

No Hedge Funds, No Cry

Javier Estrada²⁹

Abstract

Hedge funds raise capital largely from institutional investors. Small individual investors may feel left out but probably do not realize what a blessing that really is. Simple strategies way within their reach have outperformed hedge funds in terms of return and risk-adjusted return over the last 10, 15, and 20 years. Worse still, neither hedge funds really provide investors with returns uncorrelated to stocks nor do they protect portfolios from losses, at least as well as gold does, in turbulent times.

29. IESE Business School, Department of Finance, Av., IESE Business School, Department of Finance, Av.

1. INTRODUCTION

The exclusivity of hedge funds, available only to institutional and wealthy (accredited) individual investors, probably makes many small individual investors wish they had access to this 'exotic' asset. No matter how often or loudly hedge industry legends like John Bogle or Warren Buffett advised individual and institutional investors to implement simple, broadly-diversified, low-cost portfolios, the allure of hedge funds never seems to fade away.

Perhaps it is the remarkable performance of a few hedge funds that leads some investors to believe that all hedge funds perform just as well. Between 1988 and 2018 the Medallion Fund, from Jim Simon's Renaissance Technologies, delivered an annualized return of nearly 38% after fees (Zuckerman, 2019). However, far from being 'representative' of hedge funds, the Medallion fund is clearly an outlier, and a huge one at that.

Or perhaps it is the news that some hedge fund manager has acquired a penthouse in Manhattan or a mansion in Palm Beach that leads some investors to confuse the performance of hedge funds with that of hedge fund managers. Charging 2 and 20 year in and year out can go a very long way. In fact, assuming a 10% annual return and a 30-year holding period, a fee of 2% of the assets and 20% of the returns reduces the terminal value of an investment by nearly 70%.³⁰

In an amusing article, McCrum (2018) compares the performance of Slick Steve, an investor in hedge funds, with that of Joe Bloggs, an investor following a simple 60-40 stock-bond strategy; over the several periods he discusses, he finds that the latter always outperformed the former. To illustrate, in the longest period he considers, he finds that \$100 invested at the beginning of 2008 turned, by the end of 2017, into roughly \$150 invested in hedge funds and roughly \$200 invested in the 60-40 portfolio. These intriguing figures beg for a somewhat deeper (albeit still simple) analysis, which is performed and discussed in this article.

In a nutshell, the evidence discussed here shows the following. First, a two-fund strategy consisting of 60% stocks and 40% bonds outperformed hedge funds over the last 10, 15, and 20 years. Second, with an allocation to bonds slightly higher than

55%, a two-fund strategy outperformed hedge funds not just in terms of return but also in terms of risk-adjusted return. Third, similar results apply if the two-fund strategy is implemented with global (rather than U.S.) stocks and bonds. And fourth, in turbulent times, gold protected portfolios from losses far better than hedge funds, and did so at a far lower cost.

2. EVIDENCE

The sample consists of the HFRI Composite index of hedge funds, the S&P 500 index of U.S. stocks, the Bloomberg Barclays U.S. Aggregate index of U.S. investment-grade bonds, the MSCI ACWI index of global stocks, the Bloomberg Barclays Global Aggregate index of global investment-grade bonds, and gold prices.³¹ The sample period varies depending on the focus of the analysis. All returns are nominal, in dollars, and account for capital gains/losses and cash flows paid. Some additional data is described later.

2.1. Performance

Exhibit 1 compares the performance of hedge funds to that of U.S. stocks, a 60-40 strategy of U.S. stocks and bonds, and an optimized strategy in which the proportion of stocks is such that the stock-bond portfolio matches the volatility of hedge funds. The exhibit shows the arithmetic (AM) and geometric (GM) mean monthly return, monthly volatility (SD), risk-adjusted return (AM/SD), annualized GM and SD, and the terminal value of \$100 invested at the beginning of the three periods considered (TV). Panels A, B, and C focus on the last 10, 15, and 20 years, all through the end of 2020.

