percentage of the reporting fund's equity that is beneficially owned by each group of investors.

[13] We note that a portion of the ownership statistics might be attributed to master-feeder arrangements.

Non-Profits, U.S Individuals, State/Municipal Government Pensions (St./Mun. Gov. Pen.), and Pension Plans also have significant ownership in QHFs, with their ownership shares ranging from 9.6% to 15.1% in the entire sample period. There is no clear trend for these groups' ownership shares over time. We also observe that U.S individuals[14] have slightly lower ownership shares in the more recent years, and Broker-Dealers almost entirely exited the QHF space with their ownership shares falling to 0.2% in recent years.

Table 2. Beneficial Ownership Statistics for Qualifying Hedge Funds (Percent of Aggregate NAV)

Panel A. All Qualifying Hedge Funds

Investor Type	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Private funds	21.2%	20.9%	20.1%	17.9%	16.5%	16.2%	16.5%	17.0%	17.3%	18.4%	18.8%
Other	9.9%	11.3%	12.2%	13.0%	13.4%	14.0%	13.2%	13.8%	14.5%	14.8%	15.3%
Non-Profits	13.4%	13.4%	13.5%	13.9%	14.0%	13.6%	14.3%	15.1%	14.3%	13.9%	13.9%
U.S. Individuals	12.8%	12.0%	11.5%	11.6%	11.3%	10.9%	10.8%	11.6%	11.7%	11.2%	11.3%
St./Mun. Gov. Pen.	10.1%	9.6%	9.7%	11.1%	11.5%	11.5%	11.4%	11.2%	10.9%	11.7%	11.6%
Pension Plans	12.2%	12.5%	13.1%	13.5%	13.5%	13.4%	13.3%	12.8%	11.4%	10.8%	10.2%
Sov. WFs & FOI	5.3%	5.0%	5.0%	5.2%	5.4%	6.6%	6.5%	6.4%	6.3%	7.6%	7.5%
Insurance Comp.	2.5%	2.4%	2.5%	2.4%	2.5%	2.8%	2.8%	3.1%	3.4%	3.9%	4.1%
Non-U.S. Indiv,	2.5%	2.5%	2.4%	2.4%	2.4%	2.5%	2.6%	3.1%	4.3%	2.7%	2.5%
St./Mun. Gov. Ent.	1.1%	1.5%	1.5%	1.3%	1.4%	1.3%	1.5%	1.5%	1.5%	1.5%	1.8%
Unk. Non-U.S. Inv.	2.4%	2.2%	1.8%	1.5%	1.9%	1.6%	1.9%	1.9%	2.1%	1.3%	1.3%
Banking/Thrift Ins.	1.4%	1.3%	1.2%	1.1%	1.1%	1.1%	1.2%	1.0%	1.0%	1.0%	0.9%
RICs	2.1%	1.8%	2.3%	2.6%	2.4%	1.8%	1.3%	1.1%	0.9%	1.0%	0.6%
Broker-Dealers	3.0%	3.5%	3.0%	2.5%	2.6%	2.6%	2.5%	0.5%	0.2%	0.2%	0.2%

In Panel B, we restrict our sample to concentrated QHFs over the same sample period. Panel B shows that Private Funds have the largest ownership in concentrated QHFs in each year, consistent with the full sample. Their ownership trend is negative on average over the first half of the sample period, before rising thereafter; Private Funds own 30.6% of aggregate NAV in 2013, 21.7% in 2018, and 24.2% in 2023.

Insurance Companies, State/Municipal Government Entities, and Sovereign Wealth Funds and Foreign Official Institutions broadly increase their ownership shares of concentrated QHFs over the sample period, whereas U.S individuals ownership shares trend moderately downward.

[14] *See* Form PF, Question 16.

Panel B. Concentrated Qualifying Hedge Funds

Investor Type	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Private funds	30.6%	30.6%	29.1%	24.6%	22.4%	21.7%	22.5%	22.2%	22.9%	23.3%	24.2%
Other	***	***	***	***	***	***	***	***	***	***	***
Non-Profits	6.1%	5.7%	6.3%	6.8%	7.3%	7.1%	7.3%	7.5%	7.1%	6.6%	7.2%
U.S. Individuals	10.2%	8.1%	8.2%	8.8%	8.7%	7.5%	7.0%	7.1%	8.5%	7.2%	7.5%
St./Mun. Gov. Pen.	12.2%	13.0%	12.2%	14.1%	16.4%	15.7%	15.9%	16.8%	15.9%	15.7%	16.1%
Pension Plans	9.8%	10.0%	10.2%	11.4%	11.1%	11.5%	11.2%	10.4%	10.4%	9.2%	8.4%
Sov. WFs & FOI	5.6%	5.6%	4.3%	4.7%	4.7%	8.9%	8.8%	8.3%	8.0%	11.4%	10.5%
Insurance Comp.	1.6%	2.0%	2.3%	2.1%	2.5%	3.1%	3.4%	3.7%	4.7%	4.7%	5.5%
Non-U.S. Indiv,	2.0%	2.0%	1.7%	1.8%	1.5%	1.4%	2.0%	2.3%	1.8%	1.3%	1.2%
St./Mun. Gov. Ent.	0.9%	0.8%	0.9%	0.9%	1.3%	1.0%	1.0%	1.5%	1.4%	1.4%	1.5%
Unk. Non-U.S. Inv.	3.1%	2.6%	1.7%	1.3%	2.2%	1.1%	1.4%	1.4%	1.1%	1.4%	1.0%
Banking/Thrift Ins.	2.7%	2.0%	0.5%	0.6%	1.2%	1.5%	2.1%	1.8%	1.5%	1.6%	1.1%
RICs	4.2%	3.4%	6.0%	6.9%	6.1%	3.0%	1.3%	1.7%	1.3%	1.5%	0.3%
Broker-Dealers	***	***	***	***	***	***	***	***	***	***	***

