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A SURVEY OF EMPIRICAL LITERATURE ON HEDGE FUND PERFORMANCE

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A Survey of Empirical Literature on Hedge Fund Performance

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Abstract:
This paper reviews recent developments in empirical literature analyzing hedge fund performance. Popularity of hedge funds as an investment device has dramatically increased over the past decades. This prompted extensive academic research examining their performance. Systematic examination of hedge fund performance is plagued by the opaqueness of their operations, which complicates risk measurement, and by the lack of well-regulated systematic disclosure, which makes it difficult to obtain comprehensive bias-free data sets. Thus, various studies reach divergent conclusions about hedge funds' ability to benefit from investment managers' prowess in generating superior return. We survey this literature and classify it into several streams based on the underlying performance drivers. We compare and contrast conclusions of individual articles and conclude that even though there is little consensus on the magnitude and significance of hedge fund outperformance most published studies seem to suggest that hedge funds earn at least the excess return to cover the fees they charge. The relationship between the regulation and performance is complex but more stringent regulation seems to reduce managerial misreporting.

JEL: G12, G28
Keywords: hedge fund, literature, review, survey

1. Introduction

Efficient allocation of capital in the economy crucially depends on efficient pricing of assets in capital markets. In well-functioning markets prices aggregate diverse pieces of information possessed by heterogeneously informed traders, and so they can provide valuable guidance on factors beyond individual agents' horizons and induce efficient use of resources in the economy even if no investors possesses all relevant information (Hayek 1945). To induce efficient allocation of capital market prices must incorporate all information available to investors at that point in time, i.e. the market must process information efficiently (Fama 1970). Prices can be seen as a value-weighted consensus of investors' opinions about securities' intrinsic value (Lee 2001). Composition of investors and their activity thus matters for pricing efficiency. The more investors actively collect information about traded assets and independently estimate their intrinsic value the faster information gets reflected in prices and the more efficient markets get. Efficient pricing thus heavily relies on the activity of "speculative" or "contrarian" investors who trade on perceived mispricing and in doing so they help eliminate it. Hedge funds are prototypical "contrarian" or "speculative" traders that specialize in information-based trading that promotes market efficiency (Stulz 2007).1

Hedge funds are actively managed private investment vehicles for a limited number of accredited investors (institutional investors, companies, and high-net-worth individuals) that are structured to benefit from favorable regulatory and tax status, which allows them to take aggressive positions in a wide range of financial assets in order to hedge away any risk that is not implicit in their investment strategy (Connor & Woo 2004, Fung and Hsieh 1999; Stulz

[1] "Because hedge funds seek inefficiencies in the capital markets and attempt to correct them, they can play a valuable role in financial markets by bringing security prices closer to fundamental values. […] Mutual funds cannot contribute to making financial markets more efficient as effectively as hedge funds can." (Stulz 2007)

2007). The etymology of their name originates from the strategy of the first hedge funds that took the long-short or "hedged" position in equities. Such a strategy involves combining long positions in assets considered undervalued with short positions in similar assets considered overvalued. Since the two assets are closely related they likely have similar market risk exposures. The long-short position thus eliminates or "hedges" most of the market risk, which implies that the strategy should be close to "market neutral" (Patton 2009), i.e. able to generate return regardless of general capital market conditions. Employing such strategies thus leaves the fund with only the idiosyncratic risk of specific assets they bet on. It lets hedge funds specialize in pure information-based trading with little capital investment (Connor & Woo 2004).

Over time hedge funds gradually started adopting a wide range of investment strategies, many of which significantly deviate from the original "hedged" positions that initially gave hedge funds their name. Popular investment styles include: (i) relative value arbitrage strategies that exploit anomalies in fixed-income markets involving interest rates spreads, yield curves, discrepancies in cross-country bond yields, or mispricing of convertible debt relative to the corresponding equity and debt valuation, (ii) event-driven strategies that invest based on predicted outcomes of significant business events, e.g. mergers and acquisitions, spin-offs, and bankruptcies (Cao et al. 2016), and (iii) macro strategies that make leveraged bets on mispriced asset sensitivities to anticipated changes in interest rates, foreign exchange rates, and commodity prices, (Connor & Woo 2004, Stulz 2007). Many of these strategies are significantly riskier than what the word "hedge" would indicate. Furthermore, hedge funds make extensive use of financial derivatives and leverage, which further underscores their appetite for risk-taking (Connor & Woo; Ang, Gorovyy, and van Inwegen 2011).

Market-neutrality implies that hedge funds tend to perform better than conventional asset classes in recessions. Investors were found to over-extrapolate from past returns (Barberis and Shleifer 2003). Hence, hedge funds experienced a steep inflow of funds after market downturns of 1987, 2002, and 2007-2009 when hedge funds suffered less than equities and fixed income (Stulz 2007). The cumulative value of assets under hedge fund management (AUM) has surged over the past three decades. In 1990, hedge funds managed less than $50 billion, which represented less than 4 percent of the cumulative value of mutual funds. In 2006, AUM in hedge funds surpassed $1 trillion representing more than 10 percent of mutual fund holdings (Stulz 2007). In 2017, AUM estimates from various data vendors range between $3.0-3.5 trillion in 2017 (Barth et al. 2020; Brown et al. 2018). The estimate is larger when using a more accurate method by aggregating data from seven public databases with non-public information from the SEC, in which case the AUM are estimated at $5.2 trillion. The number could be even higher because there are exceptions that some funds do not market themselves through data vendors or are not required to report to SEC (Barth et al. 2020).

Investors who flocked to hedge funds must have been ready to pay substantial fees. A typical hedge fund charges a management fee of 1 to 2 percent of AUM and in addition to it a performance fee of 15 to 25 percent of generated returns generated above a hurdle rate, typically the risk-free rate (Fung and Hsieh 1999; Connor & Woo 2004; Stulz 2007). This fee structure strongly incentivizes hedge fund managers to perform better and it allows successful managers to earn compensation similar to what they would earn in mutual funds 10 times the size of the hedge fund (Connor & Woo 2004, Tremont, 2002. Performance fees tend to be highly asymmetric, i.e. fund managers are compensated for gains, but they are not equivalently penalized for commensurate losses (Fung and Hsieh 1999). Naturally, these option-like payoffs encourage managerial risk-taking. Nevertheless, performance fees are

typically paid only after reaching the so-called “high water mark”, i.e. the minimum level of absolute performance over the entire investment lifetime (Asness et al. 2001; Goetzmann, Ingersoll, and Ross 2003; Lim et al. 2016; Economist 2019, Stulz 2007). High water marks ensure that managers can claim performance fees only after having recovered any potential losses incurred in the past. The high-water mark provisions moderate managerial risk-taking incentives.

Increasing popularity of hedge funds and the magnitude of their fees prompted questions on whether they create value for investors over and above the fees they charge and whether specific hedge funds have more able managers and consistently outperform competitors. Addressing these questions turns out to be challenging for at least two reasons - (i) data limitations and (ii) complicated risk measurement.

First, hedge funds target accredited investors, which allows them to avoid much of the regulatory oversight applicable to mutual funds. The favorable regulatory status allows hedge funds to maintain flexibility in their investment style, to prevent revealing proprietary information on their trading strategies to competitors, and to avoid the cost of audited periodic disclosure. The absence of mandatory disclosure implies that there is no central depository of hedge fund data. Hedge fund data is not comprehensive as only a subset of funds self-select to voluntarily report information on their performance to private data providers. This subset of hedge funds may not be representative of the entire population and so estimates based on these private databases may be biased. Smaller funds are more likely to disclose information for attracting investors (Jorion and Schwarz 2014). Funds that turn out to be more successful during their initial incubation period are more likely to appear in the database (Fung and Hsieh 2000). Additional distortions arise due to private data providers’ policies. They typically exclude funds that do not accept new capital any more because these funds are not

relevant investment targets for their subscribers (Fung and Hsieh 2000). Both the unsuccessful ("dead") funds that were closed down and the successful funds that have raised as much capital as they sought may be excluded from these databases. These exclusions are far from being random and so they are likely to distort performance estimates. Furthermore, there is only some overlap in the coverage of individual databases (Agarwal, Daniel, and Naik 2009), and information on a specific fund may differ across the databases. Some studies use the union of several databases (e.g. Kosowski, Naik, and Teo 2007b; Aiken et al. 2016; Agarwal, Daniel, and Naik 2009), while other studies rely on a single database (e.g. Fung and Hsieh 2006; Lim, Sensoy, and Weisbach 2016; Yin 2016; Sadka 2010; Teo 2009). Some studies provide explicit arguments for the use of a single database, but some do not. There are even studies that use hand-collected data from regulatory filings of registered funds-of-funds that are more heavily regulated than individual hedge funds (e.g. Aiken, Clifford, and Ellis 2013). In addition, hedge funds are not obliged to have their data independently audited. This implies that the provided data may not only fail to be comprehensive but it may also not be reliable, either because the valuation of illiquid holdings is imprecise (Cassar and Gerakos 2011) or because the highly incentivized managers tamper with the reported information to give an impression of stronger and more consistent performance (Bollen and Pool 2009).

Second, it is difficult to properly adjust for the risk that individual hedge fund strategies involve (Asness et al. 2001). To maintain their competitive edge hedge funds cannot afford disclosing too much information on their investment strategies and under holdings. This leaves investors with rather superficial strategy descriptions (Asness et al. 2001). Investors may try to infer risk from data on historical performance that the funds provide. The aim for market neutrality implies that hedge fund returns tend to be less volatile than in mutual funds. However, the asymmetric compensation structure strongly incentivizes hedge

fund managers to take risk (Connor & Woo 2004) and the regulatory flexibility allows funds to engage in a wide range of complex investment strategies, whose risk characteristics often are not comparable with conventional equity or debt risk profiles. Furthermore, hedge fund managers often enhance risk with the use of significant leverage and financial derivatives. Stulz (2007) suggests that hedge fund risk profiles may resemble to the one of a company selling earthquake insurance. The company may appear to have very low risk over fairly long periods of time when there is no earthquake and the company collects fairly stable levels of insurance premiums. However, when an earthquake strikes the true magnitude of the company's systematic risk may quickly become apparent. It is therefore reasonable to expect the hedge fund risk to be substantial.

Due to the unorthodox investment strategies conventional risk proxies based on simple variances, covariances, or scaled returns (e.g. the Sharpe ratio) may not be suitable for estimating hedge fund risk (Eling and Schuhmacher 2007; Géhin 2004). Prior research proposes several alternative measures that may be more applicable in this setting. As the various factors taken into consideration, the results of performance of hedge funds change accordingly. Almeida et al. (2020) propose a class of performance measures based on stochastic discount factors. Performance estimates based on this measure identify fewer funds with significantly positive alphas (relative Jensen's alpha) and considerable changes in the performance ranking of individual funds. Using dollar-weighting to adjust for changes in investor exposure over time increases risk estimates to a point that suggest that the return for investors is close to zero (Dichev and Yu 2011). Besides the complicated measurement of volatilities and sensitivities, it is not trivial to factor in other constraints imposed by hedge funds that affect their liquidity. Hedge funds often limit investors' ability to withdraw funds (Teo 2011), invest in illiquid securities that are hard to value (Asness et al. 2001), and they

exhibit exposure to macroeconomic liquidity shocks (Sadka 2010). These various manifestations of hedge fund illiquidity merit a return premium. However, it is not clear how large the premium should be.

The complexity of appropriate measurement of hedge fund performance prompted extensive empirical research in this area. The figure below shows that the average number of studies on the topic published in the top five financial journals - Journal of Finance, the Journal of Financial Economics, the Review of Financial Studies, Journal of Financial and Quantitative Analysis, and the Review of Finance - has increased from 3 in 2000 to 2009 to 11 in 2010 to 2019[2].

