Fee Speech: Signalling and the Regulation of Mutual Fund Fees[1]

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Abstract

The Investment Advisers Act of 1940 (as amended in 1970) prohibits mutual funds in the US from offering their advisers asymmetric "incentive fee" contracts in which the advisers are rewarded for superior performance via-a-vis a chosen index but are not correspondingly penalized for underforming it. The rationale offered in defense of the regulation by both the SEC and Congress is that incentive fee structures of this sort encourage "excessive" risk-taking by advisers.

Apart from affecting portfolio selection incentives, however, the fee structure also influences equilibrium welfare levels in two other important ways: (a) through its risk-sharing properties, and (b) through its potential at conveying information about the adviser's abilities. This paper examines a signalling model with multiple funds and multiple risky securities in which all of these effects are present. We find that incentive fees do, as alleged, lead to more (and suboptimal) risk-taking than do symmetric "fulcrum fees." Nonetheless, taking into account the other roles of the fee structure, we find under robust conditions that investors may actually be *strictly* better off from a welfare standpoint under asymmetric incentive fee structures. In summary, we do not find much justification for the regulation.

1 Introduction

Permissible fee structures in the US mutual fund industry are laid out in the 1970 Amendment to the Investment Advisers Act of 1940.[1] The Act allows mutual funds and their investment advisers to enter into performance-based compensation contracts only if they are of the "fulcrum" variety, that is, ones in which the adviser's fee is symmetric around a chosen index, decreasing for underperforming the index in the same way in which it increases for outperforming it. Thus, while the Act does not rule out "fraction of funds" fees in which advisers are paid a fixed percentage of the total funds under management, it does prohibit so-called asymmetric "incentive fee" contracts in which advisers receive a base fee plus a bonus for exceeding a benchmark index.[2]

The rationale most commonly offered in defense of the regulation is that incentive fees with their option-like payoff structures encourage investment advisers to take "excessive" amounts of risk by protecting them from the negative consequences of their actions. This effect on portfolio selection is intuitively plausible, and may even be desirable. Nonetheless, the properties of the fee structure also affect equilibrium welfare in at least two other ways. First, by determining the division of returns between investor and adviser, the fee structure plays an important risk-sharing role. Second, in the presence of investment advisers of differing abilities, the fees potentially convey information concerning these abilities. In this paper, we describe a model in which all of these considerations are present, and use it to examine the equilibrium welfare implications of the current regulations.

A central aspect of the modeling process is the question of who determines the form of the compensation contract. The traditional principal/agent approach assigns this decision to the principal, viz., the investor in his role as fund shareholder (see, for instance, Heinkel and Stoughton [11]). We take a different approach, and instead assume that the choice of fee structure is made by the investment adviser. Two reasons underlie this decision.

The first, and more prosaic, one is that if the investor were, in fact, in control of the form of the compensation contract, restrictions on the forms of this contract can hurt, but certainly cannot enhance, investor welfare. Thus, the regulation would be superfluous, and even self-defeating. It is only when the choice of contract is effectively beyond the investor's purview that the need for legislative protection could arise.

A second, and perhaps more important, reason is that it may simply be a more appropriate assumption in the context of mutual funds that advisers, and not investors, decide the structure of the compensation contract. In principle, a fund is controlled by its shareholders (and, indeed, is required to have "outsiders" comprise at least 40% of its board). In practice, nonetheless, the relationship between a fund and its advisers tends to be extremely close. Indeed, most management companies are responsible for establishing the funds that they advise.

Our final model then has the following form. There are investment advisers of differing abilities who announce fee structures (we consider two possible types of advisers). These fee structures determine, of course, the division of realized returns between investor and adviser; but, importantly, they also act as signals of the advisers' abilities, and carry implicit information regarding the portfolio selections that advisers may make. Taking these factors into account, investors observe the

[1] For an outline of the history of this legislation, see Das and Sundaram [3] or Lin [17].

[2] We stress the point that incentive fees (or "performance fees" as they have also been called) are necessarily *asymmetric*; they reward good performance without penalizing poor performance.

announced fee structures and make their investment decisions. The advisers then choose portfolios, allocating the amount invested with them between the available securities. The participants' final rewards are then realized. We compare equilibria of this game when fee structures are restricted to being of the fulcrum form to those that arise when fees are of the incentive form.[3]

Our main findings are easily summarized. We do find, as intuition suggests, that incentive fees lead to the adoption of more risky portfolios than fulcrum fees. Indeed, when faced with fulcrum fees, advisers with poor information-generating ability in our model select only moderately risky portfolios, but even such advisers switch to extreme—and, in a precise sense, suboptimal—portfolios under incentive fees (see Proposition 4.2 and the discussion following it). Nevertheless, under general conditions, we find that investors may be *strictly* better off in welfare terms under an incentive fee regime. Thus, we do not find unambiguous support for existing regulations. Indeed, it even appears easier to make a case for the opposite requirement that only incentive fees be permitted.

Our results are more intuitive than might appear at first blush. In a separating equilibrium, the fee structure adopted by the high-type adviser must be such that two conditions are met: (a) it does not pay for the low-type adviser to imitate this structure (i.e., mimicking would result in the low-type adviser not meeting even his reservation-fee level), and (b) given that adviser types are revealed, the utility the investor obtains from the high-type adviser must at least equal the best obtainable from the low-type adviser. Now, the extent to which fees can be raised in equilibrium by the high-type adviser—and surplus transferred away from the investor—evidently depends on both constraints; loosely put, any increase in the fee level will lower the investor's utility but will also make mimicking more profitable for the low-type adviser. Thus, the welfare properties of equilibrium depend on which constraint binds first.

If the low-type adviser has a "small" reservation fee level, the first constraint, that of non-mimicking, is likely to be the one to bind first. Given this consideration, the presence of the "fulcrum" provides a crucial *relative* advantage to the high-type adviser: it creates downside risk for the low-type adviser from choosing the "wrong" (i.e., suboptimal) portfolio, and thus makes mimicking a more expensive proposition. *Ipso facto*, it enables the appropriation of more of the investor's surplus. In general, therefore, we would expect the investor to be worse off in a fulcrum fee regime than in an incentive fee regime in this case.[4]

Conversely, if the reservation-fee level of the low-type adviser is sufficiently high, the second constraint will likely be the relevant one. In this case, under either regime, the investor will be pushed down in equilibrium to the best utility level he could obtain from the low-type adviser. However, this best utility level is typically *not* the same in the two regimes: it depends in an essential way on the risk-sharing properties of the fee structure the low-type adviser may use. Intuitively speaking, when investors are risk-averse, fulcrum fees do a better job of risk-sharing since such fees effectively transfer transfer weight from the tails of the distribution to its middle (they raise investors' payoffs when returns are low and lower them when they are high). Thus, the maximum

[3]The benchmark portfolio in either case is taken as exogeneously given, and does not constitute a strategic choice in our model. This is consistent with observed reality. Funds that use fulcrum fees in practice tend overwhelmingly to take as the benchmark a widely-recognized index (such as the S&P 500). See Das and Sundaram [3] or Lin [17].

[4]Only "in general" though. The comparison of the two regimes at this intuitive level is partially blurred by the fact that even though the fulcrum fee regime enables appropriation of a greater degree of the surplus, it also has superior risk-sharing features that enhance investor utility (see the next paragraph in the text). In very highly volatile environments, this could create an interesting twist. We elaborate on this in Section 5.3.

utility level obtainable from the low-type adviser will typically be higher under a fulcrum fee regime, so we would also expect this regime to now provide a superior level of equilibrium investor welfare.

That this intuition is substantially correct is most directly verified in a model with risk-neutral investors, a setting which affords the advantage that the risk-sharing properties of the fees are irrelevant. (In particular, the best utility obtainable from the low-type adviser coincides under the two regimes.) Based on our above arguments, we would expect in this case that (i) the investor is strictly better off with incentive fees when the reservation–fee level of the low-type adviser is small, and (ii) that the two regimes are equivalent when this level is large. This is exactly what we find (Section 5.1). Building on this, we then show the arguments also hold up in general even when the investor may be risk-averse (Sections 5.2 and 5.3), though more intricate and interesting patterns may arise in the presence of very high volatility (Section 5.3). In particular, we show that when leveraged portfolio strategies are not permitted, incentive fees unambiguously dominate fulcrum fees from the investor's perspective (Section 5.2).

In the last part of our paper, we examine a number of modifications and extensions of our basic model. In all cases barring one, we find that our conclusions on the possible inferiority of fulcrum fees vis-a-vis incentive fees remain substantially unaltered. The exception arises when our imperfectly competitive market setting is replaced by one of a perfectly competitive market for advisers. We find in this setting that fulcrum fees become unabiguously superior to incentive fees from the standpoint of investor welfare. This reversal is stark but not surprising. In a competitive market for advisers, the entire surplus from interaction accrues to the investor. This surplus is higher under fulcrum fees than incentive fees for two reasons. On the one hand, fulcrum fees are more efficient at separation since they can make mimicking more expensive for the low-type advisers. On the other hand, they do a better job at risk-sharing. Under imperfect competition, these factors are partially offsetting: the first enables the adviser to extract greater surplus from the investor, while the second provides superior utility to the investor. In a competitive world, they both work to enhance investor welfare.

The remainder of this paper is organized as follows. Section 2 indicates the related literature. Sections 3 and 4 describe our model, identify the questions of interest, and derive some preliminary properties that are important in the subsequent analysis. Section 5 compares equilibrium outcomes under the different fee structures. Section 6 describes several extensions and modifications of our analysis. Section 7 concludes. The Appendices contain proofs omitted in the main body of the text.

2 The Related Literature

This section provides a brief discussion of the related literature on the money management industry, in particular as it pertains to compensation structures and signalling. The presentation here is meant to be indicative of the work that has been done and not as a survey of the field.

Broadly speaking, there are two branches to the literature on mutual fund compensation. On the one hand are papers which focus on the fund manager's optimal reaction to a given fee structure. Papers in this vein include Davanzo and Nesbit [4], Ferguson and Lestikow [5], Goetzman, Ingersoll, and Ross [6], Grinblatt and Titman [9], Grinold and Rudd [10], and Kritzman [14]. On the other hand are papers that take a broader "equilibrium" approach, such as Admati and Pfleiderer [1], Das and Sundaram [3], Heinkel and Stoughton [11], and Lynch and Musto [18].

Of the first category of papers, the most comprehensive analyses are those in Grinblatt and Titman [9] and Goetzmann, Ingersoll, and Ross [6]. Grinblatt and Titman compare the incentives provided to advisers by different fee structures. They show that for certain classes of portfolio strategies, adverse risk-sharing incentives are avoided when penalties for poor performance outweigh rewards for good performance. Goetzmann, Ingersoll, and Ross [6] are concerned with "high watermark" contracts of the sort used by some hedge funds in which the adviser receives a proportion of the fund return in excess of the fund's previous high watermark, i.e., its maximum share value since inception. They provide closed-form solutions for valuing such contracts, and show that the contracts typically represent a claim on a significant portion of investor wealth.

Turning to the second group of papers, Admati and Pfleiderer [1] study the desirability of benchmarking in a setting where a fund manager has superior information to the investor and faces a given fulcrum fee structure. (This is contrast to our paper where we take benchmarking as given and look at the desirability of different fee structures.) They look for conditions under which the manager would pick the investor's most desired portfolio, i.e., the one the investor would have chosen had he the same information as the manager. However, the determination of equilibrium fee levels and payoffs is not an explicit concern of their paper.

Das and Sundaram [3] also examine the regulatory issue that concerns us here. They study a model with one risky and one riskless asset, with the risky asset denoting the benchmark portfolio; no adverse selection or signalling considerations are involved. Under some restrictions on the set of admissible fee structures, they find that incentive fees provide Pareto-dominant outcomes, making both adviser and investor better off than under fulcrum fees.

Heinkel and Stoughton [11] aim to explain the predominance of fraction-of-funds fees in the money management industry. They study a two-period model with moral hazard and adverse selection. They show that equilibrium contracts in their model have a smaller performance-based fee in the first period than in a first-best contract. They suggest that this reduced emphasis on the first-period performance component is analogous to the lack of a performance-based fee in the industry. Lynch and Musto [18] study a moral hazard model in which the manager's effort is observable, but not contractable. They focus on identifying conditions under which different fee structures predominate.

Also closely related to our paper is the branch of the literature that has looked at the issue of signalling in a money management context. Huberman and Kandel [12] study a model in which fund managers face a given flat fee structure and use their portfolio selections to signal their abilities. These abilities evolve according to a Markov process. Under some assumptions on the market's inference process, Huberman and Kandel show that there is a unique screening equilibrium, but that a continuum of pooling equilibria may also exist that survive the Cho–Kreps Intuitive Criterion. In the screening equilibrium, the high ability manager distorts his investment choices with respect to his choices when signalling ability is not a concern; moreover, in all the pooling equilibria, *both* the high and low ability managers distort their behavior. The authors conclude that the presence of the signalling motive significantly affects fund manager behavior and equilibrium outcomes.

