

Article:

**Superior information and compensation
fees of active mutual funds**

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Executive summaries

Superior information and compensation fees of active mutual funds

by **Chekib Ezzili**, Equity Derivatives, NATIXIS, and **Patrice Poncet**, Distinguished Professor of Finance, ESSEC Business School

This paper looks at the cost of information for a client on using the knowledge of an asset management company. The manager possesses more information than the investor and charges for access to such information. How much the investor is willing to pay depends on the benefits that can be derived from such information. The investor will delegate portfolio decisions to the manager if and only if the expected utility of their wealth after fees is larger than the expected utility they can achieve by directly investing in the market. This paper allows us to characterize compensation fees charged by asset management companies in terms of information differential. The greater the difference, the higher the fees that clients are willing to pay. Hence, success for the managers depends on their ability to possess information that is superior to their peers.

Superior information and compensation fees of active mutual funds

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Abstract

We posit a fund manager and an individual investor who maximize the expected (log) utility of their respective terminal wealth. The manager possesses more information than the investor does and charges the latter, their would-be customer, a linear compensation fee. The investor will delegate their portfolio decisions to the manager if, and only if, the expected utility of their wealth after fees is larger than the expected utility they can achieve by directly investing in the market. Our framework, which uses a mathematical result by [Amendinger (2000)], allows us to characterize compensation fees in terms of information differential.

Investors who delegate their portfolio decisions to professional managers against compensation fees assume implicitly that the latter have superior skills. Goetzmann et al. (2003) found that, in extreme cases, the global (regular plus performance) fees earned by fund managers could represent up to 30% or even 40% of the fund's net asset value. According to the same study, rational investors should expect that the fund earns an additional risk-adjusted return (alpha) in the range of 200 to 500 basis points to compensate for these fees. More generally, the required positive alpha is presumably due to better judgment, superior data gathering and processing abilities, and maybe some privileged access to private information permitted by a closer relationship with, say, prime brokers.

The portfolio delegation issue is complex and can be tackled from various angles, which explains why the extant literature is voluminous. For example, many studies focus on the optimal design of the contract binding investors and their fund manager. Admati and Pfleiderer (1997) investigate what would constitute an appropriate benchmark in a one-period setting, and show that the use of a risky benchmark cannot be easily rationalized. Ou-Yang (2003) extends their analysis to a multi-period setting that allows for a dynamic, rather than a static, benchmark. Starks (1987) compares symmetric and asymmetric compensation schemes and shows that symmetric contracts, wherein the manager participates in both gains and losses, dominate asymmetric ones as they induce the manager to choose the portfolio strategy preferred by the investor.¹ Grinblatt and Titman (1993) study the case of call-like asymmetric contracts and find that a manager who can hedge their compensation fee will choose investment strategies that increase the fund's volatility. Goetzmann et al. (2003) use partial equilibrium analysis to evaluate the option granted to the manager in the case of an asymmetric compensation scheme, and express alpha as a function of the manager's abilities and the contract's implicit incentives. Carpenter (2000) and Basak et al. (2007) evaluate the impact of incentive fees on fund performance and find in particular that some asymmetric schemes encourage the manager to take reckless risks, since then they have very little to lose and much to gain. Other studies focused on the relationship

between fund performance and cash inflows or outflows. For instance, Berk and Green (2004) find that the flow-performance relationship is consistent with both high average amount of skill and strong heterogeneity across managers. Hugonnier and Kaniel (2010) solve the equilibrium problem that arises when investors are allowed to trade dynamically in the fund, which in turn affects the manager's own trading strategy. Finally, there is some scant literature regarding the general equilibrium analysis of delegated portfolio management. Recently, Cuoco and Kaniel (2011) studied the impact of managers' decisions on asset allocation by fund investors and direct investors and on asset prices within a general equilibrium dynamic model, where the extent of portfolio delegation by investors and the parameters of the compensation scheme are both endogenous.

All of the aforementioned studies assume away any information asymmetry between the manager and investors. A fund's outperformance is "explained" by other factors such as its manager's "intrinsic" abilities. By contrast, the main contribution of this paper is to explicitly introduce an information differential. The latter, which could be translated in terms of management skill, is precisely what motivates portfolio delegation in the first place.

We solve the manager's and the investor's optimization programs by combining the classical approaches of Karatzas et al. (1986) and Cox and Huang (1989) in complete markets and the findings of Amendinger (2000) and Ghorud and Pontier (2001) that provide a way to deal with an environment where managers detain more information than their customers. For tractability, we assume that the manager's fees are proportional to the fund's net asset value. It is optimal for the investor to delegate their portfolio decisions, if by so doing they achieve an expected utility (welfare) – at least as large as the one they could attain through direct investment. We solve for the manager's problem and characterize the endogenous proportional fee in terms of the information differential. Under the special case of log utility, the solution obtains explicitly.

The economic framework

We consider a financial market that is frictionless and free of arbitrage. Trading is assumed to take place continuously. There are numerous assets available for trade, such that diversification is possible, including a riskless asset (say a money market

¹ This need not be always the case. Das and Sundaram (2001) in a static setting and Cuoco and Kaniel (2011) in a dynamic framework show examples where asymmetric contracts can dominate.

account) that yields an instantaneous interest rate which is generally time-varying. Participating in the market is, in particular, an investor who must decide whether to invest directly or to delegate their portfolio decisions and a professional fund manager. Their investment horizon is known and fixed (say at future time T). The manager is supposed to be an insider, i.e., to possess some information *in addition* to the common knowledge possessed by the investor. The extra information consists in knowing initially the outcome of some random variable relevant to some asset prices or returns. This variable may be, for example, the price of a specific asset at time T , or its price at time T distorted somewhat by a random noise, or else the value of some source of risk (we provide different possible examples below).

Although we skip all technicalities, it should be noted that the market prices of risk (or risk premia associated with all risky assets) implicitly used by the direct investor and the manager are different because of the superior knowledge possessed by the latter. This is the economic mechanism by which the portfolio allocation of the manager will differ from what the investor would choose, if they decided to invest directly.

