Fragmentation of Shareholder Power*

Andrey Malenko Nadya Malenko Anton Tsoy

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Abstract

The asset management industry is increasingly shifting toward tailored portfolios, fund proliferation, and decentralization of stewardship – trends partly driven by growing heterogeneity in investor preferences. While these developments better align investment products with investor demands, they also reshape ownership structures, potentially leading to more fragmented ownership and weaker managerial oversight. We develop a framework to evaluate these trade-offs and show that fund proliferation does not necessarily weaken governance: Stronger incentives for asset managers and concentrated portfolios of specialized funds can offset these effects, especially when investor preferences are intense. However, strong investor preferences can also induce asset managers to compete on a new margin – granting investors control by decentralizing stewardship and adopting pass-through voting – without internalizing the associated governance costs.

Keywords: asset management, fund proliferation, investor heterogeneity, ownership concentration, decentralization, pass-through voting, stewardship, fund families

*Andrey Malenko is at Boston College; email: malenkoa@bc.edu. Nadya Malenko is at Boston College; email: malenko@bc.edu. Anton Tsoy is at the University of Toronto; email: anton.tsoy@utoronto.ca. This paper was previously circulated under the title "Fund Proliferation, Decentralization, and Shareholder Power." We are grateful to Heski Bar-Isaac, Alon Brav, Alvin Chen, Richard Evans, Tom Gosling, Dunhong Jin, Matteo Leombroni, Jon Reuter, Uday Rajan, Silvina Rubio, Paul Voss, participants of the BI Conference on Corporate Governance, Finance Theory Group summer school, TSE Industrial Organization & Finance Conference, HKU Accounting Theory Conference, Winter Finance Summit in Asia, RCFS, Weinberg Center Corporate Governance Symposium, and seminar participants at UBC, BC, SMU, NUS, University of Florida, Strathclyde, Lancaster, and Manchester for helpful comments and discussions, and to Karan Sehgal for excellent research assistance.

1 Introduction

Public corporations in the U.S. have traditionally featured dispersed share ownership, creating a separation of ownership and control that Berle and Means (1932) identified as a key source of agency problems. Over time, this dynamic shifted with the rise of large institutional investors and the resulting concentration of ownership (Hartzell and Starks 2003; Dasgupta et al. 2021; Lewellen and Lewellen 2022b). As Fisch and Schwartz (2023) put it, "When voting was dispersed among millions of individual investors, managers held little regard for shareholder views. Now, however, corporate leaders are extraordinarily responsive to institutional investor demands."[1]

More recently, however, the shift away from dispersed ownership may be reversing, driven by two parallel developments within the asset management industry. The first is the rapid proliferation of funds, reflecting increasing specialization in investment products. Asset managers have launched a growing array of mutual funds and ETFs tailored to diverse investor preferences and beliefs, offering customized portfolios aligned with specific styles, values, and strategies (Kostovetsky and Warner 2020; Ben-David et al. 2023; Betermier et al. 2023). This trend has been especially pronounced in the area of sustainable investing, with the number of such funds nearly doubling over the past few years (ICI 2024). The second development is the decentralization of stewardship within large asset managers. This includes mechanisms such as pass-through voting, where fund investors accounting for nearly $700 billion of BlackRock's equity assets now exercise their own voting rights, Vanguard's partial delegation of voting authority to individual fund managers, and policy proposals like the INDEX Act that call for further decentralization. Most recently, the "Big Three" took another step toward decentralization, each announcing plans to split their stewardship teams into two (see Section 2 for details).

Both trends – fund proliferation and decentralization of stewardship – reflect, in part, growing polarization over social and environmental issues, and asset managers' efforts to accommodate diverse investor preferences. In doing so, they reshape ownership structures and may reintroduce a more fragmented shareholder base. The evolving structure of the asset management industry thus reflects a trade-off: greater representation of heterogeneous investor preferences may come at the cost of fragmenting shareholder power. These concerns are echoed in recent law and policy work on pass-through voting, with Fisch and Schwartz (2023) warning of a "return to the previous

[1] See also Gilson and Gordon (2013), who state, "Equity ownership in the United States no longer reflects the dispersed share ownership of the canonical Berle-Means firm," and Lewellen and Lewellen (2022b), who note that more concentrated institutional ownership reduces "the costs of shareholder communication and activism."

era of unaccountable corporate executives" and Brav et al. (2025) emphasizing that "a world of governance diffusion ... will upend this dynamic in unpredictable ways."[2]

To understand when these developments undermine governance, and when they need not, we develop a framework linking investor heterogeneity and the resulting structure of asset management to corporate ownership and shareholder oversight. Our analysis shows that fund proliferation and decentralized stewardship do not necessarily harm governance; their effects depend on the forces that generate them. When fund proliferation is driven by supply-side factors, such as lower technological or regulatory costs that facilitate fund entry, shareholder oversight weakens. By contrast, when proliferation is demand-driven, reflecting stronger investor preferences, governance can improve – particularly if new funds are launched by incumbent families rather than new entrants. At the same time, strong investor preferences can induce asset managers to compete on a new margin – decentralizing stewardship to better reflect investor heterogeneity, even when such decentralization is inefficient. Importantly, governance outcomes depend on how stewardship is decentralized – through pass-through voting or delegation to specialized fund managers.

In our framework, investors maximize their financial returns, given by the payoff of their portfolio net of the fees paid to fund managers. Furthermore, investors may have preferences for certain stock characteristics, such as particular sectors or themes (e.g., technology, communications) or ethical principles (e.g., sustainability, religious values). These preferences can reflect non-pecuniary motives or heterogeneous beliefs about which strategies are more likely to deliver superior returns. The diversity in investor objectives creates demand for differentiated products, leading to the emergence of specialized funds that invest in subsets of stocks. By catering to specific preferences, these funds can charge higher fees.

We model the equilibrium structure of the fund management industry using an augmented Salop model (Salop 1979) that incorporates financial markets and investor monitoring. Firms have heterogeneous characteristics, and investors have heterogeneous preferences over these characteristics, both represented as positions on a circle. Funds are characterized by investment mandates corresponding to positions on the circle; they construct portfolios aligned with these mandates and choose the fees they charge to investors. After investors select funds and assets under management are allocated according to mandates, fund managers may invest resources in monitoring

[2] Corporations and the law firms advising them are also actively discussing growing fragmentation and its implications for corporate governance strategies. See, e.g., Skadden's client alert, noting that "the proxy voting landscape becomes increasingly fragmented" (Oct. 20, 2025); and Wachtell Lipton, "The 'Big Three' Shift Approach to Stewardship" (client memorandum, Aug. 27, 2025).

management. Ownership structures shape monitoring: more concentrated ownership enhances oversight, as larger blockholders have stronger incentives to monitor. However, because blockholders are fund managers, their monitoring incentives also depend on compensation: higher fees increase fund managers' share of the surplus, strengthening their incentives to improve portfolio performance through monitoring (Lewellen and Lewellen 2022a).

This framework allows us to ask how investor heterogeneity reshapes shareholder oversight through changes in the structure of the asset management industry. Asset managers can respond along two margins: by expanding the menu of investment products, leading to fund proliferation, and by reallocating control over stewardship, including more decentralized monitoring and voting.

Does the proliferation of funds catering to heterogeneous investors tend to weaken governance? We show that while the answer is yes when proliferation is driven by supply-side factors, it is not necessarily so when it is driven by demand-side factors, particularly shifts in investor preferences. On the supply side, when it becomes easier and cheaper to launch specialized funds – due, for example, to technological advances or regulatory relaxation – governance tends to worsen.[3] Increased entry and competition not only fragment ownership but also drive down fund fees, weakening fund managers' incentives to engage in oversight.

In contrast, when fund proliferation is driven by demand-side factors – such as stronger investor preferences for specific stock characteristics or growing polarization around investment values – governance can improve. As investor demand for tailored portfolios increases, fund managers can charge higher fees, which increases their payoff from active oversight. Moreover, specialized funds tend to hold more concentrated positions to better reflect their investors' priorities, further strengthening their monitoring incentives. In this sense, product differentiation and the associated fee structures and portfolios become key factors that can prevent the dilution of governance, making the net effect of demand-side factors ambiguous.

We show that this net effect depends on the organizational structure of the asset management industry – in particular, the role of fund families in (1) facilitating fund entry and (2) centralizing stewardship. First, specialized funds can be introduced either by new entrants or by incumbent families expanding their offerings. Empirically, both patterns have been observed, but the latter – incumbents launching new funds to deter entry – has been more prevalent (see Section 2). Second,

[3]For example, the SEC's 2019 Rule 6c-11 ("ETF Rule") significantly simplified the process of launching new ETFs by reducing regulatory hurdles. According to State Street, this rule "created a more efficient path to launch active ETFs and leveled the playing field regarding the use of custom baskets" (Koudelka et al. 2025).

monitoring can occur either at the family level, at the fund level, or even at the fund-investor level. These two factors are central to whether stronger investor preferences, by shaping the asset management industry structure, improve or weaken shareholder oversight.