-
30. That said, the 2-20 fee structure often associated with hedge funds does no longer represent what the average hedge fund charges. In fact, Wigglesworth (2020) reports, based on data from EurekaHedge, average management fees of 1.16% and performance fees of 14%. Picker (2021), in turn, reports that according to HFR, in the fourth quarter of 2020 the average management fee and performance fee of hedge funds were 1.4% and 16.4%, respectively. Ben-David et al (2020) discuss the asymmetry of hedge funds' incentive fees, an issue also discussed by Zweig (2020).
31. The HFRI index of hedge funds has a fund-weighted version (over 1,500 funds), which is equally weighted, and an asset-weighted version (over 1,400 funds), which is weighted by assets. Because of its longer history the former is used here, although the latter is used later for comparative purposes.

Exhibit 1: Performance

This exhibit shows, for the series of monthly returns, the arithmetic mean (AM), geometric mean (GM), standard deviation (SD), and risk-adjusted return (AM/SD); it also shows the annualized GM (Ann GM), annualized SD (Ann SD), and the terminal value of \$100 (TV) invested at the beginning of each of the three periods considered. The second column focuses on hedge funds (HFRI), and the rest of the columns in portfolios with different proportions of U.S. stocks (S&P 500) and U.S. bonds (BB U.S. Aggregate), with the figures in bold at the top of each panel referring to the proportion of stocks.

A: 2011-2020	HFRI	100	60	44.8
AM (%)	0.36	1.17	0.82	0.70
GM (%)	0.34	1.09	0.80	0.68
SD (%)	1.75	3.89	2.32	1.75
AM/SD	0.20	0.30	0.36	0.40
Ann GM (%)	4.2	13.9	10.0	8.5
Ann SD (%)	6.1	13.5	8.0	6.1
TV (\$)	151	367	259	226
B: 2006-2020	HFRI	100	60	42.9
AM (%)	0.40	0.88	0.69	0.60
GM (%)	0.39	0.79	0.65	0.58
SD (%)	1.90	4.35	2.59	1.90
AM/SD	0.21	0.20	0.27	0.32
Ann GM (%)	4.7	9.9	8.1	7.2
Ann SD (%)	6.6	15.1	9.0	6.6
TV (\$)	200	411	323	284
C: 2001-2020	HFRI	100	60	42.3
AM (%)	0.47	0.70	0.59	0.53
GM (%)	0.45	0.60	0.56	0.52
SD (%)	1.81	4.35	2.53	1.81
AM/SD	0.26	0.16	0.23	0.30
Ann GM (%)	5.5	7.5	6.9	6.4
Ann SD (%)	6.3	15.1	8.8	6.3
TV (\$)	294	422	378	346

Panel A shows that the annualized return of hedge funds (4.2%) was far lower than that of stocks (13.9%) and the 60-40 strategy (10.0%), albeit with lower annualized volatility (6.1% for hedge funds versus 13.5% for stocks and 8.0% for the 60-40 strategy). It also shows that \$100 invested in hedge funds, stocks, and the 60-40 strategy at the beginning of 2011 turned into \$151, \$367, and \$259 by the end of 2020. Hedge fund managers may claim that due to their different volatility comparing hedge funds to the (stock) market is misleading, but the argument is less compelling if the comparison is made relative to the 60-40 strategy, which hedge funds also underperformed.

In any case, the argument is moot if the comparison is made in terms of risk-adjusted return. And panel A also shows that hedge funds produced lower risk-adjusted return than both stocks and the 60-40 strategy (0.20 compared to 0.30 and 0.36). It also shows that a strategy consisting of 44.8% in stocks (and 55.2% in bonds) would have matched the volatility of hedge funds but would have more than doubled the annualized return (8.5% versus 4.2%).

Panel B shows that the last 15 years were not too different. Hedge funds underperformed stocks and the 60-40 strategy in terms of return (4.7% versus 9.9% and 8.1%) but exposed investors to lower volatility (6.6% versus 15.1% and 9.0%). In terms of risk-adjusted return, hedge funds underperformed the 60-40 strategy and slightly outperformed stocks. That said, over the whole 15-year period, a \$100 investment in stocks delivered more than twice the terminal value of an investment in hedge funds (\$411 versus \$200). A two-fund strategy with 42.9% in stocks would have matched the volatility of hedge funds and produced an additional 250 basis points per year in terms of return.