Precisely, we investigate the situation where the investor has to decide optimally whether to directly invest in the market or to delegate their portfolio decisions to the better informed manager. In the former case, the investor does not benefit from the manager's information or skill, while in the latter situation they do, but in exchange for a compensating management fee.

We will assume that both the manager and the investor are risk averse, try to maximize the expected utility of their terminal wealth (at date T) and are endowed with a logarithmic utility function. This means that their *relative* risk aversion is a constant (equal to one) irrespective of their wealth's level. This choice is extensively encountered in the literature, is motivated by simplicity as it allows for quasi-explicit solutions, and leads to results that are easy to interpret.

The manager's program

We limit our study to linear compensation schemes, where the manager's fees are proportional to the fund's terminal asset value. This is the case for the vast majority of mutual funds, and a small but non-negligible fraction of hedge funds [Ackermann

et al. (1999)].² We ignore the complexities entailed by a two-fold compensation structure that includes an additional incentive fee since it is exceptional in mutual funds. The adopted linear scheme eases the interpretation of the results and allows us to focus on the impact of superior information possessed by the manager, irrespective of any particular effects brought about by a convex compensation structure.

The fee due by the investor is paid at the maturity date T of the delegation contract (the investment horizon.) Consequently, assuming they have no outside capital, the manager's wealth at time T is equal to the management fee they receive³:

$Fee(T) = f \cdot V_M(T)$, where f , ($0 < f < 1$), is the constant, contractual fee rate to be determined endogenously and $V_M(T)$ is the fund's gross value at terminal date T .

Solving the manager's optimization problem allows us to express the (random, as of initial date) optimal gross value of the fund, $V_M(T)$, as a positive, linear function of $V_M(0)$, the investor's initial wealth devoted to the fund, and a non-linear function of the interest rate, the asset risk premia, and the sources of risk affecting the economy. It should be noted that $V_M(T)$ does not depend on the contractual fee rate " f ." This is because this coefficient is multiplicative and the manager's relative risk aversion is constant under log utility. That the endogenous fee parameter " f " is independent of the optimal strategy is what will make its solution relatively easy to get.

Along the way, we derive the dynamics of the corresponding optimal portfolio selected by the manager, i.e., the way the weights of the different assets composing the portfolio evolve through time.

Examples of superior information

The issue of informational heterogeneity among market participants is solved by using a sophisticated mathematical

2 Deli (2002) finds that 93% of his sample of 4,833 funds have advisory contracts whose fees are expressed as a fixed percentage of the terminal value of assets under management. This finding is consistent with Golec (1992) who reports that 94% of the 476 open-end funds he investigated are compensated by strictly proportional fees.

3 We could have allowed for the situation where the manager invests part of their personal wealth in the fund (although an unlikely event in mutual funds). It is easy to show that, in our mathematical setting, this would have no significant bearing on the results.

technique known as “filtration enlargement,” where filtration is just another word for available information. Jeulin and Yor (1985) is a fundamental reference and Mansuy and Yor (2005) provide a comprehensive technical survey. The problem of utility maximization in a market with two types of participants endowed with different levels of information has been studied by several authors, such as Pikovsky and Karatzas (1996), Gorud and Pontier (2001) and Amendinger et al. (1998). Most of this strand of research assumes logarithmic utility.

As stated above, the manager’s additional information is embedded in the knowledge of some random variable or process. The manager, thus, can be qualified as an insider. Corcuera et al. (2004) have classified an insider’s additional information within two categories. In the first, the insider has direct access to the underlying asset price at some future time T . The gain in utility is then infinite as there exists a pure arbitrage (a sure positive gain without any investment), cashed-in at date T . In the second, the insider “knows” the price of the asset up to a perturbation by an independent noise. This is not pure arbitrage (because of the perturbation that induces some residual risk), hence the additional utility is finite, a situation more realistic than the pure arbitrage one.

To motivate and illustrate our choice of the “filtration enlargement” technique, we discuss below three possible examples. In the first case, the fund manager’s additional information over that of their client exists in the knowledge of the value of a random variable (such as the price of an asset or a portfolio) at time T . This example is purely pedagogical and illustrative as it leads to an infinite value for the insider’s additional utility, which is economically uninteresting. It corresponds to an arbitrage opportunity, which is not allowed in any financial model, including ours. This case, incidentally, may be viewed as an illustration that not any assumption about the manager’s superior knowledge is legitimate.

The second example, analyzed by Corcuera et al. (2004), assumes that the insider knows the terminal value of some asset price(s) perturbed by a random noise whose magnitude decreases as time goes by – the information about that (those) price(s) is more and more precise – and is zero at date T . Under some conditions on the parameters of the decreasing function, the market is free of arbitrage and the manager’s additional utility is finite. If the conditions are not met, however, arbitrage is not precluded and the manager’s utility is infinite. The perturbation can, for example,

be interpreted as the refinement of the information about market flows associated with a specific event.

In the third example, the manager’s additional information consists of the knowledge of the terminal value of some asset price(s) perturbed by an independent noise constant over time. This means that the insider has an initial advantage over direct investors (say a private information), but that this advantage does not increase over time. This example has been studied by Pikovsky and Karatzas (1996) and Amendinger et al. (1998). The quality of the superior information detained by the insider is an increasing function of a particular, crucial parameter, which we call “ s .” This parameter thus measures the “magnitude” of the additional information (alternatively, the additional skill) the insider benefits from. For “ s ” positive but strictly smaller than one, the manager’s utility is finite, which is realistic. This model can be interpreted as follows. The additional expected utility (welfare) generated by the manager increases with the parameter “ s .” Thus, “ s ” commands the manager’s capacity to generate abnormal returns (α):

- ▶ If “ s ” were set to zero, the manager would have the same skill in gathering and processing information as that of the direct investor.
- ▶ If “ s ” were set to one, the manager would have perfect forecasting power, and thus could reap arbitrage gains and achieve additional infinite utility.
- ▶ In the plausible situation where “ s ” is positive but strictly smaller than one, the manager has superior information (skills) but no perfect foresight. This will be the situation we assume below.

