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THE USE OF ETFS AND PROTECTIVE OPTION STRATEGIES BY DELEGATED ASSET MANAGERS

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HAMED SALEHI

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Abstract

The secretive nature, opacity, and complexity of investment strategies employed by active asset managers lead to information asymmetry and to the agency problem. Under imperfect information, ex ante identification of skilled investment managers is difficult (adverse selection). Moreover, personal preferences may lead to investment decisions that play to the advantage of asset managers – who control the actions determining the distribution of investment outcomes – at the expense of asset owners' objectives (moral hazard). Analysing investment actions that are prone to agency problems may aid in effectively gauging managerial skill and risk preferences.

This dissertation, comprising three essays, offers empirical evaluation of the use of exchange-traded funds (ETFs) and protective option strategies by utilising a novel data on institutional investors' security holdings and one of the most comprehensive consolidated hedge fund data. The analysis of institutional investors' ETF portfolios does not support the hypothesised ETF selection ability. Rather, ETF usage is associated with managerial incentives and investment constraints. Both a robust negative relation between ETF use and stock portfolio performance and the less active investing manifested by portfolios of ETF users suggest inferior stock selection among this subset of institutional investors. The results also establish a strong association between the use of protective option strategies and a lower risk profile. In line with a costly hedging hypothesis, funds whose portfolios include protective option strategies earned countercyclical net-of-fee returns. More incentivised hedge funds with better past performance demonstrated greater likelihood of locking in their gains and insuring against the downside via protective option strategies, thereby increasing the realised fees.

Such research into use of ETFs and protective option strategies is important in two respects. It sheds light on the added value of these instruments in asset managers' investment portfolios and provides insights into the implications of investment decisions that are susceptible to agency problems with regard to managerial skill and risk preferences. Alongside policy implications, the results have potential to improve screening and hence reduce investors' search costs.

Keywords: exchange-traded funds, hedge funds, institutional investors, investment skill, protective option strategies, risk preferences

Salehi, Hamed, Pörssinoteerattujen rahastojen ja suojaavien optiostrategioiden käyttö varainhoidossa.
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Tiivistelmä

Varainhoitajien haluttomuus ilmaista selkeästi, usein varsin monimutkaisia ja joskus tarkoituksellakin salassa pidettyjä, sijoitusstrategioitaan, aiheuttaa informaation epäsymmetriaa ja voi johtaa päämies-agentti-ongelmaan. Epätäydellisen informaation myötä varainhoitajan ammattitaidon arviointi on vaikeaa ja haitallisen valikoitumisen riski merkittävä. Varainhoitajan henkilökohtaiset preferenssit saattavat myös näytellä sijoituskohteiden valinnassa tarpeettoman suurta osaa suhteessa omistajien tavoitteisiin. Moraalikadon vaara onkin ilmainen.

Tässä väitöskirjassa tutkitaan pörssinoteerattujen rahastojen ja suojaavien optiostrategioiden käyttöä varainhoidon välineinä. Empiirinen aineisto muodostuu institutionaalisten sijoittajien arvopaperiomistuksista, yhdessä kattavan sijoitusrahastoaineiston kanssa. Tutkimuksen empiiriset tulokset eivät tue nollahypoteesiksi asetettua varainhoitajien kyvykkyyttä valita salkkuunsa hyvin tuottavia rahastoja. Pörssinoteerattuihin rahastoihin sijoittaminen näyttää pikemminkin olevan yhteydessä varainhoitajille asetettuihin kannustinpalkkioihin sekä sijoitusstrategioille asetettuihin rajoitteisiin. Pörssinnoteerattujen rahastojen käytön ja sijoitussalkun tuoton välillä havaittu voimakas negatiivinen korrelaatio, yhdessä rahastoja käyttävien varainhoitajien passiivisemman kaupankäynnin kanssa, viittaa huonoon kykyyn tehdä onnistuneita osakevalintoja osana sijoitusstrategiaa. Suojaavien optiostrategioiden käyttö on puolestaan selkeästi yhteydessä alhaiseen riskinottoon. Strategioita käyttävien varainhoitajien salkkujen tuottojen havaitaan olevan vastasyklisiä hoitopalkkioiden huomioimisen jälkeen. Kannustinpalkkioilla sitoutetut varainhoitajat tapaavat myös lukita jo kertyneet palkkionsa vakuuttamalla hoitamansa riskirahaston kurssilaskua vastaan suojaavilla optiostrategioilla.

Pörssinoteerattujen rahastojen ja suojaavien optiostrategioiden käytön tutkiminen on tärkeää kahdestakin syystä. Tutkimuksen kautta saadaan uutta tietoa mainittujen instrumenttien käytöstä institutionaalisessa varainhoidossa. Opimme myös ymmärtämään paremmin päämies-agenttiongelman roolia varainhoidossa sekä varainhoitajien suhtautumista riskiin. Tutkimustuloksiin perustaen on mahdollista parantaa varainhoitajan valintaprosessia sekä alentaa siitä aiheutuvia kustannuksia.

Asiasanat: institutionaaliset sijoittajat, pörssinoteeratut rahastot, riskinottohalukkuus, riskirahastot, sijoitustaito, suojaavat optiostrategiat

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List of original essays

This thesis is based on the introductory chapter and the following essays, which are referred throughout the text by their Roman numerals:

I Salehi, H. Do institutional investors have ETF selection ability? Manuscript.

II Joenväärä, J., Salehi, H. Institutional investors' ETF usage and stock selection ability. Manuscript.

III Joenväärä, J., Kauppila, M., Salehi, H. On hedge funds' use of protective option strategies. Manuscript.

Contents

1 Introduction

1.1 Background

Asset managers play an important role in the growth of economies by designing financial products that facilitate increased diversification, risk-sharing, and information production (Greenwood & Scharfstein, 2013; Philippon, 2015). These intermediaries provide asset owners with financial services (in particular, investment services) in exchange for a fee, where the services range from handling relatively simple financial operations to offering various complex investment products. Some reports put the estimated size of the global asset management industry at 85 trillion US dollars in 2016, with the trend of increase expected to bring a total of 145 trillion dollars in 2025[1].