Specifically, when entry occurs through the creation of new fund families, governance tends to worsen. Although individual specialized funds may charge higher fees, ownership becomes more fragmented across families, reducing each family's aggregate stake and weakening its incentives to engage in oversight. By contrast, when new funds are launched within existing families, ownership at the family level remains concentrated. In this case, centralized stewardship and higher fees associated with catering to investor preferences can sustain, or even strengthen, monitoring incentives. Thus, the historical tendency for new funds to be introduced by incumbent families (e.g., Betermier et al. 2023), and the dominance of large asset managers offering multiple differentiated products, may have mitigated the dilution of governance and even supported its strengthening.

The second organizational dimension – the level at which stewardship is exercised, at the family, fund, or investor level – also plays a central role. The same forces that can strengthen governance through demand-driven fund proliferation also shape how asset managers allocate control over stewardship. Strong investor preferences affect not only entry and fee-setting, but also the incentives to decentralize stewardship, with potentially opposing effects on governance.

One prominent manifestation of this second margin is pass-through voting. Under pass-through voting, fund managers return voting authority to investors, allowing voting to reflect investors' own values and priorities. We show that competitive pressures can lead asset managers to differentiate along this dimension – investor control over stewardship – without fully internalizing the resulting governance costs. When investors derive utility from voting in line with their preferences, funds have incentives to adopt pass-through voting to attract assets and charge higher fees. Because investors are individually small, they do not internalize that their dispersed votes dilute monitoring relative to coordinated block voting by fund managers, and fund managers likewise do not fully internalize the resulting weakening of governance. This dynamic is consistent with interview evidence in Gomtsian and Gosling (2026): the asset managers they interviewed draw a clear distinction between what pass-through voting means "from a commercial perspective" and its impact "from a stewardship and governance perspective," noting that they either offer or would offer pass-through voting to retain or win a large client.

From a welfare standpoint, this competitive adoption of pass-through voting can be excessive.

Both fund managers and fund investors benefit: fund managers can sustain fee revenues while scaling back costly monitoring, and investors enjoy the utility from voting in line with their preferences. These private gains, however, come at the expense of initial asset owners, who are typically absent from discussions of voting reforms. As fund managers withdraw from monitoring, firm values decline, reducing the prices at which initial owners sell their shares. As a result, pass-through voting can be privately attractive and arise in equilibrium, yet be socially inefficient.

An alternative way to decentralize stewardship is to delegate authority to individual fund managers. While this weakens coordination within a family, there is a counteracting effect: managers of concentrated, high-fee portfolios have stronger incentives to monitor the firms in which they invest. In contrast, a family that centralizes stewardship across a broad and diverse set of funds lacks a focused interest in any one firm. As a result, delegation to fund managers is less likely to undermine oversight when investor preferences are strong and the number of funds remains limited. This prediction aligns with Herrmann et al. (2025), who study changes in voting behavior following Vanguard's partial decentralization of stewardship (see Section 5.2.2).

The broader implication is that when investors have heterogeneous preferences that they want reflected in their votes, asset managers can cater to them in two ways: by giving voting authority directly to investors, or by creating specialized funds with tailored investment and voting strategies. While the latter approach is more likely to preserve effective shareholder oversight, competitive pressures may nevertheless drive fund managers toward the former. Indeed, we show that even when delegation to fund managers is the more efficient form of decentralization, both fund investors and fund managers are better off under pass-through voting. Private incentives may therefore favor pass-through voting even when it is the least efficient governance arrangement.

Related literature. Our paper examines how competition among asset managers and product differentiation shape firms' ownership structures and governance. In doing so, it bridges two strands of the literature: work on blockholder governance[4] and the literature on the industrial organization of asset management. The latter studies product proliferation and the decision to launch new funds (Khorana and Servaes 2012; Massa 2003; Hortaçsu and Syverson 2004; Evans 2010; Kostovetsky and Warner 2020; Loseto and Mainardi 2025). More recent work examines how product differentiation caters to investor preferences for ESG characteristics (Baker et al. 2024),

[4] See, e.g., Admati et al. (1994), Kahn and Winton (1998), Maug (1998), Edmans and Manso (2011); see Edmans and Holderness (2017) for a survey.

or for attention-grabbing investment strategies (Ben-David et al. 2023), and how these strategies can deter entry (Betermier et al. 2023). Our paper contributes to this literature by introducing fund managers' ability to monitor portfolio companies and thereby influence firm valuations.

In the blockholder governance literature, the most closely related papers analyze blockholders that are asset managers, focusing on how compensation contracts and flow concerns shape their monitoring (e.g., Dasgupta and Piacentino 2015; Cvijanović et al. 2022; see Dasgupta et al. 2021 for a survey). Dasgupta and Mathews (2025) show that optimal contracts between asset managers and their clients separate risk sharing and monitoring incentives, resulting in weaker monitoring relative to a setting with proprietary blockholders. Corum et al. (2024) and Baker et al. (2022) examine the governance role of passive funds, while Osano and Adachi-Sato (2025) analyze a multi-tasking setting where funds can enhance both financial and social firm outcomes; all these papers assume homogeneous fund investors. Our paper differs from this literature by introducing heterogeneous investor preferences for asset characteristics beyond their risk and return. In this respect, we are close to the literature on demand system asset pricing (Koijen and Yogo 2019, Koijen et al. 2024, Darmouni et al. 2022). We study how this heterogeneity shapes the structure of the asset management industry, ownership concentration, and blockholders' incentives to monitor. We are also the first to analyze the organizational structure of blockholders by comparing monitoring under centralized stewardship with monitoring delegated to individual fund managers.

Within the literature on sustainable investing, Oehmke and Opp (2025), Landier and Lovo (2025), and Dasgupta et al. (2025) study socially-responsible funds and their ability to attract investor capital. These papers analyze, respectively, whether warm-glow preferences facilitate fund formation, the role of the supply chain, and the coexistence of impact and exclusionary funds. Our paper differs by studying how competition for investors shapes the structure of the asset management industry and the allocation of voting authority, and by focusing on the implications for traditional monitoring, rather than environmental outcomes. In doing so, we contribute to the broader ESG investing literature (see Pástor et al. 2025 for a review) by complementing its prevailing focus on environmental and social (E&S) aspects with an emphasis on governance (G). We show how investors' preferences over E&S issues feed back into traditional governance outcomes by shaping the degree of ownership concentration through fund proliferation and decentralization. This connects our work to Chen et al. (2025), where the interaction between E&S

and G dimensions operates through the channel of price informativeness.

Finally, our paper relates to the literature on firms' organizational structure (Gibbons and Roberts 2013) by studying how asset managers organize their stewardship activities. This literature typically examines how a firm's choice between centralization and decentralization affects its internal outcomes. In contrast, we study the effects of decentralization not only on the asset manager itself, but also on other firms – its portfolio companies. We further highlight that, in this context, incentives to decentralize arise from mechanisms distinct from those emphasized in the organizational economics literature – in particular, competition for fund investors with heterogeneous preferences.

Empirical studies on stewardship within fund families generally find a high degree of centralization and coordinated voting across affiliated funds (Morgan et al. 2011; Choi et al. 2013). However, centralization is not absolute: some families delegate authority to individual fund managers (Griffith 2019; Herrmann et al. 2025), and fund-level deviations occur (e.g., Michaely et al. 2024). Our paper contributes to this literature by examining the trade-offs involved in such decentralization. More recently, decentralization has taken the form of pass-through voting, where voting rights are delegated directly to fund investors. Döttling et al. (2025), Malenko and Malenko (2025), and Persico and Ravina (2025) examine its effects on contentious issues such as E&S, whereas we focus on its implications for traditional monitoring, where investors' interests are aligned, and show how pass-through voting can emerge endogenously from competition among asset managers.

The paper proceeds as follows. Section 2 describes the trends in the asset management industry that motivate our analysis. Section 3 introduces the setup, and Section 4 characterizes the equilibrium. Section 5 presents our main results. Section 6 concludes.

2 Institutional background

In this section, we discuss the trends in the asset management industry related to fund proliferation and decentralization of stewardship.