Huddart [13] also studies a dynamic model in which fund managers of differing abilities compete by using their portfolio choices to signal their abilities. Huddart is not explicitly concerned with the optimal contract structure; rather, his focus is on the distortionary effects of signalling. He compares outcomes under two possible fee structures, flat fees and fulcrum fees, and shows that the adoption of a fulcrum fee can mitigate undesirable reputation effects and make investors better off. Improvement also occurs in the investors' utility levels if the funds are closed after one period.

3 The Model

We study a model with two fund managers/investment advisers and a representative investor. One of the advisers, whom we shall refer to as the "informed" adviser, is assumed to have superior ability at generating information concerning returns on the model's risky securities. The other adviser lacks such ability and is termed "uninformed." An adviser's type is private information and is not observable by the investor; rather, the investor must infer this information from the actions of the advisers. The advisers are both assumed to be risk-neutral, and have as their objective the maximization of expected fees received.[5] The reservation utility levels of the informed and uninformed adviser are denoted by $\bar{\pi}_I$ and $\bar{\pi}_N$, respectively.

The investor, a representative stand-in for a large number of identical investors, has an initial wealth of w_0 (normalized to \$1 in the sequel). The investor's objective is to maximize the utility $U(\tilde{w})$ of terminal wealth $\tilde{w}$ at the end of the model's single period. We assume that U has a mean-variance form given by

$$U(\tilde{w}) \;=\; E(\tilde{w}) - \frac{1}{2}\gamma V(\tilde{w}), \tag{3.1}$$

where $E(\cdot)$ and $V(\cdot)$ represent, respectively, the expectation and variance operators, and $\gamma > 0$ is a parameter indicating the investor's aversion to variance.

The Sequence of Events

Events in our model evolve as follows. The investment advisers move first and simultaneously announce their fee structures. After observing these fee structures, the investor decides with which adviser to invest; for analytic simplicity, we assume that the investor must invest with only a single adviser.[6] Next, the informed adviser receives information concerning the return distribution on the risky securities; the uninformed adviser receives no information at this stage. Lastly, the advisers decide on their portfolio compositions, and final rewards are realized. Our objective in this paper is to examine whether restrictions on the advisers' freedom to set fees—specifically, requiring that the advisers only use "fulcrum" fees—can enhance the welfare of the investor. The remainder of this section discusses the components of this model in greater detail.

Securities and Returns Distributions

There are three securities in our model, a riskless security and two risky securities. The net return on the riskless security is normalized to zero. The "true" joint return distribution on the two risky

[5] The assumption of risk-neutrality is made partly in the interests of analytic tractability. However, the intuition behind our results appears compelling, and we do not think they would be qualitatively altered under risk-aversion.

[6] A more attractive assumption would be that the investor makes an optimal portfolio allocation amongst the available investment alternatives. Unfortunately, this would make the model wholly intractable, since the investor's responses enter various decision problems (notably the separation problems (4.8) and (4.16)) in a central way.

Table 1: Returns Distributions on the Risky Securities

The gross returns on each of the two risky securities can take on either the high value H or the low value L. We assume $H > 1 > L$ and $H + L > 2$. The joint distribution of the two returns is given by either Π_1 or Π_2. The distributions are assumed equiprobable: the prior probability of Π_1 is $\zeta = 1/2$. The table below describes the probabilities of various outcomes under Π_1 and Π_2. The first entry in each outcome corresponds to the return on the first security, and the second to that on the second security. The probabilities in the table are assumed to satisfy (i) $p + 2q + r = 1$, (ii) $p, q, r > 0$, and (iii) $p > r$.

Outcome	Probability under Π_1	Probability under Π_2
(H, H)	q	q
(H, L)	p	r
(L, H)	r	p
(L, L)	q	q

securities is either Π_1 or Π_2. The informed adviser gets to know which of the two distributions represents the true distribution prior to making his investment decision. The uninformed adviser only knows the prior probabilities ζ and $(1 - \zeta)$ of the two distributions.

Table 1 describes the specific structure we adopt concerning these returns distributions. As the table indicates, we take the gross returns on each security to follow a Binomial process in which the security returns either H or L. Under the joint distribution Π_1, security 1 returns H with a strictly higher probability than does security 2, but the reverse is true under Π_2; thus, it is valuable information to know which of these represents the true distribution.[7] Note also the important point that the *a priori* distribution of returns from the two securities is the same: each security returns H and L equiprobably. This construction is deliberate and ensures that the uninformed adviser has no return-based reasons to prefer one mix of these securities to another. Of course, such incentives may (and, as we shall see below, indeed do) arise from the fee structure employed.

Fees

The fees charged by an adviser may depend on the realized returns r_p on the adviser's portfolio, as well as on the realized returns r_b on a "target" or "benchmark" portfolio. The fees, denoted $F(r_p, r_b)$, are assumed to be received at the end of the period, and are deducted from the gross returns r_p on the adviser's portfolio. Thus, given the fee structure F and realized returns r_p and r_b, the net-of-fees return to the investor is $r_p - F(r_p, r_b)$.

[7] It is not, of course, necessary that the numbers in Table 1 represent the "true" likelihoods of the various outcomes; rather, they could simply be posterior probabilities under an informative signal received by the informed adviser.

The distribution of returns $\tilde{r}_p$ on the adviser's portfolio depends on the composition of this portfolio. We discuss the imperatives that go into the construction of this portfolio below. The benchmark portfolio is exogeneously given, and is taken to be a portfolio consisting of half a unit each of the two risky securities.

The Investor's Decision

The fee structure in our model plays three related, but distinct, roles. First, it implies a particular division of returns between adviser and investor, and ipso facto performs a risk-sharing function. Second, it affects the adviser's portfolio selection incentives, and thereby the distribution of returns on the adviser's portfolio. Lastly, it may have information content: the selection of particular fee levels may send a signal to the investor about the type of the adviser who chooses that fee. A fee profile is *separating* if it reveals adviser types to the investor; it is *pooling* otherwise.

Taking all these factors into account, the investor in our model decides on the choice of adviser with whom to invest. If the fee profile chosen by the advisers is separating, the investor compares the utility level obtained by investing with the informed adviser to that from investing with the uninformed adviser, and selects the adviser who delivers the higher utility. This choice is not a trivial one. Computing net-of-fees returns requires predicting the portfolio that will be chosen by the adviser, which will, in turn, depend on the fee structure that was committed to. Moreover, even though the informed adviser will always be able to generate higher total returns, the fees charged by the advisers may make the net-of-fees returns from the uninformed adviser more attractive.

The investor's choice problem becomes a little more complex if the fees chosen are pooling. In this circumstance, the investor assumes that each adviser is informed with probability 1/2 and uninformed with probability 1/2, and assigns the dollar to the adviser whose net-of-fees returns (computed under this assumption) are more attractive. Finally, in all cases, we assume that if the investor finds the advisers equally attractive, then he randomizes between them, so each adviser receives the dollar with probability 1/2.

The Advisers' Portfolio Choices

The final move in our model is made by the advisers selecting their portfolios. The informed adviser can condition this choice on the information he receives concerning the "true" state of the world. The uninformed adviser, not being privy to this information, must choose the same portfolio in both states. In choosing their portfolios, advisers take as given the fee structure choices made earlier, and choose an allocation between the three securities that will maximize their expected fees.

We consider two situations: where the adviser is not permitted to use levered strategies, and where such strategies are allowed. In the former case, the sum total of the investment in the two risky securities cannot exceed the initial asset value of a dollar. In the latter case, we assume that there is a pre-specified ceiling on the extent of leveraging permitted; i.e., there is $a^{\max} > 1$ such that the total amount invested in the two risky securities cannot exceed $a^{\max}$. Finally, we also assume that short positions are not permitted in either of the risky securities. This last assumption is made purely for expositional convenience; our results remain unaffected if it is replaced by a ceiling on the maximum size of short positions allowed.

Fee Structures of Special Interest

Our objective in this paper is to examine whether restrictions on the form of the fee structures $F(r_p, r_b)$ that can be used by the advisers in the first step can increase the investor's level of equilibrium utility in this model. We are especially interested in this context in the class of *fulcrum fees*, which existing regulation requires mutual funds to use. Such fees are defined by a symmetry requirement: they must increase for outperforming the benchmark returns in the same way that they decrease for underperforming it. We restrict attention to linear fulcrum fees, which are, by far, the most common type used in practice. Such fees are described by

$$F(r_p, r_b) \;=\; b_1 r_p + b_2(r_p - r_b), \tag{3.2}$$

where b_1 and b_2 are non-negative constants denoting, respectively, the base fee and the performance adjustment component. When $b_2 = 0$, the fees are simply a constant fraction b_1 of the total returns r_p; such fees are called "flat fees" or "fraction-of-funds" fees.

A second class of fees of importance are (asymmetric) *incentive fees*. Like fulcrum fees, incentive fees are described by two parameters b_1 and b_2, with b_1 denoting the base fee level, and b_2 the performance adjustment component. However, unlike fulcrum fees, the performance adjustment component must remain non-negative, and the total fee is given by

$$F \;=\; b_1 r_p + b_2 \max\{r_p - r_b, 0\}. \tag{3.3}$$

As we mentioned in the opening remarks to this paper, the existing legislation on mutual fund fees is explicitly motivated by fear of the consequences of *incentive* fee structures, in particular of the adverse risk-taking such contract forms may encourage. In the remainder of this paper, we examine the extent to which these fears are justified by comparing the set of equilibrium outcomes that result under fulcrum fees to those that obtain under incentive fees, with particular emphasis on the investor's welfare under the two regimes.[8]

4 Equilibrium

This section describes the optimization problems whose solutions identify the equilibrium outcomes under the two fee regimes described in the previous section. Sections 4.1–4.2 deal with fulcrum fees, while Sections 4.3–4.4 handle incentive fees. The results presented here are used in Section 5 to compare the equilibrium payoffs of the investors and the advisers under the two regimes. Since the focus of this paper is on separating equilibria, we avoid unnecessary details in the presentation and study only that case in this section. For completeness, Appendix C looks at pooling equilibria also; it is shown there that pooling equilibria never exist under incentive fees, and generally do not exist under fulcrum fees either.

[8]Observe that this limited comparison will also suffice to establish the possible inoptimality of existing regulations if we should find that the investor does better under incentive fees under robust conditions (specifically, we could plausibly argue then that incentive fees are better as a regulatory requirement). For analytic completeness, however, we also compare fulcrum fees to an unrestricted-fee environment in Section 6.3.

4.1 Portfolio Choices under Fulcrum Fees

As the first step in identifying equilibria under fulcrum fees, we identify the portfolios that would be chosen by the two advisers in the last step of the game given an arbitrary fulcrum fee (b_1, b_2). Some new notation will simplify this process. We will denote a typical portfolio choice for either adviser by $(\alpha_0, \alpha_1, \alpha_2)$, where α_0 represents the amount invested in the riskless security, and α_1 and α_2 represent, respectively, the amounts invested in the first and second risky securities. Of course, we must have $\alpha_0 + \alpha_1 + \alpha_2 = 1$, and, since short selling of the risky securities is prohibited, $\alpha_1, \alpha_2 \geq 0$. Moreover, since $a^{\max} \geq 1$ represents the maximum amount that may be invested in the two risky securities combined, we must also have $\alpha_1 + \alpha_2 \leq a^{\max}$. In the interests of notational simplicity, we will write a for $a^{\max}$ throughout this section.

Proposition 4.1 *Let any fulcrum fee (b_1, b_2) be given. Under the fee structure (b_1, b_2):*

1. *The informed adviser will choose the portfolio $(1 - a, a, 0)$ if state 1 were to occur, and the portfolio $(1 - a, 0, a)$ if state 2 were to occur.*
2. *Any portfolio of the form $(1 - a, m, a - m)$ for $m \in [0, a]$ is optimal for the uninformed adviser.*

Proof See Appendix A.1. □

In words, Proposition 4.1 states that given any fulcrum fee structure, the informed adviser will always choose an extreme portfolio, while the uninformed adviser is indifferent between any combination of the two risky securities. This is intuitive. Since the informed adviser receives the information in advance about which security will be the higher-performing one, his expected fee is maximized by investing the maximum amount in that security and nothing in the other security. On the other hand, the uninformed adviser has no particular information and, since both securities have identical a priori return charactersitics, no grounds for preferring one security to the other.