Finally, panel C shows that over the last 20 years hedge funds again underperformed both stocks and the 60-40 strategy in terms of return (5.5% versus 7.5% and 6.9%) but again exposed investors to lower volatility (6.3% versus 15.1% and 8.8%). Over this period hedge funds outperformed both stocks and the 60-40 strategy in terms of risk-adjusted return. However, a two-fund strategy with 42.3% in stocks would have matched the volatility of hedge funds and produced an additional 90 basis points per year in terms of return.³²

Perhaps it was the case that the stellar performance of the U.S. market over the last several years may have biased the results? Not really. On the one hand, although the argument may be

somewhat plausible over the last 10 years, it is less plausible over the last 15 years, and even less so over the last 20 years. On the other hand, evidence from the global market does not yield substantially different results.

Regarding the first point, it is indeed the case that the annualized return of U.S. stocks over the 2011-2020 period was 13.9%, far higher than the long-term (1900-2020) historical return of 9.8%. And yet, over the 2006-2020 period the annualized return of stocks (9.9%) was only 10 basis points higher than the long-term historical return; and over the 2001-2020 period, which includes three bear markets, it was only 7.5%, far lower than the long-term historical return.

Regarding the second point, Exhibit A1 in the appendix shows a similar analysis but comparing hedge funds to global stocks and to a 60-40 strategy of global stocks and bonds. Although the figures are different, the qualitative conclusions are similar. Over the last 10, 15, and 20 years both stocks and the 60-40 strategy outperformed hedge funds in terms of return but exposed investors to higher volatility. Still, over the last 10, 15, and 20 years portfolios with an allocation of 31.0%, 24.5%, and 23.7% to stocks matched the volatility of hedge funds and produced a higher return.

2.2. Protection

Individual investors do not seem to have much of a reason to cry for lacking access to hedge funds. Strategies way within their reach have performed better, and that is before accounting for some of their additional benefits such as the transparency, daily pricing, and liquidity that retail products such as index funds and ETFs provide. And yet, hedge funds may have one last line of defense, which in fact they use often: Their goal is not to outperform stocks but to produce returns uncorrelated to stocks, thus mitigating the impact of market downturns on investors' portfolios. Is that really so?

Exhibit 2 shows, over the last 20 years, the worst 12 months (panel A), worst six quarters (panel B), and worst four years (panel C) in the stock market. All three panels show the return of stocks, as well as those of the 60-40 strategy, hedge funds, and gold, another popular hedge asset. The exhibit also shows the total (cumulative) impact of the events considered.

32. The results in Exhibit 1 would be nearly identical if the S&P 500 were replaced by the Wilshire 5000, a broader benchmark of the U.S. stock market. This is the case because over the last 10, 15, and 20 years, the performance of both indices has been very similar in terms of both return and volatility.

Exhibit 2: Protection Against Market Downturns

This exhibit shows, for a portfolio fully allocated to stocks (100), another allocated 60% to stocks and 40% to bonds (60-40), another allocated to hedge funds (HFRI), and another allocated to gold, the worst 12 months (panel A), worst six quarters (panel B), and worst four years (panel C) over the Jan/2001-Dec/2020 period. 'Total' refers to the cumulative return over the 12 months, six quarters, and four years shown in the exhibit. Stocks are represented by the S&P 500 and bonds by the BB U.S. Aggregate. All figures in percent.