In Panel C, we restrict our sample to unconcentrated QHFs over the same sample period. While Private Funds still have the largest ownership shares in many of the years among investors in unconcentrated QHFs, Non-Profits and Other investor groups have comparable ownership shares in recent years of the sample. Private Funds ownership in unconcentrated QHFs has a negative trend from 2013 to 2018 before slightly increasing through the end of the sample period; Private Funds own 19.3% of total aggregate NAV of unconcentrated QHFs in 2013 compared with their ownership level of 14.4% in 2018 and 16.8% in 2023. Non-Profits ownership levels exhibit a generally positive trend from 2013 to 2020 before leveling out. Pension Plans ownership levels trend upwards from 2013 to 2017, and generally trend downwards after that.

Panel C. Unconcentrated Qualifying Hedge Funds

Investor Type	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Private funds	19.3%	18.8%	18.0%	16.1%	14.7%	14.4%	14.6%	15.4%	15.4%	16.5%	16.8%
Other	10.1%	11.1%	11.9%	12.9%	13.8%	14.0%	13.0%	13.4%	14.3%	14.8%	15.2%
Non-Profits	15.0%	15.1%	15.2%	15.8%	16.0%	15.7%	16.5%	17.4%	16.6%	16.6%	16.5%
U.S. Individuals	13.3%	12.9%	12.3%	12.3%	12.1%	12.0%	12.0%	13.0%	12.8%	12.7%	12.7%

Investor Type	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
St./Mun. Gov. Pen.	9.7%	8.8%	9.1%	10.3%	10.0%	10.2%	10.0%	9.4%	9.3%	10.3%	9.9%
Pension Plans	12.8%	13.1%	13.8%	14.0%	14.3%	14.1%	14.0%	13.5%	11.8%	11.3%	10.9%
Sov. WFs & FOI	5.2%	4.8%	5.1%	5.4%	5.6%	5.9%	5.7%	5.8%	5.7%	6.2%	6.4%
Insurance Comp.	2.6%	2.5%	2.5%	2.5%	2.6%	2.7%	2.7%	3.0%	3.0%	3.6%	3.6%
Non-U.S. Indiv,	2.6%	2.7%	2.6%	2.5%	2.6%	2.9%	2.8%	3.3%	5.1%	3.2%	3.0%
St./Mun. Gov. Ent.	1.1%	1.7%	1.7%	1.4%	1.4%	1.4%	1.7%	1.5%	1.5%	1.6%	2.0%
Unk. Non-U.S. Inv.	2.3%	2.1%	1.9%	1.6%	1.8%	1.8%	2.1%	2.0%	2.5%	1.2%	1.4%
Banking/Thrift Ins.	1.2%	1.1%	1.3%	1.2%	1.1%	1.0%	0.9%	0.8%	0.8%	0.8%	0.8%
RICs	1.6%	1.5%	1.4%	1.5%	1.3%	1.4%	1.3%	0.9%	0.8%	0.8%	0.7%
Broker-Dealers	3.2%	3.7%	3.1%	2.5%	2.6%	2.6%	2.7%	0.6%	0.3%	0.3%	0.3%

Liquidity and Capital Restrictions

Table 3 provides portfolio liquidity statistics for QHFs for the 2013-2023 period. In this table, we report the percentage of aggregate NAV that may be liquidated within each of the specified periods below.[15]

Panel A shows portfolio liquidity statistics for all QHFs. We document that portfolios have become less liquid on average over time. For example, 78% of the aggregate NAV can be liquidated within 30 days in 2013 compared with 59% in 2023. We observe similar patterns if we use different liquidation periods. For example, 63% of the aggregate NAV can be liquidated within 7 days in 2013 compared with 49% in 2023.

Table 3. Portfolio Liquidity of Qualifying Hedge Funds (Percent of Aggregate NAV)

Panel A. All Qualifying Hedge Funds

Liquidation Period	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
At most 1 day	41%	43%	43%	42%	40%	41%	37%	34%	35%	33%	32%
At most 7 days	63%	63%	64%	64%	63%	62%	58%	56%	53%	50%	49%
At most 30 days	78%	77%	76%	76%	76%	74%	70%	69%	66%	60%	59%

[15] We use responses to Question 32 in Form PF, which asks to specify the percentage by value of the reporting fund's positions that may be liquidated within each of the specified periods. Since Form PF Question 32 excludes cash and cash equivalents, we also use Form PF Question 26 or Question 30 to include investments in cash and cash equivalents in our calculations. 11% of the funds reported that 100% of their assets can be liquidated in at least 365 days. Some of these funds may be closed end funds that are less directly comparable to other funds in our sample.