Given these portfolio choices and the information in Table 1, we can compute the ex-ante distribution of returns to the informed adviser and the investor that would arise if the investor were to choose the informed adviser. Denoting these returns by F_I and Y_I, respectively, we have

$$F_I = \begin{cases} b_1(aH + 1 - a) + b_2(aH + 1 - a - H), & \text{w.p. } q \\ b_1(aH + 1 - a) + b_2(aH + 1 - a - (H + L)/2)), & \text{w.p. } p \\ b_1(aL + 1 - a) + b_2(aL + 1 - a - (H + L)/2)), & \text{w.p. } r \\ b_1(aL + 1 - a) + b_2(aL + 1 - a - L), & \text{w.p. } q \end{cases} \tag{4.1}$$

$$Y_I = \begin{cases} (1 - b_1)(aH + 1 - a) - b_2(aH + 1 - a - H), & \text{w.p. } q \\ (1 - b_1)(aH + 1 - a) - b_2(aH + 1 - a - (H + L)/2)), & \text{w.p. } p \\ (1 - b_1)(aL + 1 - a) - b_2(aL + 1 - a - (H + L)/2)), & \text{w.p. } r \\ (1 - b_1)(aL + 1 - a) - b_2(aL + 1 - a - L), & \text{w.p. } q \end{cases} \tag{4.2}$$

Since the uninformed adviser is indifferent between all portfolios of the form $(1-a, m, a-m)$ for $m \in [0, a]$, we may assume without loss that he picks the portfolio among these that maximizes the investor's expected utility. (This would also maximize the chance of his receiving the investment.) A simple computation shows that this occurs when the adviser selects the risky securities in the same proportions as the market portfolio, that is, the optimal portfolio is $(1-a, a/2, a/2)$. Under these proportions, the distribution of returns to the uninformed adviser and investor, denoted F_N and Y_N respectively, are given by

$$F_N = \begin{cases} b_1(1-a+aH) + b_2(a-1)(H-1), & \text{w.p. } q \\ b_1(1-a+a(H+L)/2) + b_2(a-1)((H+L)/2-1), & \text{w.p. } z \\ b_1(1-a+a(L+H)/2) + b_2(a-1)((H+L)/2-1), & \text{w.p. } z \\ b_1(1-a+aL) + b_2(a-1)(L-1), & \text{w.p. } q \end{cases} \tag{4.3}$$

$$Y_N = \begin{cases} (1-b_1)(1-a+aH) - b_2(a-1)(H-1), & \text{w.p. } q \\ (1-b_1)(1-a+a(H+L)/2) - b_2(a-1)((H+L)/2-1), & \text{w.p. } z \\ (1-b_1)(1-a+a(L+H)/2) - b_2(a-1)((H+L)/2-1), & \text{w.p. } z \\ (1-b_1)(1-a+aL) - b_2(a-1)(L-1), & \text{w.p. } q \end{cases} \tag{4.4}$$

When we wish to emphasize the dependence of these returns on the fee structure, we shall write $F_I(b_1, b_2)$, $Y_I(b_1, b_2)$, etc. The expectations of these variables will be denoted $E[\cdot]$ (for example, $E[F_I(b_1, b_2)]$), and the variances by $V[\cdot]$ (for instance, $V[Y_I(b_1, b_2)]$). Using this notation, conditional on knowing the adviser's identity, and given (b_1, b_2), the expected utility of the investor from investing with the informed adviser is

$$E[U_I(b_1, b_2)] = E[Y_I(b_1, b_2)] - \frac{1}{2}\gamma V[Y_I(b_1, b_2)]. \tag{4.5}$$

Similarly, conditional on knowing the adviser's identity, the expected utility to the investor from investing with the uninformed adviser is

$$E[U_N(b_1, b_2)] = E[Y_N(b_1, b_2)] - \frac{1}{2}\gamma V[Y_N(b_1, b_2)]. \tag{4.6}$$

4.2 Separating Equilibrium under Fulcrum Fees

For an equilibrium in this model to be separating, it must satisfy two conditions: (i) the fee structure chosen by the informed adviser must be one that the uninformed adviser would not wish to mimic, and (ii) the investor receives at least as much expected utility from investing with the informed adviser as he could from investing with the uninformed adviser. Thus, identifying a separating equilibrium requires a two step procedure. First, we look at the maximum utility the investor could obtain from the uninformed adviser, subject to the latter receiving at least his reservation expected fee level. That is, we solve:

$$\begin{array}{lrcl} \text{Maximize} & E[U_N(b_1, b_2)] & & \\ \text{subject to} & E[F_N(b_1, b_2)] & \geq & \bar{\pi}_N \\ & b_1, b_2 & \geq & 0 \end{array} \tag{4.7}$$

Let EU_N^* denote the maximized value of the objective function in this problem. In the second step, we look for the fee structure that maximizes the expected fee of the informed adviser subject to two constraints: providing the investor with at least his "reservation" utility level EU_N^*, and ensuring the non-mimicking condition.

$$\begin{array}{lrcl} \text{Maximize} & E[F_I(b_1, b_2)] & & \\ & & & \\ \text{subject to} & E[U_I(b_1, b_2)] & \geq & EU_N^* \\ & E[F_N(b_1, b_2)] & \leq & \bar{\pi}_N \\ & b_1, b_2 & \geq & 0 \end{array} \qquad (4.8)$$

Let EF_I^* denote the maximized value of the objective function in (4.8), and EU_I^* the expected utility of the investor in a solution. If there is a solution to (4.8) which satisfies $EF_I^* \geq \bar{\pi}_I$, then a separating equilibrium exists in this model; if not, then no separating equilibrium exists.[9,10]

4.3 Portfolio Choices under Incentive Fees

The following result identifies the advisers' optimal portfolio choices for any given incentive fee:

Proposition 4.2 *Let any incentive fee (b_1, b_2) be given. Under the fee structure (b_1, b_2):*

1. *The informed adviser will choose the portfolio $(1-a, a, 0)$ if state 1 were to occur, and the portfolio $(1-a, 0, a)$ if state 2 were to occur.*
2. *If $b_2 > 0$, the uninformed adviser will choose one of the extreme portfolios $(1-a, a, 0)$ or $(1-a, 0, a)$. If $b_2 = 0$, any portfolio of the form $(1-a, m, a-m)$ for $m \in [0, a]$ is optimal.*

Proof See Appendix A.2. □

Proposition 4.2 summarizes, in a sense, the main argument behind existing regulations on fee structures that allowing for incentive fees will lead to "excessive" amounts of risk. Under fulcrum fees, as we saw, the most reasonable choice of portfolio for the uninformed adviser was one that held the risky assets in the same proportions as the benchmark. Under incentive fees, however, the uninformed adviser also always takes an extreme portfolio. Moreover, unlike the informed adviser's choice, this could be the "wrong" extreme portfolio; from an a priori standpoint, the portfolios $(1-a, a, 0)$ and $(1-a, 0, a)$ are both optimal for the uninformed adviser, but, obviously, the second one is an inferior choice in state 1, and the first is an inferior choice in state 2. Thus, by protecting him from the downside consequences of his actions, incentive fees encourage the adviser to take on extreme positions that cannot be justified by information considerations.

[9] Such equilibria may, of course, fail to exist for arbitrary parametrizations (in particular, when $\bar{\pi}_I$ is very large relative to expected portfolio returns). For reasonable parameter values, however, existence is not a problem.

[10] Note that in a separating equilibrium only one fund (namely, that run by the informed adviser) will remain in the market. The other, unable to meet its reservation fee level, will exit. However, it is the threat of competition offered by the uninformed adviser that drives the equilibrium.

However, the important issue is not which fee structure encourages less risk-taking but which is welfare maximizing for the investor. This requires us to identify the model's *equilibria*. To this end, we first identify the returns that arise from each adviser. To maintain a distinction between the fee regimes, we amend our previous notation as follows: we will denote by G the fee received by the adviser, by X the returns to the investor, and by EV the expected utility of the investor.

If the investor were to invest with the informed adviser, the *ex ante* distribution of returns G_I and X_I to the adviser and investor, respectively, are given by

$$G_I = \begin{cases} b_1(aH+1-a) + b_2(aH+1-a-H), & \text{w.p. } q \\ b_1(aH+1-a) + b_2(aH+1-a-(H+L)/2)), & \text{w.p. } p \\ b_1(aL+1-a), & \text{w.p. } r \\ b_1(aL+1-a), & \text{w.p. } q \end{cases} \tag{4.9}$$

$$X_I = \begin{cases} (1-b_1)(aH+1-a) - b_2(aH+1-a-H), & \text{w.p. } q \\ (1-b_1)(aH+1-a) - b_2(aH+1-a-(H+L)/2)), & \text{w.p. } p \\ (1-b_1)(aL+1-a), & \text{w.p. } r \\ (1-b_1)(aL+1-a), & \text{w.p. } q \end{cases} \tag{4.10}$$

Now suppose the investor chooses the uninformed adviser. Consider first the case where $b_2 > 0$, and assume, without loss, that the uninformed adviser picks the portfolio $(1-a, a, 0)$. In this case, the distribution of returns G_N and X_N to the two parties are

$$G_N = \begin{cases} b_1(1-a+aH) + b_2(a-1)(H-1), & \text{w.p. } q \\ b_1(aH+1-a) + b_2(aH+1-a-(H+L)/2)), & \text{w.p. } z \\ b_1(aL+1-a), & \text{w.p. } z \\ b_1(aL+1-a), & \text{w.p. } q \end{cases} \tag{4.11}$$

$$X_N = \begin{cases} (1-b_1)(1-a+aH) - b_2(a-1)(H-1), & \text{w.p. } q \\ (1-b_1)(aH+1-a) - b_2(aH+1-a-(H+L)/2)), & \text{w.p. } z \\ (1-b_1)(aL+1-a), & \text{w.p. } z \\ (1-b_1)(aL+1-a), & \text{w.p. } q \end{cases} \tag{4.12}$$

On the other hand, if $b_2 = 0$, then any portfolio of the form $(1-a, m, a-m)$ for $m \in [0, a]$ is optimal. In this case, we may assume that the adviser picks the portfolio that maximizes the investor's utility, which is $(1-a, a/2, a/2)$. This results in:

$$G_N = \begin{cases} b_1(1-a+aH) + b_2(a-1)(H-1), & \text{w.p. } q \\ b_1(1-a+a(H+L)/2) + b_2(a-1)((H+L)/2-1), & \text{w.p. } z \\ b_1(1-a+a(L+H)/2) + b_2(a-1)((H+L)/2-1), & \text{w.p. } z \\ b_1(1-a+aL), & \text{w.p. } q \end{cases} \tag{4.13}$$

$$X_N = \begin{cases} (1-b_1)(1-a+aH) - b_2(a-1)(H-1), & \text{w.p. } q \\ (1-b_1)(1-a+a(H+L)/2) - b_2(a-1)((H+L)/2-1), & \text{w.p. } z \\ (1-b_1)(1-a+a(L+H)/2) - b_2(a-1)((H+L)/2-1), & \text{w.p. } z \\ (1-b_1)(1-a+aL), & \text{w.p. } q \end{cases} \tag{4.14}$$

Once again, when we wish to emphasize the dependence of any of these quantities on the fee structure, we will write $X_I(b_1, b_2)$, $G_I(b_1, b_2)$, etc. Now, note that if the investor chooses the informed adviser, then, conditional on knowning the adviser's type, the investor's ex-ante expected utility is

$$E[V_I(b_1, b_2)] \;=\; E[X_I(b_1, b_2)] - \frac{1}{2}\gamma V[X_I(b_1, b_2)].$$

Similarly, the ex-ante expected utility from investing with the uninformed adviser is

$$E[V_N(b_1, b_2)] \;=\; E[X_N(b_1, b_2)] - \frac{1}{2}\gamma V[X_N(b_1, b_2)].$$

4.4 Separating Equilibrium under Incentive Fees

The first step in identifying a separating equilibrium is identifying the maximum utility the investor could receive from the uninformed adviser subject to the adviser receiving at least his reservation utility level. That is, we solve

$$\begin{array}{lrcl} \text{Maximize} & E[V_N(b_1, b_2)] & & \\ & & & \\ \text{subject to} & E[G_N(b_1, b_2)] & \geq & \bar{\pi}_N \\ & b_1, b_2 & \geq & 0 \end{array} \tag{4.15}$$

Let EV_N^* denote the maximized value of the objective function in this problem. In the second step, we look for the fee structure that maximizes the expected fee of the informed adviser subject to two constraints: providing the investor with at least his "reservation" utility level EV_N^*, and ensuring the non-mimicking condition.

$$\begin{array}{lrcl} \text{Maximize} & E[G_I(b_1, b_2)] & & \\ & & & \\ \text{subject to} & E[V_I(b_1, b_2)] & \geq & EV_N^* \\ & E[G_N(b_1, b_2)] & \leq & \bar{\pi}_N \\ & b_1, b_2 & \geq & 0 \end{array} \tag{4.16}$$

In the next section, we use these optimization problems to obtain and compare equilibrium outcomes under the two fee regimes.