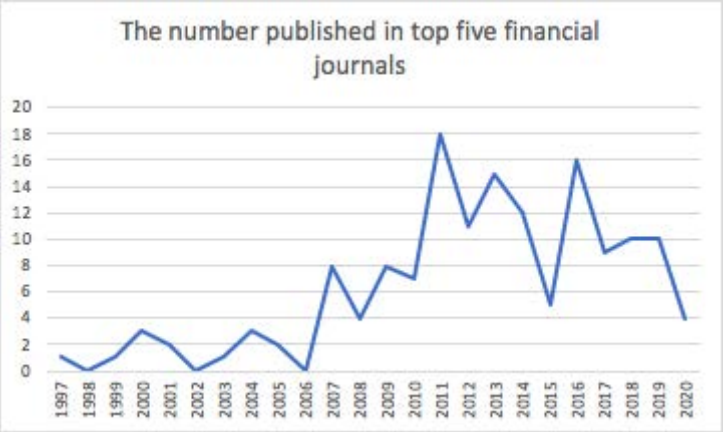

Figure 1 - Hedge fund related articles in top journals (JF, JFE, RFS, JFQA, and RF).

Note: the numbers exclude the papers that are only published online without a print version.

This research has amassed an extensive body of often contradictory empirical evidence on hedge fund performance in various settings. For example, Ackermann, McEnally,

[2] We searched the key words "hedge funds" in websites of individual journals and counted the number of papers that include the words in the title, keywords, or the abstract by years.

and Ravenscraft (1999) compare the performance of hedge funds with mutual funds by sharpe ratio and find that hedge funds consistently outperform mutual funds, but the hedge fund annual returns and sharpe ratios are not better than general indices such as S&P 500. Conversely, Ding and Shawky (2006) show the outperformance of hedge funds compared with market index. Liang (1999) argues that, compared with mutual funds, hedge funds have superior performance but higher total risks. Nonetheless, Amin and Kat (2003) conclude that hedge funds do not offer a superior risk-return profile by the efficiency test. The alpha, which is used to represent the performance of hedge funds, fluctuates in various studies (e.g. Fung et al. 2008; Dichev and Yu 2011).

In this paper we survey the extensive body of hedge fund research. We identify the main themes and we discuss the various controversies that complicate reaching more clear-cut conclusions. We pay special attention to research analyzing hedge fund performance and the persistence of performance of individual hedge funds, which gives indication on the ability of hedge fund managers. We also study how investors process the performance of hedge funds for their investment decisions by examining the relationship between the capital flows and past performance. We limit our attention to hedge fund research in finance and we will not attempt to review the business strategy literature that examines how hedge fund activism affects corporate governance and how it shapes corporate strategies. We analyze reasons why some of the extant evidence on hedge fund performance is inconsistent or contradictory. We study the key factors that influence the differences in results and we discuss how prior research addresses the data sample limitations resulting from the lack of regulated mandatory disclosure and the evolution of measures intended to adequately control for risk of the unorthodox strategies that hedge funds follow. We classify the literature into several streams based on views from analysts, investors, and regulators. We introduce the theoretical

measurement of hedge fund performance and manager skills reflected by performance persistence and review how investors perceive the hedge fund performance through the capital flows. And explain the cost and benefits of regulations imposed on hedge funds. We conclude that most of the published studies suggest that the hedge fund performance is positive, even the result may be insignificant or have a large dispersion. The performance is also affected by factors such as managers' strategies, liquidity and macroeconomic variables.

We make several important contributions. First, our survey of literature allows us to aggregate and synthesize empirical evidence on hedge fund performance, to compare and contrast findings in various studies, and to draw general conclusions that consider the weight of evidence in favor various viewpoints. Such analysis is relevant for investors who consider hedge funds as a potential investment target. Second, by presenting insights about why previous studies reach contradictory conclusions about hedge fund performance, this paper identifies potential areas for future research on hedge funds. The areas involve the use of improved methods to estimate hedge fund risk, a systematic treatment of data biases, and exploitation of time-series and cross-sectional variation in hedge fund regulations. Third, our study also has important implications for regulators who make decisions on corporate governance and disclosure requirements. Even though it would be intuitive to expect more benevolent regulation to increase hedge fund profitability prior research shows that that is not necessarily the case. Lax regulation distorts managerial incentives to perform and the absence of mandatory disclosure makes it more difficult to hold fund managers accountable for their decisions. Prior research suggests that the latter effect may offset much of the benefit stemming from the investment flexibility that hedge funds have as a consequence of weak regulation. Regulators thus need to predict the effect of various rules and balance the needs for transparency and managers' incentive.

The remainder of the paper is organized as follows. In Section 2, we provide a background of hedge funds and summarize the characteristics of hedge funds, including target investors, strategies, risks, as well as reporting channels that distinguish them from other funds. Section 3 makes the prediction about the performance of hedge funds and lists various reasons that support our argument. Section 4 reviews the literature on hedge fund performance and related topics such as performance persistence, and the relationship between past performance and capital flows. We discuss the situation that the results of hedge fund performance are controversial from available evidence. We analyze and provide possible reasons: first, there is no consensus on a proper method that is best for the evaluation of hedge fund performance. We describe the development history of the main available methods used in hedge fund papers, along with their advantages and disadvantages. We discuss some new methods that developed on different theories or extended based on standard approaches and consider additional factors that are not captured by previous approaches. Second, studies use different data sources for analysis while there are differences among these databases. Samples inherent different degrees of selection bias, survivorship bias, and backfilling bias from varying choices of databases. The reliability and accuracy of results depend highly on how properly scholars deal with these biases. Section 5 synthesizes the literature on the relationship between the regulations and hedge funds performance or managers' misreporting. One of main challenges for policy makers is to what extent hedge funds should be regulated. This section discusses related evidence that may give regulators some hints. Finally, section 6 concludes comments and promising future research of related topics.

2. Background

It is commonly suggested that the first hedge fund was created in 1949 by a former Fortune magazine writer Alfred Winslow Jones who combined long and short positions in

investments to equities to hedge out the market risk. Jones invested 40% of the initial capital and earned 20% of the profits as a performance incentive fee. By employing the leverage and the strategy of buying undervalued securities and selling overvalued securities, he got over 600% return during 10 years (Connor & Woo 2004; Caldwell 1995). In 1966, an article in Fortune revealed the higher return earned by Jones' fund compared with mutual funds. That made the public aware of this type of investment partnership and invited imitation. After a rapid growth from 1966 to 1968, the young industry experienced a difficult time because of the stock market boom when conventional mutual funds tend to perform relatively well. Since the traditional long-short hedging strategy were not better than the overall market, hedge fund managers switched to the leveraged long bias strategy. But the higher risk strategy led to greater loss in the following bear market (Connor & Woo 2004).

In the mid-1980s, Julian Robertson's Tiger Fund, a global macro fund that invest in securities and currencies with leverage in the global context, succeeded in anticipating the trend of the US dollar against European and Japanese currencies and earned an average annual return up to 43%, which created another wave of hedge fund formation (Connor & Woo 2004; Fund & Hsieh 1999). As the growth of the industry, not all hedge funds feature hedging, and there are, in fact, no universally accepted definition of hedge funds in the worldwide context (Brav et al. 2008), but they do share some typical characteristics.

First, hedge funds are private investment vehicles for high-net-worth individuals or institutional investors. The funds are formed as limited partnerships and require a large initial minimum capital, managers and investors are general partners and limited partners respectively (Fung and Hsieh 1999). Those limited number of accredited and sophisticated investors generally accept higher degrees of share illiquidity because common redemption policy requires investors to commit initial capital for fixed periods- usually a year or two,

during which periods they are not allowed to withdraw investments. Some funds also require a notice several months prior to a redemption period (Aragon 2007). The “lockup period” and “redemption notice period” give managers more freedom for their specific strategies. Because the targeted investors are presumed to have resources and ability to protect themselves, they are treated differently from general public investors. And thus hedge funds have limited constraints imposed by regulations (Fung and Hsieh 1999).

Second, hedge funds utilize complex, dynamic, and relatively unconstrained investment strategies that aggressively exploit a wide range of investment opportunities in the market. They typically further increase the risk of their position by means of financial leverage, financial derivatives, and short selling (Brown, Lu, Ray, Teo 2018). Main popular fund categories involve long-short equity, event-driven, macro, and fixed-income arbitrage (Stulz 2007). Long-short equity strategies are achieved by choosing related under- or overvalued securities to offset long and short positions and avoid most of the market risk. But they are not necessarily market neutral because of long or short bias (Connor & Woo 2004). Event-driven hedge funds capture mispricing or inefficiency before significant events, like corporate merger and bankruptcies. The managers purchase and sell stocks of merging companies according to the forecast that whether or when a merger will be completed. Global macro is based upon the judgement or predicting on the movements of international conditions (e.g. currency exchange rates, inflation, and political stability). For example, global macro hedge funds were active before the Brexit vote in 2016 when Britain voted to exit the European Union (EU). The managers would take long positions in safe assets, such as gold, and shorted British pound if they anticipated that Britain would leave the EU. They would get enough profits when investors flee to safer investments after the referendum (Rob et al., 2016) And fixed-income arbitrage hedge funds focus on fixed-income markets (Stulz 2007).

Third, as hedge funds aim to offset general market movements, they mostly pursue absolute return rather than relative return to some market benchmark (Gregoriou, Sedzro, and Zhu 2005; Stulz 2007). Unlike traditional active funds that measure risks against the benchmark, hedge funds suffer risk depending on the investment decisions made by fund managers who are strongly incentivized to take risk and perform. For a typical global macro fund, the market risk may include the movements of currency exchange rates, interest rate, and political environment. And liquidity risk increases when some macro funds specialize in illiquid assets in emerging markets. Hedge funds are also exposed to credit risk due to the high leverage engaged in the operation. The extremely severe market condition could enforce hedge funds to face both credit risk and liquidity risk, and possibly threaten their survival (Connor & Woo 2004).

The widely known hedge fund failures including the Long-Term Capital Management L.P. (LTCM)[3] prompted considerations about their potentially detrimental role for the society as a whole. Hence, despite their prominent role in promoting financial market efficiency hedge funds may also play a darker role and be macroeconomically destabilizing.

Fourth, hedge funds managers receive generous rewards tied to fund performance (Malkiel and Saha 2005). In general, they have 20% of profits if the fund exceeds its previous high-water mark except regular fees of 2% of assets (Guasoni and Obłój 2016, Economist 2019). The incentive fee is important because it aligns the managers' interest with investors'

[3] Long-Term Capital Management L.P. was a hedge fund started in 1993 by John Meriwether, a renowned Wall Street trader, as a founder and Myron Scholes and Robert Merton, Nobel Prize-winning economists, as the principal shareholders. It experienced great success between 1994 and 1998 with a return of more than 40% per annum. However, due to extremely high leverage and 1998 Russian financial crisis, LTCM lost $1.9 billion in a month and collapsed abruptly in 1998. Considering that the bankruptcy may cause a worldwide crisis because LTCM had thousands of derivative contracts, the Federal Reserve Bank of New York organized a bailout to avoid wider contagion in financial markets.

while the high-water mark ensures that managers would not be satisfied with merely recovering previous loss. Sometimes the hurdle rate, equivalent to risk-free return, is set for minimum performance qualified for incentive fees (Connor & Woo 2004). But hedge fund managers do not need to rebate fees for losses (Fung and Hsieh 1999). The asymmetric fee structure may be non-trivial. Inadequate adjustment for fees charged by hedge funds may lead to biased estimates of their performance.

Finally, voluntary reporting allows fund managers to select whether to report and which database to report. Hedge fund managers usually do not report details about portfolios or positions to avoid revealing their strategies. Instead, they provide information about their investment styles. And hedge funds are not allowed to advertise publicly, this leaves databases performing as a major distribution channel (Fund and Hsieh 2004; Baquero, Horst, and Verbeek 2005).

3. Prediction

A priori, it is not quite obvious whether hedge funds are likely to outperform actively managed mutual funds and/or passive index tracking. On the one hand, the flexibility resulting from the regulatory status that hedge funds have puts them in a strong position to exploit opportunities that others cannot. On the other hand, the resulting opacity may limit managerial accountability. If financial markets are reasonably efficient to begin with, hedge funds might be chasing elusive investment opportunities and charge substantial fees for their futile effort. Possibly hedge funds are run by extremely overconfident individuals and the means by which they attract capital rely more on investors' susceptibility to managers'

personal charm than on a pragmatic economic calculus.[4] On what grounds should we then expect superior or inferior hedge fund performance?