Liquidation Period	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
At most 90 days	85%	85%	83%	82%	82%	79%	77%	75%	72%	66%	65%
At most 180 days	88%	88%	86%	86%	85%	83%	80%	79%	77%	72%	70%
At most 365 days	91%	91%	90%	89%	89%	87%	85%	84%	82%	78%	76%

Panel B shows portfolio liquidity statistics for concentrated QHFs and Panel C shows portfolio liquidity statistics for unconcentrated QHFs.

We similarly document that concentrated QHF portfolios have become less liquid on average over time. For example, 85% of the aggregate NAV of concentrated QHFs can be liquidated within 30 days in 2013 compared with 62% in 2023. We observe that the most significant decline occurs after 2018.

Similar to concentrated fund portfolios, unconcentrated fund portfolios have also become less liquid on average over time. For example, 76% of the aggregate NAV can be liquidated within 30 days in 2013 compared with 58% in 2023.

When we compare concentrated fund portfolios with unconcentrated fund portfolios, we find that concentrated fund portfolios are more liquid than unconcentrated fund portfolios in every year and for every liquidation period.[16]

Panel B: Concentrated Qualifying Hedge Funds

Liquidation Period	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
At most 1 day	48%	47%	50%	51%	49%	51%	47%	43%	43%	41%	39%
At most 7 days	74%	70%	73%	72%	72%	72%	66%	64%	62%	56%	54%
At most 30 days	85%	81%	82%	81%	80%	80%	75%	74%	70%	64%	62%
At most 90 days	91%	88%	87%	86%	86%	85%	81%	80%	76%	69%	67%
At most 180 days	92%	91%	89%	89%	89%	88%	84%	83%	80%	75%	72%
At most 365 days	94%	93%	91%	92%	92%	91%	87%	85%	83%	79%	77%

[16] This finding is consistent with Kruttli et. al, who find that hedge funds with more concentrated investor bases hold more of their portfolios in cash and other liquid assets as a precautionary measure. *See* Mathias S. Kuttli et. al, *Investor Concentration, Flows, and Cash Holdings: Evidence from Hedge Funds* (Off. Fin. Rsch., Working Paper, June 2020), *available at* https://www.financialresearch.gov/working-papers/files/OFRwp-17-07_Investor-Concentration-in-Hedge-Funds.pdf.

Panel C: Unconcentrated Qualifying Hedge Funds

Liquidation Period	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
At most 1 day	39%	42%	41%	40%	37%	38%	35%	32%	32%	30%	30%
At most 7 days	61%	62%	62%	62%	60%	58%	55%	53%	50%	47%	47%
At most 30 days	76%	77%	75%	75%	74%	72%	69%	67%	64%	59%	58%
At most 90 days	84%	84%	82%	81%	80%	78%	75%	74%	71%	65%	64%
At most 180 days	87%	88%	86%	85%	84%	81%	79%	78%	76%	71%	69%
At most 365 days	91%	91%	89%	89%	88%	85%	85%	84%	81%	78%	76%

Table 4 provides investor liquidity statistics for QHFs for the 2013-2023 period. We report the percentage of aggregate NAV that investors are entitled, under the fund documents, to withdraw invested funds or receive redemption payments, as applicable within each of the specified periods below.[17]

Panel A shows investor liquidity statistics for all QHFs. We document that investors can liquidate approximately 24% of the aggregate NAV within 30 days in 2013, with the highest level of 28% in 2017 and 2018 and the lowest level of 18% in 2022 and 2023. Although we do not observe a clear trend over years, we document that the lowest two investor liquidity levels are observed in 2022 and 2023 for each specified period below.

Table 4. Investor Liquidity of Qualifying Hedge Funds (Percent of Aggregate NAV)

Panel A: All Qualifying Hedge Funds

Liquidation Period	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
At most 1 day	8%	8%	7%	8%	9%	8%	8%	7%	8%	6%	6%
At most 7 days	11%	11%	13%	14%	15%	15%	13%	10%	11%	8%	8%
At most 30 days	24%	26%	25%	27%	28%	28%	26%	23%	23%	18%	18%
At most 90 days	48%	50%	45%	50%	51%	50%	46%	44%	43%	38%	34%
At most 180 days	58%	59%	58%	59%	60%	58%	57%	52%	50%	46%	44%
At most 365 days	75%	75%	73%	74%	74%	72%	69%	65%	63%	58%	56%

[17] We use responses to Question 50 in Form PF, which asks to divide the reporting fund's net asset value among the specified periods depending on the shortest period within which investors are entitled, under the fund documents, to withdraw invested funds or receive redemption payments, as applicable. Many QHFs require an initial "lock-up" period of at least 1 year for new investors. *See e.g. Proskauer's Hedge Start: Key Hedge Fund Terms*, PROSKAUER (May 6, 2024), *available at* https://www.proskauer.com/pub/proskauer-hedge-start-key-hedge-fund-terms.