The last two examples are very similar, as they assume the knowledge of the terminal value of an asset (or portfolio) perturbed by some noise. Both are compatible with an “enhanced” price discovery process that may result from aggressive research policy or private information seeking and can lead to almost certain abnormal returns. This can be, for example, the case of some “small cap” stocks neglected by the bulk of financial analysts. Generally, both specifications are compatible with strategies such as event-driven arbitrage, risk arbitrage, stock split arbitrage, IPO (initial public offerings) arbitrage, etc.⁴

⁴ The term “arbitrage” appended by practitioners to these strategies is of course improper from an academic viewpoint. True (or pure) arbitrage is riskless in theory and is a free lunch.

Although the literature is mixed on whether funds can consistently generate abnormally high risk-adjusted returns, i.e., alpha, many studies have documented that some funds have created alpha by implementing these strategies [see, for example, Alexander et al. (2007) and Cremers and Petajisto (2009) for comprehensive analyses]. According to another strand of research, [Lakonishok and Vermaelen (1990), and Ikenberry et al. (1995)], abnormal returns could be obtained from a trading rule by which one buys a stock on the day following the announcement of a self-tender offer or an open market stock repurchase.

Finally, one may ask where these three illustrations stand with respect to Fama's [Fama (1970)] efficient market hypothesis (EMH). Empirical evidence suggests that capital markets are efficient in their weak and semi-strong forms most of (but not all) the time. All our cases are obvious violations of the strong form of EMH. The first example clearly violates even its weak form. The second case may be compatible with the semi-strong form, provided some relevant parameters are properly constrained. The last example is compatible with the semi-strong form of EMH, as it takes an insider to generate abnormal returns.

The investor's reservation fee

Investors have free access to the complete financial market and can allocate their wealth directly across all available assets. Alternatively, they can delegate their wealth to the manager, whose behavior was described above, who will spare them the (implicit) cost of direct investment and make them benefit from their superior information in exchange for compensation fees.

We proceed as follows. We consider one particular investor and first solve their maximization program in the case of direct investment in the market. This classical problem has been studied in particular by Karatzas et al. (1991) and Cox and Huang (1989). We derive their optimal terminal wealth, $W_i(T)$, thus their optimal expected utility, and the corresponding optimal portfolio process.

We then redo the whole optimization process under the assumption that the investor delegates their portfolio decisions to the manager. Note that their terminal wealth is now equal to the managed fund's terminal value $V_M(T)$ minus the manager's compensation fees $f \cdot V_M(T)$, i.e., $(1 - f)V_M(T)$, where f is, as we recall, to be determined endogenously. The portfolio delegation contract is attractive to the customer if the expected utility of

the wealth net of fees induced by the manager's optimal trading strategy, $(1 - f)V_M(T)$, is *not smaller* than the expected utility of the wealth $W_i(T)$ derived from direct investment.

We consider the third case of superior information discussed above, with "s" positive but strictly smaller than one. We assume a typical fund manager enjoying a de facto monopoly and able to tap a very large pool of competitive investors.⁵ Consequently, the typical investor will accept to pay fees to the manager until the point where they are indifferent between investing directly in the market and delegating their portfolio decisions. The restriction to log utility allows for a direct computation of the investor's "reservation" f^* parameter beyond which they will prefer direct investment. Moreover, and since the investor does not have access to the manager's inside information, we assume that, for reputational reasons, the manager will not claim more than the reservation fees corresponding to their own alpha. In that sense, the manager is concerned by long-term customer relationship.

We are then in a position to express quantitatively the exact condition under which the investor benefits from the delegation of their portfolio to the informed (or skillful) manager and the exact value of f^* , their reservation fee parameter.

The "alpha" generated by the investor directly investing in the market is nil by construction. The manager generates some "alpha" due to a specific extra information they gathered, or due to a more aggressive research effort or superior analytical and computational skills. The parameter f^* is an increasing function of this relative ability. In the next section, we use the relative capacity that follows from the third illustration of the section on examples of superior information.

Simulations

We assess the relevance of our main result regarding the value of the reservation fee rate f^* through Monte Carlo simulations. Our purpose is to show that the f^* we obtain lies within a reasonable range for plausible values of the parameters. We choose the following baseline values: $V_M(0) = 100$, the average return on

⁵ Dynamic aspects that would involve cash flows from and to the fund on the part of investors according to past performance are beyond the scope of this study. Our model can accommodate the case of oligopolistic managers by assuming that investors do not know ex-ante their relative skills and, therefore, choose them randomly and pay fees up to their reservation levels.

"s"	T = 1.0		T = 2.0		T = 3.0		T = 5.0	
	alpha	f*	alpha	f*	alpha	f*	alpha	f*
5%	0.14%	0.14%	0.57%	0.57%	1.28%	1.27%	3.53%	3.46%
10%	0.67%	0.67%	2.64%	2.60%	5.86%	5.69%	15.88%	14.68%
15%	1.76%	1.75%	6.83%	6.60%	14.90%	13.85%	39.05%	32.33%
20%	3.68%	3.61%	13.84%	12.92%	29.38%	25.45%	73.27%	51.94%
25%	6.74%	6.52%	24.30%	21.57%	49.70%	39.17%	116.60%	68.64%
30%	11.35%	10.73%	38.64%	32.05%	75.51%	53.00%	165.35%	80.86%
35%	17.93%	16.41%	56.90%	43.39%	105.60%	65.22%	215.43%	88.40%
40%	26.89%	23.58%	78.65%	54.46%	138.26%	74.91%	263.41%	92.82%

Table 1: Reservation proportional fees f*

The table presents the simulated values of the manager's *alpha* and the corresponding reservation fee parameter *f** for different time horizons *T* and different values of the parameter "s" that increases the quality of the superior information.

risky assets is 8%, the riskfree rate of interest is 3%, (i.e., the average risk premium is 5%), the average volatility of the risky assets is 15%, and the number of simulations is 100,000. In addition, the investment horizon *T* is either 1, 2, 3, or 5 years.