Hedge funds derive numerous benefits from their regulatory status. Their lax regulation allows them to adopt a wide range of rather unorthodox investment styles. They can creatively design and adopt strategies that are not permissible for the conventional more tightly regulated investment devices, such as mutual funds. Hedge funds may also tap attractive market segments that were previously the domain of investment banks, such as fixed income arbitrage (Connor & Woo 2004, Schneeweis 1998). Hedge funds can thus act as investment strategy innovators and benefit from their first-mover advantage and from introducing competition into previously oligopolistic market segments. Lenient regulation allows hedge funds to be secretive about the nature of their strategies, their holdings, and annual performance. This likely helps them maintain their competitive edge for longer relative to conventional mutual funds who are obliged to provide comprehensive disclosures from which their competitors can infer the fundamental facets of their strategies. This advantage may be further amplified by the fairly long "lockup periods", during which investors cannot withdraw their investment in the hedge funds. The "lockup periods" partly relieve hedge fund managers from short-term performance pressures and allow them to engage in long-term strategies that may be unprofitable for some time without the risk of being forced by disgruntled investors to liquidate their assets at prices below their values.

Hedge funds also benefit from their flexibility in designing managerial compensation contracts for their managers (Agarwal, Daniel, Naik 2009; Cao et al. 2016). Regulation obliges incentive compensation of mutual fund advisers to be symmetric, i.e. their bonus for

[4] The Bernard L. Madoff Investment Securities investors mention the founder's personality as one of the reasons why they remained confident in the fund for so long.

the positive return must be equal to the reduction in their compensation for a commensurate loss (Elton, Gruber, and Blake, 2003, Stulz, 2007). This (equity-like) incentive compensation is unattractive for risk-averse individuals, which implies that mutual funds make little use of it and they mostly compensate advisers based on the value of assets under management (Elton, Gruber, and Blake, 2003, Stulz, 2007). In contrast, hedge funds are unconstrained in the design of their compensation packages and they can offer managers asymmetric (option-like) compensation. This is naturally very attractive and it helps hedge funds recruit managerial talent. Exceptionally talented and strongly incentivized managers are likely to have a positive impact on fund performance.

In addition, hedge funds typically acquire non-trivial stakes in firms they invest in. Hence, they can become "activist" and exert considerable influence over the firms' operations. Their active ownership can rectify some of the agency conflicts between the owners and managers and help eliminate inefficiencies in the target companies' operations. Thus, hedge funds may realize superior return on their investments even beyond stock picking and market timing skills.

Hedge funds may also be more efficient on the cost side. They target a limited number of accredited investors (institutional investors, companies, and high-net-worth individuals), which allows them to save some of the marketing and communication costs. Their opacity also implies that they avoid the disclosure and attestation (audit) costs. Furthermore, hedge funds often do not aspire to hold diversified portfolios. Instead they focus on a narrowly defined market niche, which allows them to specialize and realize corresponding economics of scale. Thus it is conceivable that hedge funds profit from having an in-depth understanding of a specific very narrow market segment.

However, it does not automatically follow that these potential advantages materialize in superior returns earned for investors. The generous compensation packages may possibly attract hubris and gambling rather than competence and diligence (Cao et al. 2016). Overconfident hedge fund managers may falsely believe in the existence of investment opportunities that earn abnormal return even in efficient markets. They may take aggressive positions that expose investors to excessive risk that sometimes yield impressive returns and make the managers famous but more frequently lead to pitiful results. Excessive risk taking may be further encouraged by the convex (option-like) compensation packages that reward success but do not penalize failure. For example, the once lauded investment strategy of Long-Term Capital Management (LTCM) based on exploiting small pricing discrepancies through fixed income and equity futures arbitrage was later characterized as "picking up pennies in front of a steamroller" (Stulz 2007, p. 182). The true level of risk of these strategies may not be easily observable. Stulz (2007) argues that hedge fund risk profiles may resemble those of firms selling earthquake insurance. They may exhibit stable profitability for a long time but incur catastrophic losses at a rare event when a disaster strikes. Since hedge funds are not obliged to systematically report their performance many of these failures may be kept off the radar. If successful hedge funds are more likely to be included in the private databases and become better known to investors than the failed ones (Posthuma and van der Sluis 2003), investors' view on what is normal in terms of hedge fund performance may be distorted.

The absence of stringent regulation also implies low barriers to entry. Profitable strategies discovered by hedge funds can invite imitation by competitors and any abnormal returns may quickly disappear. It is also possible that lax regulation gives hedge fund managers opportunities to misappropriate capital from investors. Furthermore, the largely absent disclosure requirements may imply that the managers are able to camouflage the

situation long enough so that it is too late for investors to take any corrective action. Finally, it is also conceivable that hedge funds actually beat the benchmark but the abnormal return they earn is not sufficient to cover the high fees they charge and so, at the end of the day, they leave the investors worse off than they would otherwise be. Due to this ambiguity, it is important to perform a systematic empirical investigation of hedge fund performance.

4. Hedge Fund Performance

In this section we review empirical evidence on hedge fund performance. We suggest that prior research is not unified on the value hedge funds create for the investors and we discuss the potential reasons for the differences in the conclusions various studies reach. We pay attention to discussing the data sample limitations that hedge fund research faces and the evolution of measures intended to properly control for hedge fund risk.

4.1. Inconsistent Results

Many scholars have discussed the performance of hedge funds. Some studies focus on the comparisons of hedge funds and mutual funds or hedge funds and market indexes. The lower average monthly return, lower standard deviation, and higher Sharpe ratios of hedge funds compared with S&P 500 index from 1990-1999 suggest hedge funds were less volatile and enjoy a better risk-return payoff (Liang 2001). The lower beta values in asset-class factor model from 1994 to 1996 also indicate the dynamic strategy of hedge funds allows lower systematic risk (Liang 1999). Similar to above findings, Brown, Goetzmann, and Ibbotson (1997) show lower return and lower risk from 1989 to 1995 compared to the market index. On the contrary, Ding and Shawky (2006) use a three-factor model and show the outperformance of all hedge fund categories compared with market index. The results of Amin and Kat (2003) suggest that most hedge fund indices have a high mean return but investing in a single hedge

fund cannot provide a good risk-return profile. Some specific strategies of hedge funds, like long/short equity hedge and emerging hedge fund strategies, are provided with the evidence of outperformance over the US market (Bali, Brown, and Demirtas 2013). And in the context of emerging markets, hedge funds provide higher returns and alphas than mutual funds (Eling and Faust 2010).

Fung and Hsieh (2004) develop a seven-factor model which has been widely used by hedge fund research. Fung and Hsieh (2004) suggest the positive alpha of the sample from 1994 to 2002. However, Fung et al. (2008) analyze the results of subperiods classified by Long Term Capital Management (LTCM) crisis and NASDAQ crash (1995-1998, 1998-2000, 2000-2004) and find only one out of three sub-periods (1998-2000) provide positive and significant alpha. They also suggest that the aggregate level of alpha declines with time. Some studies add specific factors to extend the common models. For instance, Capocci and Hübner (2004) add the emerging bond factor to the extended model combining several factors from Fama and French (1998), Carhart (1997), and Agarwal and Naik (2002). The results show that one fourth of individual hedge funds deliver significant positive excess returns and 10 out of 13 strategies have significantly positive excess returns. Sadka (2010) regress hedge fund returns portfolios on Fund-Hsieh factors and Sadka (2006) liquidity factor and show the liquidity is an important factor for explaining the hedge fund performance. The high-liquidity -loading funds have larger alphas than low-liquidity-loading funds. Patton and Ramadorai (2013) propose the method with high frequency of risk exposure change and show that hedge funds update positions frequently and the dynamic model captures higher alpha than the constant parameter model. Generally, these alphas are positive, but fluctuate and could be insignificant.

4.2. Performance Persistence

With high fees for hedge fund investments but less information disclosed for decision making, investors may observe the hedge funds' past performance as one of the important metrics for their choices of funds (Sun, Wang, and Zheng 2018). Persistence in hedge fund returns would also indicate that managerial skill matters for hedge fund performance. Assuming relatively low managerial turnover in hedge funds one can view past hedge fund performance as a noisy proxy of managerial skill. Well-performing funds are likely to have able managers and so their performance is likely to persist also into the future.

Empirical results on this question are mixed and so there is a controversy in prior literature over how important managerial ability actually is. Some studies show the significantly positive relationship between the past performance and future performance. For example, Agarwal and Naik (2000a) investigate hedge fund persistence at the quarterly horizon. The performance is measured by the excess return (return of the hedge fund minus the average return of all hedge funds following the same strategy) and the appraisal ratio (excess return divided by residual standard deviation from the regression of individual return on the average return of the same strategy). They test performance persistence by regression-based (regress current performance on the previous results) and contingency-table-based (the fund is recorded as a winner if it is greater than the median performance) methods. The results of both methods show a reasonable amount of persistence of performance. Edwards and Caglayan (2001) also use both two-way winner-and-loser contingency-table analysis and regression-based analysis but the performance is based on the alpha from the multifactor model similar to that of Fama and French (1996). They provide similar evidence that persistence is significant for both winners and losers.

However, several studies find the persistence depends on the ranking of past

performance. Capocci and Hübner (2004) divide the hedge funds into deciles based on past mean returns and find that even middle decile funds appear some persistence, no persistence exists for best and worst performing funds. Kosowski, Naik, and Teo (2007) have a Bayesian analysis of hedge fund persistence to alleviate the short sample problem. According to comparison of deciles of alphas and deciles of t-statistics of alpha, the authors suggest that the persistence with the sort on alpha t-statistics is greater than the sort on alpha. But the alpha spreads from these sorts are small and statistically insignificant. Jagannathan, Malakhov, and Novikov (2010) find strong evidence of performance persistence among top hedge funds but little evidence of persistence among bottom hedge funds. They suggest that the persistence is the result of superior managerial talent. These studies show a difference of persistence among hedge funds.

Scholars tried to identify fund characteristics that are related to the performance persistence. Ammann, Huber, and Schmid (2013) sort portfolios based on past performance and various additional fund characteristics, such as lagged fund flows, strategy distinctiveness, and liquidity-related variables. They employ a stepwise regression as the performance measurement and define a winner (loser) if it has an above-median (below-median) alpha. The panel probit regression results show that these characteristics exhibit the opposite sign for winner and loser persistence. For example, funds with a high strategy distinctiveness index are more likely to be winners if their past performance is above the median alpha, but they are less likely to continue to be losers if they underperform in the past. Due to the inverse signs for winners and losers, the significance of the coefficients is reduced when the winner and loser persistence is investigated jointly. The results from sorting on the alpha and additional fund characteristics indicate that only strategy distinctiveness can improve persistence over time horizons up to two years. Boyson (2008) also sorts portfolios

based on past performance, size, and age. The small and young funds show strong performance persistence while the persistence is reduced for old and large funds. The author suggests the capacity constraint is the main reason.

Except the fund characteristics that may influence the performance persistence, the market environment (external factor related to the market condition) has been studied as an influential factor. Brunnermeier and Nagel (2004) find skilled hedge fund managers heavily invest in technology stocks and reduce their positions in stocks when the markets are about to decline. The hedge fund managers seem to take advantage of the technology bubble to realize the outperformance. That implies that managers' skill may vary with market conditions, for instance, managers are easily able to exploit more mistakes by unsophisticated investors who are more likely to enter the strong financial market (Sun, Wang, and Zheng 2018). They investigate the performance persistence on conditional markets and suggest that performance persistence is stronger following the periods of weak markets. Capocci, Corhay, and Hübner (2005) test periods of 1994-2000 and 2000-2002 as bull and bear markets respectively (the cutting point is when the Russell 3000 Index reached maximum observed value). They found that persistence among medium performers is significant in the bull market while only bad performance is persistent during the bearish period.

The horizon selection could also affect the results of persistence. Using similar methods of measurement methods in (Agarwal and Naik 2000a) but comparing at quarterly, half-yearly and yearly intervals, Agarwal and Naik (2000b) study the persistence of performance for more consecutive time periods rather than traditional two consecutive periods to lower the possibility that observing the persistence by chance. They find the persistence is highest at the quarterly horizon, which implies that the persistence is short in nature. Besides, Baquero, Horst, and Verbeek (2005) suggest the historical performance is important for

explaining liquidation and results show a significantly positive persistence of raw returns at the quarter horizon and an insignificant positive relationship at the annual horizon.