Panel B shows investor liquidity statistics for concentrated QHFs, and Panel C shows investor liquidity statistics for unconcentrated QHFs.

Investor liquidity of concentrated funds fluctuates over time while generally trending downward. We document that concentrated fund investors can liquidate approximately 45% of the aggregate NAV within 30 days in 2013, with the highest level of 46% in 2017 and 2018 and the lowest level of 32% in 2023.

Investor liquidity of unconcentrated funds also fluctuates over time. While investor liquidity is uniformly lower at the end of the sample across all liquidation periods, there is no clear trend over all sample years. We document that unconcentrated fund investors can liquidate approximately 20% of the aggregate NAV within 30 days in 2013, with the highest level of 23% in 2017 and the lowest level of 12% in 2023.

When we compare concentrated fund investors with unconcentrated fund investors, we find that concentrated fund investors have much higher liquidity than unconcentrated fund investors in all years and for all the specified liquidation periods.

Panel B: Concentrated Qualifying Hedge Funds

Liquidation Period	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
At most 1 day	22%	16%	17%	16%	17%	17%	16%	15%	14%	12%	13%
At most 7 days	28%	23%	27%	25%	26%	25%	22%	22%	20%	17%	17%
At most 30 days	45%	45%	45%	44%	46%	46%	42%	43%	38%	33%	32%
At most 90 days	65%	63%	62%	64%	66%	65%	60%	62%	58%	51%	47%
At most 180 days	73%	71%	72%	71%	72%	70%	69%	67%	63%	57%	54%
At most 365 days	84%	81%	80%	80%	80%	76%	76%	74%	71%	66%	63%

Panel C: Unconcentrated Qualifying Hedge Funds

Liquidation Period	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
At most 1 day	5%	6%	5%	6%	6%	6%	5%	4%	5%	3%	3%
At most 7 days	8%	9%	10%	11%	12%	11%	10%	6%	8%	5%	5%
At most 30 days	20%	22%	21%	22%	23%	22%	21%	16%	18%	13%	12%
At most 90 days	45%	47%	42%	46%	47%	46%	42%	38%	38%	33%	29%
At most 180 days	55%	56%	55%	56%	57%	55%	53%	47%	46%	41%	40%
At most 365 days	74%	74%	71%	73%	72%	70%	67%	62%	60%	56%	53%

Table 5 provides capital restriction statistics for QHFs for the 2013-2023 period. We report percentage of aggregate NAV that is or that may be subject to suspensions or restrictions on investor withdrawals and

redemptions as specified below. The "May Suspend" row relates to an adviser's or governing body's right to suspend withdrawals, and the "May Have Gates" row relates to an adviser's or governing body's right to impose a restriction on investor withdrawals and redemptions. On the other hand, the "Suspended" and "Gated" rows relate to effective corresponding type of suspension or restriction in each year. The "Side-Pocketed" row relates to assets that are in a side-pocket arrangement in each year.[18]

Panel A shows capital restriction statistics for all QHFs. We observe that although a high percentage of aggregate NAV may be subject to some type of capital restrictions, restrictions are effective only for a small portion of the aggregate NAV.[19] For example, 77.6% of the aggregate NAV across all QHFs may have been subject to a suspension in 2017, but there was an effective suspension for only 0.6% of the aggregate NAV. Similarly, 46.0% of the aggregate NAV may have been subject to gates arrangements in 2017, but only 1.2% of the aggregate NAV was gated.[20]

We also observe a decrease in the percent of aggregate NAV that permits capital restrictions over time. In 2013, 80.1% of aggregate assets may be subject to a suspension, compared with 64.3% in 2023. Similarly, in 2013, 51.2% of aggregate assets may be subject to gates, compared with 43.8% in 2023. By contrast, we observe an overall increase in gating restrictions over the same period. In 2013, 1.2% of the aggregate assets was gated versus 2.1% in 2023. However, we do not observe a similar pattern for effective suspensions, which are relatively stable over the sample period, with its peak value at 0.7% in 2016. Finally, side-pocket arrangements are relatively stable from 2013 to 2020, though there is a slight increase in later sample years.

Table 5. Restrictions on Capital for Qualifying Hedge Funds (Percent of Aggregate NAV)

Panel A. All Qualifying Hedge Funds

Type	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
May Suspend	80.1%	80.2%	80.4%	78.5%	77.6%	76.4%	75.1%	73.4%	69.7%	65.8%	64.3%
May Have Gates	51.2%	52.7%	50.1%	47.0%	46.0%	47.3%	48.1%	48.6%	44.9%	45.6%	43.8%
Side-Pocketed	1.5%	1.5%	1.3%	1.4%	1.3%	1.4%	1.5%	2.0%	2.6%	2.4%	2.2%
Gated	1.2%	1.5%	1.2%	1.0%	1.2%	1.3%	1.3%	1.8%	1.8%	2.1%	2.1%
Suspended	0.4%	0.5%	0.5%	0.7%	0.6%	0.6%	0.5%	0.5%	0.4%	0.5%	0.4%

[18] We use responses to Question 48 and 49 in Form PF, which ask what percentage of the reporting fund's net asset value is subject to or may be subject to specified capital restrictions.