The manager's additional information increases with the parameter "s" by definition. It also increases with the investment horizon *T* because, as uncertainty is larger for longer horizons, its relative reduction for a given level of "s" is also larger. Consequently, the optimal proportional fees also depend positively on "s" and *T*.

To provide some background, Goetzmann et al. (2003), for example, report that for a portfolio volatility of 15%, the annualized required excess return (*alpha*) needs to be 3% to 4% to justify a performance fee of 15% to 20%. For a volatility of 25%, the *alpha* required to justify the same performance fee ranges from 3.5% to 7.5%. Including the regular fees, the total percentage of wealth claimed by the hedge fund manager can be between 30% and 40%, as stated in the introduction. Investing in a hedge fund, therefore, would only appear rational if it provided a large, positive risk-adjusted return in compensation.

Simulation results are reported in Table 1 and displayed graphically in Figures 2 and 4 below. The manager's *alpha* and the reservation fee rate *f** are almost identical for small values of "s" (less than or equal to 15% for *T* up to 3 years and less than or equal to 10% for *T* equal to 5 years), which means that the manager reaps nearly all the benefit from a small or moderate information gap. As "s" increases, however, and, more

importantly, the investment horizon *T* gets longer, the investor shares an increasing proportion of the manager's informational advantage. Some large figures in Table 1 (which are illustrative only and not to be taken too literally) are not realistic for the mutual fund industry but can match the performance of the most successful hedge funds. It is thus apparent that picking the right fund manager is potentially extremely rewarding.

The corresponding annualized *gross* Sharpe ratios obtained by the manager before fees are reported in Table 2.⁶ For our given set of parameters, the annualized Sharpe ratio the direct investor can achieve is equal to 0.33 (= (0.08 - 0.03)/0.15) only. Our results vindicate, even for "s" equal to 10 or 15%, the potential gain associated with skillfull managers.

We finally simulate the investor's expected utility (welfare) across different values of the information parameter "s" and various levels of the fee parameter *f**. Numbers in bold appearing in the diagonal of Table 3 correspond to the expected utility of a delegated portfolio after paying the manager the reservation fee parameter *f**. By definition, these values are all equal (to 4.64). For a given fee, the investor's welfare is obviously an increasing function of "s", and for a given "s", it is evidently a decreasing function of *f**.

Figure 1 generalizes Table 3 and displays the continuous relationship between the level of expected utility and the value of

⁶ The Sharpe Ratio is equal to $[(E(\mu)/t)-r]/[\sigma_p/\sqrt{t}]$ where 't' is the number of investment years.

the information parameter “s”, for various levels of the optimal fees f^* . The corresponding values of “s” leading to the level of welfare achieved by a direct investment (i.e., 4.64) are obtained at the intersection with the horizontal line that corresponds to the “No delegation” case. The relationship is generally convex, and the convexity is strong for “s” larger than 40%. This is because the weight of the risky assets in the optimal portfolio explodes for large values of the information parameter.

Empirical evidence

Sample description

Our data is downloaded from the CRSP Survivor-Bias-Free U.S. Mutual Fund Database, which provides open-ended mutual fund data from December 1961 for funds of all investment objectives, principally equity funds, taxable and municipal bond funds, international funds, and money market funds.

From CRSP we gather the following data related to the funds’ composition and trading activity: specialized primarily in equities or in debts, open to investors or not, retail fund or not, and institutional fund or not. We also collect for each fund the net monthly returns, computed as changes in NAV (Net Asset Value) including reinvested dividends from one period to the next, the amount of managed assets and the management fees calculated as a percentage of its assets.

We consider only funds for which the track record, as measured by net returns, and management fees are available. We also exclude funds for which the marginal compensation rate has been negative. This leaves us with 23,916 funds. We first report elements relative to the empirical distribution of these sampled funds in Figure 3 below. Fifty-five percent of the funds are equity funds, 36% are debt funds, and 9% invest in both equities and debt instruments.

Table 4a provides descriptive statistics for management fees by fund type. The mean and median marginal compensation rates are both 0.50%. They are slightly higher for equity funds (0.61% and 0.69%, respectively). Our results are in line with those of Coles et al. (2000), who find a mean (median) marginal compensation of 0.55% (0.50%). Deli (2002) finds comparable (though slightly higher) results with a mean (median) rate of 0.68% (0.65%). The funds’ durations are displayed in Table 4b. The mean (median) duration for all fund types is 12 (10) years. Fixed

“s”	T = 1.0	T = 2.0	T = 3.0	T = 5.0
5%	0.34	0.35	0.36	0.38
10%	0.38	0.42	0.46	0.55
15%	0.45	0.56	0.66	0.85
20%	0.58	0.79	0.99	1.31
25%	0.78	1.14	1.44	1.89
30%	1.09	1.62	2.01	2.54
35%	1.53	2.23	2.68	3.21
40%	2.13	2.96	3.41	3.85

Table 2: Annualized gross Sharpe ratios

The table presents the simulated values of annualized gross Sharpe ratios delivered by the manager for different values of the parameter “s” and of the time horizon T.

“s”	3.64%	23.58%	59.29%	84.52%
0%	4.60	4.37	3.71	2.77
20%	4.64	4.41	3.78	2.81
40%	4.87	4.64	4.00	3.04
60%	5.50	5.27	4.64	3.67
80%	6.47	6.24	5.61	4.64

Table 3: Expected utility of wealth

The table presents the simulated values of the expected utility of wealth obtained by the investor who delegates to the manager for different values of the parameter “s” and the fees paid to the manager. Bold values are equal to the wealth’s expected utility obtained with no delegation. Thus, we can find from the table the reservation fees f^* corresponding to different values of “s.”