Proliferation of funds. Over the past few decades, the industry has seen a rise in fund proliferation, both in the number of funds and in the diversity of their investment strategies. Kostovetsky and Warner (2020) document that the number of actively managed U.S. equity mutual funds grew from 530 in 1975 to almost 7,800 by 2016, and that between 1999 and 2015, approximately 250 new funds were started each year. They also report that the number of Morningstar style classifications increased from fewer than 20 in 1975 to over 100 in 2016, nearly tripling over the past 20 years. Betermier et al. (2023) report the same dynamics globally, with the number of equity mutual funds growing more than seven times between 1990 and 2015, noting that by comparison, the number of publicly listed companies barely doubled during that period. Similar trends are observed among ETFs: Ben-David et al. (2023) find that while early ETFs tracked broad market indexes, newer offerings tend to track niche portfolios, and the annual number of specialized ETF launches has consistently exceeded that of broad-based ETFs.

One notable development has been the rapid expansion of funds investing based on ESG criteria. According to ICI (2024), the number of such funds nearly doubled between 2019 and 2023, from 484 to 913, alongside a comparable rise in assets under management. Csiky et al. (2024) find that the average AUM share of ESG funds reached nearly 7% in 2022, and among fund families offering ESG products, this share was even higher—around 22% in 2022. These funds often provide tailored strategies focused on "green sectors" such as renewable energy, resource conservation, or clean technology, or on specific ESG themes including climate change, gender diversity, or water scarcity. While most recently, U.S. sustainable funds have experienced net outflows (ICI 2024), the number of such funds remains high, resulting in a large market share by count, but not by AUM (Black and Kölbel 2024). Growing polarization over social and environmental issues has also given rise to the coexistence of sustainable funds and anti-ESG funds such as those offered by Strive.

Not only has the number of funds grown over the past decades, but so has the number of fund families: Kostovetsky and Warner (2020) report an increase from 297 to 824 between 1975 and 2016. However, the rise in new fund offerings has come from established families to a larger extent than from new entrants, and the industry has become increasingly concentrated among larger players (Betermier et al. 2023). According to ICI (2024), in most recent years, the number of families has even slightly declined, and the concentration has increased even further. Betermier et al. (2023) show that incumbent families launch multiple funds on an increasingly granular style grid, using this congestion to deter entry. They also find that despite the proliferation of funds and investment styles, the underlying dimensionality of the fund menu has remained persistently low—"closer to six" dimensions (p. 795)—and that incumbent fund families exploit this low dimensionality by dividing the product space into an increasingly crowded grid.

Specialized products allow asset managers to charge higher fees (Kostovetsky and Warner 2020; Ben-David et al. 2023). For example, Ben-David et al. (2023) show that in 2019, specialized ETFs accounted for just 18% of industry assets but generated 35% of fee revenues. This suggests that investors are willing to pay a premium for alignment with their personal values and beliefs or targeted exposure. This willingness has been explicitly documented in the context of sustainable investing (e.g., Bauer et al. 2021; Heeb et al. 2023). At the same time, competitive forces also influence fees: Wahal and Wang (2011) and Hoberg et al. (2018) find that greater overlap in holdings or style reduces fee levels, and Black and Kölbel (2024) conclude that strong competition has compressed ESG fund fees, despite investors' willingness to pay more for sustainable investment strategies.

Decentralization of stewardship. Another development in the asset management industry has been partial decentralization of stewardship. Traditionally, large asset managers centralized governance, with stewardship teams engaging with companies on behalf of the entire family, and with affiliated funds voting in unison (Morgan et al. 2011; Choi et al. 2013).[5] More recently, however, some large players have begun to decentralize these activities.

In 2019, Vanguard partially decentralized stewardship by transferring voting authority from its centralized stewardship team to the managers of its externally managed funds. According to Herrmann et al. (2025), this change applied to 40 funds with at least one external manager as of 2019, while 90 internally managed funds remained under Vanguard's centralized voting authority. The stated goal was "creating a greater alignment of investment management and investment stewardship on a fund-by-fund basis" (Booraem 2019).

Another shift toward decentralization occurred in 2022, when BlackRock, Vanguard, and State Street introduced pass-through programs known as "Voting Choice" (Brav et al. 2025; Lund 2025; Malenko and Malenko 2025). Unlike Vanguard's earlier move, which delegated voting authority to fund managers, these programs give authority directly to fund investors, allowing them to either exercise their voting rights or delegate them back to the asset manager. As of December 2025, more than \$3.7 trillion of BlackRock's total index equity AUM were eligible for Voting

[5] There is some variation across families in the extent to which stewardship is centralized. For example, T. Rowe Price and Invesco have followed a more decentralized approach, granting proxy voting authority to individual fund managers (Griffith 2019).

Choice, and almost 25% of those (primarily institutional clients) chose to exercise their voting rights. Industry reports suggest that adoption has accelerated: in 2025, the use of pass-through voting increased by 175% relative to the previous year, with one industry specialist commenting, "For years, pass-through voting was seen as experimental. This season, it moved firmly into the mainstream."[6]

This shift reflects growing heterogeneity in investor preferences, particularly around ESG issues, and efforts to align stewardship with those preferences. The INDEX Act, originally introduced in the U.S. Senate in 2022 and reintroduced in 2025, goes even further by advocating for full delegation of voting authority to the investors of passive funds.[7]

Finally, and most recently, the same "Big Three" asset managers each announced an additional step toward decentralization, planning to split their stewardship teams into two separate units. For example, State Street indicated that one of its stewardship teams, State Street Sustainability Stewardship Service, will be for "investors who prioritize sustainability," whereas the other one, State Street Asset Stewardship Team, will be tailored to investors without such priorities.[8] These trends may dilute the influence of the "Big Three," which have become central players in corporate governance and, through concentrated ownership, may have facilitated shareholder activism (Appel et al. 2019; Brav et al. 2023; Brav et al. 2024).

3 Model

The model features fund investors, who allocate capital across funds, and fund managers, who make investment and monitoring decisions.

Investor preferences and fund differentiation. To capture investor heterogeneity and fund differentiation in a tractable way, we extend the circular model of Salop (1979). There is a unit continuum of investors and a continuum of assets (company stocks) supplied inelastically by initial asset owners in total supply s. Asset characteristics (types) are two-dimensional and uniformly distributed on a unit circle, with asset type $\beta \in [0, 2\pi]$ indicating its angular position on the circle. Investors differ in their preferences for these characteristics, captured by investor types

[6] https://www.netzeroinvestor.net/news-and-views/asset-owner-uptake-of-pass-through-voting-increases-by-175.

[7] See https://www.govtrack.us/congress/bills/119/s1670.

[8] See https://corpgov.law.harvard.edu/2025/08/27/the-big-three-shift-approach-to-stewardship/.

$\alpha \in [0, 2\pi]$, which are uniformly distributed on the unit circle. This circular framework captures heterogeneity of asset characteristics and investor preferences along two dimensions, which may represent environmental or social considerations, sectoral or geographic focus, or investment styles such as value versus growth investing.[9]

An investor of type α, holding a portfolio $\boldsymbol{x} = \{x_\beta, \beta \in [0, 2\pi]\}$, derives utility

$$\int_0^{2\pi} \left(x_\beta \left(v_\beta + r\cos(\beta - \alpha) - p_\beta \right) - \frac{\eta x_\beta^2}{2} \right) d\beta, \tag{1}$$

where x_β is the position in asset β, and v_β and p_β denote the asset's equilibrium payoff and price. An investor thus values both the asset's payoff and the alignment between the asset's characteristics and her preferences: an investor of type α gets additional utility $r\cos(\beta - \alpha)$ from holding asset β. The angular distance $|\beta - \alpha|$ captures preference misalignment, so utility declines as the asset moves farther from the investor's ideal point.[10] Parameter r reflects the intensity of these preferences and captures the degree of investor heterogeneity: investors are homogeneous and value assets identically when $r = 0$, and heterogeneity increases with r.

We interpret investor heterogeneity as reflecting either heterogeneous nonpecuniary benefits from investing in certain assets (as in Pástor et al. 2021, Pedersen et al. 2021) or heterogeneous beliefs about which asset characteristics are likely to generate higher returns or have lower risk (as in Koijen et al. 2024). In Online Appendix C.1, we provide a microfoundation for preferences over asset characteristics, showing that they may arise from pure tastes, portfolio-diversification motives, or heterogeneous beliefs about returns.

Quadratic holding costs $\eta x_\beta^2/2$ ensure that investors demand an interior amount of each asset. Such holding costs typically arise in a CARA-model with a finite number of assets, normally and independently distributed asset returns (see Online Appendix C.1). Parameter η then corresponds to the product of the investor's risk aversion parameter and variances of asset-specific shocks.

[9]The symmetry of the circular structure allows for tractable equilibrium characterization, which typically cannot be obtained Hoteling-style horizontal differentiation models due to boundary effects. Our economic mechanisms do not crucially rely on the circular structure and should hold more broadly in models with horizontal product differentiation. Further, while the two-dimensional structure of the product space is a stylized simplification, it is broadly consistent with Betermier et al. (2023), who conclude that the industry has exhibited a "persistently low dimensionality of the mutual fund product space" over the past decades, and that fund proliferation has largely taken the form of increasing congestion within the existing "style grid."