A: Monthly					B: Quarterly				
	100	60-40	HFRI	Gold		100	60-40	HFRI	Gold
Oct/2008	-16.8	-10.2	-6.8	-16.9	Q4-2008	-21.9	-9.9	-9.2	1.3
Mar/2020	-12.4	-7.3	-9.1	-0.5	Q1-2020	-19.6	-10.5	-11.5	3.9
Sep/2002	-10.9	-5.0	-1.5	3.5	Q3-2002	-17.3	-7.6	-3.9	2.9
Feb/2009	-10.6	-6.3	-1.2	1.6	Q3-2001	-14.7	-6.5	-4.0	8.3
Feb/2001	-9.1	-5.2	-2.2	0.5	Q3-2011	-13.9	-6.9	-6.8	8.2
Dec/2018	-9.0	-4.9	-2.5	5.1	Q4-2018	-13.5	-7.9	-6.0	7.7
Sep/2008	-8.9	-5.6	-6.1	4.8	Total	-67.0	-40.2	-35.1	36.7
Jun/2008	-8.4	-5.0	-1.3	4.4	C: Annual				
Jan/2009	-8.4	-5.4	-0.1	5.2		100	60-40	HFRI	Gold
Feb/2020	-8.2	-4.2	-2.3	-0.2	2008	-37.0	-20.1	-19.0	5.8
Sep/2001	-8.1	-3.9	-2.8	6.9	2002	-22.1	-9.2	-1.5	24.8
May/2010	-8.0	-4.5	-2.9	3.2	2001	-11.9	-3.8	4.6	2.5
Total	-71.5	-50.2	-33.0	16.1	2018	-4.4	-2.6	-4.7	-1.6
					Total	-58.7	-32.0	-20.5	33.1

Panel A shows that in the worst 12 months of the last 20 years hedge funds did mitigate the stock market declines in every case. In fact, over the 12 months considered, the stock market fell a cumulative 71.5% but hedge funds fell less than half as much (33.0%). The 60-40 strategy also mitigated the market declines, but to a lesser degree than hedge funds did. That said, in all but one of the 12 months (Oct/2008), gold mitigated the market declines more than hedge funds did. In fact, although hedge funds had a negative return in all 12 months, gold had a positive return in all but three months. Furthermore, its cumulative impact was a *positive* 16.1%.

Panel B strengthens the previous point. In the worst six quarters of the last 20 years, hedge funds did mitigate the stock market declines in every case (as did the 60-40 strategy, to a lesser degree), but gold held up much better. Unlike hedge funds, which had a negative return in every quarter, and a cumulative return of -35.1%, gold had a positive return in every quarter, and a cumulative return of 36.7%.

Finally, panel C shows that, in the worst four years over the last 20, hedge funds mitigated the impact of stock market declines in three out of the four years, the exception being 2018, in which hedge funds declined slightly more than stocks did.

Cumulatively, hedge funds fell less than half as much as stocks did (20.5% versus 58.7%). Gold, however, provided protection against stock market declines in all four years, and cumulatively *gained* 33.1%.

The better performance of gold relative to hedge funds as an insurance against stock markets declines perhaps should not be that surprising. Although hedge fund managers typically stress their goal of delivering uncorrelated returns, the correlation between hedge funds and stocks was a very high 0.89, 0.85, and 0.83 over the last 10, 15, and 20 years. Over the same periods, the correlation between gold and stocks was 0.08, 0.06, and 0.04.

2.3. Further Discussion

The results of the previous two sections suggest that small individual investors should not wish they had access to hedge funds; despite their allure, hedge funds neither outperformed simple strategies widely available to all investors at a very low cost nor did they protect portfolios from stock market declines, at least as well (and cheaply) as gold did. This section first considers some objections that could be raised to the analysis and then expands the discussion.

First, the analysis of hedge funds was based on the fund-weighted version of the HFRI index (HFRI-FW), instead of on the asset-weighted version (HFRI-AW) which seems to be more appropriate. However, panel A of Exhibit 3 shows that over the (Jan/2008-Dec/2020) period for which both indices have data available their performance was very similar, with the fund-weighted version delivering a slightly higher return with a slightly higher volatility, but the same risk-adjusted return. Hence, using the asset-weighted version of the HFRI index would have limited the sample period of the analysis but not changed its main conclusions.