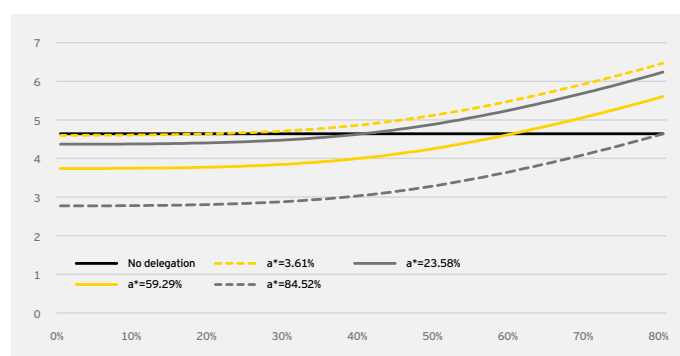


Figure 1: Expected utility of wealth

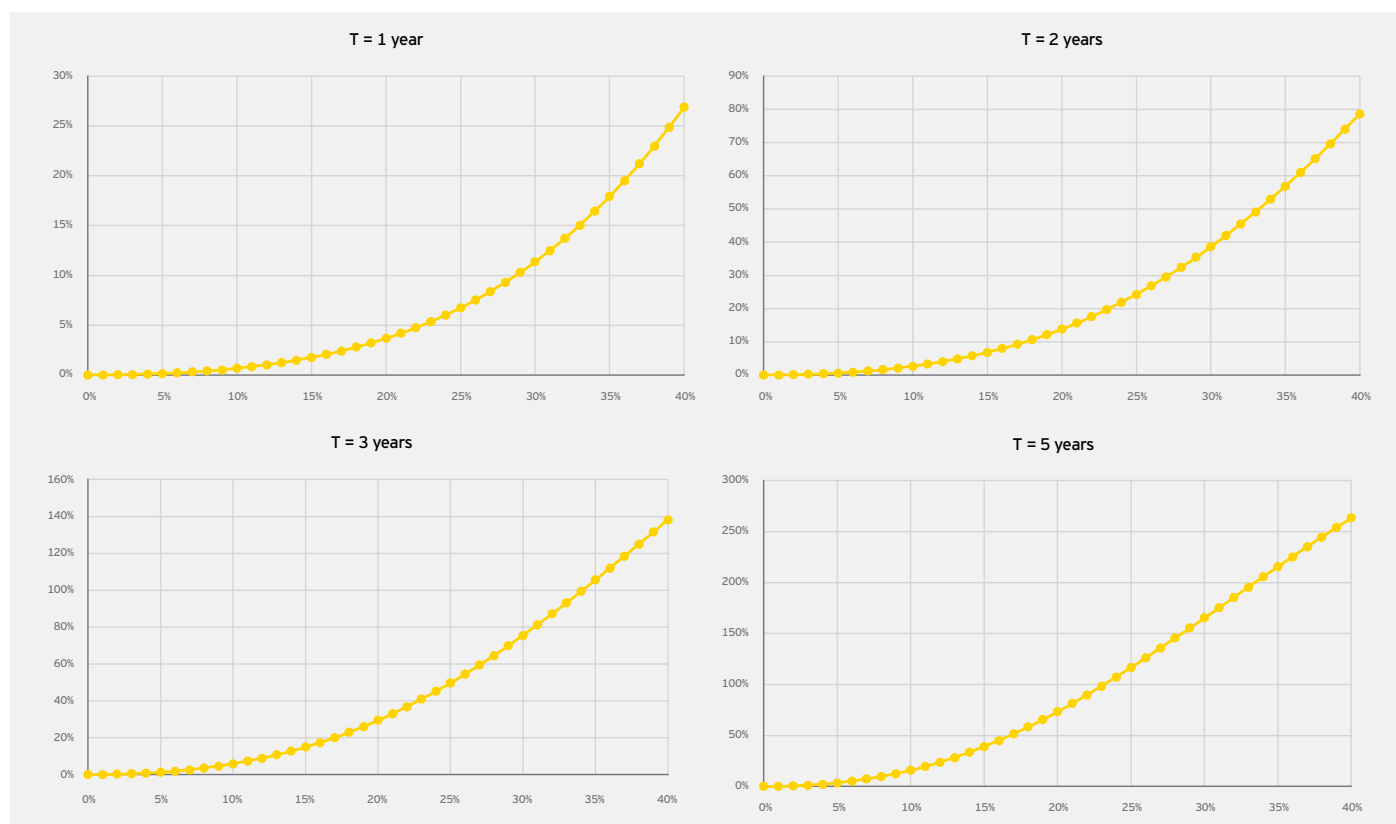


Figure 2: Alpha
The figure plots the simulated values of the manager's *alpha* for different values of the parameter "s" (from 0% to 40%) and the time horizon T (1 year, 2 years, 3 years and 5 years)

income funds have longer lives than equity and mixed funds, with a mean (median) of 13 (12) years.

Most of the funds in our sample are open-end funds as shown in Table 5a. Almost 76% are open to investment with little discrepancy across different fund types.

Table 5b reports that 26% of the funds studied in our sample are declared to be institutional funds. Table 5c shows that 43% of the 23,916 funds claim to be retail funds. For both institutional and retail, equity funds are the majority, with relatively few invested in mixed instruments.