Overall, the prior research provides some evidence of performance persistence. But the persistence is affected by the funds' relative ranking, size, age, strategies, time horizon, as well as market condition. These factors, together with methodology differences, make the results complicated and sometimes conflicted with each other.

4.3. Capital Flows of Hedge Funds

Even though many studies explore risks and develop models for evaluating hedge fund performance, it is uncertain how investors allocate resources and whether they respond to existing evaluation methods (Agarwal, Green, and Ren 2018). The research that focuses on the changes of capital inflows could provide some insights about investors' decision-making.

Some previous studies identify how investors make evaluation by observing the relationship between capital flows and hedge fund performance. Li, Zhang, and Zhao (2011) regress fund flows on hedge fund indices, such as hedge fund index and index of FoFs, and find a significant positive relationship, which implies that investors follow the obvious indicator. Agarwal, Daniel, and Naik (2004) classify funds into quintiles based on returns relative to one's peer group as a performance measure. They find a convex performance-flow relationship. Agarwal, Green, and Ren (2018) use six different evaluation models of hedge funds, including the Capital Asset Pricing Model (CAPM), the three-factor model, the four-factor model, the Agarwal and Naik (2004) option-factor model, the seven-factor model, and a combined 12-factor model. First, they estimate the sensitivity of investor flows to annual returns and alphas (the average probability that the sign of the fund flow is positive conditional on the sign of alpha being positive) based on different models. They find that

although all flow-performance sensitivity likelihood estimates are significantly greater than 50%, the probability is the highest for the CAPM alpha. Then they regress flows on a fund's decile ranking based on two different models to have a pairwise model comparison. The results also show that investors are more responsive to the performance based on the CAPM alpha. All above measures of performance suggest the flow-performance relationship even some of them cause differences in the magnitude or direction.

Some factors, such as share restriction and manager incentives, may influence the investors' choice. Agarwal, Daniel, and Naik (2004) show that the managers' incentive is significantly associated with fund flows. Liang et al. (2019) explore the effect of share restriction on the relationship between flows and past performance. They present similar results as Agarwal, Daniel, and Naik (2004) in the absence of share restriction but a concave relation with restriction.

Investors' ability also has been taken into consideration. Fung et al. (2008) divide funds of hedge funds (FoFs) into two groups (have-alpha and beta-only) depending on whether they have positive alphas measured by the seven-factor model. The have-alpha funds have a statistically significant higher inflows than the beta-only funds. The authors regress flows on past flows and past returns and find that the coefficient of past returns in have-alpha funds is not significant but it is significant in beta-only funds. It suggests that some unsophisticated investors are attracted by returns of beta-only funds while the sophisticated investors could realize the existence of alpha and will not be simply driven by returns. In another test, they sort three different measures of performance (returns, alpha, and t-statistic of alpha) into quintiles and regress annual flows on the relative performance ranking of the previous year within its performance quintile separately for subgroups. The results show that the within-quintile performance-flow relationship is mostly insignificant for both have-alpha

and beta-only funds. But the baseline flows (intercept) still reveal the trend-chasing behavior in beta-only funds (the bottom quintile of beta-only funds experience a baseline outflow while the bottom quintile of have-alpha funds still have an inflow). By comparing two groups of FoFs, Fung et al. (2008) suggest sophisticated and unsophisticated investors have different evaluation standards for investment.

Investors chase funds with good performance, but higher capital inflows do not necessarily lead to greater performance. Current literature provide nonuniform results for the relationship between fund flows and future performance. Fung et al. (2008) provide evidence that the have-alpha fund with above-median flow has a lower future t-statistic of alpha and a lower probability of being a have-alpha fund in the subsequent period than the have-alpha fund with below-median-flow. They show that inflows to have-alpha funds have an adverse effect on the performance and suggest capacity constraints in the hedge fund industry may be the reason because managers' ability to generate returns is restricted by declining returns to scale. But there are no significant results for beta-only funds. Naik, Ramadorai, and Stromqvist (2007) regress alpha on flows, size and size squared for different strategies to confirm evidence of capacity constraints. Four out of eight strategies show significantly negative coefficients of flows, and two of the four strategies show significantly positive coefficients of size and negative coefficients of size squared. That provides some evidence for diminishing returns to scale. In addition, Li, Zhang, and Zhao (2011) find a significant negative relation between flows and both size and age. They suggest that there might be an optimal size of funds. They also test for managers' characteristics (education and work experience) on funds flows, the results show that higher-SAT managers have less negative impact of size and age on fund flows, while experienced managers are more likely to be influenced by the capacity constraints. However, when the authors regress raw returns and

alpha on fund flows, the results are not significant. As a result, it is unclear whether capital inflows have a negative impact on future performance.

4.4. Potential Explanations

4.4.1 Difference in Evaluation Approach

One of the main streams of hedge fund literature is to develop the method for examining hedge fund performance. Due to insufficient data and research on the hedge fund industry until the 1990s (Fung and Hsieh 2006), many earlier studies utilize general methods in mutual funds as a start for analysis. Then specialized methods were created and improved for deeper exploration.

Ackermann, McEnally, and Ravenscraft (1999) and Liang (1999) use Sharpe (1966) ratio to compare mutual fund and hedge fund performance. The reward-to-variability, obtained by ratio of the average excess return and standard deviation of the return, evaluates the expected return per unit of risk for a zero-investment strategy that usually involves purchasing and selling securities of equivalent value simultaneously. . Sharpe ratio is simple but theoretically meaningful, given that it takes account of both average return and risk without reference to a market index (Sharpe 1966, Sharpe 1994). However, the result is time-dependent: mathematically, monthly Sharpe ratios can be annualized by multiplying by $\sqrt{12}$ while in practice, the effect of compounding interest and serial correlation of monthly returns make the standardization of Sharpe ratio (annualization) complicated. Lo (2002) provides evidence that serial correlation in monthly returns would make Sharpe ratio overstated up to 65%. In addition, the correlations of a fund or a strategy with other potential choices of assets will influence the Sharpe ratio's predictability due to the fact that the standard deviation of the portfolio is affected by the correlation (Sharpe 1994). An unresolved issue is whether the non-

normal distribution of returns of hedge funds will make Sharpe ratio invalid, with some agree that risk cannot be measured adequately by standard deviation of asymmetric return distribution (Zakamouline and Koekebakker 2009) and others have different opinions (Auer and Schuhmacher 2013; Schuhmacher and Eling 2010). They suggest that the theoretic foundation of applying Sharpe ratio is location and scale condition, which assumes that return distributions equal to one another except for their location and scale parameters. The asymmetry or fat tails of excess return distributions should not be the reason for rejecting Sharpe ratio.

Jensen's alpha (Jensen 1968) utilizes a benchmark to calculate performance relative to a market standard. Unlike Sharpe ratio that aims to compare relative performance of portfolio A to B, Jensen's alpha, was designed to measure the performance of investment relative to an absolute standard (expected return on market portfolio). It requires a linear regression of portfolio returns on benchmark returns. For an individual security or unmanaged portfolio, the return above free-risk return should be equal to systematic risk premium plus a random error. But for managed portfolios, the difference between return above free-risk return and normal risk premium, reflected by the intercept of regression (alpha), represents managers' superior forecasting ability to earn additional return.. A positive alpha indicates the fund manager outperforms a certain benchmark taking into account the systematic risk while a negative alpha suggests underperformance.

Afterwards, Reinganum (1981) and Fama and French (1992) find that the simple relationship between average return and market beta (the slope in the regression of a security's return on the market's return)disappears gradually. With several factors, such as firm size, leverage, E/P, and book-to-market equity, having been shown to affect average returns in some other studies (Banz 1981; Bhandari 1988; Basu 1983; Rosenberg, Reid, and Lanstein

1985; Chan, Hamao, and Lakonishok 1992), Fama and French (1992) test these factors and show that size and book-to-market equity capture cross-sectional variation in average stock returns. They add size and book-to-market equity into regression and propose an international factor for book-to-market equity (Fama and French 1998). Since three-factor model errors are influenced by portfolios' past performance, Carhart (1997) develops a four-factor model, which takes the momentum effect into consideration. It improves on the average pricing errors of the three-factor model and greatly reduces the mean absolute errors from the model. Except those general market indexes used, Sharpe (1992) develops asset class factor model, which evaluates return by summing estimated return on specific asset style factor. The product of return index of each asset class and sensitivity of portfolio return to asset class factor measures estimated return on each asset class. Asset class factor model highlights effectiveness of asset allocation. By determining relative movement and return of each component of the portfolio, investors could estimate the overall investment performance. In the asset class factor model, the residual value comes from managers' active selection. Since fund exposure to different asset classes vary, it is reasonable to estimate performance based on their asset classes.

Above methods, although employed in hedge fund literature, mostly focus on measurements of mutual funds. As to hedge funds, a standard method of measuring risk and performance of hedge funds involves a hedge fund index, which is obtained by averaging individual funds in a database. The database vendors also provide subindexes of hedge funds that are classified based on managers' self-disclosed strategies and locations. Aggarwal and Jorion (2010) use peer-group-based style factors in analyzing emerging hedge fund performance. Even though peer-group-based factors capture various styles, it lacks meaningful explanation of differences in performance of different styles and possibly inherits

bias in databases (Fung and Hsieh 2002).

In details, Fung and Hsieh (2004) explain that using hedge fund indexes may cause several issues. First, selection bias, survivorship bias, and backfilling bias exist in databases. Different databases have different coverage of hedge funds. When samples cannot represent the universe, the selection bias would appear. Similarly, survivorship bias and backfilling bias will make hedge fund index inaccurate As a result, the indexes in different databases vary (in this article, the HFR index for equity market-neutral hedge funds is -1.57% while CSFB/ Tremont Index for equity market-neutral hedge funds is 2.13 % for the same month). Second, there is no optimal way to determine how the index should be formed in the industry. The imbalance distribution of the resources makes the equally weighted index improper. The instability of assets under management (AUM) in the hedge fund industry seems unsolidified for using value weighted average. And the leverage cannot be simply reflected by using a general index. Finally, the quality of information in databases are doubtful due to lack of transparency. Because hedge fund managers do not have the obligation to report details of their activity, analysts have limited information about bond or equity content in a portfolio that may affect the overall allocation framework.

To overcome these problems, Fung and Hsieh (2004) extend Sharpe (1992) asset class factor model. They tried to identify the common sources of risk and create a link between hedge fund investments and conventional capital assets. In this way, the data bias will not influence benchmarks that are constructed from asset returns rather than hedge fund returns. In addition, it allows researchers to analyze performance beyond a short history of reliable data and circumvent the difficulty of considering environment influence. The study discusses the return characteristics of trend-following funds, merger-arbitrage funds, fixed-income hedge funds, and equity long-short hedge funds separately. In Fung and Hsieh (2001), the

authors found that trend-following funds have good performance during extreme market conditions like large declines in equity markets. Because option buyers also earn money in volatile markets. They extracted the common component of trend-following fund return and linked the returns characteristics of lookback option portfolios with returns of trend-following funds; For merger arbitrage funds, they did an analysis based on Mitchell and Pulvino (2001), which provides evidence that the returns of merger arbitrage funds are correlated with the S&P 500 Index returns when the S&P 500 experienced a large decline. The risk of merger arbitrage comes from the possibility that the merger transaction cannot be completed. Thus, systematic risk of merger arbitrage will be higher if the market condition is worse when merger transactions cannot complete. They suggest that the risk of merger arbitrage funds exposed can be proxied by a short position in an out-of-the-money put option on the S&P 500; Fixed-income hedge funds typically buy bonds with lower credit rating or less liquidity and short U.S. T-bonds simultaneously to hedge the interest. So this type of hedge funds are associated with the changes of yield spread and the change of treasury yield; Equity long-short hedge funds are similar to equity long-short funds. They have exposure to the stock market and the spread between large-capitalization stocks and small-capitalization stocks. Then the seven asset-based factors are formed: market risk and the spread between small-cap stock returns and large-cap stock returns for equity long-short hedge funds (30-40% of hedge funds); the change in 10-year Treasury yields and the change in the yield spread between 10-year T-bonds and Moody's Baa bonds for fixed-income hedge funds (5% of hedge funds); the portfolios of lookback straddles on bonds, on currencies, and on commodities for trend-following hedge funds (5-10% of hedge funds). Furthermore, in Fung and Hsieh (2006), the authors find that Emerging Market hedge funds' returns are strongly correlated with the IFC Emerging Market stock index, thus emerging market index become the eighth factor. But the authors admit that risk factors are not unique and may be substituted by others. They suggest

that narrower benchmarks may be needed for strategies on specific sectors.