5 Comparison of Equilibrium Outcomes

Our comparison of equilibrium outcomes under the different fee regimes proceeds in several steps. In the Introduction, we outlined our intuitive expectation of the results. To recapitulate briefly, as the informed adviser "raises" the level of fees in the separation problem, both constraints move closer to binding: on the one hand, mimicking is now more profitable for the uninformed adviser;

on the other, the investor's expected utility from the informed adviser is pushed down towards his "reservation" level. Thus, the properties of equilibrium depend on which constraint binds first.

For small values of $\bar{\pi}_N$, the non-mimicking constraint appears the relevant one. In this case, the "fulcrum" provides the informed adviser with a crucial *relative* advantage: it creates downside risk to mimicking, and thereby enables the appropriation of greater rents. We would expect, therefore, that for small $\bar{\pi}_N$, the investor would be strictly better off under incentive fees.

On the other hand, as $\bar{\pi}_N$ increases, the investor's reservation utility constraint will start to bind. (Note that this should happen sooner under fulcrum fees because of the greater rent extraction.) For large $\bar{\pi}_N$, therefore, the superior regime from the investor's standpoint is the one that provides a greater level of reservation utility. In general, we would expect this to be the fulcrum fee regime: such a fee effectively transfers weight from the tails of the returns distribution to the middle, and thereby enables superior risk-sharing between the risk-averse investor and the risk-neutral adviser.

We verify this intuition in several steps. First, in Section 5.1, we examine the limiting case of a *risk-neutral* investor. In this case, the risk-sharing attributes of the fee structure are immaterial. Thus, we would expect that from the investor's viewpoint, (i) for small $\bar{\pi}_N$, the incentive fee regime strictly dominates the fulcrum fee regime, and (ii) for large $\bar{\pi}_N$, the regimes are equivalent. This is exactly what we find; indeed, we also find, as anticipated, that the investor is pushed down to his resevation level faster under fulcrum fees than under incentive fees.

Building on this analysis, we look at equilibrium with a risk-averse investor. We begin in Section 5.2 with a particular case of interest: that of zero leverage. We show that in this setting also it is the case that incentive fees are *never* worse, and can be strictly better, than fulcrum fees. Finally, in Section 5.3, we consider the general case of both risk-aversion and leverage. We find that our intuitive arguments are borne out for the most part. However, an interesting twist may occur when return volatility gets very high. In this case, the presence of leverage may compound matters sufficiently that for low values of $\bar{\pi}_N$, fulcrum fees dominate incentive fees due to their superior risk-sharing features. As $\bar{\pi}_N$ rises, however, the surplus extraction afforded by fulcrum fees also rises, so incentive fees now become preferable for the investor. At very high values of $\bar{\pi}_N$, the investor is forced down to his "reservation" levels, and fulcrum fees once again become superior.

5.1 A Risk-Neutral Investor

Our analysis of equilibrium outcomes when the investor is risk-neutral ($\gamma = 0$) begins with a characterization of separating equilibrium payoffs under a fulcrum fee regime. To this end, denote by R_N and R_I, respectively, the returns from the uninformed and informed adviser in a fulcrum fee regime, and by R_B the return on the benchmark portfolio. Letting $E(\cdot)$ denote expectations under the uninformed adviser's information set, define the quantity T_1 by

$$T_1 = E(R_N - R_B). \tag{5.1}$$

The significance of the quantity T_1 is captured in the following proposition:

Proposition 5.1 *If $\bar{\pi}_N < T_1$, the investor's utility in a separating equilibrium under fulcrum fees* *is strictly higher than his "reservation" level EU_N^*. If $\bar{\pi}_N \geq T_1$, the investor's equilibrium utility is equal to the reservation level EU_N^*.*

Proof See Appendix B.1. □

Proposition 5.1 is a formal confirmation of our intuition that for low $\bar{\pi}_N$, the investor receives a surplus over his reservation level, but for high $\bar{\pi}_N$, the investor is forced down to the reservation utility level. Appendix B.1, which proves this result, also provides closed-form expressions for the equilibrium payoffs for any value of $\bar{\pi}_N$.

Our second result provides the analog of Proposition 5.1 for incentive fees. We first introduce some notation to differentiate the returns distributions in this case from those under fulcrum fees; this will emphasize that the portfolio selections differ under the two regimes. Let $\mathcal{R}_I$ and $\mathcal{R}_N$ denote respectively, the returns from the informed and uninformed advisers, and let $\mathcal{R}_B$ denote the benchmark returns. (Note that benchmark returns coincide under the two regimes.) Letting $E^*(\cdot)$ denote the informed adviser's expectations, define

$$T_2 = \frac{E[(\mathcal{R}_N - \mathcal{R}_B)^+] \cdot [E^*(\mathcal{R}_I) - E(\mathcal{R}_N)]}{E^*[(\mathcal{R}_I - \mathcal{R}_B)^+] - E[(\mathcal{R}_N - \mathcal{R}_B)^+]} \tag{5.2}$$

The quantity T_2 plays the same role under incentive fees as T_1 did for fulcrum fees:

Proposition 5.2 *If $\bar{\pi}_N < T_2$, the investor's utility in a separating equilibrium under incentive fees is strictly higher than his "reservation" level EV_N^*. However, if $\bar{\pi}_N \geq T_2$, then the investor's utility in a separating equilibrium is equal to EV_N^*.*

Proof See Appendix B.2. □

Appendix B.2 provides closed-form solutions for the equilibrium payoffs under incentive fees for any $\bar{\pi}_N$. Using these closed-forms and the corresponding ones in in Appendix B.1, we may compare equilibrium payoffs for the investor in the two regimes. We would expect that (i) if $\bar{\pi}_N$ is small, the investor is strictly better off under incentive fees; (ii) if $\bar{\pi}_N$ is large, then the investor's utility in the two regimes coincides, and (iii) the investor gets forced down to his reservation level faster under fulcrum than under incentive fees. We will show all these to be true:

Proposition 5.3 *If $\bar{\pi}_N < T_2$, then the investor is strictly better off under incentive fees than under fulcrum fees. If $\bar{\pi}_N \geq T_2$, the investor receives the same equilibrium welfare levels in the two cases.*

Proof See Appendix B.3. □

The proof of Proposition 5.3 involves a considerable amount of algebraic manipulation, but the steps in the proof are quite simple. Appendices B.1 and B.2 show, respectively, that the reservation utilities EU_N^* and EV_N^* under the two regimes are defined by $EU_N^* = E(R_N) - \bar{\pi}_N$ and

Table 2: Separating Equilibrium Outcomes with No Risk-Aversion

This table presents separating equilibrium outcomes under both fulcrum and incentive fees for a range of parameter values when the investor is risk-averse. The probabilities p, q, and r of Table 1 are fixed at 0.50, 0.15, and 0.20, respectively, and the maximum leverage allowed at $a = 1.50$. In the table: (i) H and L refer to the returns on the risky securities, (ii) $\bar{\pi}_N$ is the reservation expected fee level for the uninformed adviser, (iii) EU_I^* and EV_I^* are the equilibrium utility levels of the investor under fulcrum and incentive fees, respectively, and (iv) EU_N^* and EV_N^* are the investor's (endogenously determined) reservation utility levels under fulcrum and incentive fees, respectively.

$H = 1.20$, $L = 0.90$, $a = 1.50$						
$\bar{\pi}_N$	0.00	0.01	0.02	0.03	0.04	0.05
EU_I^*	1.1425	1.1055	1.0685	1.0450	1.0350	1.0250
EU_N^*	1.0750	1.0650	1.0550	1.0450	1.0350	1.0250
EV_I^*	1.1425	1.1288	1.1152	1.1015	1.0879	1.0742
EV_N^*	1.0750	1.0650	1.0550	1.0450	1.0350	1.0250

$H = 1.50$, $L = 0.90$, $a = 1.50$						
$\bar{\pi}_N$	0.000	0.025	0.050	0.075	0.100	0.150
EU_I^*	1.4350	1.3763	1.3175	1.2588	1.2000	1.1500
EU_N^*	1.3000	1.2750	1.2500	1.2250	1.2000	1.1500
EV_I^*	1.4350	1.4010	1.3671	1.3331	1.2991	1.2312
EV_N^*	1.3000	1.2750	1.2500	1.2250	1.2000	1.1500

$EV_N^* = E(\mathcal{R}_N) - \bar{\pi}_N$. These reservation levels obviously coincide since $E(R_N) = E(\mathcal{R}_N)$. From the previous propositions, this means the investor gets pushed down to this common reservation level under the fulcrum fee regime if $\bar{\pi}_N \geq T_1$, and under the incentive fee regime if $\bar{\pi}_N \geq T_2$.

We prove that $T_1 \leq T_2$. This immediately establishes three points: that (a) the investor gets pushed to the reservation level faster under fulcrum fees, (b) incentive fees are strictly better than fulcrum fees for the investor when $\bar{\pi}_N \in [T_1, T_2)$, and (c) that the two regimes are equivalent when $\bar{\pi}_N \geq T_2$. Then, to complete the proof, we show that when $\bar{\pi}_N < T_1$, the investor is strictly better off under incentive fees.

Table 2 provides a numerical illustration of the utility received by the investor in the two regimes, as also of the reservation utility levels under the two regimes. For the parametrizations used in the upper panel in the table, it is easily checked that $T_1 = 0.025$ and $T_2 = 0.1845$; for the lower panel, these numbers are $T_1 = 0.10$ and $T_2 = 0.3764$. Thus, the investor is forced down to his reservation level far more quickly under fulcrum fees. As the table indicates, the differences in the investor's equilibrium utilities under the two regimes can also be substantial.

5.2 Risk-Averse Investors I: The Case of No Leverage

We turn now to the general case where $\gamma > 0$ is permitted. A particular case of interest here is where no leverage is permitted ($a = 1$).[11] The advantage afforded by this setting is that closed-form

[11]The attractiveness of this case was drawn to our attention by this paper's referee who suggested we examine it.

Table 3: Separating Equilibrium Outcomes with No Leverage

This table presents separating equilibrium outcomes under both fulcrum and incentive fees for a range of parameter values when there is no leverage. The probabilities p, q, and r of Table 1 are fixed at 0.50, 0.15, and 0.20, respectively. In the table: (i) H and L refer to the returns on the risky securities, (ii) $\bar{\pi}_N$ is the reservation expected fee level for the uninformed adviser, (iii) γ is the variance-aversion coefficient of the investor, (iv) EU_I^* and EV_I^* are the equilibrium utility levels of the investor under fulcrum and incentive fees, respectively, and (v) EU_N^* and EV_N^* are the investor's (endogenously determined) reservation utility levels under fulcrum and incentive fees, respectively.

$H = 1.20,\ L = 0.90,\ \gamma = 0.50$						
$\bar{\pi}_N$	0.00	0.01	0.02	0.03	0.04	0.05
EU_I^*	1.0483	1.0383	1.0284	1.0184	1.0084	0.9985
EU_N^*	1.0483	1.0383	1.0284	1.0184	1.0084	0.9985
EV_I^*	1.0899	1.0763	1.0626	1.0488	1.0349	1.0209
EV_N^*	1.0483	1.0383	1.0284	1.0184	1.0084	0.9985

$H = 1.50,\ L = 0.90,\ \gamma = 1.00$						
$\bar{\pi}_N$	0.000	0.025	0.050	0.075	0.100	0.150
EU_I^*	1.1865	1.1621	1.1376	1.1131	1.0887	1.0397
EU_N^*	1.1865	1.1621	1.1376	1.1131	1.0887	1.0397
EV_I^*	1.2491	1.2202	1.1901	1.1587	1.1260	1.0568
EV_N^*	1.1865	1.1621	1.1376	1.1131	1.0887	1.0397

solutions for the equilibria are easily computed. Indeed, we have the following result:

Proposition 5.4 *When there is no leverage ($a = 1$), the investor's equilibrium utility under incentive fees dominates that under fulcrum fees.*

Proof See Appendix B.4. □

The key to Proposition 5.4 lies in the following observations. As part of Proposition 4.1, we showed that if $a = 1$, the performance-adjustment component b_2 has no effect on the uninformed adviser's expected fees. This is intuitive: the uninformed adviser has no a priori reasons to prefer one mix of the risky stocks to another, so regardless of the portfolio he picks, the expected upside benefit is balanced by the expected downside loss. Thus, the informed adviser may change the value of b_2 without affecting the non-mimicking constraint. In particular, he can always raise it high enough to push the investor down to his reservation level EU_N^*, so the investor's utility in any equilibrium under fulcrum fees will only be EU_N^*.

Under incentive fees, however, this is not the case. Here, because of the asymmetric nature of the fees, the performance-adjustment component b_2 has a *positive* impact on the expected fees of the uninformed adviser whenever the latter does not choose the benchmark portfolio. As a consequence, any attempt by the informed adviser to extract investor surplus by raising b_2 will also affect the non-mimicking constraint. This limits the extent to which investor surplus can be reduced, so the investor's equilibrium utility will typically strictly exceed his reservation level EV_N^*. (Note the interesting point here that the "adverse" portfolio effect of incentive fees—namely, the fact that incentive fees will induce even the uninformed adviser to choose an extreme portfolio—actually works to the investor's advantage!) To complete the proof, we show that EU_N^* can never exceed EV_N^* if there is no leveraging.