For broad classification, asset managers' investment products can be divided into *active* and *passive* ones. The active management products (actively managed mutual funds, hedge funds, private equities, etc.) are often associated with hopes of capital appreciation: outperforming a predefined benchmark or generating *alpha*. On the other hand, passive asset management products are centered less on the performance's magnitude; the focus is instead on replicating the performance of their underlying index. Lower-cost index funds and most exchange-traded funds (ETFs) fall in this category.

Passive investment products add value by lowering the trading costs and providing diversification benefits, while the value added via active management is often justified by managerial skill, including selection and timing skill (see, for example, Admati, Bhattacharya, Pfleiderer, & Ross, 1986). Here, the fundamental economic principle is that rents are earned if and only if there is a skill in short supply. Whether active investment managers actually possess the skills required for adding value beyond the passive investment alternatives' is one of the most important debates in the asset management literature.[2]

Be they individuals operating on a small scale or large institutions, asset owners aiming for capital appreciation face an allocation decision: they must choose from direct investment, investing in passive products, and hiring one or more active delegated-portfolio managers. The principal–agent problem may arise in the last of these

[1] See, for example, PricewaterhouseCoopers, 2017.

[2] See, for example, the work of Berk and Van Binsbergen (2015), Fama and French (2010), French (2008), Jensen (1968), and Lewellen (2011).

alternatives (Ross, 1973). Firstly, finding skilled investment managers *ex ante* is difficult. Secondly, while the asset managers are in control of actions that contribute to the outcome for the portfolio, these individuals' objectives are not necessarily aligned with the asset owners'. Asset managers may make investment decisions that play to their personal advantage while distorting the pursuit of the owners' objectives.

Some managerial preferences may lead to agency conflicts. In response to motives such as personal benefits, a wish to *play it safe*, or the costliness of effort, managers may perform investment actions that involve a higher or lower level of risk than is desired by the asset owners (excessive risk-taking or steering a safer course, respectively) or may exert less effort than the owner would prefer (i.e., engage in shirking).[3] Also among the issues of central concern in the asset management literature is whether, or the extent to which, managerial investment decisions/actions reflect managers' risk-taking behavior and reveal information about their preferences.

Active asset managers operate in an increasingly competitive environment. The expansion of the active asset management industry and the fact that managers have become more skilled over time have led to higher price efficiency and to more dramatic decreasing returns to scale (Bai, Philippon, & Savov, 2016; Pástor, Stambaugh, & Taylor, 2015). Furthermore, the rapid growth in popularity of index funds and exchange-traded products, which provide cheaper exposure to diverse asset classes' indices and investment strategies, renders the active management industry more competitive (Cremers, Ferreira, Matos, & Starks, 2016). Together, these phenomena have transformed the dynamics of active asset management, among which are the costs of active management and the effort incentives. In such an environment, optimal investment decisions of an asset manager may change as a function of the manager's risk preferences coupled with his or her skill level, and some managers may hence deploy capital less efficiently (D. C. Brown & Davies, 2017).

These developments coincide with growth in the scale of employing alternative investments, particularly ETFs and protective option strategies, among active asset managers. Do such instruments serve active managers with better tools for pursuing active strategies, or are they used instead for purposes other than active management? What are the implications of the use of these securities in active asset management with regard to managerial skill or managers' risk preferences? This dissertation constitutes an

[3] See Amihud and Lev (1981); K. C. Brown, Harlow, and Starks (1996); S. J. Brown, Lu, Ray, and Teo (2018); Gormley and Matsa (2016); Grossman and Hart (1983); Holmstrom (1979); Holmström (1999); Smith and Stulz (1985).

attempt to address these questions by providing empirical evidence of the implications of ETFs' and protective option strategies' use by active asset managers.

1.2 The research aims and hypotheses

This dissertation aims to evaluate the use of ETFs and protective option strategies in active asset managers' portfolios empirically and to assess the information that such investment decisions can provide on management skills and risk preferences.

ETFs and protective option strategies have come to form a significant proportion of many asset managers' allocation of investments. Studying the use of ETFs and protective option strategies is important on two counts: It sheds light on the asset management dynamics – specifically, on whether these instruments add value to the asset manager's investment portfolio. Secondly, it yields insights into whether such agency-problem-prone investment allocation decisions, beyond a simple investment style, reveal information about the managers' skill and risk preferences.

On the use of exchange-traded funds

ETFs are financial instruments whose prices are quoted on stock exchanges and are designed to replicate the returns of a predefined index as in their prospectus. Their low costs for covering various asset classes and indices, along with their liquidity and tax advantages, have made ETFs a popular investment option.[4]

Much of the literature on ETFs focuses on their price efficiency (Engle & Sarkar, 2006; Petajisto, 2017); their impact on the volatility, liquidity, and information efficiency of the underlying securities (Agarwal, Hanouna, Moussawi, & Stahel, 2018; Ben-David, Franzoni, & Moussawi, 1996; Hamm, 2014; Israeli, Lee, & Sridharan, 2017); and the effects on financial stability (Anadu, Kruttli, McCabe, Osambela, & Shin, 2018). Much less is known, however, about how asset managers actually employ ETFs.

Active asset managers' utilization of ETFs has witnessed a sharp upswing in recent years. With asset owners being able to invest directly in ETFs and thereby pay little in fees, the question follows of what would justify active managers' recourse to ETF investments, with the accordant charging of active management fees. One possible explanation, with anecdotal support, lies in ETF selection skills: on account of the large

[4] For a comprehensive review, see Ben-David, Franzoni, and Moussawi (2017); Lettau and Madhavan (2018); and Madhavan (2014).

number of ETFs and the variety of products they offer, it might seem plausible that asset managers are better than asset owners at selecting ETFs that add value beyond a fair benchmark.

In Essay I, I document the trends in the use of ETFs within a set of large institutional investors. The research entails testing the assumption of ETF selection ability in aggregate, on institution level, and within various categories of ETFs. I extend the analysis by considering several alternative elements that may explain the use of ETFs by one sub-group of active asset managers in particular: those responsible for hedge funds. Testing whether fund-specific characteristics have explanatory power with respect to the use of ETFs, I look specifically at the cross-sectional relationship between the use of ETFs and key hedge fund characteristics – namely, size, flows, fees, share restrictions, and other managerial discretion variables.