Second, the HFRI indices of hedge funds report returns net of fees, whereas the stock and bond indices used do not account for any fees. Would accounting for the cost of obtaining exposure to these indices change the results? Not really. Panels B and C of Exhibit 3 show that index funds, in particular Vanguard's VFIAX for stocks and VBTLX for bonds, delivered nearly- identical return, risk, and risk-adjusted return than did the indices considered.³³

33. The comparison between the S&P 500 and VFIAX covers the whole 20-year sample period used in this article. Because VBTLX was launched on Nov/12/2001, the comparison between the BB Agg and VBTLX starts in January, 2002.

Exhibit 3: Robustness

This exhibit shows, for the series of monthly returns, the arithmetic mean (AM), geometric mean (GM), standard deviation (SD), and risk-adjusted return (AM/SD); it also shows the annualized GM (Ann GM) and the annualized SD (Ann SD). Panel A focuses on two hedge fund indices, the fund-weighted index (HFRI- FW) and the asset-weighted index (HFRI-AW); panel B on U.S. stocks through an index (S&P 500) and an index fund (VFIAX); panel C on U.S. bonds through an index (BB Agg) and an index fund (VBTLX); and panel D on gold through its price and an ETF (IAU). All data through year-end 2020.

	A: Hedge Funds		B: U.S. Stocks		C: U.S. Bonds		D: Gold	
	(From Jan/2008)		(From Jan/2001)		(From Jan/2002)		(From Feb/2005)	
	HFRI-FW	HFRI-AW	S&P 500	VFIAX	BB AGG	VBTLX	Gold	IAU
AM (%)	0.33	0.28	0.70	0.70	0.38	0.37	0.91	0.89
GM (%)	0.31	0.27	0.60	0.60	0.38	0.37	0.79	0.76
SD (%)	1.96	1.64	4.35	4.34	0.98	0.99	5.00	5.12
AM/SD	0.17	0.17	0.16	0.16	0.39	0.38	0.18	0.17
Ann GM (%)	3.7	3.3	7.5	7.4	4.6	4.5	9.9	9.6
Ann SD (%)	6.8	5.7	15.1	15.1	3.4	3.4	17.3	17.7

Third, a similar argument can be raised about the performance of gold, which was reported before the costs of investing in it. Would that make a difference when evaluating its ability to protect portfolios relative to hedge funds? Again, not really. Panel D shows that over most of the period analyzed the same protection could have been achieved by investing in a gold ETF, which would have delivered essentially the same return, risk, and risk-adjusted return.³⁴

A bad (but not unheard of) argument would suggest that focusing on an index of hedge funds obscures the fact that

some hedge funds may have performed very well, and much better than the index. The Medallion fund, from Jim Simon's Renaissance Technologies, is a case in point. Exhibit 4 shows that between 1988 and 2018 the fund returned 37.7% per year net of fees, obliterating the annual return of the S&P 500 (10.2%).³⁵ In fact, \$100 invested in the S&P 500 at the beginning of 1988 would have turned into just over \$2,000 by the end of 2018, and into over \$2 million in the Medallion fund.

34. The ETF considered is BlackRock's iShares Gold Trust (IAU) which currently has an expense ratio of 25 basis points. Because IAU was launched on Jan/21/2005, the comparison between gold and IAU starts in February, 2005. State Street's SPDR Gold Shares (GLD) would have provided the same protection but a slightly higher cost (currently 40 basis points).

35. Before fees, the annualized return of the Medallion fund was 63.3%. The fees of the highly-secretive fund have reportedly been 5% of assets plus a performance fee that increased over time from 20% to 44%.

Exhibit 4: The Medallion Fund

This exhibit shows, for the series of annual returns of the S&P 500 and the Medallion fund between 1988 and 2018, the arithmetic mean (AM), geometric mean (GM), standard deviation (SD), risk-adjusted return (AM/SD), and terminal value of \$100 (TV) invested at the beginning of 1988.

	S&P 500	Medallion
AM (%)	11.6	39.1
GM (%)	10.2	37.7
SD (%)	16.9	20.0
AM/SD	0.69	1.95
TV (\$)	2,017	2,031,813

Needless to say, the performance of the Medallion fund has been remarkable by any measure. And yet, the skill or the earnings of tennis players cannot be assessed by focusing on Roger Federer or Rafael Nadal; both are clear outliers and far from representative of tennis players at large. In addition, just as the HFRI index condenses the performance of a large number of hedge funds, the S&P 500 and the BB U.S. Aggregate condense the performance of a large number of stocks and bonds, some of which are bound to outperform the aggregate indices.