Table 3 gives numerical expression to the superiority of incentive fees when there is no leverage. The parametrizations used are similar to those in Table 2. Note that—as expected—the investor is pushed down towards his reservation level under incentive fees also as $\bar{\pi}_N$ increases, so the extent of dominance declines.

5.3 Risk-Averse Investors II: The General Case

We now turn to the general case where $a \geq 1$ and $\bar{\pi}_N \geq 0$ are both permitted. We begin with fulcrum fees.

Separating Equilibria under Fulcrum Fees

When $\gamma > 0$ and $a > 1$, general solutions to the separation problems (4.7) and (4.8) are hard to obtain, because of the large number of parameters involved. For any specific parametrization, however, these problems present no special obstacles. The first one has a particularly simple structure: the objective function is quadratic and the constraint is linear in (b_1, b_2). The second problem is only a little more involved: it has a linear objective function, and although it has two constraints, one is linear and the other quadratic.

Consequently, for specific parameterizations, these problems are easily solved. Table 4 presents the equilibrium utility level EU_I^* of the investor, and the "reservation" utility level EU_N^* for a range of parameter values. The numbers in the table behave much as expected. In particular, in all cases, for small values of $\bar{\pi}_N$, the investor receives a surplus over his reservation utility level but for higher values, he is pushed down to his reservation level.

Separating Equilibria under Incentive Fees

Turning to incentive fees now, the reservation utility problem (4.15) is a little more complex than its counterpart (4.7) in the fulcrum fee case, since there are two possible distributions for G_N and X_N depending on the choice of (b_1, b_2). Thus, a two-step procedure is required, where we first look for the maximum conditional on $b_2 > 0$, and then for a maximum conditional on $b_2 = 0$. A comparison of the two cases then establishes the "reservation" utility level EV_N^* for the second problem.

The added complication is, however, minor; for specific parametrizations, both problems (4.15) and (4.16) are easy to solve. Table 5 presents the equilibrium utility level EV_I^* of the investor, and the investor's reservation utility level EV_N^* for the same range of parameter values as used in Table 2. Once again, there are no big surpises here: as $\bar{\pi}_N$ increases, the investor's equilibrium utility level in all cases drops towards the reservation level. Note, however, that unlike the fulcrum fee case, the equilibrium utility level remains strictly above the reservation level for the parameter values in the table; that is, the investor gets pushed down to his reservation level faster much slower here than under fulcrum fees.

Table 4: Separating Equilibrium Outcomes in a Fulcrum Fee Regime

This table presents separating equilibrium outcomes under a fulcrum fee regime for a range of parameter values. The probabilities p, q, and r of Table 1 are fixed at 0.50, 0.15, and 0.20, respectively, and the maximum leverage allowed at $a^{\max} = 1.50$. In the table: (i) H and L refer to the returns on the risky securities, (ii) $\bar{\pi}_N$ is the reservation expected fee level for the uninformed adviser, (iii) γ is the variance-aversion coefficient of the investor, (iv) EU_I^* is the equilibrium utility of the investor, and (v) EU_N^* is the investor's (endogenously determined via (4.15)) reservation utility.

$H = 1.20,\ L = 0.90,\ \gamma = 0.50$						
$\bar{\pi}_N$	0.00	0.01	0.02	0.03	0.04	0.05
EU_I^*	1.1310	1.0999	1.0661	1.0436	1.0342	1.0246
EU_N^*	1.0712	1.0621	1.0530	1.0436	1.0342	1.0246

$H = 1.20,\ L = 0.90,\ \gamma = 1.00$						
$\bar{\pi}_N$	0.00	0.01	0.02	0.03	0.04	0.05
EU_I^*	1.1195	1.0942	1.0638	1.0423	1.0333	1.0242
EU_N^*	1.0674	1.0593	1.0509	1.0423	1.0333	1.0242

$H = 1.20,\ L = 0.90,\ \gamma = 2.00$						
$\bar{\pi}_N$	0.00	0.01	0.02	0.03	0.04	0.05
EU_I^*	1.0964	1.0830	1.0591	1.0395	1.0317	1.0233
EU_N^*	1.0598	1.0536	1.0468	1.0395	1.0317	1.0233

$H = 1.50,\ L = 0.90,\ \gamma = 0.50$						
$\bar{\pi}_N$	0.000	0.025	0.050	0.075	0.100	0.150
EU_I^*	1.3889	1.3461	1.2992	1.2483	1.1933	1.1462
EU_N^*	1.2848	1.2622	1.2395	1.2165	1.1933	1.1462

$H = 1.50,\ L = 0.90,\ \gamma = 1.00$						
$\bar{\pi}_N$	0.000	0.025	0.050	0.075	0.100	0.150
EU_I^*	1.3429	1.3160	1.2810	1.2378	1.1865	1.1424
EU_N^*	1.2696	1.2495	1.2289	1.2079	1.1865	1.1424

$H = 1.50,\ L = 0.90,\ \gamma = 2.00$						
$\bar{\pi}_N$	0.000	0.025	0.050	0.075	0.100	0.150
EU_I^*	1.2507	1.2557	1.2444	1.2169	1.1730	1.1348
EU_N^*	1.2393	1.2240	1.2078	1.1908	1.1730	1.1348

Table 5: Separating Equilibrium Outcomes in an Incentive Fee Regime

This table separating equilibrium outcomes under an incentive fee regime for a range of parameter values. The probabilities p, q, and r of Table 1 are fixed at 0.50, 0.15, and 0.20, respectively, and the maximum leverage allowed at $a^{\max} = 1.50$. In the table:(i) H and L refer to the returns on the risky securities, (ii) $\bar{\pi}_N$ is the reservation expected fee level for the uninformed adviser, (iii) γ is the variance-aversion coefficient of the investor, (iv) EV_I^* is the equilibrium utility of the investor, and (v) EV_N^* is the investor's (endogenously determined via (4.15)) reservation utility.

$H = 1.20,\ L = 0.90,\ \gamma = 0.50$						
$\bar{\pi}_N$	0.00	0.01	0.02	0.03	0.04	0.05
EV_I^*	1.1310	1.1184	1.1057	1.0930	1.0802	1.0673
EV_N^*	1.0712	1.0613	1.0513	1.0414	1.0315	1.0215

$H = 1.20,\ L = 0.90,\ \gamma = 1.00$						
$\bar{\pi}_N$	0.00	0.01	0.02	0.03	0.04	0.05
EV_I^*	1.1195	1.1079	1.0962	1.0844	1.0724	1.0604
EV_N^*	1.0674	1.0575	1.0477	1.0378	1.0280	1.0181

$H = 1.20,\ L = 0.90,\ \gamma = 2.00$						
$\bar{\pi}_N$	0.00	0.01	0.02	0.03	0.04	0.05
EV_I^*	1.0964	1.0869	1.0772	1.0672	1.0570	1.0465
EV_N^*	1.0598	1.0501	1.0404	1.0306	1.0209	1.0112

$H = 1.50,\ L = 0.90,\ \gamma = 0.50$						
$\bar{\pi}_N$	0.000	0.025	0.050	0.075	0.100	0.150
EV_I^*	1.3889	1.3601	1.3310	1.3014	1.2715	1.2105
EV_N^*	1.2848	1.2604	1.2360	1.2115	1.1871	1.1391

$H = 1.50,\ L = 0.90,\ \gamma = 1.00$						
$\bar{\pi}_N$	0.000	0.025	0.050	0.075	0.100	0.150
EV_I^*	1.3429	1.3192	1.2948	1.2967	1.2438	1.1899
EV_N^*	1.2696	1.2458	1.2219	1.1980	1.1741	1.1262

$H = 1.50,\ L = 0.90,\ \gamma = 2.00$						
$\bar{\pi}_N$	0.000	0.025	0.050	0.075	0.100	0.150
EV_I^*	1.2507	1.2374	1.2226	1.2063	1.1885	1.1485
EV_N^*	1.2393	1.2166	1.1938	1.1711	1.1482	1.1025

Comparison of Outcomes

A perusal of Tables 4 and 5 immediately establishes that in large part the intuitive arguments stated at the top of this section are valid. For example, for all of the parametrizations studied here, the reservation levels under fulcrum fees are higher than under incentive fees, indicating the superior risk-sharing features of the former. Secondly, as we have observed above, the investor in each case gets pushed down to his reservation utility faster under fulcrum fees than under incentive fees. Thirdly, in each of the first five panels in the tables, the investor's equilibrium utility under incentive fees is higher than that under fulcrum fees; however, this difference diminshes as $\bar{\pi}_N$ increases. Moreover, (the tables do not show this) as $\bar{\pi}_N$ becomes large enough, fulcrum fees again begin to dominate as the investor gets pushed down to reservation under either regime.[12]

An interesting twist, however, is observed when comparing the last panels in the tables. In this case, for small $\bar{\pi}_N$, the fulcrum fee is actually initially dominant (see. e.g., $\bar{\pi}_N = 0.01$). As $\bar{\pi}_N$ increases however, incentive fees become dominant again. At very high values of $\bar{\pi}_N$, of course, fulcrum fees will again dominate, since they provide a higher value of reservation utility. This pattern is actually very intuitive. For the parameter values considered in this panel, return volatility is very high given the investor's aversion to variance. Thus, risk-sharing is very imporant. For low values of $\bar{\pi}_N$, the superior risk-sharing under fulcrum fees outweighs the negative effect of surplus-extraction that they facilitate, and they dominate incentive fees. As $\bar{\pi}_N$ increases, however, the latter factor gains importance, so incentive fees become dominant. □

6 Extensions and Modifications

In this section, we examine a number of extensions and modifications of our model. We begin in Section 6.1 with examining the impact of providing the investor with other natural investment alternatives. In Section 6.2, we look at a simpler (and more traditional) signalling model than the one studied in this paper. Then, in Section 6.3, we investigate the question: what if the alternative to which we compare fulcrum fees were an *unrestricted* structure? In all cases, we show that it remains a general possibility that fulcrum fees may be dominated from the investor's perspective. Finally, to round off the analysis, we look in Section 6.4 at a *competitive* market setting for advisers. We find now that fulcrum fees unambiguously dominate incentive fees from the investor's viewpoint.

6.1 Expanding the Investment Alternatives

The analysis thus far has effectively assumed that there are just three investment alternatives available to the investor, namely, the two advisers and the riskless asset. A natural addition to consider to this list is an "index fund" that provides the same returns as on the benchmark portfolio. From an analytic standpoint, this adds a third constraint to the separation problem: that the utility from investing with the informed adviser must also be at least that from investing in the index.

[12] Note that when $\bar{\pi}_N = 0$, equilibrium payoffs coincide under the two regimes. This is easy to see. First, EU_N^* and EV_N^* must be the same in this case, since both reservation utility problems (4.7) and (4.15) are solved by $b_1 = b_2 = 0$. Second, the separation problem also has the solution $b_1 = b_2 = 0$, or the non-mimicking constraint will be violated.

We will show that this does not affect our results substantively. Fix any value of $\bar{\pi}_N$, and given $\bar{\pi}_N$, let EU_N^* and EV_N^* denote the investor's "reservation" utility levels obtained from the problems (4.7) and (4.15), respectively. In addition, let EU^I denote the utility from the index. For expositional simplicity, we will assume that $EU_N^* \geq EV_N^*$ (as will typically be the case). Three possibilities arise: (i) $EV_N^* \geq EU^I$; (ii) $EU_N^* \geq EU^I > EV_N^*$; and (iii) $EU^I > EU_N^*$.

Now, consider the formulation in which the new constraint is not present. Suppose first that the equilibria here are such that incentive fees dominate fulcrum fees. Then, in cases (i) and (ii), adding the new constraint cannot change equilibrium payoffs: the equilibrium utility under fulcrum fees must be at least EU_N^*, and, by hypothesis, the equilibrium utility under incentive fees is at least that under fulcrum fees. Thus, the new constraint is irrelevant in these cases. (Note the important and relevant point that incentive fees are likelt to dominate fulcrum fees for small $\bar{\pi}_N$, and it is precisely for small values of $\bar{\pi}_N$ that we would expect cases (i) or (ii) to hold.) In case (iii) alone, this may not be the case: indeed, equilibrium utility levels under *both* regimes may now be affected. In turn, this creates two possibilities: either the strict dominance of incentive fees continues to obtain, or, at worst, the utility under either regime equals that from the index.

An analogous argument shows that if fulcrum fees dominated incentive fees in the original problem, adding the third constraint will either continue the dominance intact or lessen it. Thus, the new constraint potentially creates new payoff patterns, but it does not alter our basic conclusions. In particular, it remains true that incentive fees may dominate fulcrum in robust settings.