Essay II presents assessment of the relationship between the managers' ETF allocation and equity selection skill. Increasing competition in active management, under conditions of decreasing return to scale, may lead to lower effort incentives (D. C. Brown & Davies, 2017). Hence, some managers might have an incentive to shirk by engaging in passive investing. If asset managers' ETF allocation decisions stem from lack of commitment to active management, one would expect ETF use to signal somewhat passive investing and inferior selection skill with regard to their direct equity holdings too. If, on the other hand, ETF usage is not indicative of managers' investment choices and their selection skill, one should not detect a meaningful difference in characteristics or performance between equity portfolios of those using and not using ETFs. We test whether ETF usage indicates lower activeness and a difference in investment style and also whether the performance of ETF users' stock portfolios differs from that of non-users, after controlling for risk, style, and other characteristics.

On the use of protective option strategies

Derivative securities are unique instruments often characterized by an asymmetric payoff structure. This feature enables asset managers to engineer the expected outcome of a given portfolio for hedging (to decrease the overall portfolio risk) or speculative purposes (to raise the overall portfolio risk).

Ex ante evaluation of asset managers' motives for utilizing derivatives in their portfolios is challenging. Some strategies involving derivative securities can provide insurance and effectively reduce the downside risk to which many asset managers'

investment strategies are exposed. On the other hand, extreme speculative use of strategies involving derivative securities, for reason of their embedded leverage capacity, can potentially increase the systemic risk of the economy (for detailed discussion of this topic, see Stulz, 2004). This forms part of the rationale behind regulators' restrictions on using derivatives in many classes of asset management product.

As collective investment products, hedge funds are subject to fairly little regulation pertaining to use of derivatives. Therefore, they offer an interesting setting for analyzing derivatives' use. One important aspect of hedge fund performance is tail risk: many of the strategies that hedge fund managers employ are known to generate steady returns in stable market conditions while bringing extreme losses in times of market distress (Stulz, 2007). Option strategies are among the instruments that many hedge funds frequently use to protect against the downside risk.

The third essay examines the use of protective option strategies among managers utilizing hedge funds. We identify a selected set of long-side option strategies, applied for both equities and ETFs, that are more likely to be used for hedging purposes: *long straddles*, *protective puts*, and *long puts*. Such strategies can be used to limit the downside losses in conditions of high volatility or market distress and simultaneously preserve the upside potentials. We considered funds to be applying protective option strategies if their long option positions included any such protective strategy. These funds were the treatment group, while the remaining funds, the non-users, served as the control group.

If employing such strategies provides an effective hedge, one would expect those using them to experience lower portfolio risks. As for actual performance, our hypothesis here, developed in light of the insurance-like costs of protective option strategies, is that the users of protective option strategies would underperform, relative to the non-users, in up markets and outperform them in down markets. The extent to which using these strategies affects portfolios' performance is ultimately an empirical question; our empirical testing of the relationship of the use of protective option strategies with portfolio risks and with performance follows from this.

What drives a manager in a highly competitive industry toward buying costly insurance against the downside? In Essay III, we argue that the use of protective option strategies is associated with managers' risk preferences. Accordingly, we test the relationship between using these strategies and certain variables showing some *a priori* relevance to managers' risk choices: the structure of the manager's compensation, incentives, fund size, and fund performance. The backdrop is our expectation of an

inverse correlation between the variables linked to managerial risk-taking and the likelihood of applying protective option strategies. Delving into further implications, we examine, furthermore, how investors in hedge funds perceive the use of protective option strategies.

1.3 Data

Holdings data

Most asset managers operate in secretive trading environments wherein the availability of data on their investment activities is highly limited. Nevertheless, for purposes of investor protection, several regulations are in place that require some asset managers to disclose information on their investment activities. One example is Section 13(f) of the US Securities Exchange Act of 1934, under which some data on institutional investors' security holdings must be made publicly available. All investment managers that exercise investment discretion in the US with an aggregate fair market value of at least $100 million on the last trading day of any month of any calendar year are required to disclose quarter-end security holding information to the US Securities and Exchange Commission (SEC) within 45 days after the last day of the relevant calendar year and the last day of each of the first three calendar quarters of the subsequent year.[5]

For our objective of taking a bottom-up approach to study asset managers' use of ETFs and option strategies, the landscape of institutional investors' mandatory 13F holdings data provides an ideal setting. These data enable ascertaining the institutional investors' actual holdings, computing the portfolios' most important characteristics, and calculating the holdings-based portfolio returns for the securities those investors hold.

To obtain our sample of institutional investors and their security holdings, we downloaded and parsed the aforementioned data from the SEC's EDGAR database. The advantage of this dataset over the commonly referenced Thomson Reuters ownership database is that it enables extracting information on the option holdings of institutional investors. These data also include late disclosures and amendments, which are not covered by the Thomson Reuters ownership database.

[5] See `https://www.sec.gov/pdf/form13f.pdf`.

Securities data

The Center for Research in Security Prices (CRSP) database serves as our primary source for identifying the securities and retrieving their return data. To examine security characteristics in more detail, we use data from Bloomberg and Thomson Reuters Datastream also.

Data on hedge funds

Though analysis of various types of fiduciary as institutional investors forms the foundations of the efforts (particularly with regard to Essay I and Essay II), hedge funds deserve special attention. This group of funds is an attractive target for scholarly examination of ETFs' and protective option strategies' use in active investment management partly because hedge funds are among the most active types of institutional investors, as judged by the fees they charge, the competitive environment in which they operate, and the relative flexibility for investment choices that is afforded by fairly loose regulatory constraints. In addition, hedge funds' compensation structure, which often features performance-based contracts, share restrictions, and other discretionary characteristics, facilitates making predictions about their investment preferences and risk choices and drawing inferences about their use of ETFs and protective option strategies.[6]

Our database of hedge fund characteristics with monthly time-series information is compiled by consolidating major commercial databases[7] as in the work of Joenväärä, Kaupila, Kosowski, and Tolonen (2019). We manually match each hedge fund adviser's name to the Form 13F data, thereby arriving at one of the most comprehensive hedge fund databases in existence.

[6] Agarwal, Mullally, Naik, et al. (2015) and Getmansky, Lee, and Lo (2015) provide a comprehensive review of the literature on hedge funds.

[7] The work in Essay I and Essay II uses the BarclayHedge, Eurekahedge, HFR, Lipper TASS, and Morningstar databases up to Q2 of 2013. For Essay III, we include Bloomberg, eVestment, and Preqin data also, and the data are updated to extend to Q4/2016.