[19] 98% of the fund-year observations have either no suspensions rights (13%) or have suspension rights for 100% of the fund's NAV (86%). In addition, 87% of the fund-year observations have either no gate arrangements (40%) or have gate arrangements for 100% of the fund's NAV (47%).

[20] Funds may have capital restriction rights for a high percentage of their NAVs for rare substantial withdrawal events that would warrant an action, but not exercise these rights routinely. Due to data limitations on actual investor redemptions, our analysis does not focus on this aspect.

We next show capital restriction statistics for concentrated QHFs in Panel B and for unconcentrated QHFs in Panel C. In each group, we similarly observe that only a small fraction of aggregate NAV is side-pocketed or gated, while a larger fraction is potentially subject to gates or suspensions. There are nonetheless meaningful differences in capital restrictions between these two groups. Concentrated QHFs have fewer dollars in side-pocket arrangements relative to their aggregate NAV than unconcentrated QHFs. For instance, in 2023, concentrated funds have side-pocket arrangements for 0.6% of their aggregate NAV whereas unconcentrated funds have side-pocket arrangements for 2.9% of their aggregate NAV. Similarly, concentrated funds have a smaller portion of their aggregate NAV that is gated relative to unconcentrated funds for every year of the sample period. In 2023, concentrated QHFs impose gates for 0.3% of their aggregate NAV while unconcentrated QHFs impose gates for 2.8% of their aggregate NAV.

Panel B: Concentrated Qualifying Hedge Funds

Type	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
May Suspend	76.3%	74.3%	76.3%	74.7%	73.9%	72.5%	72.4%	72.2%	67.0%	64.4%	62.7%
May Have Gates	44.1%	48.0%	45.9%	42.9%	40.8%	41.8%	43.5%	41.4%	40.2%	40.7%	38.0%
Side-Pocketed	0.7%	0.6%	0.5%	0.6%	0.6%	0.4%	0.7%	0.7%	0.7%	0.5%	0.6%
Gated	0.3%	0.6%	0.5%	0.4%	1.2%	0.9%	0.4%	0.3%	0.4%	0.6%	0.3%
Suspended	***	***	***	***	***	***	***	***	***	***	***

Panel C: Unconcentrated Qualifying Hedge Funds

Type	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
May Suspend	80.8%	81.5%	81.3%	79.6%	78.8%	77.6%	76.0%	73.8%	70.6%	66.3%	64.9%
May Have Gates	52.7%	53.7%	51.1%	48.1%	47.6%	49.0%	49.5%	50.8%	46.4%	47.4%	45.9%
Side-Pocketed	1.7%	1.7%	1.5%	1.6%	1.5%	1.7%	1.7%	2.4%	3.2%	3.0%	2.9%
Gated	1.4%	1.7%	1.4%	1.2%	1.3%	1.5%	1.6%	2.2%	2.2%	2.7%	2.8%
Suspended	0.5%	0.5%	0.6%	0.9%	0.7%	0.8%	0.6%	0.7%	0.6%	0.7%	0.6%

Leverage

Table 6 shows leverage ratios, defined as aggregate fund gross asset values divided by aggregate net asset values, across years for all QHFs, concentrated QHFs, and unconcentrated QHFs.[21] We find that QHFs have higher leverage in the more recent years of the sample. For example, in 2013, the leverage ratio is

[21] We use responses to Form PF Question 8 for gross asset value, and Form PF Question 9 for net asset value.

1.8 compared with 2.3 in 2023. This overall increase in leverage ratios are mainly driven by unconcentrated QHFs, as concentrated funds have a more stable leverage over the sample period.

We find no evidence that one type of funds has persistently higher leverages over the sample period. However, concentrated funds have slightly higher leverage than unconcentrated funds from 2013 to 2016, and unconcentrated funds have slightly higher leverage ratios than concentrated funds in more recent years.