[10]Formally, the investor corresponds to point $a = (\cos\alpha, \sin\alpha)$ on the circle and the asset to point $b = (\cos\beta, \sin\beta)$, so the investor's additional utility from holding the asset is $r(a_1b_1 + a_2b_2) = r\cos(\beta - \alpha)$ by the cosine addition formula.

Thus, investor demand is described by two parameters: the intensity of preferences for asset characteristics r and their preference for diversification η.

Investors allocate capital exclusively through funds. Given investor heterogeneity, funds adopt differentiated investment strategies to serve distinct segments of the market. Each fund operates under an investment mandate that determines its portfolio. Formally, fund k's mandate is characterized by the type of investor it serves, α_k: the fund offers the portfolio that maximizes (1) for investor type α_k, given the investor's beliefs.[11] As becomes clear below, fund mandates play a role analogous to brand locations in Salop (1979). In line with our model, the survey of asset managers by Edmans et al. (2025) shows that stock selection decisions are strongly influenced by investment mandates and client preferences. Fund managers are price-takers when making investment decisions, and asset prices are determined by market clearing.

Our model focuses on specialized funds rather than broad market funds. As such, it applies equally to actively and passively managed funds, including ETFs (as discussed in Section 2, the proliferation of investment strategies has occurred across all types of funds). In our framework, active and passive funds are similar because we do not model stock selection based on private information, and the forces we highlight are common across both funds. However, as we discuss below, the strength of some effects may differ between active and passive funds, allowing us to derive additional predictions.

Timing. The industry consists of K funds, which are part of N symmetric fund families. In the baseline model, we take K and N as given, but endogenize them through the free-entry condition at $\tau = 0$ in Section 5.1. At $\tau = 1$, fund fees f_k are set. At $\tau = 2$, investors choose between funds, and funds invest according to their mandates and make monitoring decisions. At $\tau = 3$, payoffs are realized. We now describe each stage in more detail.

At $\tau = 2$, each investor picks one of the funds based on fees and investment mandates. Specifically, investor α chooses fund k that maximizes her utility

$$\int_0^{2\pi} \left(x_{\beta,k} \left((1 - f_k) \, v_\beta + r \cos(\beta - \alpha) - p_\beta \right) - \frac{\eta x_{\beta,k}^2}{2} \right) d\beta, \tag{2}$$

which is expression (1) net of the fee f_k charged by fund k on the time $\tau = 3$ value of its AUM.

[11] Our model of funds that intermediate investment for heterogeneous investors and are restricted by investment mandates is similar to the two-layered demand system studied in Darmouni et al. (2022).

We assume that investors take v_β and p_β as given and equal to the payoffs and prices of assets in equilibrium.[12]

Also at $\tau = 2$, funds invest according to their mandates and monitoring takes place. We assume, for simplicity, that financial markets clear simultaneously with monitoring. Monitoring increases the payoff of firm (asset) β from $u \geq 0$ to

$$v_\beta = u + v\left(\vec{e}_\beta\right), \text{ where } v\left(\vec{e}_\beta\right) \equiv \left(\sum_{n=1}^{N} e_{\beta,n}^{\rho}\right)^{1/\rho}, \tag{3}$$

and $\vec{e}_\beta = (e_{\beta,1}, \ldots, e_{\beta,N})$ denotes fund families' monitoring efforts. In the baseline model, we analyze centralized monitoring decisions made at the fund family level: each family chooses its monitoring effort to maximize total family profits. This assumption is consistent with the practices of major asset managers up until recently (Morgan et al. 2011; Choi et al. 2013). In Section 5.2.2, we consider extensions where monitoring is decentralized and delegated to either individual funds within the family or fund investors directly.

Parameter $\rho \geq 1$ in Eq. (3) captures substitutability of monitoring efforts across shareholders: as ρ increases, the degree of substitutability becomes larger in that the largest individual effort has greater influence on the asset payoff. In the main text, we focus on $\rho \geq 2$, which admits a particularly simple equilibrium structure.[13] As we show below, substitutability implies that greater ownership concentration, all else equal, leads to higher aggregate monitoring.

Fund family n incurs total monitoring costs

$$c\left(\boldsymbol{e}_n\right) = \frac{\gamma}{2} \int_0^{2\pi} e_{\beta,n}^2 d\beta, \tag{4}$$

where $\gamma > 0$ and $\boldsymbol{e}_n = \{e_{\beta,n}, \beta \in [0, 2\pi]\}$ are family n's monitoring efforts across all firms. Fund family's profit equals its fee income (the value of its portfolio holdings multiplied by the fee rate) net of monitoring costs. Thus, fund family n chooses $\boldsymbol{e}_n$ to maximize its profits across all funds

[12] This assumption precludes more sophisticated inference that investors can make about future monitoring efforts and asset payoffs when observing an unexpected (off-equilibrium) fee offered by a fund. By abstracting from such inference, we suppose that investors lack such level of reasoning , which is supported by limited financial sophistication of retail investors.

[13] For completeness, we consider the case $\rho \in [1, 2)$ in Online Appendix C.2 and show that our main insights are robust.

in the family:

$$\int_0^{2\pi} \sum_{k \in F_n} f_k m_k \left(f_k, f_{-k}\right) x_{\beta,k} \left(u + v\left(\vec{e}_\beta\right)\right) d\beta - c\left(\boldsymbol{e}_n\right), \tag{5}$$

where F_n is the set of funds offered by family n, and $m_k\left(f_k, f_{-k}\right)$ is fund k's market share given its fees f_k and competitors' fees f_{-k}. In Eq. (5), monitoring raises the value of portfolio companies, and hence, increases funds' fee income, creating a direct incentive to monitor, as in Lewellen and Lewellen (2022a) and Heath et al. (2025).

At $\tau = 1$, fund families set fees simultaneously. Given the symmetry of our setting, we assume that families set uniform fees across their funds to maximize total family profits. Formally, f_k are constant across all $k \in F_n$ and, with a bit of abuse of notation, we denote f_n the (uniform across funds) fee set by family n. We further focus on symmetric equilibria in which all families charge the same fees. Fund families play a subgame perfect Nash equilibrium in the fee setting and monitoring game. Appendix A formalizes the equilibrium definition.

Following much of the industrial organization literature, we do not model the strategic "location choice," but rather assume that fund mandates α_k are evenly spaced around the circle.[14] In the baseline model, we take K as exogenously given. We endogenize entry in Section 5.1, allowing for two alternative market structures: entry through expansion by incumbent families or through the entry of new families. We focus on even K, which preserves symmetry, and assume $K \geq 6$ to guarantee equilibrium existence. Given the circular structure, there is a continuum of equilibria—identical in the number of funds, fees, and monitoring—that differ only by a uniform rotation of fund mandates around the circle. Without loss of generality, we set $\alpha_1 = \pi/K$ and $\alpha_k = 2\pi k/K$ for $k = 1, \ldots, K$.

To model fund families in a tractable way and preserve symmetry, we assume that (i) if a family owns a fund with mandate α_k, it also owns the fund with mandate $\alpha_k + \pi$; (ii) no family owns two adjacent funds, k and $k+1$.[15] This assumption enables closed-form solutions and aligns

[14] The analog of this assumption in Salop (1979) is that "brands are equally spaced around the circular product space." Following Salop (1979), the literature has commonly adopted this equidistance assumption and, like us, focused on determining equilibrium product prices (fund fees) and the number of entrants (funds), without endogenizing location (e.g., Syverson 2004; Heidhues and Kőszegi 2008; see also Tirole 1988). Strategic location choice is a known technical issue in differentiated-product models (see Economides 1989 for a microfoundation of the equidistance assumption in the basic Salop model). In our setting, it is further complicated by the fact that investors care not about mandates per se, but about the portfolios they induce. Thus, we follow the literature in abstracting from endogenous location choice.

[15] Throughout, types are arranged on a circle, so $\alpha_k + \pi$ denotes the point directly opposite α_k, and $\alpha_k + \pi$ coincides with α_k.