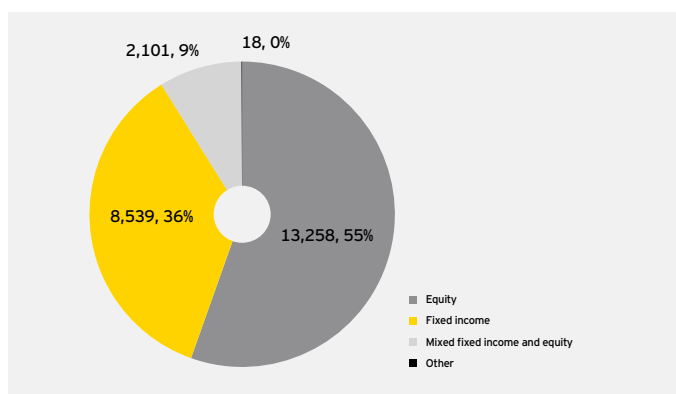


Figure 3: Descriptive statistics on all funds

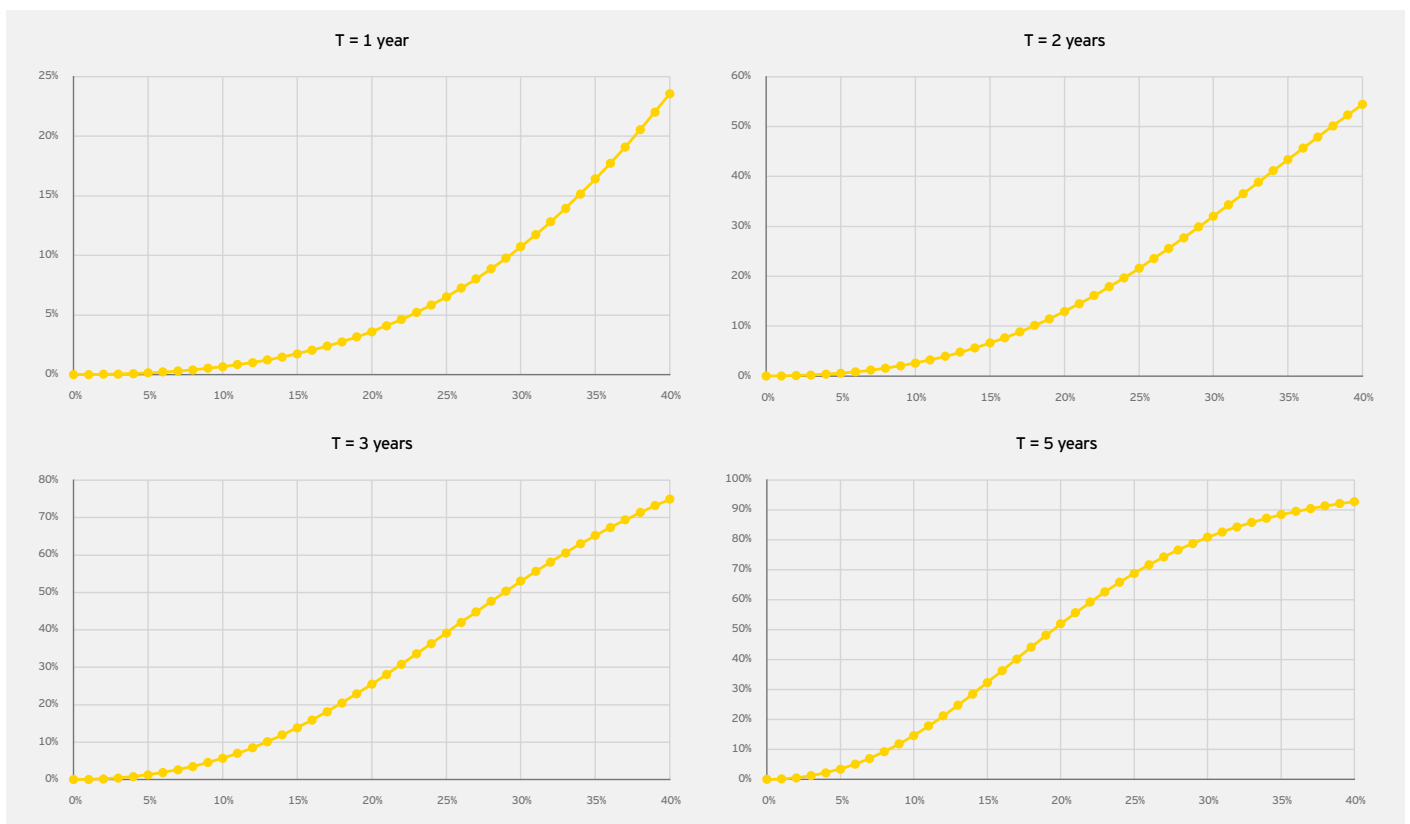


Figure 4: Reservation fees

The figure plots the simulated values of the reservation fee parameter f^* for different values of the parameter "s" (from 0% to 40%) and the time horizon T (1 year, 2 years, 3 years, and 5 years).

Data analysis

From the 23,916 funds, we exclude those for which the management fees are negative (this may happen when the fund makes reimbursements) and those with an insufficient track-record (less than one year of data). Our selected sample here then includes 23,869 funds.

For each fund, we use monthly net returns as stated above and compute its mean annualized net return over its duration. For a given duration, depending on the objective of the fund, we calculate the mean return of an equivalent investment in a closely related benchmark. For equity funds, the selected benchmark is the S&P 500. For fixed income funds, the benchmark is the 10-

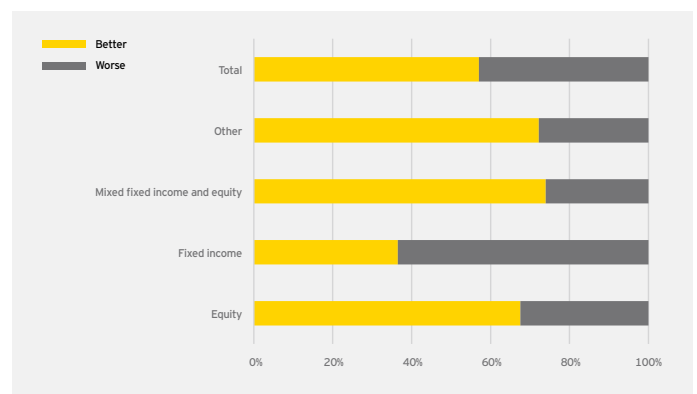


Figure 5: Percentage of funds doing better than our calculated benchmark

	Minimum	Maximum	Mean	Median
Equity	0.0%	21.94%	0.61%	0.69%
Fixed income	0.0%	1.90%	0.39%	0.42%
Mixed fixed income and equity	0.0%	2.25%	0.33%	0.23%
Other	0.01%	1.17%	0.51%	0.51%
Total	0.0%	21.94%	0.50%	0.50%