Table 6. Qualifying Hedge Funds' Leverage (GAV/NAV)

Year	All QHFs	Concentrated QHFs	Unconcentrated QHFs
2013	1.8	2.0	1.8
2014	1.8	1.9	1.8
2015	1.8	1.9	1.8
2016	1.9	2.0	1.9
2017	1.9	1.9	1.9
2018	2.1	1.9	2.1
2019	2.1	2.1	2.1
2020	2.0	2.0	2.0
2021	2.0	1.9	2.0
2022	2.1	1.9	2.1
2023	2.3	2.0	2.4

Performance and Margins

Table 7 shows margin, gross return, and net return statistics for all QHFs, concentrated QHFs, and unconcentrated QHFs.[22]Panel A of Table 7 demonstrates that unconcentrated funds have higher margins on average than concentrated funds. Specifically, unconcentrated funds have margins that are on average 1.1% higher than those for concentrated funds, which is a difference of approximately 48% (1.1 divided by 2.3) of the average margin for all QHFs. However, while the difference is consistently positive in each year, there is substantial variation in this difference over time. For example, unconcentrated funds have a margin that is approximately 2.2 percentage points greater than concentrated funds in 2020 but only 0.5 percentage points greater than concentrated funds in 2022.[23]

[22] There is variation in how advisers report gross and net returns on their Form PF filings. For instance, some advisers, including materially large advisers, don't report gross returns at all, and are not included in the margin analysis. Similarly, some advisers, including some materially large advisers, report gross and net returns that are the same. Finally, some prominent multi-strategy hedge funds do not account for pass-through fees in their reported returns. These issues are potential sources of measurement error in the analysis of hedge fund margins.

[23] Our review of fund-level performance indicates few funds show a J-curve that would be typical of reporting since inception IRRs. *J-Curve*, CORP. FIN. INST., *available at* https://corporatefinanceinstitute.com/resources/economics/j-curve/. However, we recognize that the estimation used in this paper may not accurately reflect fees and allocations charged by the adviser or incurred by the fund when the adviser reports a since-inception IRR on Form PF.

We next consider whether the higher margins observed in unconcentrated funds correspond with better performance of those funds (as measured by their gross performance)[24]. While Panel B shows that the gross return of unconcentrated funds is on average 1.2% higher than concentrated funds, Panel C shows that the net return of unconcentrated funds is on average only 0.1% higher than concentrated funds. This indicates that, on average, the gross performance advantage of unconcentrated funds over concentrated funds in the sample period is largely offset by higher margins. There is also substantial variation in the differences of both gross and net returns between concentration groups over time. For instance, in 2021, unconcentrated funds have a net return 0.8 percentage points lower than the net return of concentrated funds, despite having a gross return that is 0.6 percentage points higher than the gross return of concentrated funds.

The relatively high margins in unconcentrated funds along with similar net returns motivates the regression analysis below.

Table 7. Qualifying Hedge Fund Margins and Performance (Percent of Aggregate NAV)[25]

Panel A. Margin = Gross Return - Net Return

Year	All QHFs	Concentrated QHFs	Unconcentrated QHFs	(Unconcentrated - Concentrated)
2014	2.2%	1.7%	2.3%	0.6%
2015	1.9%	1.4%	2.1%	0.6%
2016	2.0%	1.4%	2.2%	0.8%
2017	2.6%	1.6%	2.9%	1.3%
2018	1.7%	0.9%	1.9%	1.0%
2019	2.5%	1.4%	2.9%	1.5%
2020	3.5%	1.9%	4.1%	2.2%
2021	2.7%	1.7%	3.1%	1.4%
2022	1.8%	1.5%	2.0%	0.5%
2023	2.2%	1.3%	2.5%	1.2%
Average	**2.3%**	**1.5%**	**2.6%**	**1.1%**

Panel B. Gross Return

Year	All QHFs	Concentrated QHFs	Unconcentrated QHFs	(Unconcentrated - Concentrated)
2014	8.0%	7.2%	8.2%	1.0%
2015	3.0%	1.6%	3.4%	1.8%
2016	6.3%	6.1%	6.3%	0.2%

[24] For instance, higher margins may be supported by higher gross returns, allowing for superior net returns.

[25] The results in Table 7 are calculated over observations with non-missing values of both gross and net return.

Year	All QHFs	Concentrated QHFs	Unconcentrated QHFs	(Unconcentrated - Concentrated)
2017	13.4%	13.6%	13.3%	-0.2%
2018	1.8%	0.7%	2.1%	1.4%
2019	14.6%	13.8%	14.9%	1.1%
2020	15.4%	11.8%	16.7%	4.9%
2021	12.8%	12.4%	13.0%	0.6%
2022	0.0%	0.1%	0.0%	-0.1%
2023	12.6%	11.5%	13.0%	1.5%
Average	**8.8%**	**7.9%**	**9.1%**	**1.2%**

Panel C. Net Return

Year	All QHFs	Concentrated QHFs	Unconcentrated QHFs	(Unconcentrated - Concentrated)
2014	5.8%	5.5%	5.9%	0.4%
2015	1.1%	0.2%	1.3%	1.2%
2016	4.2%	4.7%	4.1%	-0.6%
2017	10.8%	12.0%	10.5%	-1.5%
2018	0.1%	-0.2%	0.2%	0.4%
2019	12.1%	12.4%	12.0%	-0.4%
2020	11.9%	9.9%	12.6%	2.7%
2021	10.1%	10.7%	9.9%	-0.8%
2022	-1.8%	-1.4%	-2.0%	-0.6%
2023	10.4%	10.2%	10.5%	0.3%
Average	**6.5%**	**6.4%**	**6.5%**	**0.1%**

We further investigate the relation between margin and gross performance for concentrated versus unconcentrated funds by estimating the model of the general type in Regression (1) below. We use QHFs for the period from 2013 through 2023 in our sample.[26] We estimate three versions of the Equation 1 by changing the fixed effects in each model. The first model includes no fixed effects, Model 2 includes year fixed effects, and Model 3 includes both year fixed effects and adviser fixed effects. Our dependent variable "Margin" is equal to the QHF's margin (gross return-net return) for year t. "Concentrated" is an indicator variable that is equal to 1 if a QHF is concentrated in year t, and 0 otherwise. "Gross Return" is qualifying hedge fund's gross return in year t. "Log (NAV)" is natural logarithm of fund's beginning-of-year net asset value.