2 Theory

2.1 Price efficiency and active asset management

The degree of price informativeness has direct implications for the active asset management dynamics. The *efficient market hypothesis*, formalized by Fama (1970), states that prices fully reflect all available information. This directly calls into question the role of active asset management and, alternatively, supports passive investing – i.e., holding the market portfolio. Under conditions of fully informative prices, active management is a loser's game in aggregate (Sharpe, 1991). This is because every dollar of actively managed gain is offset by a dollar of actively managed loss. Empirical findings that, on average, actively managed mutual funds do not outperform the market and that they underperform after fees are consistent with this argument (e.g., Fama & French, 2010; French, 2008; Jensen, 1968).

Considering costly information acquisition, Grossman and Stiglitz (1976, 1980) point out the paradox in a competitive equilibrium wherein arbitrage profits are completely eliminated: If information acquisition is costly and the prices reveal the information in full, the market participants do not have an incentive to become informed. The absence of informed trading poses a challenge to the very notion of price efficiency. In their model, Grossman and Stiglitz (1976, 1980) describe a *mostly efficient* economy in which skilled active managers can exploit the inefficiencies in prices at least to break even with the costs they bear.

Not only is the value of active management related to the degree of efficiency of the markets they operate in (Dyck, Lins, & Pomorski, 2013), but also a relatively competitive asset management industry leads to higher price efficiency (Bai et al., 2016; Garcia & Vanden, 2009). Bai et al. (2016) identify a higher level of price efficiency in relation to institutional ownership. Reviewing the literature, Jones and Wermers (2011) argue that empirical findings surrounding the performance of active asset managers are consistent with the mostly efficient economy described above and that active asset management improves price efficiency via efficient allocation of resources.

2.2 Asset management dynamics

To describe the asset management dynamics and analyze the investment actions of asset managers with regard to their investment skills and risk preferences, I adopt a simple framework in which i) prices do not reveal all the information; ii) investors both delegate some fraction of their assets to asset managers and face search cost in conditions of imperfect information; and iii) managers, who differ in their skill sets, make agency-problem-prone investment decisions that involve information acquisition and allocation decisions.[8]

2.2.1 Asset managers and asset owners

Investors and asset managers optimize the utility of their gains. Investors decide how much to invest through asset managers, and asset managers make investment decisions on behalf of these investors. The investors' allocation decision determines the volume of asset management, and the managers' investment decisions shape the distribution of the outcome. These choices are considered to be endogenously determined, conditional to search costs, preferences, management skill, the cost of effort, information set, and asset price properties. The contract between the two parties is designed such that the investor-expected value is maximized and managers' *participation constraints* and *incentive compatibility* are commensurate. This contract features a fee whereby the surplus created by the asset manager is shared with the investors in a bargaining game (e.g., Ang, 2014, pp. 491–506).

2.2.2 Skill, effort, and activeness

One can define investment skill as managers' ability to observe a noisy private signal about the future payoff of some assets by exerting costly effort. One can view this as exercising due diligence and processing information on the target assets. As for managerial activeness, in turn, I distinguish between the following two categories: a *truly active* manager is one who is skilled and exerts effort, and a *faux-active* manager is

[8] This framework is commonplace in many theoretical approaches conceptualizing asset management dynamics. See, for example, D. C. Brown and Davies (2017); Dybvig, Farnsworth, and Carpenter (2009); Garcia and Vanden (2009); Gârleanu and Pedersen (2018); Grossman and Stiglitz (1980); Kacperczyk, Van Nieuwerburgh, and Veldkamp (2016); Kyle, Ou-Yang, and Wei (2011), and Van Nieuwerburgh and Veldkamp (2010).

a manager who either is unskilled or does not exert effort. By this definition, only truly active managers are informed, and informed traders may still differ in the precision of their signal.

2.2.3 The agency problem

The utility for investors is maximized when their asset manager maximizes their expected risk-adjusted return. Simultaneously, however, rational managers seek to maximize their compensation. Imperfect information leads to the standard principal–agent problem (see, for instance, Ross, 1973) rearing its head between investors and the designated asset managers. Investment skill is difficult to identify (this manifests *adverse selection*), and the investment actions are difficult to monitor (*moral hazard* exists), for reason of the complexity, opacity, and secretiveness of the investment strategies.

Adverse selection

Investors' decision on hiring a particular manager for delegated asset management is commonly considered to be a function of their perceptions about that manager's investment skill. In conditions of imperfect information, it is difficult to identify skill *ex ante*, and this factor may lead to adverse selection. Search costs are important among the determinants of flows to asset managers (Sirri & Tufano, 1998). Investors may use, for example, past performance as a proxy for asset managers' skill (Chevalier & Ellison, 1997; Sirri & Tufano, 1998); however, prior performance does not necessarily represent greater skill (unskilled managers may mimic skilled managers' performance; see Foster and Young (2010)), and neither does it guarantee better performance in the future – performance persistence is rare (Berk & Green, 2004). Investors tend to chase past performance and allocate more money to those funds that have exhibited better performance. This investor flow negatively predicts future fund returns (e.g., Frazzini & Lamont, 2008). The so-called *dumb money* effect documented in the literature confirms the difficulties investors face in choosing skilled managers.

Moral hazard

Another problem arising from imperfect information in the principal–agent relationship is the aforementioned moral hazard (Holmstrom, 1979). Asset managers exercise control

of the actions that at least partially determine the outcome of the portfolio distribution in general and its risks and returns in particular. For managers, utility may be maximized by undertaking actions that do not necessarily maximize utility for the investors, especially when the actions are difficult to monitor.

Two important decisions the managers encounter involve *information acquisition*, whether to put effort in, and to what extent, and *portfolio allocation*, how to form the portfolio, given the available information (Kyle et al., 2011). One's personal preferences and risk tolerance, the cost of information, compensation levels, and investment constraints are among the numerous variables that influence these decisions, all of which affect the moral hazard problem in asset management.

Let us consider the decision on information acquisition in conditions of costly effort, which is endogenously determined (Verrecchia, 1982). When addressing the possibilities for obtaining a private signal about the assets' future payoff with some precision, managers choose whether to incur the effort costs involved. If both skill and effort are entirely observable, the problem boils down to a simple one of risk-sharing between the manager and the investor, with the manager getting compensated in line with his or her skill and cost of effort (Stoughton, 1993). When, in contrast, the effort is unobserved, even if fully observable skill can be assumed, there is no guarantee that a skilled manager will exert the costly effort to observe the signal. Motivations connected with personal benefits, the amount of effort required, or a desire to play things safe may give managers an incentive to shirk.