With the existence of different methods, recent papers tend to use multiple methods to compare, or combine several factors to analyze based on the topic. For instance, Capocci and Hübner (2004) simultaneously utilize the capital asset pricing model, three factor model, and four factor model to investigate hedge fund performance. They also develop a multi-factor model combining factors from Carhart (1997), Fama and French (1998), and Agarwal and Naik (2002) and the factors representing emerging bond markets. Dichev and Yu (2011) use three factor model (Fama and French 1992) as well as eight factor model (Fung and Hsieh 2006) to complement analysis.

Several papers point out that current understanding of risks is incomplete and additional factors should be involved for analysis. Sadka (2010) indicates that the Quant crisis of August 2007 (the systematic collapse of many Hedge Funds in 2007), occurring when these funds had shown little exposure to systematic risk, show the needs for deeper understanding of risk factors. He regresses the market-wide liquidity as an additional risk factor besides seven asset-based factors (Fung and Hsieh 2004) and provides evidence that liquidity risk is an important factor in analyzing cross-section performance. Teo (2011) specializes in hedge funds that offer favorable redemption terms to investors. These hedge funds are likely to overpromise in terms of liquidity and may be forced to sell assets at fire sale price in response to investor redemptions. But why do these hedge funds take excessive liquidity risk? Teo (2011) follows the “liquidity beta” used in Pastor and Stambaugh(2003) and constructs 10 hedge fund portfolios from low liquidity beta funds to high liquidity beta funds. The results show substantial differences in alphas on the portfolios sorted by “liquidity beta”. Hedge funds that are exposed to higher liquidity risk appear to have a higher liquidity risk premium and outperform hedge funds with lower liquidity risk. The results are similar to Sadka (2010)

even though they use different measures of liquidity. In addition, Kessler and Scherer (2011) test the global liquidity risks in hedge fund return and add liquidity indicators into a model combining four factor model (Carhart 1997) and seven factor model (Fung and Hsieh 2004). They provide evidence that hedge fund index returns are exposed to factors in Carhart(1997) and Fung and Hsieh (2004) as well as the global liquidity factor. And adding the liquidity factor increases the explanatory power of the original model. In this paper, the global liquidity is identified by a range of liquidity measures across different asset classes. All above papers investigate the influence of market liquidity but they use various methods to measure the liquidity.

Avramov et al. (2011) suggest evaluation of manager skill (proxied by the alpha in seven factor model) conditional on various macroeconomic variables (default spread and measures of volatility). From the perspectives of 13 types of investors classified by their beliefs about manager skill, scholars form optimal portfolios for each type and evaluate their performance by seven factor model. The results show that the performance of optimal portfolios incorporating predictability, based on macroeconomic variables, is substantially higher than performances of other types. However, combining the results from Sadka (2010) and Avramov et al. (2011), Brandon and Wang (2013) raises the possibility that the significantly higher positive alpha may be the result of liquidity risk premia. They follow the method of forming optimal portfolios for each type of investors who hold different views about the existence of manager skills in Avramov et al. (2011) and Pastor and Stambaugh (2003) liquidity measure and find similar results as Avramov et al. (2011). The portfolios incorporating predictability generate superior performance but the outperformance weakens substantially for most emerging markets, event-driven, and long/short hedge fund portfolios after taking liquidity factor into consideration.

Bollen and Whaley (2009) suggest that while the standard approaches, such as seven-factor model, that regress returns on risk factors that proxy for different trading strategies assume coefficients are constant, the shift of asset classes, strategies, and leverage in hedge funds in response to markets and arbitrage opportunities remind us that coefficients should be time-varying. Hence the standard methods that fail to capture dynamic strategies will lead to unreliable results. They employ an optimal changepoint regression that allows for one shift in parameter values and find that about 40% of the hedge funds in the sample have a significant shift in risk exposures. The after-shift performances are divergent from the performances measure with constant parameter model. Unlike Bollen and Whaley (2009) that investigates changepoints of individual funds, Fung and Hsieh (2004) focuses on aggregate breakpoints (the overall changepoints of hedge funds). They compute the cumulative sum of recursive residuals and establish 95% confidence bounds for the sum under the null hypothesis of constant regression parameters. The crossing of bounds and cumulative residuals implies breakpoints when managers change strategies. The two breakpoints they identified are September 1998 (the LTCM debacle) and March 2000 (the end of the Internet bubble). They find changes in magnitude and statistical significance of factor loadings in subperiods. Fung et al. (2008) use Fung and Hsieh (2004) seven factor model but add two breakpoints with major market events (the collapse of LTCM in September 1998 and the end of the technology bubble in March 2000) to test performance of different periods. They show that alpha is only significant between September 1998 and March 2000 (the bull market period).

Despite the popularity of their use, the traditional methods of measuring hedge fund performance are criticized because of model uncertainty and abnormal distribution. On one hand, Vrontos, Vrontos, and Giamouridis (2008) suggest that the nature of hedge fund investments, like utilizing dynamic strategies and leverage, results in intensive model

uncertainty (the true set of pricing factors). Therefore Bayesian model averaging approach is used to account for uncertainty. On the other hand, hedge funds may be exposed to more than seven asset classes captured by a seven-factor model. Schaub and Schmid (2013) use a stepwise regression approach that includes more factors than the seven-factor model while keeping less factors in the model to avoid the low level of degrees of freedom. In addition, some papers point out that hedge fund return distributions are significantly skewed and non-linearly related to the reference index, traditional methods may reach wrong conclusions (Amin and Kat 2003). To avoid this issue, alternative methods, such as efficiency test (Amin and Kat 2003) and bootstrap (Kosowski, Naik, and Teo 2007), are selected in measuring performance. (Heuson, Hutchinson, and Kumar n.d.) show that return skewness is associated with managerial skill and develop a fund skewness-adjusted alpha measure for predicting managerial performance. Except for reasons above, scholars try other potential methods that capture hedge fund performance. Dichev and Yu (2011) suggest that return of investors should be measured by dollar-weighted method which reflects the effect of the timing and magnitude of fund flows on investor returns.

It is worth mentioning that the discussion of multiple methods in this section cannot represent the whole available methods. Prolific studies on the evaluation of hedge fund performance are beneficial for a thorough understanding of hedge funds, but without an agreement on a recognized method possibly cause confusions for investors especially when they show conflicting conclusions.

4.4.2 Effects from Sample Difference

Most current studies notice the potential problems from samples used in hedge funds. That is the reason why authors tried to measure visible biases and mitigate effects of these

biases. The efforts from these authors, together with improvement from data vendors, witness the progress to get more accurate and representative samples.

Common bias identified by hedge fund studies are selection bias, survivorship bias (liquidation bias), and backfilling bias (instant-history bias). These biases create some challenges for researchers in collecting appropriate samples and doing analysis. And a study of hedge funds requires researchers to select some proper methods to mitigate the effects of these biases to get accurate results. Fung and Hsieh (2000) suggest that index of funds-of-hedge could avoid these biases. Fund-of-hedge fund (FOF) managers provide accurate performance information on a timely basis. And many of these track records can be reconciled and audited to match underlying hedge fund performance records including those funds that cease operations or choose not to report. Furthermore, adding a new hedge fund to FOF does not need to add its past performance records, which lead to backfilling bias. But the lack of complete records of FOFs is another potential problem.

Selection bias appears when a sample from a database cannot represent the characteristics of the universe of hedge funds (Fund and Hsieh 2004). Due to the nature of voluntary reporting, fund managers can select whether to report and which database to report. And hedge funds are not allowed to advertise publicly, this leaves databases performing as a major distribution channel (Fund and Hsieh 2004; Baquero, Horst, and Verbeek 2005). For this reason, databases only contain hedge funds that tend to disclose information for attracting potential investors. Data from funds that perform well and are not inclined to seek investors or funds that perform badly and want to prevent investors from withdrawing by hiding information is scarce in databases (Posthuma and van der Sluis 2003). Assuming these types of hedge funds present different characteristics, selection bias exists in databases.

In early stage, most hedge fund databases do not provide information for hedge funds that cease operations because these dead funds are regarded as uninteresting to investors (Fund and Hsieh 2004). The disappearance of hedge funds comes from various reasons. On one hand, survival of hedge funds depends on relative performance as well as absolute performance (Brown, Goetzmann, and Park 2001), thus the disappearance of a hedge fund may result from bad performance (Fund and Hsieh 2004). On the other hand, hedge fund strategies have limit capacity and hedge fund managers face decreasing returns in scale (Fund and Hsieh 2004; Fung et al. 2008) Even though successful funds tend to attract more inflows in the subsequent period, they deliver smaller magnitude of alpha (Fung et al. 2008). Hedge funds with good performance may choose to close to new capital (Fund and Hsieh 2004; Baquero, Horst, and Verbeek 2005). Researchers test survivorship bias by comparing performance (average return) of surviving funds and performance of both surviving and dead funds. For example, Liang (2000) uses data from TASS and HFR and finds that survivorship bias in TASS exceeds 2% per year while in HFR is only .39% per year. Fund and Hsieh (2006) find that survivorship bias in TASS, HFR, and in CISDM are 2.4%, 1.8%, and 2.4% respectively. To avoid the effect of survivorship bias, many studies analyzing performance of hedge funds focus on data after Jan. 1994 when most database vendors distribute data of both live and dead funds (e.g. Aggarwal and Jorion 2010; Kosowski, Naik, and Teo 2007).

When a new hedge fund enters a database, it has an incubation period to record past performance. If the past performance is good, the record is backfilled. If the past performance is bad, the hedge fund will probably cease the operation. This situation makes average returns in databases biased upward (Fund and Hsieh 2004). Some studies use indirect methods to mitigate backfilling bias. For instance, Edwards and Caglayan (2001) eliminate the first 12 months of returns from the MAR database and find that the average annual returns of hedge

funds in the first year are 1.17% higher than in subsequent years. Fung and Hsieh (2006) eliminate the first 14 months of returns and their results show that backfilling bias is around 1.5% in TASS, HFR, and CISDM. Given that some databases, such as TASS, Eurekahedge, and HFR, provide dates when funds start to report to databases, several studies use direct method by eliminating returns for each fund between fund's inception date and the date to start reporting to the database (e.g. Agarwal, Green, and Ren 2018; Posthuma and van der Sluis 2003).

Except the generally accepted treatment of survivorship bias is to analyze data after Jan. 1994, there is no uniform approach to deal with backfilling bias and selection bias. To alleviate backfilling bias, the appropriate period of eliminating previous return is significant. But selection bias may be more difficult to deal with since no one can promise his data can represent the universe. The most effective way probably is to consider all reliable databases and capture all available data. But it would be not that efficient because it is time consuming and costly. Hence, researchers should balance their needs with costs to verify their choices of databases are reasonable.

Commonly used hedge fund databases are CISDM, Eureka, HFR, MSCI, BarclayHedge, and TASS. The most popular one is TASS, which is regarded as a leading data vendor that covers one-half of the estimated total hedge funds (Aggarwal and Jorion 2010; Aragon and Nanda 2017; Sun, Wang, and Zheng 2018). This may be the reason why many studies use TASS as the single source of data (e.g. Lim, Sensoy, and Weisbach 2016; Yin 2016; Sadka 2010; Brandon and Wang 2013). To prove that their sample is representative, Lim, Sensoy, and Weisbach (2016) compare the sample fund characteristics from TASS and the characteristics of sample in Agarwal, Daniel, and Naik (2009) that combine four databases (CISDM, HFR, MSCI, and TASS) and find that two samples are very close.

Different databases have various coverages while they have some common funds. Some papers prefer to use the union of some databases to have comprehensive results. Agarwal, Daniel, and Naik (2009) shows the Venn diagram of distribution of hedge funds by four main databases (CISDM, HFR, MSCI, and TASS). The diagram shows that the common funds of four databases account for only 3% and individual databases have a portion (around 20%) of funds that other databases do not have. As a result, they use the four databases to create a comprehensive database for analysis. And Kosowski, Naik, and Teo (2007) also use the union of CISDM, HFR, MSCI, and TASS, which represents the largest known data set of hedge funds for the time. Aiken et al. (2016) merge five hedge fund databases (TASS, BarclayHedge, HFR, Eureka, and Morningstar) and remove duplicate funds.