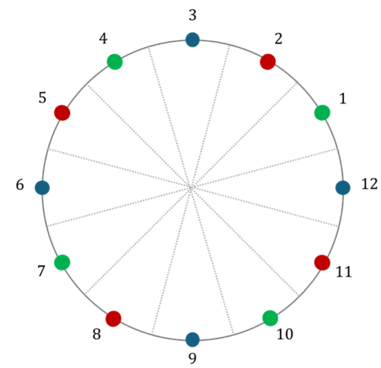


Figure 1: **Fund market structure**

Notes: The figure illustrates the market structure with $K = 12$ funds, indexed by $k \in \{1, 12\}$. There are $N = 3$ fund families, represented by different colors (green, red, and blue); each family has $F = 4$ funds. For example, the first family (green) includes the set of funds $F_1 = \{1, 4, 7, 10\}$. As we show in the next section, the segments of investors served by each fund are located on the circumference of the circle, between the pairs of dashed lines.

with the evidence in Betermier et al. (2023), who find that mutual fund markets are characterized by "families with large, granular, and similar fund offerings rather than a collection of different family 'types' that specialize in few categories."

Figure 1 illustrates this industry structure. We suppose that fund families are symmetric in the number of funds they manage. Then, if F denotes the number of funds per family, the total number of funds is $K = FN$.

Additional assumptions. Generally, a fund family's deviation from its equilibrium fee at $\tau = 1$ can affect not only its own AUM and monitoring effort, but also the monitoring efforts of other families—an effect that is likely of second-order in practice but would significantly complicate the analysis. To abstract from this indirect effect of fee deviations, we make two simplifying assumptions. First, we assume that fund families do not observe their competitors' fees when choosing monitoring at $\tau = 2$. This can be justified by small costs of discovering competitors' fees: since all fees are identical in equilibrium, no one has incentives to pay such costs. Second, we assume that monitoring decisions at $\tau = 2$ are made simultaneously with investors' fund choices. This assumption approximates real-world dynamics, where investors move in and out of funds continuously, and monitoring decisions evolve continuously as well. Together, these assumptions imply that a fund family deviating from its equilibrium fee anticipates the effect of this deviation on its own market share and monitoring incentive but—because its deviation is unobservable to its rivals—treats other families' monitoring efforts as fixed at their equilibrium levels.

4 Equilibrium characterization

Equilibrium prices and mandates. Since fund k's mandate is to pick a portfolio that maximizes (1) for investor of type α_k, its demand for asset β is

$$x_{\beta,k} = \frac{1}{\eta}\left(v_\beta - p_\beta + r\cos\left(\beta - \alpha_k\right)\right). \tag{6}$$

Funds tilt their portfolios toward assets located near their mandate α_k, placing less weight on more distant assets. Combined with market clearing, this implies the following result.

Lemma 1. *The equilibrium portfolio offered by fund k is*

$$x_{\beta,k} = s + \frac{r}{\eta}\cos\left(\beta - \alpha_k\right). \tag{7}$$

Moreover, both on the equilibrium path and after a deviation in fee setting by a single fund family,[16] *asset prices are identical across assets and equal to*

$$p_\beta = v_\beta - \eta s. \tag{8}$$

Intuitively, the symmetry of mandates across funds within a given family implies that their individual portfolio tilts exactly offset each other at the family level, generating balanced aggregate demand across assets. As a result, the price of each asset equals its (expected) payoff v_β minus the risk premium ηs, and each family's average asset position is identical across assets and across families and is given by

$$\bar{x}_{\beta,n} \equiv \frac{1}{|F_n|}\sum_{k\in F_n} x_{\beta,k} = s. \tag{9}$$

Our symmetric setting thus allows us to abstract from the *cost-of-capital* channel of heterogeneous investor preferences (Heinkel et al. 2001, Pástor et al. 2021) and isolate the *monitoring* channel: investors' preferences for specific asset characteristics do not distort equilibrium prices directly (see Eq. (8)); instead, they influence valuations only indirectly, by shaping monitoring incentives

[16]These are the only relevant histories in the analysis of symmetric equilibria.

and thereby affecting the fundamental payoff v_β. We assume $s \geq r/\eta$, which, by Eq. (7), rules out short-selling in equilibrium.

Monitoring. Consider the monitoring subgame. Let f_n be the fee charged by family n (common across funds within the family), M_n be the family's equilibrium prediction about its market share, and $\bar{x}_{\beta,n}$ be its average position per investor in firm β.[17] As we show in Appendix A, family n's optimal monitoring effort then solves

$$\max_{\{e_{\beta,n}\}_{\beta\in[0,2\pi]}} f_n M_n \int_0^{2\pi} \bar{x}_{\beta,n}\left(u + v\left(e_{\beta,n}, \boldsymbol{e}_{\beta,-n}\right)\right) d\beta - \frac{\gamma}{2}\int_0^{2\pi} e_{\beta,n}^2 d\beta,$$

where $\boldsymbol{e}_{\beta,-n}$ denotes the vector of monitoring efforts of all other families at asset β. The maximization can be done asset-by-asset:

$$\max_{e_{\beta,i}} f_n M_n \bar{x}_{\beta,n}\left(u + v\left(e_{\beta,n}, \boldsymbol{e}_{\beta,-n}\right)\right) - \frac{\gamma e_{\beta,n}^2}{2}.$$

Thus, the key determinant of differences in monitoring incentives across shareholders of firm β is

$$\xi_{\beta,n} \equiv \frac{f_n M_n \bar{x}_{\beta,n}}{\gamma}. \tag{10}$$

This expression reflects two core factors identified by Lewellen and Lewellen (2022a) as driving asset managers' incentives to engage: (i) the size of the asset manager's position in the firm captured by $M_n\bar{x}_{\beta,n}$ (market share times portfolio position in the asset) and (ii) the asset manager's compensation, i.e., the fee f_n, which captures the share of the surplus from monitoring that the asset manager retains. In our setting, an asset manager's incentives to monitor are stronger, other things equal, in firms where its position is more concentrated, when it has a larger market share, or charges a higher fee.

In the symmetric equilibrium, all families charge identical fees, split the market equally, and hold the same average portfolio per investor (see Eq. (9)). As a result, monitoring incentives are identical across families, leading to a multiplicity of equilibrium monitoring configurations. To

[17] Recall that market shares are determined simultaneously with monitoring at $\tau = 2$. Because fees are unobservable, the fund family assumes that other families charge equilibrium fees and choose equilibrium monitoring efforts. Thus, family n chooses its monitoring effort based on its equilibrium prediction M_n, which depends on its own (potentially off-equilibrium) fee f_n set at $\tau = 1$, while taking other families' fees f_{-n} as given at their equilibrium levels (see Eq. (16) below).

select a unique equilibrium, we introduce a small perturbation: family n derives an additional infinitesimal private benefit $\epsilon > 0$ from monitoring asset β whenever one of its funds holds the largest position in that asset among all funds in the market. The interpretation is that, while asset holdings are identical at the family level, they differ across funds. Thus, for a generic firm, there is a unique fund that holds the largest stake, and the family to which this fund belongs has slightly stronger incentives to monitor that firm.[18] We focus on monotone equilibria, in which effort $e_{\beta,n}$ increases with incentives $\xi_{\beta,n}$, and consider their limit when private benefits become small, $\epsilon \to 0$. This gives the following characterization of equilibrium monitoring efforts.

Lemma 2. *In the monitoring subgame, for any $\{\xi_{\beta,n}, n = 1, \ldots, N\}$, the payoff of firm β is*

$$v_\beta = u + \max_{n=1,\ldots,N} \{\xi_{\beta,n}\}, \tag{11}$$

with effort $e_{\beta,n} = \xi_{\beta,n}$ for the fund family with the highest $\xi_{\beta,n}$, and zero for all others. On the equilibrium path, monitoring effort satisfies

$$e_{\beta,n} = \xi_{\beta,n} = \frac{sf}{\gamma N} \tag{12}$$

for exactly one fund family, and is zero for all others, and the payoff of firm β is

$$v_\beta = u + \frac{sf}{\gamma N} \tag{13}$$

for all β. The payoff of portfolio $x_{\beta,k}$ held by any fund k is constant across funds and equal to

$$\bar{v} \equiv \int_0^{2\pi} x_{\beta,k} v_\beta d\beta = 2\pi s \left(u + \frac{sf}{\gamma N} \right). \tag{14}$$

Lemma 2 implies that monitoring is concentrated: because of free-riding, only a single fund family monitors any given asset, even though monitoring efforts are technologically imperfect substitutes. Eq. (11) for the firm's payoff v_β thus highlights the importance of shareholder concentration: only the incentives of the largest asset manager matter for v_β. The literature on

[18]Formally, for any n, whenever $\beta \in (\alpha_k - \pi/K, \alpha_k + \pi/K)$ for some $k \in F_n$ (i.e., fund k has the mandate closest to asset β and thus holds the largest position in it), we assume that $\xi_{\beta,n} = f_n M_n X_{\beta,n}/\gamma + \epsilon$. This perturbation breaks indifference for all assets except those on the boundaries, $\beta \in \{2\pi/K, k = 1, \ldots, K\}$. Since these assets have measure zero, aggregate implications are not affected by which equilibrium is played, so tie-breaking for them can be arbitrary.

blockholder governance often assumes that a single shareholder monitors a firm (Admati et al. 1994, Kahn and Winton 1998, Maug 1998); in our setting, this result arises as an equilibrium outcome whenever $\rho \geq 2$.