As for the second element, managers' portfolio allocation decision, a private signal with higher precision may be achieved via either greater skill or application of greater (cost-incurring) effort. In conditions of imperfect information, investors are unable to observe the signal's precision. In other words, they cannot know how informed the manager is, if at all. The manager chooses whether to acquire information and how much to obtain, notes the precision of the private signal, updates his or her beliefs about the future outcome distribution accordingly, and makes the allocation decision. Managers' personal preferences and risk tolerance directly influence the portfolio allocation decision, so they may select a higher or a lower level of risk than what optimizes investor utility. For example, S. J. Brown et al. (2018) identify a connection between hedge fund managers' personal level of sensation seeking and the risk-taking behavior they display with their funds.

Skill and personal preferences are not the only factors shaping the information acquisition or portfolio selection decisions of asset managers. Compensation, competition,

and investment constraints influence their incentives and hence the investment decisions made.

2.2.4 Compensation

The compensation provided directly affects both the manager's information acquisition choices and his or her portfolio allocation decisions. For an asset manager to behave in the interest of the delegating investor, the contract should be designed such that it is worthwhile for the skilled manager to participate, effort is rewarded, and the manager and investor are aligned well with regard to risk-taking. In practice, however, various types of compensation plans are employed, and their effectiveness remains subject to debate.[9] These plans run the gamut from simple fixed management fees to sophisticated performance-based fees with numerous provisions (see Ang, 2014, pp. 491–506).

Explicit compensation

Management fees charged as a percentage of the assets under management (AuM) are commonplace for many asset management entities, particularly mutual funds. Fixed management fees are another important element of compensation for hedge fund management (Lan, Wang, & Yang, 2013). Yet such compensation alone is ineffective for rewarding managers in a manner consistent with their true skill, providing incentive for costly effort, and facilitating optimal risk-sharing, especially once the investor has made the delegation decision.

Also common in asset management are performance-based fees, often tied to a benchmark. Here, the objective is to gauge the effort undertaken in relation to equally observable alternatives available to investors and to assess the manager's skill. Designing contracts in which the compensation is linearly tied to a given benchmark, as seen in the simplest setups, turns out to be ineffective at inducing effort or assuring optimal risk-sharing. Firstly, the choice of benchmark is challenging. Subject to a static benchmark, managers wishing to optimize their compensation may have an incentive to fake skill by taking risks that are not captured by the benchmark (Ang, 2014, p. 500). Secondly, whereas linear compensation is optimal under traditional contract theory (Holmstrom & Milgrom, 1987), for contexts of delegated asset management wherein the agent controls both the level and the volatility of the outcome, theoretical models

[9] For discussion of the level of fees paid to asset managers, see Cochrane (2013) and Malkiel (2013).

suggest that a linear-incentive contract leads to underinvestment of effort and is, at best, "irrelevant" with regard to sharpening the incentives for effort (Admati & Pfleiderer, 1997; Stoughton, 1993).[10]

Some scholars argue that asymmetric-incentive contracts or so-called option-like bonus contracts are able to cultivate effort (Li & Tiwari, 2009) but may still result in sub-optimal risk-sharing (Starks, 1987). The compensation structure of many hedge funds features a bonus fee that is granted when their performance is above their high-water mark (HWM). Managers are incentivized to expend costly effort, since their expected compensation increases in consequence. Nevertheless, since they are not penalized for losses, such contracts may encourage them to undertake riskier investments so as to maximize their expected compensation (Anson, 2001).

Implicit compensation

Considering the contract in a multi-period framework, wherein managers are subject to contract renewal choices and investors update their beliefs about the manager's skills by watching their performance unfold, provides greater insight with regard to asset managers' incentives (Heinkel & Stoughton, 1994). In this framing, the flow–performance relationship serves as an implicit contract (Chevalier & Ellison, 1997). The tradeoff between the incentive to adjust the outcome distribution toward higher compensation and the desire to avoid termination of the contract (with the associated career concerns) influences asset managers' investment behavior (Lan et al., 2013).

Chevalier and Ellison (1997), for example, find that the mutual fund managers in their study "gambled in" or "played it safe" in a manner conditioned by their past performance. Also, Yin (2016)'s work shows that hedge funds' compensation increases with fund size and is maximized at a larger size than is optimal for performance. Nevertheless, to avoid capital outflow, managers have an incentive to balance the growth to maintain performance. Carpenter (2000), examining a dynamic investment setup, argues that the effect of option-like compensation on risk-taking is more complex than what prior simple intuition suggests. The distance between net asset value and HWM

[10] That said, applying more dynamic benchmarks and considering strategic trading models, some scholars find that a linear contract increases the incentives for effort (Kyle et al., 2011; Li & Tiwari, 2009; Ou-Yang, 2003). Non-linear contracts are more effective in tackling the underinvestment problem and inducing the manager to expend effort. For example, Bhattacharya and Pfleiderer (1985) and Stoughton (1993) find that quadratic contracts provide incentive to put effort in but are neither optimal from a risk-sharing perspective nor feasible in practice.

affects risk-taking behavior, and managers constantly adjust their risk-taking with regard to this distance. Finally, Hodder and Jackwerth (2007), considering the contract of a typical hedge fund manager, suggest that the risk-taking depends on fund value and that the risk-taking in multi-period cases is rapidly moderated if the fund performs reasonably well.

Overall, one captures managerial incentives best by studying both explicit and implicit compensation. Both forms of incentive affect managers' effort and portfolio allocation. For instance, Agarwal, Daniel, and Naik (2009) reveal a positive correlation between performance and the "direct incentives" of hedge funds – quantified as the combination of the delta of the option-like incentive-fee contracts, managerial ownership, and HWM provision – while Lim, Sensoy, and Weisbach (2016), quantifying the "indirect incentives" of hedge funds (as the additional income from the future inflows and increase in value of existing assets), conclude that indirect incentives constitute an important part of hedge fund compensation and, in fact, are 1.4 times larger than the direct incentives.