6.2 An Alternative Signalling Framework

In the model we have studied in this paper, the separation problem for the high-type adviser involved a constraint that once types get revealed, investing with the informed adviser must provide at least as much utility for the investor as investing with an uninformed adviser. A more traditional signalling-game model would have involved a simpler framework with the investor playing against just a single adviser whose type is unknown to the investor. The separation problem would then involve the non-mimicking constraint (which is as we have it in this paper) and a "reservation utility" constraint that investing with the adviser must provide the investor with at least as much utility as some exogeneous outside alternative (e.g., an index fund).

Using this simpler setting would only make our results sharper. For low values of $\bar{\pi}_N$, the non-mimicking constraint would bind first, and the investor would be better off under incentive fees than fulcrum fees. For higher $\bar{\pi}_N$, the investor would be forced down to the reservation utility level. Thus, there are no scenarios now under which fulcrum fees emerge as a dominant alternative.

6.3 Unrestricted Fee Structures

This paper has compared outcomes under fulcrum fee structures to those under incentive fee structures. Three considerations motivated this analysis. First, the regulation requiring the use of fulcrum fees is explicitly motivated by a fear of the possible adverse portfolio-selection consequences of incentive fees; as such, incentive fees offer the natural alternative. Second, of some importance, incentive fees are widely used in the money-management industry; in contrast, equilibrium compensation contracts in unrestricted agency models are often unrealistically complex. Third, if fulcrum fees are dominated by the chosen alternative under robust conditions, then this would suffice to establish a case against existing regulations: namely, that, even if the need for regulation is taken as given, a restriction to fulcrum fees is not the "right" or optimal way to regulate.

It is of interest, nonetheless, to ask how the outcomes under the fulcrum fee regime would compare to those in an unrestricted environment. We examine that issue here, begining with an intuitive description of the structure of equilibrium payoffs in the latter case. (The arguments that follow are easily formalized.) Consider first the "reservation utility" problem of identifying the maximum utility obtainable from the uninformed adviser. In this problem, it is clearly optimal for the risk-neutral adviser to assume all the risk leaving the risk-averse investor with a certainty payoff. Since the expected fee of the uninformed adviser must be at least $\bar{\pi}_N$, it is immediate that the maximum utility level the investor can obtain from the uninformed adviser, denoted EW_N^* say, is given by $EW_N^* = E(R_N) - \bar{\pi}_N$. Now consider the separation problem. Since there are only two constraints, it is immediate that in any solution to this problem, the investor will be pushed down to his reservation utility level EW_N^*. Under unrestricted fees, therefore, the investor's equilibrium utility is itself given by $EW_N^* = E(R_N) - \bar{\pi}_N$.

Now note that we must always have $EW_N^* \geq EU_N^*$, since the solution to the reservation utility problem cannot be worsened by removing restrictions on the fee structure. This simple observation implies that in all circumstances where the investor only receives his reservation utility EU_N^* in a fulcrum fee regime, his welfare would be higher (typically strictly) under an unrestricted fee regime. Particular instances of such situations include the case where there is no leveraging, or where leveraging is permitted and $\bar{\pi}_N$ is not very low.

Of course, when leveraging is permitted and $\bar{\pi}_N$ is low, equilibrium utility levels under fulcrum fees will strictly exceed the reservation level EU_N^*. In such circumstances, it is plausible that these equilibrium utility levels will also exceed EW_N^*, so that the restriction to fulcrum fees does benefit the investor.[13] Nonetheless, even such situations cannot be taken as an adequate defense of fulcrum fees: as we have seen, when $\bar{\pi}_N$ is low, equilibrium payoffs under incentive fees typically dominate those under fulcrum fees, so a restriction to incentive fees would achieve even better results.

6.4 A Competitive Model

We have assumed thus far an imperfectly competitive market environment for informed advisers in which the latter are able to extract part or all of the surplus from the investor. We examine in this subsection the consequences of assuming this market to be *competitive*, i.e., of assuming that all the surplus now accrues to the investor.

To identify equilibrium outcomes under a fulcrum fee regime when the market for informed

[13] It is easy to identify such situations since we have an explicit form for EW_N^*. Consider, for example, the parametrization $H = 1.5$, $L = 0.9$, $a = 1.5$. A simple calculation shows that $EW_N^* = 1.30 - \bar{\pi}_N$ in this case. For $\gamma = 0.5$ or $\gamma = 1$, Table 4 shows that this value of EW_N^* is strictly less than the equilibrium utility EU_I^* under fulcrum fees, provided $\bar{\pi}_N \leq 0.075$.

advisers is competitive, we solve the following optimization problem:

$$\begin{array}{lrcl} \text{Maximize} & E[U_I(b_1, b_2)] & & \\ & & & \\ \text{subject to} & E[F_N(b_1, b_2)] & \leq & \bar{\pi}_N \\ & E[F_I(b_1, b_2)] & \geq & \bar{\pi}_I \\ & b_1, b_2 & \geq & 0 \end{array} \tag{6.3}$$

(The terms $E(U_I)$, etc. are as defined in Section 4.) The first constraint ensures separation of the adviser types, while the second constraint ensures that the informed adviser nets at least his reservation fee level. Subject to these considerations, the optimization problem ensures that the surplus utility all accrues to the investor. Equilibrium outcomes under an incentive fee regime are identified analogously, with the obvious changes in (6.3).

A little reflection shows that under these competitive market conditions, fulcrum fees must do better than incentive fees for the investor. On the one hand, fulcrum fees enable superior risk-sharing between the informed adviser and the investor. On the other hand, they make the problem of separation easier. In an imperfectly competitive world, the latter consideration worked to reduce investor welfare; here, it is unambiguously to the good.

Table 6 verifies these arguments. The table shows competitive equilibrium outcomes under both regimes for a range of parametrizations. As anticipated, fulcrum fees do better than incentive fees across the board. It is important to note that this only means that a restriction to incentive fees will now lower investor welfare from the fulcrum fee level; it still does not imply that fulcrum fees are an optimal regulatory instrument. Indeed, (6.3) suggests that in a competitive world, investor welfare could be enhanced by lifting regulations altogether. This is unsurprising; a competitive world for advisers is formally akin to a traditional principal/agent model where the investor (as principal) sets the structure of the contract to maximize his own surplus subject to participation constraints. In such a model, restrictions on the instruments the principal could use cannot increase his welfare.

7 Conclusion

The fee structure adopted by an investment adviser plays three roles: (i) it influences trading behavior and portfolio choice by affecting investment adviser incentives, (ii) it determines the distribution of returns between investor and adviser, and *ipso facto* serves a risk-sharing function, and (iii) it may be used as a device for signalling ability. Our paper describes an equilibrium model of fee structure determination in which all three factors are present.

A central focus of our model is on existing regulations on mutual fund fee structures that require their advisers' compensation contracts to be only of the "fulcrum" form, i.e., the adviser's fee must be symmetric with respect to a chosen index, increasing for outperforming the index in the same way in which it decreases for underperforming it. The regulation is explicitly motivated by the fear that asymmetric or option-like "incentive" fee structures will hurt investors by inducing advisers to take "excessive" amounts of risk.

In a break from the traditional approach, the choice of fee structure in our model is made not by the investor, but by the investment adviser, who also selects the risk profile of the fund's portfolio.

Table 6: Equilibrium Outcomes with Competitive Advisers

This table presents separating equilibrium outcomes under fulcrum and incentive fee regimes for a range of parameter values, when the market for informed advisers is competitive. The probabilities p, q, and r of Table 1 are fixed at 0.50, 0.15, and 0.20, respectively, and the maximum leverage allowed at $a^{\max} = 1.50$. In the table: (i) H and L refer to the returns on the risky securities, (ii) $\bar{\pi}$ refers to the common reservation-fee level $\bar{\pi}_N$ and $\bar{\pi}_I$ of the advisers, (iii) γ is the variance-aversion coefficient of the investor, (iv) EU_I^* is the equilibrium utility of the investor under fulcrum fees, and (v) EV_I^* is the equilibrium utility of the investor under incentive fees.

$H = 1.20,\ L = 0.90,\ \gamma = 0.50$						
$\bar{\pi}$	0.00	0.01	0.02	0.03	0.04	0.05
EU_I^*	1.1310	1.1228	1.1145	1.1060	1.0972	1.0883
EV_I^*	1.1310	1.1218	1.1125	1.1032	1.0939	1.0845

$H = 1.50,\ L = 0.90,\ \gamma = 1.00$						
$\bar{\pi}_N$	0.000	0.025	0.050	0.075	0.100	0.150
EU_I^*	1.3429	1.3324	1.3205	1.3071	1.2922	1.2581
EV_I^*	1.3429	1.3255	1.3078	1.2897	1.2711	1.2329

Investors respond to these decisions by making portfolio decisions. In such a scenario, we find that restrictions requiring the fund to use only fulcrum fees are not easily justifiable. Indeed, under robust conditions, we find that investors can be made better off in welfare terms by imposing the opposite requirement that only asymmetric incentive fees be used! This result is particularly striking since asymmetric incentive fees do have, as alleged, a definite adverse impact on portfolio choice. In our model, they lead even poorly-informed advisers to take on extreme portfolios, whereas such advisers would choose portfolios of more moderate risk characteristics under fulcrum fees.

Finally, we examine a number of extensions and modifications of our model and find that these results on the possible inferiority of fulcrum fees are robust to these changes. In all but one of these situations, fulcrum fees are dominated by incentive fees for at least some parametrizations. The exception arises when the market for advisers is perfectly competitive, but even in this case, fulcrum fees may not be particularly optimal.

A Proofs for Section 4

A.1 Proof of Proposition 4.2

Recall that a denotes $a^{\max}$. Consider the informed adviser first, and assume, without loss, that the adviser has learnt that state 1 will occur, i.e., that the distribution Π_1 represents the true joint distribution. (The proof is analogous if state 2 is the true state.) Suppose the adviser were to pick the portfolio $(\alpha_0, \alpha_1, \alpha_2)$, where $\alpha_0 + \alpha_1 + \alpha_2 = 1$. Then, the distribution of returns $\tilde{r}_p$ on the adviser's portfolio is as follows:

$$\tilde{r}_p = \begin{cases} \alpha_0 + (\alpha_1 + \alpha_2)H, & \text{with probability } q \\ \alpha_0 + \alpha_1 H + \alpha_2 L, & \text{with probability } p \\ \alpha_0 + \alpha_1 L + \alpha_2 H, & \text{with probability } r \\ \alpha_0 + (\alpha_1 + \alpha_2)L, & \text{with probability } q \end{cases} \tag{A.1}$$

Thus, the distribution of $(\tilde{r}_p - \tilde{r}_b)$, the difference in performance between the adviser's portfolio and the benchmark, is given by

$$\tilde{r}_p - \tilde{r}_b = \begin{cases} \alpha_0 + (\alpha_1 + \alpha_2 - 1)H, & \text{with probability } q \\ \alpha_0 + (\alpha_1 - 1/2)H + (\alpha_2 - 1/2)L, & \text{with probability } p \\ \alpha_0 + (\alpha_1 - 1/2)L + (\alpha_2 - 1/2)H, & \text{with probability } r \\ \alpha_0 + (\alpha_1 + \alpha_2 - 1)L, & \text{with probability } q \end{cases} \tag{A.2}$$

From (A.1) and (A.2), the expected fee $EF_I(\alpha, b_1, b_2)$ for the adviser, given the portfolio $\alpha = (\alpha_0, \alpha_1, \alpha_2)$, is $EF_I(\alpha, b_1, b_2) = b_1 M_1 + b_2 M_2$, where $M_1 = [\alpha_0 + \{\alpha_1(p+q) + \alpha_2(q+r)\}H + \{\alpha_1(q+r) + \alpha_2(p+q)\}L]$, and M_2 is given by

$$\begin{aligned} M_2 &= \alpha_0 + \{\alpha_1(p+q) + \alpha_2(q+r) - q - (p+r)/2\}H \\ &\quad + \{\alpha_1(q+r) + \alpha_2(p+q) - q - (p+r)/2\}L \end{aligned}$$

It follows easily by checking the partials that this expected fee is maximized at $\alpha_1 = a$ and $\alpha_2 = 0$, that is, by putting the maximum possible into security 1. This proves the first part of Proposition 4.2. To see the other part of the proposition, suppose the uninformed adviser were to pick the portfolio $(\alpha_0, \alpha_1, \alpha_2)$. For notational simplicity, let z denote $(p+r)/2$, where p and r are the probabilities from Table 1. Then, since the two states of the world are equiprobable, the returns (H, L) and (L, H) on the two risky securities each occurs with prior probability z. Thus, the distribution of portfolio returns $\tilde{r}_p$ is

$$\tilde{r}_p = \begin{cases} \alpha_0 + (\alpha_1 + \alpha_2)H, & \text{with probability } q \\ \alpha_0 + \alpha_1 H + \alpha_2 L, & \text{with probability } z \\ \alpha_0 + \alpha_1 L + \alpha_2 H, & \text{with probability } z \\ \alpha_0 + (\alpha_1 + \alpha_2)L, & \text{with probability } q \end{cases} \tag{A.3}$$

while the ex-ante distribution of the difference in returns is

$$\tilde{r}_p - \tilde{r}_b = \begin{cases} \alpha_0 + (\alpha_1 + \alpha_2 - 1)H, & \text{with probability } q \\ \alpha_0 + (\alpha_1 - 1/2)H + (\alpha_2 - 1/2)L, & \text{with probability } z \\ \alpha_0 + (\alpha_1 - 1/2)L + (\alpha_2 - 1/2)H, & \text{with probability } z \\ \alpha_0 + (\alpha_1 + \alpha_2 - 1)L, & \text{with probability } q \end{cases} \tag{A.4}$$