In Online Appendix C.2, we generalize the model to $\rho \in (1, 2)$. In this case, monitoring is shared, with all shareholders exerting positive effort, but ownership concentration continues to increase asset payoffs because monitoring efforts remain strategic substitutes (see Lemma 6). As a result, as we discuss below, the core forces we highlight continue to operate when $\rho \in (1, 2)$.

On the equilibrium path, the symmetry of our setting implies simple expressions for monitoring efforts and firm payoffs (12)–(13). It also implies that all individual fund portfolios earn the same payoff, denoted $\bar{v}$. Firm and portfolio payoffs are increasing in each family's stake and fees (lower N and higher f).

Investor fund choice. To describe investors' choice among funds, we derive the utility of an investor of type α from investing in fund k.

Lemma 3. *The utility of an investor of type α from investing in fund k with mandate α_k is*

$$U_k(\alpha) = \bar{U} + \frac{r^2 \pi}{\eta} \cos(\alpha - \alpha_k) - f_k \bar{v}. \tag{15}$$

where $\bar{U} = \pi \eta s^2 - \frac{\pi r^2}{2\eta}$. In equilibrium, investor types in $[\alpha_k - \pi/K, \alpha_k + \pi/K]$ prefer to invest in fund k over all other funds.

Intuitively, $\bar{U}$ is the utility of an investor without preferences for firm characteristics (i.e., with $r = 0$) who invests in fund k without any fees. This utility is adjusted for investor tastes, the second term in (15), and fees, the third term in (15). The adjustment for tastes mirrors the Salop model: The investor derives additional utility when the fund mandate is more aligned with her type (α_k is close to α), and a disutility (akin to the transportation cost in the Salop model) when the alignment is poor. The fees paid by the investor are proportional to $\bar{v}$, the payoff of the fund's portfolio, and we will refer to $t_k \equiv f_k \bar{v}$ as the "dollar fees" collected by fund k from each investor. On equilibrium path, all funds charge the same fees, so investors choose the fund whose mandate is closest to their type, as depicted in Figure 1.

Fee setting. At the fee-setting stage $\tau = 1$, fund families simultaneously set their fees. As can be seen from Eq. (5), fees enter the family's objective function only through the revenue share, which is the product of its market share and fee rate:

$$M\left(f_n, f_{-n}\right) f_n, \tag{16}$$

where $M\left(f_n, f_{-n}\right)$ denotes the mass of investors in funds of family n given its own fees f_n and competitors' fees f_{-n} (see Eq. (24) in the Appendix). Intuitively, revenue share captures the portion of the realized value of the portfolio company that accrues to the fund family, and thus higher revenue share increases the fund family's return from monitoring. Naturally, and as we formally show in Lemma 4 in Appendix B, the problem of optimal fee setting boils down to the maximization of (16). The family faces the standard trade-off: a marginal fee reduction lowers revenue per investor, but expands its market share by attracting additional investors from competing funds. Equilibrium fees are then characterized as follows.

Proposition 1. *In equilibrium, funds charge fees*

$$f = \frac{-u + \sqrt{u^2 + 2t/(\pi\gamma N)}}{2s/(\gamma N)}, \tag{17}$$

and earn profit per fund

$$\Pi = \frac{t}{K}\left[1 - \frac{1}{2N}\left(1 - \frac{\bar{u}}{\bar{v}}\right)\right], \tag{18}$$

where $\bar{u} \equiv 2\pi s u$ *is the average portfolio payoff absent monitoring, and*

$$t \equiv f\bar{v} = \frac{2\pi^2 r^2 \sin\left(\pi/K\right)}{K\eta} \tag{19}$$

denotes the dollar fees collected per investor by each fund. Equilibrium fees f *increase in preference intensity* r*, decrease in diversification motives* η*, and decrease in the number of funds* K *(holding the number of families* N *fixed).*

Proposition 1 introduces *dollar fees*, $t \equiv f\bar{v}$, as the key object governing equilibrium pricing. Dollar fees capture the total fee revenue a fund collects per investor, i.e., the fee rate multiplied by the portfolio payoff. Intuitively, from (15), since investors take portfolio payoffs as given and equal to $\bar{v}$, their choice among funds can be equivalently represented in terms of either fee rates f or dollar fees $t = f\bar{v}$. Similarly, the maximization of the revenue share in (16) can be expressed directly in terms of dollar fees. It follows that the equilibrium dollar fees are determined by fund families' local market power, which depends on the importance of product differentiation for investors (parameters r and η) and the distance from the closest competing fund mandates, which depends solely on K. Consistent with intuition, dollar fees decline with greater competition (K) and increase with stronger investor preferences for fund characteristics (r) or weaker diversification motives (η). Dollar fees do not depend on the number of funds per family F, the number of families N (reflecting ownership structure), or the monitoring efficiency parameter γ.

Given equilibrium dollar fees, the equilibrium fee rate f is then pinned down to deliver the implied dollar fee, taking the equilibrium portfolio payoff $\bar{v}$ as given.[19] As a result, any parameter that affects equilibrium dollar fees, namely investor preferences (r and η) and the competitive structure (K), affects fee rates through its impact on t. Accordingly, changes in these parameters that raise dollar fees similarly raise fee rates, as reflected in Eq. (17). By contrast, ownership structure and monitoring efficiency affect fee rates only through their impact on portfolio payoffs. More efficient monitoring (lower γ), as well as stronger family incentives due to larger asset holdings (higher s) or greater market shares (lower N, holding K fixed), increase portfolio payoffs. Because these forces do not affect equilibrium dollar fees t, Eq. (19) implies that they lead to lower equilibrium fee rates f.

Proposition 1 presents a simple expression for per-fund profits. Each fund's profit equals fee revenue, t/K, minus monitoring costs, which constitute a fixed share of the fee revenue. The intuition is as follows. In equilibrium, all investors correctly anticipate fund families' monitoring activity, so asset prices fully reflect it. As a result, while families bear the full cost of monitoring, they cannot extract rents from it. Indeed, as argued above, dollar fees t are determined solely by investor demand and the competitive structure of the fund industry. Improvements in monitoring technology or larger ownership stakes strengthen asset managers' ex-post incentives to monitor, but because enhanced monitoring is reflected in higher asset prices, it does not raise the value delivered to fund investors and thus does not affect the dollar fees they pay.

A related free-riding problem arises in models of blockholder monitoring (Grossman and Hart 1980, Admati et al. 1994), where it leads to lower positions of the blockholder and inefficiently low levels of activism. In our setting, fund families nevertheless establish large asset positions, because they intermediate investment on behalf of investors. Monitoring, however, remains a pure cost from an ex-ante profit perspective and is undertaken only because it is optimal ex post, given

[19]We suppose that u is sufficiently high, so that $t/\bar{u} < 1$; then $f = t/\bar{v} < 1$.

families' ownership stakes. Specifically, fund families incur the costs of raising portfolio payoffs from $\bar{u}$ to $\bar{v}$, which reduces their per-fund profits by a factor of $\frac{1}{2N}\left(1-\frac{\bar{u}}{\bar{v}}\right)$. This reduction is decreasing in N: as the number of families rises, their market shares and ownership stakes fall, weakening ex-post monitoring incentives and reducing the costs.

It is worth noting that if a fund manager had private information about the firms it plans to buy, the market would not be able to perfectly anticipate the future increase in value due to monitoring, and prices would not fully adjust. This could allow the fund manager to capture some ex-ante profits from future monitoring – a force that arises in models of blockholder activism (e.g., Kyle and Vila 1991; Maug 1998; Kahn and Winton 1998). Hence, the result that monitoring is a pure cost from an ex-ante profit perspective is especially relevant for passively managed funds, whose positions are perfectly anticipated by the market, relative to actively managed funds.

5 Implications

Heterogeneity among investors creates demand for differentiated products, leading to market entry and the proliferation of funds. Whether this proliferation weakens shareholder oversight depends on the factors driving fund entry and the structure of the asset management industry—the relative roles of new vs. incumbent fund families in launching new funds, and whether families centralize stewardship. To illustrate these effects, we organize the analysis around the following scenarios. First, we study how market structure and the drivers of fund growth shape fund proliferation and monitoring outcomes. Second, we focus on decentralization of stewardship, both through pass-through voting and through delegation of monitoring to individual fund managers, and analyze the resulting trade-offs.