2.2.5 Competition

Competition between asset managers, often formalized in multi-agent frameworks, affects investment behavior through several channels. Firstly, managers compete to render their product more attractive than others' to investors by increasing the payoff that, *ex ante*, the investor is expected to receive. This competition can take the form of offering a lower fee than would be offered in imperfect competition, on account of investors' bargaining option. The trend of decreasing fee magnitude visible in, for example, mutual funds (French, 2008) may be attributable to rising competition, perhaps connected with the increasing number of asset management products. Another example is visible in increasing competition arising from the growth shown by less costly passive index funds and ETFs, which provide some of the services previously packaged under portfolio management, such as diversification benefits and factor exposure. Cremers et al. (2016) identify this competitive force as leading to active funds displaying lower fees and higher activeness. D. C. Brown and Davies (2017), on the other hand, argue that the decline witnessed in the overall compensation of active asset managers has led to lower effort incentives and to less capital being deployed efficiently.

Secondly, relative performance becomes an important determinant of managerial risk-shifting when future compensation is tied to performance (K. C. Brown et al., 1996). In the phenomenon of so-called tournament behavior, managers engage in risk

manipulation informed by their performance relative to their peers', which creates an incentive to *lose* funds to take on more risk and thereby catch up or to *win* funds for locking in their performance and thus be safe (K. C. Brown et al., 1996). Thirdly, with a larger asset management industry and higher proportion of skilled investors come changes in the opportunities exploitable by asset managers. More capital following investment opportunities, due to the decreasing return to scale, makes these elusive (Pástor et al., 2015). The phenomenon can be viewed as increased information cost imposed on active asset managers as a result of competition, a cost that might well influence their incentives and investment decisions.

2.2.6 Investment constraints

Even skilled asset managers who are willing to expend great effort may be subject to constraints or externalities that influence their investment behavior. For proper analysis of asset managers' investment actions, it is important to take such constraints into account in addition.

One of the services that asset managers offer is the liquidity provision, which is neglected in typical performance metrics. Liquidity-motivated trades, often prompted by investor flows, constitute an important part of asset managers' trade and impose costs that have a negative impact on the returns realized (Coval & Stafford, 2007; Edelen, 1999).

Inflows may inflate the size of the fund beyond the capacity that is optimal for informed investment, thus leading the manager to deploy capital less efficiently. In the theoretical model of Berk and Green (2004), investors learn about managers' skill from their past performance and allocate capital accordingly. However, the actions of skilled managers are subject to decreasing return to scale. The authors' model predicts that when the fund exceeds its optimal capacity, the manager chooses to index the remaining capital. Naik, Ramadorai, and Stromqvist (2007) cite evidence consistent with a capacity constraint at hedge fund strategy level.

Outflows too can affect the realized outcome, by imposing additional costs on skilled asset managers. Investors may have an investment horizon that diverges from the asset manager's, or other forces may create a wish to withdraw their capital before the manager's trades mature and the gains are realized. In this scenario, a manager who has fully invested on the basis of existing information must liquidate some of his or her positions, often with a discount (Coval & Stafford, 2007; Shleifer & Vishny,

2011, 1992). Empirical evidence suggests also that those provisions providing more flexibility for dealing with liquidity constraints, such as lock-up periods and other share restriction, lead to higher performance (Agarwal et al., 2009; Aragon, 2007). Such provisions, which are most commonplace for hedge funds, enable the managers to harvest the premiums more freely in cases of, for example, more illiquid assets.

2.3 Alternative monitoring mechanisms

Given the difficulties with attempting to identify skill, effort, or risk-taking via only past performance or a typical contracting structure, taking alternative mechanisms into account becomes crucial. Ma, Tang, and Gómez (2019) point out the importance of various alternative mechanisms, among them investor sophistication, greater monitoring ability (Evans & Fahlenbrach, 2012), and portfolio manager ownership (Khorana, Servaes, & Wedge, 2007), which together make explicit contracts redundant. Manager-specific characteristics are another potential source of information about managerial skill. For example, a manager's age (Howell, 2001), education (Chevalier & Ellison, 1999; Gottesman & Morey, 2006), and network (Cohen, Frazzini, & Malloy, 2008) are discussed as related to performance and skill. Also, Dybvig et al. (2009) point out the importance of trading restrictions for contracts with managers.

Analysis of portfolio holdings holds potential for bringing about better monitoring of investment actions and an enhanced process of identifying skill and effort. However, observing actions, *per se*, may not necessarily reveal the full picture of the outcome. For instance, some investment actions that are perceived as susceptible to agency problem might benefit the investors. In the case of risk-shifting behavior among asset managers, the consequences may depend on the economic motives behind the behavior, which are not directly observable. It may be driven by agency-related motives or connected with the manager's efforts to take advantage of the investment opportunities revealed by particular information (Huang, Sialm, & Zhang, 2011). Robust empirical evidence can bring further insights for evaluating investment actions.

There is extensive literature on assessing the actions of asset managers and how these tie in with managerial skill and the outcome achieved. The holdings-based performance metrics developed by Daniel, Grinblatt, Titman, and Wermers (1997), for example, tend to be effective for identifying the selectivity, timing, and style of asset managers. Research demonstrates that such variables as tracking error and active share (Cremers & Petajisto, 2009), return gap (Kacperczyk, Sialm, & Zheng, 2006), industry concentration

(Kacperczyk, Sialm, & Zheng, 2005), and turnover (Pástor, Stambaugh, & Taylor, 2017a) – all of which may be related in some way to a manager's effort – possess predictive power with regard to future performance. Similarly, asset managers' direct investment choices as to, for example, the use of cash, derivatives, leverage, and options have direct agency-related implications and can aid in revealing information about managers' skill, effort, and risk-taking (Ang, Goetzmann, & Schaefer, 2011; Aragon & Martin, 2012; Chen, 2011; Koski & Pontiff, 1999; Natter, Rohleder, Schulte, & Wilkens, 2016; Simutin, 2013; Yan, 2006).

3 Summary of the empirical findings

3.1 Essay I: Do institutional investors have ETF selection ability?

The first essay documents a significant increase in institutional investors' employment of ETFs, with ETFs constituting an important part of portfolios for a large group of institutional investors. In figures from 2013, the typical institutional investor's ETF allocation is a striking 20% of its total equity holdings. The figure is lowest for investors responsible for hedge funds, at 13%. Furthermore, even though almost every listed ETF is represented in the holdings of the institutional investors studied (a sample accounting for some 30% of the total capital of the ETF industry), the data show the capital to be concentrated with a handful of large ETFs for the most part.