One final point. Like hedge funds, private equity companies target institutional and wealthy individual investors. Should small individual investors regret being left out? For at least two reasons, not really. The first reason is that individual investors can get indirect access to private equity by buying shares of the private equity companies that trade publicly, such as Blackstone, Carlyle, and KKR, to name but three. The second reason is, again, the stubbornness of evidence, such as that reported in Exhibit A2 in the appendix.

Listed private equity companies (LPX50) delivered somewhat higher returns than hedge funds, particularly over the last 10 years, but also exposed investors to far higher volatility.³⁶ In fact, these companies had higher volatility than both stocks and the 60-40 strategy over the last 10, 15, and 20 years. Over the last 10 years, panel A shows that private equity underperformed stocks and outperformed the 60-40 strategy

in terms of return (10.5% versus 13.9% and 10.0%). Because of its far higher volatility, however, private equity clearly underperformed stocks and the 60-40 strategy in terms of risk-adjusted return (0.18 versus 0.30 and 0.36). A strategy consisting of 65.1% in stocks (and 34.9% in bonds) would have matched the return of private equity but exposed investors to less than half its volatility (8.7% versus 19.9%).³⁷

Over the last 15 years, panel B shows that private equity underperformed stocks and the 60-40 strategy in terms of both return (5.5% versus 9.9% and 8.1%) and risk-adjusted return (0.10 versus 0.20 and 0.27). Similarly, over the last 20 years, panel C shows that private equity underperformed stocks and the 60-40 strategy in terms of both return (5.8% versus 7.5% and 6.9%) and risk-adjusted return (0.10 versus 0.16 and 0.23). Over both periods, optimized stock-bond strategies that matched the return of private equity exposed investors to much lower volatility (3.5% versus 25.7% over the last 15 years, and 4.2% versus 24.4% over the last 20 years), thus producing a much higher risk-adjusted return.³⁸

The results are not very different if private equity companies are compared to an investment in global (rather than U.S.) stocks and bonds. Unreported results show that private equity underperformed both global stocks and a global 60-40 strategy in terms of risk-adjusted return over the last 10, 15, and 20 years. In short, although small individual investors cannot invest directly in private equity, they can invest indirectly in private equity companies. The fact that they can, however, should not lead them to conclude that they should; as with hedge funds, evidence from the last 10, 15, or 20 years would not support such decision.

3. ASSESSMENT

The glamour surrounding hedge funds never fails to surprise those familiar with their performance. Yes, some hedge funds have produced spectacular returns; and yes, many hedge fund managers are very wealthy. Still, the performance of the hedge fund industry has been nothing if not a major disappointment. As shown here, extremely-simple strategies that combine stocks

36. The LPX50 is a cap-weighted index of the 50 most highly capitalized and liquid listed private equity (global) companies.

37. In the analysis of the previous section, the optimized portfolios aimed to maximize return subject to the restriction of matching the volatility of hedge funds; that made sense because hedge funds were less volatile than both stocks and the 60-40 strategy. In this section, because private equity was more volatile than both stocks and the 60-40 strategy, it makes more sense to find the combination of stocks and bonds that minimizes volatility subject to the restriction of matching the return of private equity.

38. Among the listed private equity companies, Blackstone has performed particularly well. Having gone public on June 21, 2007, between Jul/2007 and Dec/2020, the company returned 12.5% per year, clearly outperforming the LPX50 (3.5%) and the S&P 500 (9.3%), albeit with a higher volatility than both.

and bonds, which can be implemented with just two index funds or ETFs, have outperformed hedge funds in terms of return and risk-adjusted return over the last 10, 15, and 20 years.