Table 4a: Descriptive statistics for management fees

Equity	0	51	11	9
Fixed income	0	50	13	12
Mixed fixed income and equity	1	50	11	9
Other	4	24	10	8
Total	0	51	12	10

Table 4b: Descriptive statistics for fund duration (years)

	Yes	No	Non reported
Equity	9,930 (74.90%)	921 (6.95%)	2,404 (18.16%)
Fixed income	6,627 (77.61%)	510 (5.97%)	1,402 (16.42%)
Mixed fixed income and equity	1,492 (71.01%)	114 (5.43%)	495 (23.56%)
Other	12 (66.67%)	0 (0%)	6 (33.33%)
Total	18,061 (75.52%)	1,545 (6.46%)	4,310 (18.02%)

Table 5a: Distribution of open to investment funds

Equity	3,536 (26.67%)	4,464 (33.67%)	5,258 (39.66%)
Fixed income	2,097 (24.56%)	2,950 (34.55%)	3,492 (40.89%)
Mixed fixed income and equity	587 (27.94%)	717 (34.13%)	797 (37.93%)
Other	6 (33.33%)	4 (22.22%)	8 (44.44%)
Total	6,226 (26.03%)	8,135 (34.01%)	9,555 (39.95%)

Table 5b: Distribution of institutional funds

Equity	5,664 (42.72 %)	2,221 (16.75%)	5,373 (40.53%)
Fixed income	3,627 (42.48 %)	1,374 (16.09%)	3,538 (41.43%)
Mixed fixed income and equity	963 (45.84 %)	329 (15.66%)	809 (38.51%)
Other	6 (33.33 %)	4 (22.22%)	8 (44.44%)
Total	10,260 (42.90%)	3,928 (16.42%)	9,728 (40.68%)

Table 5c: Distribution of retail funds

year T-note. And for mixed or alternative funds, the benchmark is taken as the one that performed best among the S&P 500 and the T-note, which is admittedly very harsh.⁷

Following this approach, we show in Figure 5 above, that 57% over performed their assigned benchmark in the long run. For these funds, the explanation provided by our theoretical framework for the existence of portfolio delegation is plausible. The percentage

of equity funds doing better than their benchmark is larger than that of the whole sample. The percentage is also higher for mixed (investing in both equity and fixed-income assets) funds, with roughly 74% of these outperforming their benchmark. On the other hand, we observe that the percentage of fixed income funds performing better than their benchmark is much lower than that of the whole sample (36.5%).

We also find that among funds identified as retail, 55% do better than their assigned benchmark, which is slightly lower than the percentage observed over the whole sample (57%). We also find

⁷ As we do not know the targeted mix of equities and debts of these funds, we cannot compute their benchmark as a weighted average.

	Minimum	Maximum	Mean	Median
Equity	0.0%	63.62%	4.19%	3.63%
Fixed income	0.0%	62.88%	2.32%	1.85%
Mixed fixed income and equity	0.0%	26.53%	2.72%	2.60%
Other	0.09%	3.78%	1.25%	1.01%
Total	0.0%	63.62%	3.40%	2.78%

Table 6a: Descriptive statistics for the annualized overperformance (management fees excluded)

Equity	0.01%	65.27%	4.79%	4.24%
Fixed income	0.0%	63.88%	2.74%	2.26%
Mixed fixed income and equity	0.01%	27.51%	3.04%	2.92%
Other	0.51%	4.78%	1.52%	1.19%
Total	0.0%	65.27%	3.91%	3.24%

Table 6b: Descriptive statistics for the annualized overperformance (management fees included)

Equity	1.0%	63.8%	22.1%	21.1%
Fixed income	0.0%	63.3%	17.9%	16.4%
Mixed fixed income and equity	1.0%	42.6%	18.8%	18.2%
Other	9.0%	22.3%	14.1%	12.9%
Total	0.0%	63.7%	20.6%	19.2%

Table 6c: Empirical calibration for the parameter “s”

that the percentage of institutional funds performing better than their benchmark is even higher (60%). Finally, we find that the percentage of outperforming open-end funds is slightly lower than that of the complete sample at 56%.

We then calculate for each type of fund the min, max, mean and median outperformance of the fund manager after and before management fees. Results are presented in Tables 6a and 6b, respectively. On average, the performance over the benchmark is quite substantial (300 basis points) and the management fee is roughly 50 basis points (the difference between the corresponding means or medians in Tables 6a and 6b). It should be kept in mind, however, that our illustrative sample was not corrected for the survivor bias, which tends to overestimate the funds’ actual performance.

Estimation of the “s” parameter

From the data gathered in Table 6c, we are able to calibrate empirical values for the “s” parameter, which represents in our theoretical setup the higher information possessed by the manager. If we retain the median “s” (18.0%), and the median alpha (2.74%, see Table 6b), we readily see from the comparison with Table 1, that this is compatible with a theoretical median investment horizon of roughly one year for the “average fund,”

which seems realistic enough. It is rather remarkable that this still holds true when we segregate equity and fixed income funds. For the sub-sample of equity funds, the median “s” and alpha are 19.3% and 3.33%, respectively, and for the fixed income funds, the analogous figures are 14.4% and 1.61%. In both cases, this implies an investment horizon of almost one year.

Conclusion

The “filtration enlargement” technique allowed us to characterize the parameter of the compensation contract in terms of information differential. We thereby provided a new justification for the existence of portfolio delegation and a novel explanation for the manager’s alpha. Assuming that the manager and the investor have log utility, we have obtained quasi-explicit (unreported) solutions and characterized the investor’s reservation fee rate for a given information differential.