The use of ETFs among institutional investors extends beyond solely short-term investment. For most of the institutional investors, the data reveal an ETF holding in the portfolio for more than 10 quarters between 1999 and 2013. The average duration of the ETF holdings in the portfolios in the later years of the study period is more than three quarters of a year, and there is high autocorrelation in the use of ETFs. Together, these findings suggest that some institutional investors may use ETFs for strategic asset allocation purposes.

Analysis of these investors' ETF portfolios yields a negative assessment of their ETF selection ability. I find no evidence of ETF selection ability in aggregate or on average. With the ETFs they hold, the institutional investors fail to add value beyond that provided by a set of simple benchmarks. A similar conclusion follows from assessing selection ability with regard to any of the sub-categories of ETF examined: ETFs connected with a particular asset class, geographical focus, replication strategy, size, or market *beta*.

I assess ETF selection ability at institution level also. By evaluating the distribution of the average ETF portfolio return of institutional investors, I am able to demonstrate that under five percent of the institutions achieve performance significantly surpassing that of the S&P 500 index with a 90% confidence interval. This proportion only shrinks when other benchmark models are used. The intensity of ETF use, proxied by the amount of ETF usage, the number of ETFs in the given portfolio, and the duration of the ETF positions, also fails to explain the cross-section of institutional investors' ETF portfolio returns. Overall, these results imply that either the institutional investors' ETF

use is a failed attempt at active management or ETFs are used for purposes other than direct active investing.

For the sub-group of asset managers that I give special emphasis (i.e., those managing hedge funds), I can identify fund size, compensation structure, share restrictions, and hurdle rates as holding significant power to predict whether a given hedge fund utilizes ETFs in its portfolio. Specifically, those larger funds, with lower management and performance-based fees and with more extensive share restrictions proved more likely to use ETFs. These results point to the importance of managerial incentives and investment constraints for ETF allocation decisions.

3.2 Essay II: Institutional investors' ETF usage and stock selection ability

Essay II evaluates the relationship between ETF usage and stock selection skill. We find less evidence of active investing in the portfolios of ETF users than in those of the non-ETF-users. Specifically, ETF users' stock holdings showed a lower average score with regard to active share measurements, and these institutions invest in higher-market-capitalization stocks with broader analyst coverage. Also, the results show that ETF users hold more diversified portfolios and invest a lower percentage of their wealth directly in individual equities than do non-ETF-users.

In addition, we document a negative correlation between ETF use and stock portfolio performance. The return of ETF users' stock portfolios is closer to the market portfolio and shows strong underperformance in comparison with non-ETF-users' portfolios. The performance difference remains even after we account for various risk factors. The essay also examines four characteristics that have some *a priori* relevance that may account for either passive investing or the cross-sectional performance difference between the stock portfolios of ETF users and of other investors: fiduciary type, size, degree of ETF use, and the stocks' market capitalization focus. We demonstrate that the difference in stock performance is robust to all four of these characteristics. More specifically, we show that the difference in performance between the stock portfolios of ETF users and non-ETF-users is evident irrespective of the degree of ETF use and that this effect is stronger among smaller, more active types of institution and those with a small-capitalization focus.

Using a regression approach and simultaneously controlling for the institution and portfolio characteristics, we show that the cross-sectional difference in performance

between the two sets of stock portfolios is both robust and consistent with the results obtained in the portfolio approach. Furthermore, we identify the main source of the difference in stock portfolio performance between ETF users and non-ETF-using entities as lying mainly in the characteristics denoted as selectivity and average style. Besides the robust cross-sectional relationship, our examination of within-institution differences in stock portfolio performance reveals that institutions' stock portfolios have significantly lower risk-adjusted returns at times of ETF use than during non-ETF-use periods.

These findings are consistent with the notion of equilibrium that D. C. Brown and Davies (2017) present. The competition pressure imposed by the expansion in lower-cost index-linked products and a more severe level of decreasing return to scale (Pástor et al., 2015), perhaps due to increasing volumes of active management, may reduce effort incentives and may prompt managers with inferior selection ability to deploy capital less efficiently. More skilled managers engaging in security selection compete by increasing their active bets and reducing their fees (Cremers et al., 2016), whereas less skilled managers would be better off shifting their attention to cost reduction and passive investment strategies. Therefore, as long as that dynamic prevails, an institution's holding of ETFs serves as a gauge of its investors' stock-picking skills.

3.3 Essay III: On hedge funds' use of protective option strategies

In Essay III, we demonstrate that, indeed, protective option strategies constitute the majority of long-side option positions of hedge funds in the time under study, 1999–2016. We identify a strong negative association between the use of protective option strategies and hedge funds' risk profile. The users of such strategies maintained lower covariance with the market, especially amid financial crisis, and hence provided more effective hedging, which lead to more successful downside protection. This lower risk profile is most strongly evident among heavy users of protective option strategies. Those using protective option strategies experience lower losses even when we control for other fund-specific characteristics and the entities' other equity holdings.

In terms of performance, those funds for which the portfolios feature protective option strategies display countercyclical net-of-fees returns in the data. This may be due to the costs associated with downside protection. In any case, over the time covered by the dataset, the difference in return between users and non-users of protective option strategies is insignificant.

The results show, furthermore, that better incentivized hedge funds showing stronger past performance are more likely to lock in their gains and insure against the downside by using protective option strategies, which increases the fees realized. Specifically, indirect incentives (the additional income from the future inflows and the increase in value of existing assets), "moneyness" (how good a hedge fund's current performance is relative to its HWM), and past performance (i.e., demonstrated return) are positively associated with the use of protective option strategies, when one controls for other fund characteristics.

No significant difference in investor flow is evident for users *versus* non-users of protective option strategies, after accounting for fund-specific characteristics. Nevertheless, the flows prove to be less sensitive among those hedge funds that employed protective option strategies during the financial crisis, as compared with the non-users group.