[26] *See* the "Data Cleaning Procedures" appendix for details of the sample construction.

$$\text{Margin}_{f,t} = \beta_0 + \beta_1 \times 1(\text{concentrated}_{f,t}) + \beta_2 \times \text{Gross\_Return}_{f,t} + \beta_3 \times 1(\text{concentrated}_{f,t}) \times \text{Gross\_Return}_{f,t} + \beta_4 \times \textit{Log}\,(\text{NAV}_{f,t}) + \text{Fixed\_Effects} + \text{error}_{f,t} \quad (1)$$

We report our estimated coefficients and associated standard errors in Table 8. Across all models, the coefficient on *gross return* is positive, and the coefficient on *concentrated* times *gross return* is negative, and all these results are statistically significant at 1% level.[27] The coefficients on *gross return* indicate that each percentage point increase in an unconcentrated fund's gross return is on average associated with a 13 to 15 basis point increase in the fund manager's margin. This relationship is roughly consistent with a typical 2-and-20 fee structure with a hurdle rate.[28] However, the negative coefficients on *concentrated* times *gross return* indicate that higher gross returns is associated with a more muted margin increase in concentrated funds. The presence of fixed effects in Models 2 and 3 shows that these margin differences are not driven by time trends or unobserved time-constant adviser characteristics.[29]

Table 8. Regressions of Margin on Fund Concentration and Gross Return

	Model 1	Model 2	Model 3
Concentrated	-0.12**	-0.10	0.04
(S.E.)	(0.058)	(0.085)	(0.095)
Gross Return	0.15***	0.15***	0.13***
(S.E.)	(0.002)	(0.010)	(0.012)
Concentrated X Gross Return	-0.06***	-0.06***	-0.05***
(S.E.)	(0.003)	(0.008)	(0.010)
Log (NAV)	0.08***	0.08***	0.09*
(S.E.)	(0.018)	(0.021)	(0.050)
Year Fixed Effects	No	Yes	Yes
Adviser Fixed Effects	No	No	Yes
# of Observations	14,140	14,140	14,140
Adj R^2	0.339	0.350	0.489

[27] Untabulated results show that our findings remain qualitatively similar under alternative specifications, including allowing for "low," "moderate" and "high" levels of investor concentration, and using the number of investors in a fund as a measure of concentration.

[28] Hedge funds charge management fees, which are typically 1% to 2% of total NAV, and performance-based fees, which are typically 20% of the gains earned. Performance-based fees are often charged only on profits that exceed a predefined benchmark, which often includes the previous highest portfolio valuation (high-water mark) and sometimes a hurdle rate. *See* Itzhak Ben-David, Justin Birru, & Andrea Rossi, *The Performance of Hedge Fund Performance Fees* (Nat'l Bureau of Econ. Rsch., Working Paper No. 27454, June 2020), *available at* http://www.nber.org/papers/w27454. Note that the average gross return across all sample years in Table 7 is 8.8%, with substantial variation across years. If a typical hurdle rate is 8%, then variation in gross return beneath that hurdle would not be expected to result in higher performance-based fees. For variation in gross return above the benchmark, a 1% increase in gross return would be expected to result in 20 basis points higher performance-based fees under a 2-and-20 fee structure.

[29] All regressions are weighted by fund beginning-of-year NAV and standard errors are clustered at the fixed effect levels in Model 2 and Model 3. In untabulated analyses, we estimated our model using alternative measures of concentration of ownership. First, we used three concentration buckets (low, medium, high) instead of using a binary concentration variable (concentrated versus unconcentrated). Second, we used number of investors in a fund as an alternative measure of a binary concentration variable. In both specifications, our results remain qualitatively similar.

The differences in gross performance between concentrated and unconcentrated QHFs reported in Table 7 complicate the interpretation of Table 8. In particular, for QHFs whose performance fees apply only after a certain hurdle rate is cleared, unconcentrated QHFs are more likely to have gross returns in excess of any given hurdle. To the extent that their hurdle rates are not correspondingly higher, unconcentrated QHFs would appear to have margins that are more responsive to gross returns even if the underlying pass-through rates are the same as concentrated QHFs. We demonstrate that the patterns presented in Table 8 are unlikely to reflect this mechanical relation by separately repeating Regression (1) for values of gross performance above and below a benchmark level of 8%.[30] Restricting the samples in this way ensures that the coefficients on gross return are not unduly influenced by differences in gross return between concentrated and unconcentrated QHFs. These regressions are presented in Table 9.