5.1 Fund proliferation and monitoring

To analyze the effects of fund proliferation, we introduce funds' entry decisions at $\tau = 0$. We compare two alternative market structures: fund entry (i) through expansion of incumbent fund families or (ii) through entry of new fund families. While both types of entry are observed in practice, empirical evidence suggests that the former – expansion of incumbent families – is more prevalent (Betermier et al. 2023). In this subsection, we set $u = 0$ (asset payoffs without monitoring), which allows for a tractable analysis of endogenous entry.

If entry occurs via incumbent family expansion, the number of families N is fixed, while the number of funds per family F is endogenous. If entry occurs via new families, the number of funds per family is fixed at an even F, while the number of families N is endogenous. In both models, the total equilibrium number of funds, $K = FN$, is determined by the free-entry condition. Following the industrial organization literature (e.g., Tirole 1988, Syverson 2004), we ignore the integer constraint on K and assume that the free-entry condition holds with equality (we preserve the integer constraint in our numerical examples). Specifically, we assume that the number of funds is given by

$$\Pi(K) = C \tag{20}$$

for a constant C, where $\Pi(K)$ is the profit of a single fund.[20] The justification for (20) depends on the market structure. When funds are launched by new entrants, a new family does not enter if and only if $\Pi(K+F) \leq C$ is satisfied, where C is the cost of launching one new fund. On the other hand, when new funds are launched by incumbents, we microfound Eq. (20) in Appendix A.2 through a game in which incumbents launch funds to preempt potential entrants, in line with Betermier et al. (2023). In this model, entry is deterred as long as K satisfies $\Pi^E(K) \leq C^E$, where C^E is the entrant's cost of launching a new fund and $\Pi^E(K)$ is the entrant's profit. Thus, the equilibrium K is the smallest number for which this inequality is satisfied. We show that the condition $\Pi^E(K) \leq C^E$ is equivalent to $\Pi(K) \leq C$ for some C that depends on C^E and other parameters of the model. The intuition is that profits of a potential entrant move in line with per-fund profits of incumbent families: the lower the latter, the lower the former. In both cases, ignoring the integer constraint, we get Eq. (20).

Drivers of fund proliferation. Fund proliferation can be driven by supply- or demand-side factors. On the supply side, lower regulatory or technological barriers to launching new funds reduce the effective cost of entry C. For example, the SEC's 2019 "ETF Rule" (Rule 6c-11) relaxed regulatory constraints and, according to industry observers, facilitated the growth of thematic ETFs targeting specific sectors or trends (e.g., Koudelka et al. 2025, Yang 2025). Technological advances further lowered the cost and complexity of launching new products. On the demand side, greater heterogeneity of investor preferences raises demand for specialized products, captured in our model by higher intensity of preferences for asset characteristics r. Further, when investors

[20]As we show in the proof of Proposition 2, Π is strictly decreasing in K, so Eq. (20) admits a unique solution.

can better diversify other parts of their asset portfolios (e.g., pension savings or social insurance), the relative importance of the diversification motive η declines, which again results in a higher demand for asset characteristics.[21] The next result establishes that both factors raise the number of funds, regardless of whether funds are launched by existing families or new entrants.

Proposition 2. *Suppose $u = 0$. In both family-expansion and family-entry models, the equilibrium number of funds K increases when (i) C decreases, (ii) r increases or η decreases.*

We next show that these two forces have very different implications for governance. We begin by analyzing supply factors.

Proposition 3. *Suppose $u = 0$. In both family-expansion and family-entry models, when C decreases, fees f decrease and the average portfolio payoff $\bar{v}$ decreases.*

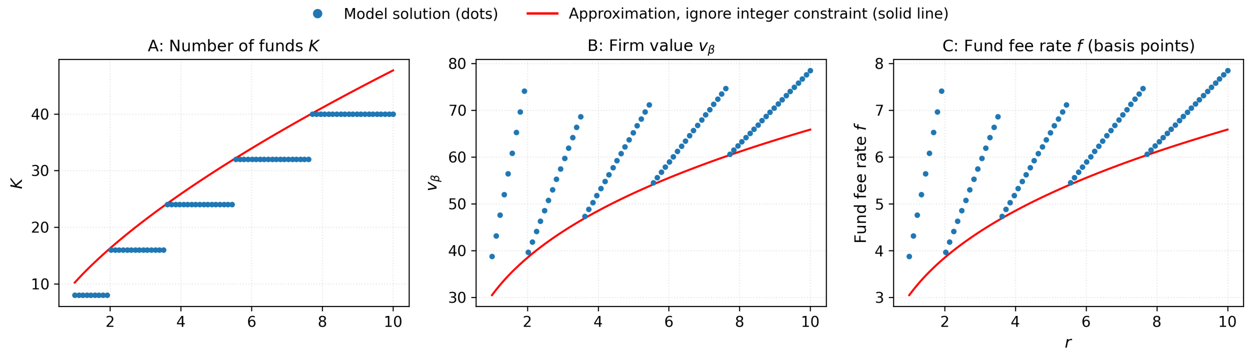
The result is intuitive. When fund creation becomes cheaper (a supply-side factor), additional funds enter either as part of new fund families or through the expansion of existing families to better cater to investor tastes. This proliferation intensifies competition, compresses fees, and weakens monitoring incentives, reducing average portfolio payoffs (see Figure 3 in the Appendix for an illustration).

In contrast, the effect of demand factors depends on the market structure.

Proposition 4. *Suppose $u = 0$. In both family-expansion and family-entry models, when r increases or η decreases, fees f increase. The average portfolio payoff $\bar{v}$ increases if entry occurs through family expansion, but decreases if entry occurs through new family entry.*

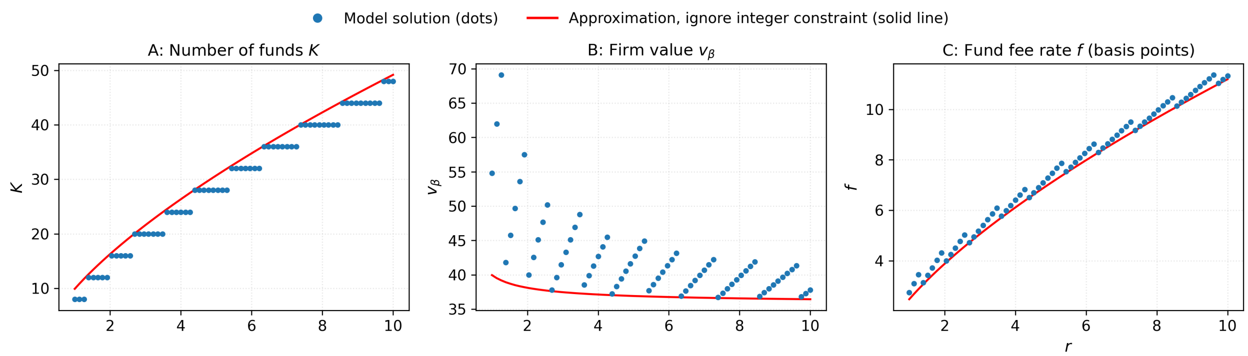
Unlike supply-side forces, demand-driven fund proliferation can increase asset payoffs. When investor preferences for asset characteristics become stronger (through higher r or lower η), investors place greater value on specialization, which induces entry of more differentiated funds. While this entry still intensifies competition and tends to reduce fees, there is now a countervailing force: investors' higher willingness to pay for tailored portfolios pushes fees upward. Consistent with this mechanism, Ben-David et al. (2023) document that in the context of specialized ETFs, fees have declined only slightly over time, even though the number of specialized products has grown substantially. Proposition 4 shows that in our setting this positive effect dominates, leading to a net increase in fees.

[21]This can be clearly seen from Eq. (19), where dollar fees are decreasing in η.



(a) Family expansion

Note: In the example, N is fixed at 4, and F is pinned down by the free-entry condition.



(b) New family entry

Note: In the example, F is fixed at 4, and N is pinned down by the free-entry condition.

Figure 2: Effect of demand factors: Comparative statics with respect to r

Parameters: $s = 200$, $\gamma = 0.0005$, $\eta = 0.05$, $C = 1$.