4 Discussion and concluding remarks

Notwithstanding the extensive media attention on increasing use of ETFs among institutional investors, lack of rigorous empirical evidence has left the domain of knowledge limited largely to anecdotes. Sherrill, Shirley, and Stark (2016) document the growing use of ETFs in portfolios of mutual funds and, accordingly, Sherrill, Shirley, and Stark (2017) examine a sample of actively managed US domestic equity funds, reporting lower performance by heavy users of ETFs but being unable to pinpoint any characteristic differences between funds that employ ETFs extensively and non-ETF-using ones. The analysis we undertake, however, is different both methodologically and in the sample under study. Our holdings-based approach allows for disentangling the performance of ETF portfolios (addressed in Essay I) and stock portfolios (examined in Essay II) from other elements and thereby facilitates evaluating each component separately. Via this technique, we also avoid confounding the results with any mechanical relationship between an institution's ETF holdings and its performance. Furthermore, the sample utilized for Essay I and Essay II, by including a broad spectrum of institutional investors, enables us to take the type of fiduciary into account when evaluating the use of ETFs. The lack of empirical support for the contention that institutional investors demonstrate ETF selection ability, the association we find between ETF use and hedge funds' incentive and investment constraints, and the evidence of passive investing and inferior stock selection ability that we observe from ETF users' portfolios, especially when taken together, attest to the importance and informativeness of the ETF allocation decisions made by institutional investors.

The use of derivatives securities in general, and options in particular, and their relation to asset managers' performance have been widely studied in the literature (Aragon & Martin, 2012; Cao, Ghysels, & Hatheway, 2011; Chen, 2011; Cici & Palacios, 2015; Koski & Pontiff, 1999; Natter et al., 2016; Peltomäki, 2011). The importance of said agency-problem-prone investment allocation decisions arises mainly from their two-sided outcome: managers can employ them for either speculation or hedging purposes. The complexity of these strategies and substantial difficulties in identifying the motives for which they are applied have led policymakers to impose restriction on asset managers' use of derivatives and options. Evidence of this matter's importance

from the regulatory perspective is visible in, for example, from the SEC's Concept Release document soliciting comments on funds' use of derivatives[11].

In results consistent with research identifying benefits of hedging associated with option use for some groups of hedge or mutual funds (e.g., Aragon & Martin, 2012; Cici & Palacios, 2015; Natter et al., 2016; Peltomäki, 2011), we document a lower risk profile among the users of protective option strategies. The countercyclical net-of-fees performance we observe for hedge funds that employ these strategies supports the costly insurance hypothesis of Cao et al. (2011). The latter authors, working with a sample covering roughly 300 mutual funds around the time of the Russian crisis of August 1998, state that, while the level of option use did not change significantly during the crisis, heavy users of derivatives and options underperformed in non-crisis conditions and outperformed others during the crisis. Essay III's core contribution to this stream of literature lies in analyzing the relationship between the use of options and funds' performance in detail, through attention to both the stock and the ETF option positions of hedge funds; identifying a subset of option strategies that are more likely to be employed for hedging purposes; and employing a methodological technique that factors in the time-varying use of these strategies. In addition, inclusion of the financial crisis period enables us to pinpoint the effectiveness of the hedging mechanism and to assess the costs and benefits of protective option strategies over the fairly long time span covered.

Also, our results addressing the factors determining the use of protective option strategies tie in with the literature on the relation between manager-specific characteristics and the use of derivatives and options. For instance, Cao et al. (2011), finding an association between the timing of derivatives' use and past performance, conclude that derivatives may be used for agency-driven pursuits such as window dressing. Cici and Palacios (2015), in turn, document a relationship between the use of options and such traits of mutual fund managers as gender, experience, and academic aptitude. In addition, they posit avoiding further losses to be a motive behind some mutual funds' utilization of options. The unique features of hedge funds' compensation structure enable testing the relationship between the use of protective option strategies and particular fund characteristics (hedge funds' compensation, incentives, past performance, etc.).

Our overall assessment of what ETFs' and protective option strategies' use contributes to institutions' performance points to ETFs being more likely to be used as a channel for conservative investing and protective option strategies as a mechanism for

[11] `https://www.sec.gov/rules/concept/2011/ic-29776.pdf`

downside protection. Also, we identify a strong relationship between these investment allocation decisions and the managerial incentives offered, risk-taking behavior, and selection skill. Besides the contributions to asset management literature, the results have implications for screening and monitoring of asset managers, with potential also for reducing investors' search costs and alleviating conflicts of interest associated with the agency problem. Furthermore, the improved understanding of investment allocation decisions can contribute to the design of compensation structures for asset managers and to recontracting mechanisms.

Much as do other efforts that rely on 13F filing reports, our holdings-based dataset has several shortcomings. Since holdings reports are made at low frequency (i.e., quarterly), one cannot accurately compute the exact returns that institutional investors obtain on their long ETF or equity positions. Indeed, Puckett and Yan (2011) document significant returns on institutional investors' intra-quarter trades and show that their returns are underestimated when calculated at quarterly intervals. In recent work, Chakrabarty, Moulton, and Trzcinka (2017), on the other hand, find a large proportion of short-term institutional investors' trades to lose money and conclude that such trades do not reflect fundamental information. Another issue is that institutional investors' short positions are exempted from disclosure requirements. This rules out taking a potential short leg of a trading strategy into account. Therefore, our selection criteria with regard to the use of ETFs or the use of protective option strategies concentrates on the long side of these trades. We also acknowledge the data biases associated with using the hedge funds' return data, particularly in the work for Essay III. Among the documented biases connected with hedge-fund return data are survivorship bias (S. J. Brown, Goetzmann, Ibbotson, & Ross, 1992; Fung & Hsieh, 2000; Liang, 2000), backfill and incubation biases (Fung & Hsieh, 2004), self-reporting bias (Agarwal, Fos, & Jiang, 2013), and smoothing bias (Bollen & Pool, 2009; Getmansky, Lo, & Makarov, 2004). That said, much of the resulting data bias is more severe with smaller funds. In contrast to typical hedge fund research, ours utilizes a sample comprising relatively large hedge fund advisers for which the return figures are the value-weighted fund-level returns. This mitigates the database bias effects associated with smaller funds. Finally, further precautionary measures, recommended by the literature, verify the robustness of our results.

Future research into the implications of utilizing ETFs and protective option strategies could test potential improvements to the metrics for managerial skill, risk-taking, and portfolio characteristics such as liquidity and diversification (e.g., Cremers & Petajisto,

2009; Pástor, Stambaugh, & Taylor, 2017b). In addition, greater availability of data on high-frequency trades or short selling by institutional investors may yield further insight into the use of ETFs or option strategies for arbitrage activities, short-term liquidity management, and the timing of these instruments' use.

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