From (A.3) and (A.4), the expected fee $EF_U(\alpha, b_1, b_2)$ is seen to be $EF_U(\alpha, b_1, b_2) = b_1 N_1 + b_2 N_2$, where $N_1 = \alpha_0 + (\alpha_1 + \alpha_2)(q + z)(H + L)$ and $N_2 = \alpha_0 + (\alpha_1 + \alpha_2 - 1)(q + z)(H + L)$. Since $(q + z)(H + L) > 1$, it follows immediately now that any vector of the form $(1 - a, m, a - m)$ for $m \in [0, a]$ constitutes an optimal portfolio for the adviser. □

A.2 Proof of Proposition 4.3

Consider the informed adviser first, and assume without loss that state 1 will occur. Given any portfolio $(\alpha_0, \alpha_1, \alpha_2)$, the distribution of outcomes $\tilde{r}_p$ on the adviser's portfolio is

$$\tilde{r}_p = \begin{cases} \alpha_0 + (\alpha_1 + \alpha_2)H, & \text{w.p. } q \\ \alpha_0 + \alpha_1 H + \alpha_2 L, & \text{w.p. } p \\ \alpha_0 + \alpha_1 L + \alpha_2 H, & \text{w.p. } r \\ \alpha_0 + (\alpha_1 + \alpha_2)L, & \text{w.p. } q \end{cases} \tag{A.5}$$

while the distribution of the difference $(\tilde{r}_p - \tilde{r}_b)$ is given by

$$\tilde{r}_p - \tilde{r}_b = \begin{cases} \alpha_0(1 - H), & \text{w.p. } q \\ \alpha_0 + (\alpha_1 - 1/2)H + (\alpha_2 - 1/2)L, & \text{w.p. } p \\ \alpha_0 + (\alpha_1 - 1/2)L + (\alpha_2 - 1/2)H, & \text{w.p. } r \\ \alpha_0(1 - L), & \text{w.p. } q \end{cases} \tag{A.6}$$

Under the incentive fee (b_1, b_2), the informed adviser's expected fee $E[G_I(b_1, b_2)]$ is given by $E[G_I(b_1, b_2)] = b_1\, E[\tilde{r}_p] + b_2\, E[\max\{0, \tilde{r}_p - \tilde{r}_b\}]$. A simple calculation shows that for any $b_1 > 0$, the first term $b_1 \cdot E[\tilde{r}_p]$ is maximized by choosing the portfolio $(1 - a, a, 0)$, that is, by putting the maximum possible into the first risky security. Since b_2 is non-negative, it suffices to show that the same is true of the term $E[\max\{0, \tilde{r}_p - \tilde{r}_b\}]$ also. To this end, we first identify the terms on the right-hand side of (A.6) that are non-negative. Obviously, this will depend on the relative magnitudes of the quantities α_0, α_1 and α_2.

Consider first the case where $\alpha_0 \leq 0$ and $\alpha_1 \geq \alpha_2$ (so $\alpha_1 \geq (1 - \alpha_0)/2$). In this case, the first term $\alpha_0((1 - H)$ is non-negative, while the last term $\alpha_0(1 - L)$ is always non-positive. The second term is also always non-negative since, using $\alpha_2 = 1 - \alpha_0 - \alpha_1$ and $H + L > 2$, we have

$$\begin{aligned} \alpha_0 + (\alpha_1 - 1/2)H + (\alpha_2 - 1/2)L &= \alpha_0(1 - L) + (\alpha_1 - 1/2)(H - L) \\ &\geq \alpha_0(1 - L) - \alpha_0(H - L)/2 \\ &= \alpha_0(1 - (H + L)/2), \end{aligned}$$

which is non-negative. This leaves the third term in (A.6). A straightforward calculation shows that there is $\alpha^* \in ((1-\alpha_0)/2, 1-\alpha_0)$ such that the term is positive for $\alpha_1 < \alpha^*$ and negative for $\alpha_1 > \alpha^*$. Summing up, therefore, if $\alpha_1 \in ((1-\alpha_0)/2, \alpha^*]$, then

$$\begin{aligned} E[r_p - r_b] &= \alpha_0(q(1-H)+p+r) + \alpha_1(pH+rL) \\ &\quad + \alpha_2(pL+rH) - (pH+pL+rL+rH)/2 \end{aligned}$$

while, if $\alpha_1 \in (\alpha^*, 1-\alpha_0]$, then $E[r_p - r_b] = \alpha_0(q(1-H)+p) + \alpha_1 pH + \alpha_2 pL - p(H+L)/2$. A comparison of these terms establishes after a little computation that $E[r_p - r_b]$ is maximized when $\alpha_0 = 1-a$, $\alpha_1 = a$, and $\alpha_2 = 0$. A second, and easier set of computations, shows that this dominates the best possible outcome if $\alpha_0 > 0$, that is, when there is a positive amount invested in the riskless asset. (This is intuitive. Since the expected return on the first risky asset exceeds that on the riskless asset in state 1, the risk-neutral adviser would never want to invest a positive fraction of his portfolio in the risk-free asset.) This establishes the first part of Proposition 4.3.

To see the second part, note that the ex-ante outcomes for the uninformed adviser are exactly those in (A.5) and (A.6), but with the probabilities of the four outcomes being q, z, z, and q, respectively, where $z = (p+r)/2$. Suppose the uninformed adviser chooses a portfolio $(\alpha_0, \alpha_1, \alpha_2)$. Running through the same set of computations as for the informed adviser (but using the new set of probabilities) easily establishes that the optimal portfolio for the uninformed adviser is to invest as much as possible into one of the two risky stocks. This completes the proof. □

B Proofs for Section 5

B.1 Proof of Proposition 5.1

We prove the result by deriving the equilibrium payoffs under a fulcrum fee regime. Let EF_I^* denote the informed adviser's expected fee in equilibrium, EU_I^* denote the investor's expected utility in this equilibrium, and EU_N^* the investor's "reservation" utility defined via (4.7). Letting $E^*(\cdot)$ denote the informed adviser's expectations, we will show that if $\bar{\pi}_N < T_1$, we have

$$EF_I^* = \frac{E^*(R_I - R_B)}{E(R_N - R_B)} \bar{\pi}_N \tag{B.1}$$

$$EU_I^* = E^*(R_I) - EF_I^* \tag{B.2}$$

while if $\bar{\pi}_N \geq T_1$, we have

$$EF_I^* = E^*(R_I - R_N) + \bar{\pi}_N \tag{B.3}$$

$$EU_I^* = E(R_N) - \bar{\pi}_N \tag{B.4}$$

and that in all cases we have

$$EU_N^* = E(R_N) - \bar{\pi}_N. \tag{B.5}$$

Observe first of all that when the investor is risk-neutral, we must have $E(U_N)+E(F_N) = E(R_N)$ and $E^*(U_I)+E^*(F_I) = E^*(R_I)$. Using the first of these expressions, it is immediate that any solution to the investor's "reservation utility" problem (4.7) results in $EU_N^* = E(R_N) - \bar{\pi}_N$, whence (B.5) follows. To see the rest of the proposition, we substitute these expressions into the separation problem (4.8), and use the full forms for the expected fees $EF_I = b_1 E^*(R_I) + b_2 E^*(R_I - R_B)$ and $EF_N = b_1 E(R_N) + b_2 E(R_N - R_B)$. After some rearranging, the separation problem (4.8) now becomes

$$\begin{array}{lrcl} \text{Maximize} & b_1\, E^*(R_I) + b_2\, E^*(R_I - R_B) & & \\ & & & \\ \text{subject to} & b_1\, E(R_N) + b_2\, E(R_N - R_B) & \leq & \bar{\pi}_N \\ & b_1\, E^*(R_I) + b_2\, E^*(R_I - R_B) & \leq & \bar{\pi}_N + E^*(R_I) - E(R_N) \\ & b_1, b_2 \;\geq\; 0 & & \end{array} \tag{B.6}$$

When $b_2 = 0$, the first constraint imposes an upper bound on b_1 of $\bar{\pi}_N / E(R_N)$, while the second constraint imposes an upper-bound on b_1 of $[\bar{\pi}_N + E^*(R_I) - E(R_N)]/E^*(R_I)$. A simple calculation shows that the first of these bounds is always smaller than the second whenever $\bar{\pi}_N \leq E(R_N)$. This latter inequality must hold in any sensible definition of the problem: the reservation fee cannot be greater than the total expected returns. Thus, at $b_2 = 0$, the second constraint is always slack.

When $b_1 = 0$, the first constraint imposes an upper-bound on b_2 of $\bar{\pi}_N / E(R_N - R_B)$, while the second constraint imposes an upper-bound of $[\bar{\pi}_N + E^*(R_I) - E(R_N)]/E^*(R_I - R_B)$. The first of these bounds is smaller if, and only if, $\bar{\pi}_N < E(R_N - R_B)$, which may or may not hold.

Summing up, therefore, there are two possibilities. If $\bar{\pi}_N < E(R_N - R_B)$, the second constraint is always slack. An easy computation shows that the maximum in problem (B.6) occurs in this case when $b_1 = 0$ and $b_2 = \bar{\pi}_N / E(R_N - R_B)$. This leads to the equilibrium payoffs (B.1)–(B.2). In the second case, when $\bar{\pi}_N \geq E(R_N - R_B)$, the second constraint is binding at a maximum. One solution to the problem (there are many) is $b_1 = [\bar{\pi}_N - E(R_N - R_B)]/E(R_B)$ and $b_2 = 1 - b_1$. This leads (as do all solutions) to the payoffs (B.3)–(B.4). □

B.2 Proof of Proposition 5.2

Once again, we derive the relevant equilibrium payoffs. Let EG_I^* denote the informed adviser's expected fee in equilibrium in an incentive fee regime, EV_I^* denote the investor's expected utility in this equilibrium, and EV_N^* the investor's "reservation" utility defined via (4.7). We will show that if $\bar{\pi}_N < T_2$, then equilibrium payoffs are given by

$$EG_I^* \;=\; \frac{E^*[(\mathcal{R}_I - \mathcal{R}_B)^+]}{E[(\mathcal{R}_N - \mathcal{R}_B)^+]} \tag{B.7}$$

$$EV_I^* \;=\; E^*(\mathcal{R}_I) - EF_I^* \tag{B.8}$$

while if $\bar{\pi}_N \geq T_2$, then the outcomes are

$$EG_I^* \;=\; E^*(\mathcal{R}_I) - E(\mathcal{R}_N) + \bar{\pi}_N \tag{B.9}$$

$$EV_I^* \;=\; E(\mathcal{R}_N) - \bar{\pi}_N \tag{B.10}$$

and that, in all cases,

$$EV_N^* \;=\; E(\mathcal{R}_N) - \bar{\pi}_N. \tag{B.11}$$

Note first that the "reservation utility" EV_N^* is equal to $E(\mathcal{R}_N) - \bar{\pi}_N$ for the same reason as in Proposition 5.1. Thus, we only have to show that the remaining values follow from the separation problem (4.16). To this end, note that the separation problem in this case may be rewritten as

$$\begin{array}{ll} \text{Maximize} & b_1\, E^*(\mathcal{R}_I) + b_2\, E^*[(\mathcal{R}_I - \mathcal{R}_B)^+] \\ & \\ \text{subject to} & b_1\, E(\mathcal{R}_N) + b_2\, E[(\mathcal{R}_N - \mathcal{R}_B)^+] \;\;\le\;\; \bar{\pi}_N \\ & b_1\, E^*(\mathcal{R}_I) + b_2\, E^*[(\mathcal{R}_I - \mathcal{R}_B)^+] \;\;\le\;\; \bar{\pi}_N + E^*(\mathcal{R}_I) - E(\mathcal{R}_N) \\ & b_1, b_2 \;\ge\; 0 \end{array} \tag{B.12}$$

When $b_2 = 0$, the first constraint implies an upper bound on b_1 of $\bar{\pi}_N / E[\mathcal{R}_N]$, while the second constraint implies an upper-bound of $[\bar{\pi}_N + E^*(\mathcal{R}_I) - E(\mathcal{R}_N)]/E^*[\mathcal{R}_I]$. The first of these bounds is smaller than the second if and only if $\bar{\pi}_N \le E[\mathcal{R}_N]$, which must hold in any sensible definition of the problem. Consequently, the second constraint is always slack when $b_2 = 0$.