Rekenthaler (2018) argues that there are no ways to portray the performance of the hedge fund industry positively. In his view, hedge funds had a disappointing seven-year stretch through 2013, followed by half a decade of even worse performance, and preceded by three years of unremarkable performance. Inevitably, he concludes that regardless of how the analysis is performed, "hedge funds have failed."

Lack (2012) argues that hedge funds produced high returns when the industry was small, but the returns declined substantially as the industry grew.³⁹ In fact, the HFRI data shows that the annualized returns of hedge funds were 18.3% over the 1990-1999 period, 6.4% over the 2000- 2009 period, and 4.0% over the 2010-2019 period, confirming the decreasing trend in returns.⁴⁰ Unsurprisingly, institutional investors have been reconsidering their involvement with the hedge fund industry. From insurance companies to pension

funds, numerous large investors, fed up with low returns and high fees, have been busy trimming or eliminating their allocation to hedge funds. Notably, CalPERS, the largest public pension plan in the U.S., announced in September, 2014, that it would be divesting its \$4 billion investment in hedge funds, thus eliminating its exposure to the industry; see Hartley (2014).

It should not be surprising to anyone familiar with their thinking that John Bogle and Warren Buffett have repeatedly rallied against hedge funds. Not only did they have evidence on their side but also had a plausible alternative to suggest. Painful as it may be to many, simple, broadly- diversified, low-cost portfolios are very hard to beat; and that includes mighty rivals such as hedge funds. Come to think of it, that *particularly* includes hedge funds.

-
39. Interestingly, his analysis was made in the early 2010s, when the industry had \$1.6 trillion of assets under management, less than half the amount that hedge funds managed by the end of 2020 (\$3.8 trillion).
40. The poor and declining performance of hedge funds has of course not gone unnoticed in the academic literature. Bollen et al (2020) and Newton et al (2020) discuss it at length, as do the references therein.

APPENDIX

Exhibit A1: Performance – Hedge Funds vs. Global Stocks and Bonds

This exhibit shows, for the series of monthly returns, the arithmetic mean (AM), geometric mean (GM), standard deviation (SD), and risk-adjusted return (AM/SD); it also shows the annualized GM (Ann GM), annualized SD (Ann SD), and the terminal value of \$100 (TV) invested at the beginning of each of the three periods considered. The second column focuses on hedge funds (HFRI), and the rest of the columns in portfolios with different proportions of global stocks (MSCI ACWI) and global bonds (BB Global Aggregate), with the figures in bold at the top of each panel referring to the proportion of stocks.

A: 2011-2020	HFRI	100	60	31.0
AM (%)	0.36	0.86	0.61	0.43
GM (%)	0.34	0.78	0.57	0.41
SD (%)	1.75	4.04	2.63	1.75
AM/SD	0.20	0.21	0.23	0.25
Ann GM (%)	4.2	9.7	7.1	5.1
Ann SD (%)	6.1	14.0	9.1	6.1
TV (\$)	151	253	199	164
B: 2006-2020	HFRI	100	60	24.5
AM (%)	0.40	0.74	0.60	0.45
GM (%)	0.39	0.63	0.55	0.43
SD (%)	1.90	4.68	3.05	1.90
AM/SD	0.21	0.16	0.19	0.24
Ann GM (%)	4.7	7.8	6.8	5.3
Ann SD (%)	6.6	16.2	10.6	6.6
TV (\$)	200	307	268	218
C: 2001-2020	HFRI	100	60	23.7
AM (%)	0.47	0.65	0.56	0.47
GM (%)	0.45	0.54	0.52	0.45
SD (%)	1.81	4.58	2.92	1.81
AM/SD	0.26	0.14	0.19	0.26
Ann GM (%)	5.5	6.7	6.4	5.6
Ann SD (%)	6.3	15.9	10.1	6.3
TV (\$)	294	363	347	296

Exhibit A2: Performance – Private Equity vs. U.S. Stocks and Bonds

This exhibit shows, for the series of monthly returns, the arithmetic mean (AM), geometric mean (GM), standard deviation (SD), and risk-adjusted return (AM/SD); it also shows the annualized GM (Ann GM), annualized SD (Ann SD), and the terminal value of \$100 (TV) invested at the beginning of each of the three periods considered. The second column focuses on private equity (LPX50), and the rest of the columns in portfolios with different proportions of U.S. stocks (S&P 500) and U.S. bonds (BB U.S. Aggregate), with the figures in bold at the top of each panel referring to the proportion of stocks.