Other choices may relate to special concerns. For example, Fung and Hsieh (2006) use CISDM, HFR, and TASS instead of MSCI because the former three databases have over ten years of actual data collection experience at that time while MSCI enter the field relatively late and the majority of data are from reconstruction of history data rather than real-time collection. Except HFR, Teo (2009) use Asiahedge and Eurekahedge, which include mainly funds that invest a large portion of assets in Asian market, for investigation of Asia-focused hedge funds. Jorion and Schwarz (2014) focus on TASS and HFR for analyzing whether hedge fund managers list their funds strategically (list funds in certain hedge fund databases with a time difference) due to the fact that only TASS and HFR provide precise information about the listing date, which is necessary for their analysis. In addition, Aiken, Clifford, and Ellis (2013) have hand-collected information from regulatory filings of registered funds-of-funds to compare performance between voluntarily reported hedge fund performance and involuntarily reported hedge fund performance.

Sample difference arises not only from various funds in different databases, but also

from different information regarding the same funds. Jorion and Schwarz (2014) indicate that smaller funds are more likely to report to both databases (HFR and TASS) immediately while better-performing larger funds tend to report to the second database with some delay. For all management companies with at least one fund in TASS or HFR, only 60% of their funds are listed in both funds. They suggest company's listing decisions relate to their strategies. But even the same database may provide investors with different information within different periods. Patton, Ramadorai, and Streatfield (2015) provide some evidence that the routine revisions of hedge fund historical disclosure in the publicly available databases are widespread (about half of funds in the sample have revised their historical returns at once). And negative revisions are more frequently than positive revisions. The revisions occur mostly when the funds change managers who might want a new start or when a high-water mark affects managers' performance fee. That means investors or scholars may be misguided regarding the initial reported behavior that will be revised later.

5. The effects of regulation

This stream of literature focuses on a more practical part of hedge funds. It has been a long history of debate of hedge funds between transparency and managers' incentives. Two major branches are the effects of regulations on overall hedge fund performance and managers' misreporting.

5.1. The effect of regulations on performance

In theory, the relationship between hedge fund regulation and hedge fund performance is ambiguous (Cumming and Dai 2010a). On one hand, the enhanced regulation could restrict managers from unethical and compensation-oriented actions and possibly improve the

performance of the hedge funds (Cumming and Dai 2010a, Frumkin and Vandegrift 2009). The lack of regulatory oversight makes it possible for managers to merely chase high compensation and disguise investment schemes, which is a part of the agency problem. One example in Cumming and Dai (2010a) is that two funds under the control of the same managers could have strategies of shorting the S&P index and going long on S&P separately. The result would be one wins and one loses but managers still have high compensation from fixed management fees and carried interest performance fees. Neither investors or regulatory authorities would know the true nature of these hedge funds. Given the improved regulation and oversight, hedge fund structure and performance may be enhanced by preventing managers from such behavior. On the other hand, the regulations and rules may hamper hedge fund performance because managers lose freedom to contract organize resources in the most efficient way. The common regulations such as restrictions on minimum hedge fund size, restrictions on the location of key service providers, and market channels for hedge fund distributions set barriers to entry or participate and to choose efficient human resources. The regulations may lead to worse performance and less efficient hedge fund structures (Cumming and Dai 2010a).

To have a clear understanding of the relationship between regulations and hedge fund performance. Cumming and Dai (2010a) collectively investigate 29 countries' hedge fund data. In the United States, hedge funds can avoid the public disclosure requirements by claiming as a private placement. And prior to February 2006, they were not restricted by the registration requirement. But some other countries, such as the United Kingdom, have minimum capital requirements to operate as hedge fund managers, other marketing channels (banks, fund distribution companies, other financial service institutions, ect.) except private placements. Besides above related regulations, countries like Canada and Germany, have

restrictions on location of key service providers. The results show that the requirements like locational restrictions of key service providers give rise to lower performance. But minimum capital requirements and locational restrictions of key service providers are associated with lower standard deviations of returns. Therefore, the requirements could lower risks in the market.

Other than international differences in hedge fund regulations, several papers focus on regulations of hedge funds in the United States. Section 13(f) of the Exchange Act (adopted by the SEC in 1978) requires hedge fund managers who exercise investment discretion over accounts holding at least $100 million to make quarterly disclosures of portfolio holding to SEC on Form 13F within 45 days of the quarter end. However, managers could request confidential treatment to delay public disclosure of some or all of the holdings reported on Form 13F. Then Form 13F "add new holdings" Amendment should be filed within six days of the end of the confidential treatment period (Aragon, Hertzel, and Shi 2013). More transparency is beneficial for investors' decision making, but it may reduce the incentives of hedge fund managers since revealed information makes competitors identify their strategies or free-ride on their efforts. Shi (2017) uses TASS data from 1994 to 2010 and finds that the drop in performance is concentrated among funds that disclose a greater fraction of their assets. The return correlations between the disclosing funds and other hedge funds that have the same investment style increase after the disclosure. That implies that after a fund discloses, other funds take similar positions. Aragon, Hertzel, and Shi (2013) find that managers are more likely to seek confidential treatment for positions if they perform well in the past. And securities that are kept confidential earn significantly positive abnormal returns over the post-filing confidential period while securities disclosed originally do not have abnormal stock price performance over the same period. Agarwal et al. (2013) also compare

confidential holdings and original holdings and find the confidential holdings have higher benchmark-adjusted returns than the original holdings up to 12 months. All these studies suggest that Form 13F and complete public disclosure may encourage free-riding activities and negatively influence fund performance.

In addition, the relationship between the registration requirements (enforced in 2006 in the U.S but was revoked by court soon) and hedge fund performance has been investigated. Rule 203(b)(3)-2 required that hedge fund advisor register with the SEC except those have less than $25 million undermanagement or with a lockup longer than 2 years. And the net worth requirement for accredited investors was raised to $1.5 million. Frumkin and Vandegrift (2009) expect the rule would reduce fraudulent or unethical behavior of advisors and improve the average quality of investors. They assume that the registration rule will improve the performance of hedge funds. By using a regression on size, age, volatility, and registration rule, they find registration increases hedge fund returns by 11.6 percent comparing before the registration period and registration in-effect period. The Dodd-Frank Act (effective in 2012) requires smaller advisors (with $25-$100 million AUM) register with states instead of SEC, which prevents small advisors from registration exemption. Also, it imposes a number of recordkeeping and reporting requirements for sensitive and proprietary information including advisory activities, clients and employees' information, service providers' information. Because the Dodd-Frank Act improves the oversight, Cumming, Dai, and Johan (2017) expect some risk-averse managers would change their activities for meeting requirements. And the cost of compliance expenditure may lower the returns. They compare pre-Dodd-Frank period and after-Dodd-Frank period and find evidence that US funds have lower alphas after the effectiveness of Dodd-Frank Act. These studies have conflicted results regarding the influence of hedge fund registration and performance.

5.2. The effect of regulations on misreporting

Even though the requirements seem to have different effects on hedge fund performance, they have benefits for mitigation of the manipulation or misreporting from managers, which is another concern for hedge fund research. Related researches use two types of discontinuity as the evidence of manager's manipulation. The first one is "the number of small gains far exceeds the number of small losses" Discontinuities in distributions are used in earning management and corruption in sports where highly asymmetric incentives bracket a fixed hurdle (Bollen and Pool 2009). By observing the fact that the returns of hedge funds in CISDM from 1994 to 2005 have a significantly larger number of small gains and a lower number of small losses, Bollen and Pool (2009) suggest that one of the potential explanations is that hedge fund managers misreport. Discontinuity resulting from misreporting relates to worse subsequent fund performance because the overstatement would be reversed. They test bimonthly returns and find no signal of discontinuity. And for those funds that feature a discontinuity, the performance is worse than the funds that do not appear discontinuity. They also find the discontinuity disappears on audit dates and the 2 months leading up to them. All the evidence indicate misreporting is at least one of the reasons. However, Jorion and Schwarz (2014) express that "alternative explanations for the discontinuity in the distribution of hedge fund returns around zero. The authors show that such a kink (describes the phenomenon that distribution of returns has an abnormally low number of small losses and an abnormally large number of small gains) occurs because asymmetric incentive fees tend to pull positive returns toward zero. As the reported returns are net of fees, it does not necessarily lead to higher return if a fund above its high-water mark grants a manager rich rewards. And the impact of asset illiquidity could be an alternative explanation. As a result, they suggest that the observed hedge fund return discontinuities are not direct proof of manipulation. Cassar and Gerakos (2011) also suggest that many assets held by hedge funds

are illiquid, and therefore their valuations could be imprecise.

The second type of discontinuity is the spike in certain months. For instance, Agarwal, Daniel, and Naik (2011) find that returns during December are significantly higher than returns during the rest of the year, even after controlling for risk in both the time series and the cross-section. Two possible reasons can explain the “December spike”. First, a hedge fund with more positive monthly returns reflects good operations and attracts more inflows (Bollen and Pool 2009). If the fund has significantly positive returns in the earlier part of the year, the manager would consider to engage in smoothing of returns and create reserves for a “rainy day”. Any unused reserves would be added to the December returns during the financial audit at the end of the year. Second, hedge fund managers are compensated by incentive fees, which is available only when year-end net asset value (NAV) exceeds the threshold NAV. If the hedge fund does not operate well, the manager may want to borrow future performance to report higher December returns for the incentive fees. The authors suggested hedge funds manage their returns upward in an opportunistic fashion in order to earn higher fees. Moreover, Ben-David et al. (n.d.) show hedge funds’ incentive to inflate their monthly performance by buying stocks that they hold in their portfolios. As their fees are typically tied to performance, it is rational to have doubts about the reliability of their reports. This type of discontinuity has not been explained by other reasons except manipulation.

To address the inaccuracy of data and managers’ manipulation, many call for effective regulations of hedge funds. Honigsberg (2019) compare “kink at zero” and “cookie jar accounting” (whether the company accumulates reserves during good times to protect against bad times), two phenomenons for measuring manipulation of managers, of three periods relate to “the SEC’s hedge fund rule” in 2004 that requiring registration of hedge funds, “Goldstein’s suing” that leads to allowance to withdraw from registration without penalty in

2006, and “the Dodd-Frank Act” that requires registration of majority of hedge funds again in 2011 respectively. The results show that regulation reduces misreporting at hedge funds. The disclosure requirements led funds to make changes in their internal governance, such as hiring or switching the fund’s auditor, and that these changes induced funds to report their financial performance more accurately. Dimmock and Gerken (2016) also test the effect of “the SEC’s hedge fund rule” and “Goldstein’s suing” on misreporting. They use Low Max R2, based on the maximum proportion explained hedge fund style factors, and Low Index Beta, based on the relation between hedge fund returns and style index, except “kink at zero” and “cookie jar accounting” for measuring misreporting flags. The misreporting frequency is higher for funds that respond to registration rules than funds that already registered and it decreases following the rule. But after the revocation of the rule, the deregistered funds increase their misreporting compared with funds that remained registered. Cumming and Dai (2010b) provide evidence that international differences in hedge fund regulation, from minimum capitalization, restriction on location of key service providers, to marketing ways, are significantly associated with the propensity of fund managers to misreport monthly returns. Specifically, hedge funds are restricted by the location of key service providers and funds with higher minimum capitalization are less likely to misreport.

6. Conclusion

In this article, we summarize the existing literature on hedge fund performance and we examine empirical evidence on the key research questions addressed in this research stream. We observe conflicting results of overall performance, the performance persistence, and the relationship of capital flows and performance. The aggregate results based on the measurement of alpha show that hedge funds have overall non-negative performance, but

there is a controversy over the magnitude of the abnormal returns hedge funds earn and over whether these are sufficient to offset the high fees hedge funds charge. Prior research provides some evidence on the persistence of hedge fund performance that supports the importance of managerial ability. However, the persistence is greatly affected by factors such as methods selected for relative ranking of hedge funds, strategy distinctness, and the market conditions. Sophisticated and unsophisticated investors, who are likely to rely on different hedge fund evaluation methods, may differ in their evaluation of hedge fund attractiveness. This finding suggests investors who rely more on the conventional risk-adjustment methods may reach misleading conclusions about hedge fund characteristics. This underscores the importance of the advanced measurement method dedicated to estimating hedge fund performance.