When $b_1 = 0$, the first constraint implies an upper bound on b_2 of $\bar{\pi}_N / E[(\mathcal{R}_N - \mathcal{R}_B)^+]$, while the second constraint implies an upper bound of $[\bar{\pi}_N + E^*(\mathcal{R}_I) - E(\mathcal{R}_N)]/E^*[(\mathcal{R}_I - \mathcal{R}_B)^+]$. It is easily checked that the first of these bounds is smaller than the second if and only if $\bar{\pi}_N \le T_2$.

Combining these observations, we have the following. If $\bar{\pi}_N \le T_2$, the second constraint is always slack in the optimization problem (B.12). Given the linear objective function, the solution must lie on the first constraint at $b_1 = 0$ or at $b_2 = 0$, and an easy computation shows that the solution is at $b_1 = 0$ with the payoffs given by (B.7)–(B.8). On the other hand, if $\bar{\pi}_N > T_2$, then the second constraint is also binding in equilibrium, and one solution to the problem (there are many) leads to the equilibrium payoffs given in (B.9)–(B.10). □

B.3 Proof of Proposition 5.3

The steps of the proof were outlined in the text following the statement of the proposition. We fill in the details here. Some new notation will simplify this process. For a given value of a, let

$$\begin{array}{lll} y_h = aH + 1 - a & \qquad & x_h = H \\ y_{hl} = a(H+L)/2 + 1 - a & \qquad & x_{hl} = (H+L)/2 \\ y_l = aL + 1 - a & \qquad & x_l = L \end{array} \tag{B.13}$$

Note that y_h and y_l are simply the possible realized returns if the adviser chooses an extreme portfolio; while y_h, y_{hl}, and y_l are the possible outcomes if the adviser picks the "middle" portfolio

$(1-a, a/2, a/2)$. Similarly, x_h, x_{hl}, and x_l are the possible outcomes on the benchmark portfolio. In this notation, it is easily verified that

$$T_1 = \frac{1}{2}(a-1)(x_h + x_l - 2). \tag{B.14}$$

$$T_2 = [q(y_h - x_h) + z(y_h - x_{hl})] \cdot \left(\frac{y_h - y_l}{y_h - x_{hl}} \right). \tag{B.15}$$

Some algebra thus shows that $T_1 \leq T_2$ if, and only if,

$$(a-1)(x_h + x_l - 2)(x_h - x_{hl}) \leq (y_h - 2qx_h - 2zx_{hl})(y_h - y_l). \tag{B.16}$$

Using $(y_h - y_l) = a(x_h - x_l)$ and $q + z = 1/2$, the inequality in (B.16) is seen to hold whenever $(a-1)(x_h - x_{hl}) \leq 2a[q(y_h - x_h) + z(y_h - x_{hl})]$, or what is the same thing, whenever

$$(a-1)(x_h - x_{hl}) - 2az(y_h - x_{hl}) \leq 2aq(y_h - x_h). \tag{B.17}$$

For (B.17) to hold, it suffices that $(a-1-2az)(y_h - x_{hl}) \leq 2aq(y_h - x_h)$. But $(a-1-2az) = 2aq-1$, so some slight rearranging shows that this condition holds provided in turn that $2aq(x_h - x_{hl}) \leq (y_h - x_{hl})$. This last inequality always holds by $q < 1/2$ since

$$2aq(x_h - x_{hl}) < a(x_h - x_{hl}) < ax_h - x_{hl} = y_h - x_{hl}.$$

This establishes Step 1 that $T_1 \leq T_2$. We turn to Step 2. Since the total expected returns from the informed adviser coincides under the two regimes, to show that the investor is strictly better off under incentive fees whenever $\bar{\pi}_N \leq T_1$ is the same as showing that the informed adviser's fee is lower in this case. Using the notation (B.13) in the equilibrium fee levels of the informed adviser under the two regimes, we obtain

$$EF_I^* = \frac{(p+q)y_h + (q+r)y_l - (x_h + x_l)/2}{(a-1)(x_h + x_l - 2)/2} \bar{\pi}_N. \tag{B.18}$$

$$EG_I^* = \frac{q(y_h - x_h) + p(y_h - x_{hl})}{q(y_h - x_h) + z(y_h - x_{hl})} \bar{\pi}_N. \tag{B.19}$$

Thus, we are to show that the RHS of (B.18) is larger than the RHS of (B.19). Using $q + z = 1/2$, cross-multiplying and rearranging, the required inequality holds if and only if

$$(y_h - y_l)[q(y_h - x_h) + z(y_h - x_{hl})] > \frac{1}{2}(a-1)(y_h - x_{hl})(x_h + x_l - 2).$$

Using $q+z=1/2$ again, we have $q(y_h-x_h)+z(y_h-x_{hl}) = [(y_h-x_{hl})-q(x_h-x_l)]/2$. Some further rearrangement now shows that the required inequality holds if, and only if,

$$(y_h - x_{hl})[y_h - y_l - (a-1)(x_h + x_l - 2)] \;>\; q(y_h - y_l)(x_h - x_l). \tag{B.20}$$

Now, $(y_h - y_l) = a(x_h - x_l)$ and $(x_h + x_l - 2) < (x_h - x_l)$, so $[(y_h - y_l) - (a-1)(x_h + x_l - 2)] > [a(x_h - x_l) - (a-1)(x_h - x_l)] = (x_h - x_l)$. Therefore, the LHS of (B.20) is always strictly larger than $(y_h - x_{hl})(x_h - x_l)$. Since $x_{hl} = (x_h + x_l)/2$ and $q < 1/2$, a further computation also establishes that $(y_h - x_{hl}) > q(y_h - y_l)$. This completes Step 2 and proves the proposition. □

B.4 Proof of Proposition 5.4

Proposition 5.4 is proved in two steps. First, we show that the investor recives only his "reservation" utility level EU_N^* in any separating equilibrium under fulcrum fees (this is true regardless of $\bar{\pi}_N$). Then, we show that EU_N^* is never larger than EV_N^*, the endogeneously-determined "reservation" level under incentive fees. This will complete the proof since the investor must necessarily receive at least the reservation level EV_N^* in any separating equilibrium under incentive fees.

Equilibrium under Fulcrum Fees

When $a = 1$, the performance-adjustment component b_2 in the fulcrum fee is irrelevant to the uninformed adviser, since his portfolio here coincides with the benchmark portfolio. As a consequence, the "reservation utility" problem (4.7) is simply one of choosing $b_1 \geq 0$ to maximize the investor's utility subject to the expected fee of the uninformed being at least $\bar{\pi}_N$. The solution evidently lies at $b_1 = \bar{\pi}_N / E(R_N)$.[14] This results in the investor's reservation utility being

$$EU_N^* \;=\; (1 - b_1)E[R_N] - \frac{1}{2}\gamma(1 - b_1)^2 V[R_N], \tag{B.21}$$

where $E[R_N] = (H + L)/2$ and $V[R_N] = q(H - L)^2/2$.

Turning now to the separation problem (4.8), we claim that the investor's utility in any solution to this problem will be equal to EU_N^*. To see this, note first that since b_2 does not affect the expected fee of the uninformed adviser, its value can be altered without regard to the non-mimicking constraint. Moreover, the expected fee of the informed adviser increases linearly in b_2, so it is optimal for the informed adivser to choose the highest possible b_2 subject to the investor's utility being at least EU_N^*. Now, the expected return to the investor decreases linearly in b_2, and, for large enough b_2, the variance of the investor's returns increases in b_2. It easily follows from this that there is a maximum value $\hat{b}_2$ at which the investor receives exactly his reservation EU_N^* and such that at any higher value, the investor's utility drops below EU_N^*. This establishes the claim.

[14] Strictly speaking, as γ gets arbitrarily large, the investor becomes so variance-averse that he is willing to give up a part of the returns just to avoid this uncertainty. (In the limit as $\gamma \to \infty$, the investor would rather give up all the returns and avoid uncertainty altogether.) We ignore such implausible scenarios here and elsewhere in this proof, and assume that γ takes on only reasonable values. The relevant bounds are easily computed.

Equilibrium under Incentive Fees

In the reservation utility problem (4.15) under incentive fees, one alternative available is to set b_2 equal to zero. In this case, the uninformed adviser can credibly commit to choosing the benchmark portfolio, and the solution to the problem under this resetriction will be exactly equal to EU_N^* given by (B.21). Since the overall solution to the problem (4.15) must do at least as well as this solution under the restriction on b_2, it follows that we must have $EV_N^* \geq EU_N^*$.

Finally, observe that in any solution to the separation problem (4.16) under incentive fees, the investor must obtain a utility level of at least EV_N^*. It follows that the investor is never worse off under incentive fees than under fulcrum fees. □

C Pooling Equilibrium

This section describes pooling equilibria under either fee regime. Section C.1 discusses the fulcrum fee case, while Section C.2 looks at incentive fees. The notation used in the two cases is the same as that introduced in Sections 4.1 and 4.3, respectively. We show that pooling equilibria never exist under incentive fees, and, in general, do not exist under fulcrum fees either.

C.1 Pooling Equilibrium under Fulcrum Fees

If a profile of fee structures is pooling, then the investor presumes that each adviser is informed with probability 1/2 and uninformed with probability 1/2. Thus, the investor's expected utility from investing with an adviser who has announced the structure (b_1, b_2) is

$$W(b_1, b_2) \;=\; \frac{1}{2}EU_I(b_1, b_2) + \frac{1}{2}EU_N(b_1, b_2), \tag{C.1}$$

The investor compares his expected utility under each announced fee structure using (C.1), and chooses the adviser who offers the higher expected utility. If the expected utility from the two advisers is the same, the investor chooses each adviser with probability 1/2.

For a profile of fee structures to constitute a pooling *equilibrium*, it is necessary that neither adviser can profit from a unilateral change of strategy. For this to be the case, it is necessary that the investor be indifferent between the two chosen fee structures. Otherwise, one of the advisers would be better off using another fee structure (or even withdrawing from the market). As a consequence, it must be the case that each adviser receives the money with probability 1/2 in a pooling equilibrium. To meet the reservation utility constraint, therefore, conditional on receiving the dollar, each of the candidate fee structures must guarantee each adviser an expected fee of at least twice his reservation level.

These conditions severely restrict the candidate fee structures that could constitute pooling equilibria. In particular, neither adviser can set $b_1 > 0$; else the other adviser could mimic the fee structure, but reduce b_1 slightly, thereby making it strictly more attractive to the investor and receiving the dollar with probability one. Analogously, the value of b_2 that is chosen must also be "unimprovable," and so must solve

$$\max_{b_2 \geq 0} W(0, b_2) \tag{C.2}$$

where $W(\cdot)$ is defined in (C.1). It is easy to show that $W(0, b_2)$ is a strictly concave function of b_2 and so has a unique maximum b_2^* on $b_2 \geq 0$. Note that this maximum need not always occur at $b_2 = 0$. The fulcrum transfers weight from the tails to the center of the reward distribution, and for small values of b_2, this could benefit the variance-averse investor. Of course, if the investor is risk-neutral ($\gamma = 0$), then $b_2 = 0$ is the only solution.

Thus, the only candidate pooling equilibrium under fulcrum fees is where both advisers offer the fee structure $(0, b_2^*)$. For this candidate structure to actually constitute a pooling equilibrium, two additional conditions must be met: (i) under $(0, b_2^*)$, each adviser receives an expected fee of at least twice his reservation utility, conditional on receiving the investment, and (ii) there is no separating equilibrium fee profile which the informed adviser finds preferable. Condition (i) rules out the existence of pooling equilibrium if the investor is risk-averse except in the unintersting case where both advisers have reservation utilities of zero. Indeed, unsurprisingly, the combined conditions appear very difficult to satisfy in general. We tried a vast range of parametrizations, but were not able to unearth a single case where they were satisfied simultaneously.

C.2 Pooling Equilibrium under Incentive Fees

Unlike with fulcrum fees, it is easy to show that no pooling equilibria can exist under incentive fees. Arguing along analogous lines as above, it is seen that any candidate pooling equilibrium must satisfy $b_1 = 0$ and have b_2 equal to the solution to (C.2). However, under incentive fees, the solution to (C.2) is always $b_2 = 0$ (there is no analogous transfer of weight from the tails to the center in this case). Thus, pooling equilibria cannot exist except in the trivial case where $\bar{\pi}_I = \bar{\pi}_N = 0$. In this latter case, separating equilibria do not exist (any choice of non-negative (b_1, b_2) by the informed adviser can be costlessly and profitably mimicked by the uninformed adviser); so the only equilibrium under incentive fees is, in fact, a pooling equilibrium where $b_1 = b_2 = 0$.

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