A: 2011-2020	LPX50	100	60	65.1
AM (%)	1.01	1.17	0.82	0.87
GM (%)	0.84	1.09	0.80	0.84
SD (%)	5.73	3.89	2.32	2.51
AM/SD	0.18	0.30	0.36	0.35
Ann GM (%)	10.5	13.9	10.0	10.5
Ann SD (%)	19.9	13.5	8.0	8.7
TV (\$)	272	367	259	272
B: 2006-2020	LPX50	100	60	14.7
AM (%)	0.73	0.88	0.69	0.45
GM (%)	0.45	0.79	0.65	0.45
SD (%)	7.41	4.35	2.59	1.01
AM/SD	0.10	0.20	0.27	0.45
Ann GM (%)	5.5	9.9	8.1	5.5
Ann SD (%)	25.7	15.1	9.0	3.5
TV (\$)	223	411	323	223
C: 2001-2020	LPX50	100	60	25.0
AM (%)	0.73	0.70	0.59	0.48
GM (%)	0.47	0.60	0.56	0.47
SD (%)	7.05	4.35	2.53	1.22
AM/SD	0.10	0.16	0.23	0.39
Ann GM (%)	5.8	7.5	6.9	5.8
Ann SD (%)	24.4	15.1	8.8	4.2
TV (\$)	311	422	378	311

REFERENCES

- Ben-David, Itzhak, Justin Birru, and Andrea Rossi (2020). "The Performance of Hedge Fund Performance Fees." https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3630723.
- Bollen, Nicolas, Juha Joenväärä, and Mikko Kauppila (2020). "Hedge Fund Performance: End of an Era?" https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3034283.
- Hartley, Jon (2014). "Why CALPERS Is Exiting the Hedge Fund Space." *Forbes*, September 22. <https://www.forbes.com/sites/jonhartley/2014/09/22/why-calpers-is-exiting-the-hedge-fund-space>
- Lack, Simon (2012). *The Hedge Fund Mirage – The Illusion of Big Money and Why It's Too Good to Be True*. John Wiley & Sons.
- McCrum, Dan (2018). "These hedge fund numbers can't be right." *Financial Times*, April 20. <https://www.ft.com/content/864b37b9-f6f9-392a-91a4-758ee90a9e94>
- Newton, David, Emmanouil Platanakis, Dimitrios Stafylas, and Xiaoxia Ye (2020). "Hedge Fund Strategies, Performance & Diversification: A Portfolio Theory & Stochastic Discount Factor Approach." https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3388184.
- Picker, Leslie (2021). "Two and Twenty Is Long Dead. Hedge Fund Fees Fall Further Below Onetime Industry Standard." *CNBC*, June 28. <https://www.cnbc.com/2021/06/28/two-and-twenty-is-long-dead-hedge-fund-fees-fall-further-below-one-time-industry-standard.html>
- Rekenthaler, John (2018). "Will Hedge Funds Ever Recover?" *Morningstar*, September 21. <https://www.morningstar.com/articles/883298/will-hedge-funds-ever-recover>
- Wigglesworth, Robin (2020). "DE Shaw Quant Takes Hit From Markets Gone Haywire." *Financial Times*, March 24. <https://www.ft.com/content/90876f5c-6cf0-11ea-89df-41bea055720b>
- Zuckerman, Gregory (2019). *The Man Who Solved the Market – How Jim Simons Launched the Quant Revolution*. Portfolio / Penguin, Random House.
- Zweig, Jason (2020). "Invest With the Upper Crust and Sometimes You Just Get Crumbs." *Wall Street Journal*, June 19. <https://www.wsj.com/articles/invest-with-the-upper-crust-and-sometimes-you-just-get-crumbs-11592585413>