We also analyze the reasons for the conflicting evidence on hedge fund performance. Although various data biases were not completely eliminated in prior research, we do find in the research more effective methods for mitigating selection bias like aggregating more reliable sources, and for backfilling bias like eliminating returns during the "backfilling period". Even authors may use different methods to treat selection bias and backfilling bias, most recent studies unify the method for dealing with survivorship bias by focus data after 1994. We notice the improvements contributed by these papers, and data vendors in the treatment of data. We also notice that there is potential space for a more comprehensive database that combines all available sources and provides more information like the records of return change and the date of updating.

We also investigate prior evidence on the impact of regulatory oversight. Current evidence suggests that the negative relationship between regulation and managers' misreporting. But we cannot simply summarize the overall influence on the hedge fund performance. We analyze different rules and hope the policy makers could benefit from the

analysis of different kinds of rules.

Hedge fund is still at its early stage. Our research points out the need for future studies on a mature method of evaluation performance and various regulation influences. A deeper and sharper exploration is needed for a more solid understanding of the hedge fund industry and for the design of appropriate regulation trades off the strategic flexibility and transparency and that ultimately promotes hedge funds operating in a way that promotes strong corporate governance in target firms and efficient functioning of financial markets.

References

Ackermann, Carl, Richard McEnally, and David Ravenscraft. 1999. “The Performance of Hedge Funds: Risk, Return, and Incentives.” *The Journal of Finance* 54 (3), 833–74.

Agarwal, Vikas and Narayan Y. Naik. 2000a. “Multi-Period Performance Persistence Analysis of Hedge Funds.” *Journal of Financial and Quantitative Analysis* 35 (3), 327–42.

Agarwal, Vikas and Narayan Y. Naik. 2000b. “Multi-Period Performance Persistence Analysis of Hedge Funds.” *Journal of Financial and Quantitative Analysis* 35 (3), 327–42.

Agarwal, Vikas and Narayan Y. Naik. 2000c. “On Taking the ‘Alternative’ Route: The Risks, Rewards, and Performance Persistence of Hedge Funds.” *The Journal of Alternative Investments* 2 (4), 6–23.

Agarwal, V., & Naik, N. (2002). Characterizing Systematic Risk of Hedge Funds with Buy-and-Hold and Option Based Strategies. London Business School. Working paper.

Agarwal, Vikas and Narayan Y. Naik. 2004. “Risks and Portfolio Decisions Involving Hedge Funds.” *The Review of Financial Studies* 17 (1), 63–98.

Agarwal, Vikas, Naveen D. Daniel, and Narayan Y. Naik. 2004. *Flows, Performance, and Managerial Incentives in Hedge Funds*. Rochester, NY: Social Science Research Network.

Agarwal, Vikas, Naveen D. Daniel, and Narayan Y. Naik. 2009. “Role of Managerial Incentives and Discretion in Hedge Fund Performance.” *The Journal of Finance* 64 (5), 2221–56.

Agarwal, Vikas, Naveen D. Daniel, and Narayan Y. Naik. 2011. “Do Hedge Funds Manage Their Reported Returns?” *The Review of Financial Studies* 24 (10), 3281–3320.

Agarwal, Vikas, T. Clifton Green, and Honglin Ren. 2018. “Alpha or Beta in the Eye of the Beholder: What Drives Hedge Fund Flows?” *Journal of Financial Economics* 127 (3), 417–34.

Agarwal, Vikas, Wei Jiang, Yuehua Tang, and Baozhong Yang. 2013. “Uncovering Hedge Fund Skill from the Portfolio Holdings They Hide.” *The Journal of Finance* 68 (2),

739–83.

Aggarwal, Rajesh K. and Philippe Jorion. 2010. “The Performance of Emerging Hedge Funds and Managers.” *Journal of Financial Economics* 96 (2), 238–56.

Aiken, Adam L., Christopher P. Clifford, and Jesse Ellis. 2013. “Out of the Dark: Hedge Fund Reporting Biases and Commercial Databases.” *The Review of Financial Studies* 26 (1), 208–43.

Aiken, Adam L., Christopher P. Clifford, Jesse A. Ellis, and Qiping Huang. 2016a. “Funding Liquidity Risk and the Dynamics of Hedge Fund Lockups.” *SSRN Electronic Journal*.

Aiken, Adam L., Christopher P. Clifford, Jesse A. Ellis, and Qiping Huang. 2016b. “Funding Liquidity Risk and the Dynamics of Hedge Fund Lockups.” *Journal of Financial and Quantitative Analysis, Forthcoming*.

Almeida, Caio, Kym Ardison, and René Garcia. 2020. “Nonparametric Assessment of Hedge Fund Performance.” *Journal of Econometrics* 214 (2), 349–78.

Amin, Gaurav S. and Harry M. Kat. 2003. “Hedge Fund Performance 1990-2000: Do the ‘Money Machines’ Really Add Value?” *The Journal of Financial and Quantitative Analysis* 38 (2), 251–74.

Ammann, Manuel, Otto Huber, and Markus Schmid. 2013. “Hedge Fund Characteristics and Performance Persistence.” *European Financial Management* 19 (2), 209–50.

Ang, Andrew, Sergiy Gorovyy, and Gregory B. van Inwegen. 2011. “Hedge Fund Leverage.” *Journal of Financial Economics* 102 (1), 102–26.

Aragon, George O. 2007. “Share Restrictions and Asset Pricing: Evidence from the Hedge Fund Industry.” *Journal of Financial Economics* 83 (1), 33–58.

Aragon, George O. and Vikram Nanda. 2017. “Strategic Delays and Clustering in Hedge Fund Reported Returns.” *Journal of Financial and Quantitative Analysis* 52 (1), 1–35.

Aragon, George O., Michael Hertzel, and Zhen Shi. 2013. “Why Do Hedge Funds Avoid Disclosure? Evidence from Confidential 13F Filings.” *Journal of Financial and Quantitative Analysis* 48 (5), 1499–1518.

Asness, Clifford S., Robert J. Krail, and John M. Liew. 2001. “Do Hedge Funds Hedge?” *The Journal of Portfolio Management* 28 (1), 6–19.

Auer, Benjamin R. and Frank Schuhmacher. 2013. “Performance Hypothesis Testing with the

Sharpe Ratio: The Case of Hedge Funds." *Finance Research Letters* 10 (4), 196–208.

Avramov, Doron, Robert Kosowski, Narayan Y. Naik, and Melvyn Teo. 2011. "Hedge Funds, Managerial Skill, and Macroeconomic Variables." *Journal of Financial Economics* 99 (3), 672–92.

Bali, Turan G., Stephen J. Brown, and K. Ozgur Demirtas. 2013. "Do Hedge Funds Outperform Stocks and Bonds?" *Management Science* 59 (8), 1887–1903.

Banz, Rolf W. 1981. "The Relationship between Return and Market Value of Common Stocks." *Journal of Financial Economics* 9 (1), 3–18.

Baquero, Guillermo, Jenke ter Horst, and Marno Verbeek. 2005. "Survival, Look-Ahead Bias, and Persistence in Hedge Fund Performance." *Journal of Financial and Quantitative Analysis* 40 (3), 493–517.

Barberis, Nicholas and Andrei Shleifer. 2003. "Style Investing." *Journal of Financial Economics* 68 (2), 161–99.

Barth, Daniel, Juha Joenvaara, Mikko Kauppila, and Russell R. Wermers. 2020. "The Hedge Fund Industry Is Bigger (and Has Performed Better) Than You Think." *SSRN Electronic Journal*.

Basu, Sanjoy. 1983. "The Relationship between Earnings' Yield, Market Value and Return for NYSE Common Stocks: Further Evidence." *Journal of Financial Economics* 12 (1), 129–56.

Ben-David, Itzhak, Francesco Franzoni, Augustin Landier, and Rabih Moussawi. n.d. "Do Hedge Funds Manipulate Stock Prices?" 44.

Bhandari, Laxmi Chand. 1988. "Debt/Equity Ratio and Expected Common Stock Returns: Empirical Evidence." *The Journal of Finance* 43 (2), 507–28.

Bollen, Nicolas P. B. and Veronika K. Pool. 2009. "Do Hedge Fund Managers Misreport Returns? Evidence from the Pooled Distribution." *The Journal of Finance* 64 (5), 2257–88.

Bollen, Nicolas P. B. and Robert E. Whaley. 2009. "Hedge Fund Risk Dynamics: Implications for Performance Appraisal." *The Journal of Finance* 64 (2), 985–1035.

Boyson, Nicole M. 2008. "Hedge Fund Performance Persistence: A New Approach." *Financial Analysts Journal* 64 (6), 27–44.

Brandon, Rajna Gibson and Songtao Wang. 2013. “Liquidity Risk, Return Predictability, and Hedge Funds’ Performance: An Empirical Study.” *Journal of Financial and Quantitative Analysis* 48 (1), 219–44.

Brav, Alon, Wei Jiang, Frank Partnoy, and Randall Thomas. 2008. “Hedge Fund Activism, Corporate Governance, and Firm Performance.” *The Journal of Finance* 63 (4), 1729–75.

Brown, Stephen J., William N. Goetzmann, and Roger G. Ibbotson. 1997. *Offshore Hedge Funds: Survival and Performance 1989-1995*. National Bureau of Economic Research.

Brown, Stephen J., William N. Goetzmann, and James Park. 2001. “Careers and Survival: Competition and Risk in the Hedge Fund and CTA Industry.” *The Journal of Finance* 56 (5), 1869–86.

Brown, Stephen, Yan Lu, Sugata Ray, and Melvyn Teo. 2018. “Sensation Seeking and Hedge Funds: Sensation Seeking and Hedge Funds.” *The Journal of Finance* 73 (6), 2871–2914.

Brunnermeier, Markus K. and Stefan Nagel. 2004. “Hedge Funds and the Technology Bubble.” *The Journal of Finance* 59 (5), 2013–40.

Cao, Charles, Bradley A. Goldie, Bing Liang, and Lubomir Petrasek. 2016. “What Is the Nature of Hedge Fund Manager Skills? Evidence from the Risk-Arbitrage Strategy.” *Journal of Financial and Quantitative Analysis* 51 (3), 929–57.

Capocci, Daniel and Georges Hübner. 2004. “Analysis of Hedge Fund Performance.” *Journal of Empirical Finance* 11 (1), 55–89.

Capocci, Daniel, Albert Corhay, and Georges Hübner. 2005. “Hedge Fund Performance and Persistence in Bull and Bear Markets.” *The European Journal of Finance* 11 (5), 361–92.

Carhart, Mark M. 1997. “On Persistence in Mutual Fund Performance.” *The Journal of Finance* 52 (1), 57–82.

Caldwell, Ted. "Introduction: The model for superior performance." Hedge Funds, Irwin, New York (1995): 1-17.

Cassar, Gavin and Joseph Gerakos. 2011. “Hedge Funds: Pricing Controls and the Smoothing of Self-Reported Returns.” *The Review of Financial Studies* 24 (5), 1698–1734.

Chan, Louis K. C., Yasushi Hamao, and Josef Lakonishok. 1991. “Fundamentals and Stock Returns in Japan.” *The Journal of Finance* 46 (5), 1739–64.

Connor, Gregory and Mason Woo. n.d. “An Introduction to Hedge Funds.” 39.

Cumming, Douglas and Na Dai. 2010a. “A Law and Finance Analysis of Hedge Funds.” *Financial Management* 39 (3), 997–1026.

Cumming, Douglas and Na Dai. 2010b. “Hedge Fund Regulation and Misreported Returns.” *European Financial Management* 16 (5), 829–57.

Cumming, Douglas, Na Dai, and Sofia Johan. 2017. “Dodd-Franking the Hedge Funds.” *Journal of Banking & Finance* 105216.

Dichev, Ilia D. and Gwen Yu. 2011. “Higher Risk, Lower Returns: What Hedge Fund Investors Really Earn.” *Journal of Financial Economics* 100 (2), 248–63.