Panel A of Table 9 presents coefficients to Regression (1) for QHFs over a subsample of observations with gross returns less than 8%. As in Table 8, the coefficient on *gross return* is positive and statistically significant at the 1% level across all models. The coefficient on *concentrated* times *gross return* is negative and statistically significant at the 5% level in Models 1 and 3 and at the 10% level in Model 2. The association between gross return and margin is quantitatively smaller for both concentrated and uncentrated funds relative to the results in Table 8. This is likely because gross returns below 8% are less likely to be in excess of a fund's hurdle rate at which a manager's performance fee applies (for funds whose fee structure includes a hurdle). Even for this subsample however, the association between gross return and margins is modestly smaller for concentrated funds relative to unconcentrated funds: while unconcentrated funds in this subsample see on average a 4-5 basis point increase in margin for each percentage point increase in gross returns, versus a 3 basis point increase for concentrated funds.

Panel B of Table 9 presents coefficients to Regression (1) over a subsample with gross returns of 8% or more. Here, all coefficients on *gross return* are positive and significant at the 1% level, and all coefficients on *concentrated* times *gross return* are negative and significant at the 1% level. The association between *gross return* and *margin* is quantitatively larger for both concentrated and uncentrated funds relative to the results in Table 8, likely because *gross returns* in this subsample are more likely to be in excess of any given hurdle rate a fund has in place. The differences in the association between *gross return* and *margin* between concentrated and unconcentrated QHFs are also more pronounced in this sample: while a 1% higher *gross performance* is associated with margins that are 19-20 basis points higher for unconcentrated funds, it is associated with margins that are only 11 basis points higher for concentrated funds.

Table 9. Regressions of Margin on Fund Concentration and Gross Return Using Sub Samples

Panel A: Qualifying Hedge Funds with Gross Return Below 8%

	Model 1	Model 2	Model 3
Concentrated	-0.08	-0.06	-0.15*
(S.E.)	(0.062)	(0.077)	(0.076)
Gross Return	0.04***	0.04***	0.05***
(S.E.)	(0.004)	(0.007)	(0.010)

[30] The results of this exercise are qualitatively similar for alternative cutoff thresholds of 6% and 10%.

	Model 1	Model 2	Model 3
Concentrated X Gross Return	-0.01**	-0.01*	-0.02**
(S.E.)	(0.006)	(0.006)	(0.006)
Log (NAV)	0.15***	0.15***	0.06
(S.E.)	(0.020)	(0.024)	(0.039)
Year Fixed Effects	No	Yes	Yes
Adviser Fixed Effects	No	No	Yes
# of Observations	7,028	7,028	7,028
Adj R^2	0.032	0.034	0.298

Panel B: Qualifying Hedge Funds with Gross Return Above 8%

	Model 1	Model 2	Model 3
Concentrated	0.63***	0.75***	0.86***
(S.E.)	(0.146)	(0.165)	(0.253)
Gross Return	0.20***	0.20***	0.19***
(S.E.)	(0.004)	(0.014)	(0.015)
Concentrated X Gross Return	-0.09***	-0.09***	-0.08***
(S.E.)	(0.006)	(0.013)	(0.016)
Log (NAV)	0.02	0.05	0.09
(S.E.)	(0.029)	(0.034)	(0.056)
Year Fixed Effects	No	Yes	Yes
Adviser Fixed Effects	No	No	Yes
# of Observations	7,112	7,112	7,112
Adj R^2	0.348	0.366	0.524

Appendix: Data Cleaning Procedures

We create our final qualifying hedge fund data set used in Tables 1-5 by following these steps:

- We start with all the Form PF filings with a report period in the last quarter for each year from 2013 through 2023.
- Where there exist multiple submissions for a fund-report period pair (for instance, due to subadviser relationships or amendments), we keep only the most recent submission for each fund-report period.
- We only keep qualifying hedge funds by including the funds that have a response to Question 48, Question 49, or Question 50.

Table 6 uses the same data as Tables 1-5 with the additional restriction that NAV and GAV are non-negative.

Table 7, Table 8, and Table 9 use performance data reported on Form PF Question 17. The following steps are taken to prepare the data used in this analysis:

- Keep Question 17 observations corresponding to item "(q) Most recently completed fiscal year".
- Keep the most recently submitted observation by private fund and fiscal year.
- Merge with the Question 9 data by private fund, report year-1, and report quarter to retrieve the most recently submitted beginning-of-year NAV values.[31]
- Limit to fiscal years from 2014 through 2023. Our sample period starts from 2014 in these tables as beginning-of-year Net Asset Values are available starting from this year.
- Limit to qualifying hedge funds using responses to Questions 48-50.
- Remove observations with negative beginning-of-year NAV.
- Winsorize gross performance, net performance, and beginning-of-year NAV (upper tail only) at 0.5%.

[31] We implement a 1-year lag when matching this variable to approximate beginning-of-period NAVs, as end-of-period NAVs are likely already inclusive of the reporting period's returns.