Simulations showed that our specification of the manager’s additional information (the knowledge of a terminal value perturbed by a constant noise) reasonably matches the industry practice in terms of management fee levels uncovered by our empirical study.

A possible extension of this work would be to consider utility

functions more general than the log to derive the investor's reservation fee parameter. However, solving the problem would be much more involved. Indeed, a fixed point problem arises in this context and, furthermore, it is impossible to disentangle the standard terms from terms due to the insider's change of probability in the optimal portfolio strategy. Another natural extension would be to assume a convex compensation scheme, a more realistic provision for most hedge funds.⁸ The (non-analytical) solution would be difficult to derive and simulations tricky to perform. The main thrust of our simpler approach, however, would not be hurt by these extensions.

References

- Ackermann, C., R. McEnally, and D. Ravenscraft, 1999**, "The performance of hedge funds: risk, return, and incentives," *Journal of Finance*, 54, 833-874
- Admati, A., and P. Pfleiderer, 1997**, "Does it all add up? Benchmarks and the compensation of active portfolio managers," *Journal of Business*, 70, 323-350
- Alexander, G., G. Ciccì, and S. Gibson, 2007**, "Does motivation matter when assessing trade performance? An analysis of mutual funds," *Review of Financial Studies*, 12, 125-150
- Amendinger, J., P. Imkeller, and M. Schweizer, 1998**, "Additional logarithmic utility of an insider," *Stochastic Processes and their Applications*, 75, 263-286
- Amendinger, J., 2000**, "Martingale representation theorems for initially enlarged filtrations," *Stochastic Processes and their Applications*, 89, 101-116
- Basak, S., S. Pavlova, and A. Shapiro, 2007**, "Optimal asset allocation and risk shifting in money management," *Review of Financial Studies*, 20, 1583-1621
- Carpenter, J., 2000**, "Does option compensation increase managerial risk appetite," *Journal of Finance*, 55, 2311-2331
- Coles, J., S. Jose, and D. Woodbury, 2000**, "Fund advisor compensation in closed-end funds," *Journal of Finance*, 55, 1385-1414
- Corcuera, J., P. Imkeller, A. Kohatsu-Higa, and D. Nualart, 2004**, "Additional utility of insiders with imperfect dynamical information," *Finance and Stochastics*, 8, 437-450
- Cox, J., and C.-F. Huang, 1989**, "A variational problem arising in financial economics," *Journal of Mathematical Economics*, 20, 465-487
- Cremer, M., and A. Petajisto, 2009**, "How active is your fund manager? A new measure that predicts performance," *Review of Financial Studies*, 22, 3329-3365
- Cuoco, D., and R. Kaniel, 2011**, "Equilibrium prices in the presence of delegated portfolio management," *Journal of Financial Economics*, 101, 264-269
- Das, S., and R. Sundaram, 2001**, "Fee speech: signaling, risk-sharing, and the impact of the fee structures on investor welfare," *RFS*, 15, 1465-1497
- Deli, N., 2002**, "Mutual fund advisory contracts: an empirical investigation," *Journal of Finance*, 57, 109-132
- Ezzilli, C., and P. Poncet, 2013**, "Information differential and compensation of active fund managers," *Working Paper*
- Fama, E. F., 1970**, "Efficient capital markets: a review of theory and empirical work," *Journal of Finance*, 25, 383-417
- Goetzmann, W., J. Ingersoll, and S. Ross, 2003**, "High-water and hedge fund management contracts," *Journal of Finance*, 58, 1685-1717
- Golec, J. H., 1992**, "Empirical tests of a principal-agent model of the investor-investment advisor relationship," *Journal of Financial and Quantitative Analysis*, 27, 81-95
- Grinblatt, M., and S. Titman, 1993**, "Performance measurement without benchmarks: an examination of mutual funds returns," *Journal of Business*, 66, 47-68
- Grorud, A. and M. Pontier, 2001**, "Asymmetrical information and incomplete markets," *International Journal of Theoretical and Applied Finance*, 2, 285-302
- Hugonnier, J., and R. Kaniel, 2010**, "Mutual fund portfolio choice in the presence of dynamic flows," *Mathematical Finance*, 20, 187-227
- Ikenberry, D., J. Lakonishok, and T. Vermaelen, 1995**, "Market underreaction to open market share repurchases," *Journal of Financial Economics*, 39, 181-208
- Jeulin, J., and M. Yor, 1985**, *Grossissement de filtration: exemples et applications*, Springer-Verlag
- Karatzas, I., J. Lehoczky, S. Sethi, and S. Shreve, 1986**, "Explicit solution of a general consumption/investment problem," *Mathematics of Operations Research*, 11, 261-294
- Karatzas, I., J. Lehoczky, S. Shreve, and G. Xu, 1991**, "Martingale and duality methods for utility maximization in incomplete markets," *SIAM Journal of Control and Optimization*, 29, 261-294
- Lakonishok, J., and T. Vermaelen, 1990**, "Anomalous price behavior around repurchase tender offers," *Journal of Finance*, 45, 455-477
- Mansuy, R., and M. Yor, 2005**, *Random times and (enlargement of) filtrations in a Brownian setting*, Springer-Verlag, Berlin
- Ou-Yang, H., 2003**, "Optimal contracts in a continuous-time delegated portfolio management problem," *Review of Financial Studies*, 16, 173-208
- Pikovskiy, I., and I. Karatzas, 1996**, "Anticipative portfolio optimization," *Advances in Applied Probability*, 28, 1095-1122
- Starks, L. T., 1987**, "Performance incentive fees: an agency theoretic approach," *Journal of Financial and Quantitative Analysis*, 22, 17-32

⁸ Hedge fund contracts are often characterized by a particular compensation scheme that includes a 'high-water mark' provision: the manager receives, in addition to a given proportion of the fund's net asset value (NAV), a compensation proportional to the NAV conditional on the latter being larger than some predetermined value.

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