Dimmock, Stephen G. and William C. Gerken. 2016. “Regulatory Oversight and Return Misreporting by Hedge Funds.” *Review of Finance* 20 (2), 795–821.

Ding, Bill and Hany A. Shawky. 2006. *The Performance of Hedge Fund Strategies and the Asymmetry of Return Distributions*. Rochester, NY: Social Science Research Network.

Edwards, Franklin R. and Mustafa Onur Caglayan. 2001a. “Hedge Fund Performance and Manager Skill.” *Journal of Futures Markets* 21 (11), 1003–28.

Edwards, Franklin R. and Mustafa Onur Caglayan. 2001b. “Hedge Fund Performance and Manager Skill.” *Journal of Futures Markets* 21 (11), 1003–28.

Eling, Martin and Roger Faust. 2010. “The Performance of Hedge Funds and Mutual Funds in Emerging Markets.” *Journal of Banking & Finance* 34 (8), 1993–2009.

Eling, Martin and Frank Schuhmacher. 2007. “Does the Choice of Performance Measure Influence the Evaluation of Hedge Funds?” *Journal of Banking & Finance* 31 (9), 2632–47.

Elton, Edwin J., Martin J. Gruber, and Christopher R. Blake. 2003. *Marginal Stockholder Tax Effects and Ex-Dividend Day Behavior - Thirty-Two Years Later*. Rochester, NY: Social Science Research Network.

Fama, Eugene F. 1970. “Efficient Capital Markets: A Review of Theory and Empirical Work.” *The Journal of Finance* 25 (2), 383–417.

Fama, Eugene F. and Kenneth R. French. 1992. “The Cross-Section of Expected Stock Returns.” *The Journal of Finance* 47 (2), 427–65.

Fama, Eugene F. and Kenneth R. French. 1996. “Multifactor Explanations of Asset Pricing Anomalies.” *The Journal of Finance* 51 (1), 55–84.

Fama, Eugene F. and Kenneth R. French. 1998. “Value versus Growth: The International Evidence.” *The Journal of Finance* 53 (6), 1975–99.

Frumkin, Dvir and Donald Vandegrift. 2009. “The Effect of Size, Age, Beta and Disclosure Requirements on Hedge Fund Performance.” *Journal of Derivatives & Hedge Funds* 15 (3), 241–51.

Fung, William and David A. Hsieh. 1999. “A Primer on Hedge Funds.” *Journal of Empirical Finance* 6 (3), 309–31.

Fung, William and David A. Hsieh. 2000. “Performance Characteristics of Hedge Funds and Commodity Funds: Natural vs. Spurious Biases.” *The Journal of Financial and Quantitative Analysis* 35 (3), 291–307.

Fung, William and David A. Hsieh. 2001. “The Risk in Hedge Fund Strategies: Theory and Evidence from Trend Followers.” *The Review of Financial Studies* 14 (2), 313–41.

Fung, William and David A. Hsieh. 2002. “Asset-Based Style Factors for Hedge Funds.” *Financial Analysts Journal* 58 (5), 16–27.

Fung, William and David A. Hsieh. 2004. “Hedge Fund Benchmarks: A Risk-Based Approach.” *Financial Analysts Journal* 60 (5), 65–80.

Fung, William K. H. and David A. Hsieh. 2006. “Hedge Funds: An Industry in Its Adolescence.” *Economic Review (Atlanta, Ga.)* 91 (4), 1–36.

Fung, William, David A. Hsieh, Narayan Y. Naik, and Tarun Ramadorai. 2008. “Hedge Funds: Performance, Risk, and Capital Formation.” *The Journal of Finance* 63 (4), 1777–1803.

Géhin, Walter. 2004. *A Survey of the Literature on Hedge Fund Performance*. Rochester, NY: Social Science Research Network.

Goetzmann, William N., Jonathan E. Ingersoll, and Stephen A. Ross. 2003. “High-Water Marks and Hedge Fund Management Contracts.” *The Journal of Finance* 58 (4), 1685–1718.

Gregoriou, Greg N., Komlan Sedzro, and Joe Zhu. 2005. “Hedge Fund Performance Appraisal Using Data Envelopment Analysis.” *European Journal of Operational Research* 164 (2), 555–71.

Guasoni, Paolo and Jan Obłój. 2016. “The Incentives of Hedge Fund Fees and High-Water Marks.” *Mathematical Finance* 26 (2), 269–95.

Hayek, F. A. 1945. “The Use of Knowledge in Society.” *The American Economic Review* 35 (4), 519–30.

Heuson, Andrea J., Mark C. Hutchinson, and Alok Kumar. n.d. “Predicting Hedge Fund Performance When Fund Returns Are Skewed.” *Financial Management* n/a (n/a).

Honigsberg, Colleen. 2019. “Hedge Fund Regulation and Fund Governance: Evidence on the Effects of Mandatory Disclosure Rules.” *Journal of Accounting Research* 57 (4), 845–88.

Jagannathan, Ravi, Alexey Malakhov, and Dmitry Novikov. 2010. “Do Hot Hands Exist among Hedge Fund Managers? An Empirical Evaluation.” *The Journal of Finance* 65 (1), 217–55.

Jensen, Michael C. 1968. “The Performance of Mutual Funds in the Period 1945–1964.” *The Journal of Finance* 23 (2), 389–416.

Jorion, Philippe and Christopher Schwarz. 2014. “The Strategic Listing Decisions of Hedge Funds.” *Journal of Financial and Quantitative Analysis* 49 (3), 773–96.

Kessler, Stephan and Bernd Scherer. 2011. “Hedge Fund Return Sensitivity to Global Liquidity.” *Journal of Financial Markets* 14 (2), 301–22.

Kosowski, Robert, Narayan Y. Naik, and Melvyn Teo. 2007. “Do Hedge Funds Deliver Alpha? A Bayesian and Bootstrap Analysis.” *Journal of Financial Economics* 84 (1), 229–64.

Lee, Charles M. C. 2001. “Market Efficiency and Accounting Research: A Discussion of ‘Capital Market Research in Accounting’ by S.P. Kothari.” *Journal of Accounting and Economics* 31 (1), 233–53.

Li, Haitao, Xiaoyan Zhang, and Rui Zhao. n.d. “Investing in Talents: Manager Characteristics and Hedge Fund Performances.” 41.

Li, H., Zhang, X., & Zhao, R. (2011). Investing in Talents: Manager Characteristics and

Hedge Fund Performances. Journal of Financial and Quantitative Analysis, 46(1), 59-82. doi:10.1017/S0022109010000748

Liang, Bing. 1999. “On the Performance of Hedge Funds.” *Financial Analysts Journal* 55 (4), 72–85.

Liang, Bing. 2000. “Hedge Funds: The Living and the Dead.” *Journal of Financial and Quantitative Analysis* 35 (3), 309–26.

Liang, Bing. 2001. “Hedge Fund Performance: 1990–1999.” *Financial Analysts Journal* 57 (1), 11–18.

Liang, Bing, Christopher Schwarz, Mila Getmansky Sherman, and Russ Wermers. 2019. *Share Restrictions and Investor Flows in the Hedge Fund Industry*. Rochester, NY: Social Science Research Network.

Lim, Jongha, Berk A. Sensoy, and Michael S. Weisbach. 2016a. “Indirect Incentives of Hedge Fund Managers.” *The Journal of Finance* 71 (2), 871–918.

Lim, Jongha, Berk A. Sensoy, and Michael S. Weisbach. 2016b. “Indirect Incentives of Hedge Fund Managers.” *The Journal of Finance* 71 (2), 871–918.

Lo, Andrew W. 2002. “The Statistics of Sharpe Ratios.” *Financial Analysts Journal* 58 (4), 36–52.

Malkiel, Burton G. and Atanu Saha. 2005. “Hedge Funds: Risk and Return.” *Financial Analysts Journal* 61 (6), 80–88.

Mitchell, Mark and Todd Pulvino. 2001. “Characteristics of Risk and Return in Risk Arbitrage.” *The Journal of Finance* 56 (6), 2135–75.

Naik, Narayan Y., Tarun Ramadorai, and Maria Stromqvist. 2007. “Capacity Constraints and Hedge Fund Strategy Returns.” *European Financial Management* 13 (2), 239–56.

Pástor, Ľuboš and Robert F. Stambaugh. 2003. “Liquidity Risk and Expected Stock Returns.” *Journal of Political Economy* 111 (3), 642–85.

Patton, Andrew J. 2009. “Are ‘Market Neutral’ Hedge Funds Really Market Neutral?” *The Review of Financial Studies* 22 (7), 2495–2530.

Patton, Andrew J. and Tarun Ramadorai. 2013. “On the High-Frequency Dynamics of Hedge Fund Risk Exposures.” *The Journal of Finance* 68 (2), 597–635.

Patton, Andrew J., Tarun Ramadorai, and Michael Streatfield. 2015. “Change You Can Believe In? Hedge Fund Data Revisions.” *The Journal of Finance* 70 (3), 963–99.

Posthuma, Nolke and Pieter Jelle van der Sluis. 2003. *A Reality Check on Hedge Funds Returns*. Rochester, NY: Social Science Research Network.

Reinganum, Marc R. 1981. “A New Empirical Perspective on the CAPM.” *The Journal of Financial and Quantitative Analysis* 16 (4), 439–62.

Rosenberg, Barr, Kenneth Reid, and Ronald Lanstein. 1985. “Persuasive Evidence of Market Inefficiency.” *The Journal of Portfolio Management* 11 (3), 9–16.

Sadka, Ronnie. 2006. “Momentum and Post-Earnings-Announcement Drift Anomalies: The Role of Liquidity Risk.” *Journal of Financial Economics* 80 (2), 309–49.

Sadka, Ronnie. 2010. “Liquidity Risk and the Cross-Section of Hedge-Fund Returns.” *Journal of Financial Economics* 98 (1), 54–71.

Schaub, Nic and Markus Schmid. 2013. “Hedge Fund Liquidity and Performance: Evidence from the Financial Crisis.” *Journal of Banking & Finance* 37 (3), 671–92.

Schneeweis, T. 1998. “Dealing with Myths of Hedge Fund Investment.”

Schuhmacher, Frank and Martin Eling. n.d. “Are Drawdown-Based Performance Measures as Good as the Sharpe Ratio?” 18.

Sharpe, William F. 1966. “Mutual Fund Performance.” *The Journal of Business* 39 (1), 119–38.

Sharpe, W. F. (1994). The sharpe ratio. Journal of portfolio management, 21(1), 49-58.

Sharpe, W. F. (1992). Asset allocation: Management style and performance measurement. Journal of portfolio Management, 18(2), 7-19.

Shi, Zhen. 2017. “The Impact of Portfolio Disclosure on Hedge Fund Performance.” *Journal of Financial Economics* 126 (1), 36–53.

Stulz, Rene M. n.d. “Hedge Funds: Past, Present, and Future.” 26.

Sun, Zheng, Ashley W. Wang, and Lu Zheng. 2018. “Only Winners in Tough Times Repeat: Hedge Fund Performance Persistence over Different Market Conditions.” *Journal of Financial and Quantitative Analysis* 53 (5), 2199–2225.

Teo, Melvyn. 2009. “The Geography of Hedge Funds.” *The Review of Financial Studies* 22

(9), 3531–61.

Teo, Melvyn. 2011. “The Liquidity Risk of Liquid Hedge Funds.” *Journal of Financial Economics* 100 (1), 24–44.

Tremont Capital Management. 2005. “Tremont Asset Flow Report.” Second Quarter 2005.

New York.

Vrontos, Spyridon D., Ioannis D. Vrontos, and Daniel Giamouridis. 2008. “Hedge Fund Pricing and Model Uncertainty.” *Journal of Banking & Finance* 32 (5), 741–53.

WSJ, Rob Copeland, Gregory Zuckerman and Laurence Fletcher. n.d. “Some Hedge Funds Clean up after Brexit Vote.”

Yin, Chengdong. 2016. “The Optimal Size of Hedge Funds: Conflict between Investors and Fund Managers.” *The Journal of Finance* 71 (4), 1857–94.

Zakamouline, Valeri and Steen Koekebakker. 2009. “Portfolio Performance Evaluation with Generalized Sharpe Ratios: Beyond the Mean and Variance.” *Journal of Banking & Finance* 33 (7), 1242–54.

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