Whether these higher fees translate into stronger governance depends on how entry occurs. Under expansion by incumbent families, aggregate family-level ownership stakes are unchanged. As long as stewardship remains centralized, the increase in fees therefore translates directly into stronger incentives to engage in monitoring. Figure 2a illustrates this mechanism.[22]

By contrast, demand-side factors operate differently when entry occurs through new families. For small increases in r that do not trigger entry, fees rise while incumbent families' market shares remain unchanged, strengthening monitoring – exactly as under family-expansion-driven entry. However, once r rises enough to induce entry by a new family, incumbents' market shares decline

[22] In this figure and Figure 3, the solid red lines correspond to the theoretical results stated in the propositions, where the integer constraint is ignored and the free-entry condition holds with equality, i.e., (20) holds. In contrast, the blue dotted lines show the equilibrium under the integer constraint on the total number of funds and the number of funds per family. Accordingly, the blue line evolves smoothly until a parameter shift induces fund entry, at which point there is a discrete jump.

and monitoring incentives weaken. As shown in Figure 2*b*, the net effect on monitoring negative: the loss from ownership fragmentation outweighs the gain from higher fees.[23]

The strength of this effect depends on how different shareholders' monitoring efforts interact. When monitoring efforts are close substitutes (as in our baseline model with $\rho \geq 2$), ownership fragmentation is particularly costly. As we show in Online Appendix C.2, however, the net effect on monitoring can reverse when the substitutability of monitoring efforts is sufficiently weak (ρ is close to one). In this case, fragmented ownership is less consequential for monitoring, so the fee effect dominates and the average portfolio payoff increases.[24]

Taken together, the key distinction between supply- and demand-side forces lies in their effects on fund managers' compensation. Supply-driven entry compresses fees and weakens shareholder oversight, whereas demand-driven entry raises fees and can strengthen monitoring, but only when fund proliferation occurs within incumbent families. Thus, the tendency for new funds to be launched within established families (e.g., Betermier et al. 2023), together with the dominance of large asset managers offering a broad range of differentiated products, may have helped preserve, or even strengthen, governance despite fund proliferation.

These results underscore the central role of fund families in sustaining oversight: expansion within existing families maintains aggregate family ownership, and centralized stewardship allows higher fees—reflecting more heterogeneous investor preferences—to translate into stronger monitoring incentives. The next section shows, however, that the same investor heterogeneity can also push asset managers to compete by decentralizing stewardship.

5.2 Decentralization of stewardship

As investor preferences have become more heterogeneous, asset managers have responded not only by launching new funds but also by reallocating voting authority – representing a new form of competition, focused on governance and control rights, rather than portfolio holdings. For

[23]More precisely, there are two counteracting effects on fees: fees rise due to investors' higher valuations of funds, but drop once a new family enters the market; see Figure 2*b*. Proposition 4 shows that the the net effect on fees remains positive, but this increase in fees is not sufficient to offset the drop in market share due to new entrants.

[24]Monitoring activities differ in how substitutable shareholders' efforts are. Actions such as submitting proposals, running activist campaigns, or engaging directly with management are often highly substitutable: once one shareholder acts, additional effort adds little. Voting, by contrast, can involve low substitutability. For example, when voting aggregates information about proposals of uncertain value when changing the outcome requires reaching a voting threshold, shareholders' voting efforts are more complementary.

example, disagreements over E&S issues not only led to the rise of sustainable and anti-ESG funds, but also prompted the delegation of voting authority to fund investors through pass-through voting, effectively leading to a decentralization of stewardship. Decentralization can also occur through the delegation of voting authority to individual fund managers, who align their votes more closely with investors' preferences. While such decentralization can improve preference aggregation on divisive issues, it can weaken monitoring by dispersing voting power. In this section, we examine these trends and analyze how different forms of decentralization shape shareholder oversight. We begin with pass-through voting in Section 5.2.1, and then analyze delegation to fund managers in Section 5.2.2. For simplicity, we abstract form entry and take the number of families N and the number of funds per family F as given.

5.2.1 Pass-through voting

Under pass-through voting programs, investors exercise voting rights directly rather than delegating them to fund managers (Malenko and Malenko 2025). This arrangement thus shifts control—and with it monitoring authority—from fund managers to investors. The benefit of pass-through voting for fund investors is that it allows them to vote in line with their individual preferences and beliefs, particularly on ideological issues, such as environmental or social proposals.

To study asset managers' incentives to offer pass-through voting, we consider the following setup. At $\tau = 1$, families simultaneously decide on fees and, in addition, whether to (i) adopt pass-through voting for all their funds or (ii) continue monitoring firms and voting themselves. At $\tau = 2$, as in the baseline model, investors choose between funds, funds invest according to their mandates, and monitoring and voting decisions are made. The key difference from the baseline is that, at $\tau = 2$, in addition to monitoring (which can be interpreted as voting on operational or governance issues that increase firm value for all investors), there is also voting on "ideological" issues, over which investors' positions differ. An investor derives additional utility when her vote is cast in line with her preferences (either directly, as under pass-through voting, or indirectly, when the vote is cast by the fund manager), and disutility when it is not. Formally, each firm faces a continuum of ideological proposals, each characterized by its type $\delta \in [0, 2\pi]$, uniformly distributed on the unit circle. An investor of type α receives, in addition to utility from portfolio investment in Eq. (2), a warm-glow utility from her voting

$$B\int_0^{2\pi} v_\delta \cos(\delta-\alpha)\,d\delta, \tag{21}$$

where $v_\delta = 1$ if her vote (for all of her shares) is cast in favor of proposal δ and $v_\delta = -1$ if it is cast against; $\boldsymbol{v} = (v_\delta)_{\delta\in[0,2\pi]}$ denotes the investor's overall vote profile. To isolate ideological voting, we assume that ideological proposals are value-neutral, i.e., whether they pass or fail does not affect firm payoffs. Eq. (21) thus captures expressive voting preferences (e.g., Brennan and Hamlin 1998), with B representing the warm-glow utility an investor derives when her vote is cast in line with her values. Such warm-glow utility may reflect intrinsic values for the asset manager's retail clients or, for institutional clients—such as endowments and public pension funds—may arise from political or stakeholder pressures related to climate, sustainability, and social objectives.

Under pass-through voting, the investor votes herself, and hence picks $v_d = \mathbf{1}\{\cos(\delta-\alpha)>0\} - \mathbf{1}\{\cos(\delta-\alpha)<0\}$, so the investor's overall warm glow utility equals $2B\int_{-\pi/2}^{\pi/2}\cos(\gamma)\,d\gamma = 4B$ (see Lemma 13 in the Online Appendix).[25] Without pass-through voting, the investor's vote is cast by the asset manager, i.e., the fund family. Because the family's aggregate position on ideological proposals is neutral (a family that offers a fund with mandate α_k also offers one with mandate $\alpha_k+\pi$), it does not vote ideologically. Formally, we assume that the family does not favor any particular group of its investors and randomizes between voting for and against with equal probability across ideological proposals. As a result, under centralized stewardship, the investor's expected warm-glow utility is zero.

The downside of pass-through voting is that small investors have no advantage in monitoring, effectively facing an infinitely high monitoring cost. The rationale is that if monitoring is interpreted as informed voting on governance and operational matters, or as engagement and negotiation with management, individual fund investors are too small to have incentives to perform these activities effectively.[26] Hence, shares held under pass-through voting do not affect firm

[25] In practice, institutional clients of large asset managers that opt into pass-through voting can indeed vote directly, through an in-house stewardship team and tailored recommendations from proxy advisors (see Hu et al. 2025). For small institutional clients and retail clients, pass-through voting is implemented via menus of proxy-advisor policies. Our implicit assumption is that these menus are sufficiently granular to capture investors' preferences precisely. Note also that for now, we treat parameter B as being independent of r as this does not matter for any of the results; in practice, B and r are likely to move together.

[26] We can formalize this point using the logic of Lemma 2. When monitoring is performed by I individual investors, investor i's monitoring incentives are governed by $\xi_{\beta,i} = x_{\beta,i}/(\gamma I)$. By Lemma 2, for $\rho \geq 2$,only one investor monitors any given asset. As the number of investors grows large ($I\to\infty$), that investor's incentive, and

payoffs.[27] In contrast, without pass-through voting, the asset manager's monitoring technology is the same as in the baseline model, with its effort continuing to depend on its equilibrium market share and fees.[28]

To maintain parallelism with our assumptions about fees, we assume that decisions about pass-through voting adoption are private and only observable by investors.[29] In addition, as in the baseline model, we continue to assume that investors ignore families' deviations from the equilibrium path in either fees or pass-through voting adoption, and thus take v_β and p_β as given, fixed at their equilibrium levels. We focus on symmetric equilibria in pure strategies, in which either all families adopt pass-through voting for their funds or no family adopts it. The next proposition characterizes the conditions under which pass-through voting emerges in equilibrium.

Proposition 5. *Suppose $N \geq 4$. There exist $0 < \underline{B} < \bar{B}$ such that, in the unique symmetric equilibrium, all families adopt pass-through voting if $B \geq \bar{B}$, and all families do not adopt pass-through voting if $B < \underline{B}$. When all families adopt pass-through voting, equilibrium fees are higher than in the baseline model, investor utility and fund family profits are higher, while the welfare of initial asset owners is lower.*

A fund family contemplating a deviation from the no-pass-through-voting equilibrium weighs the benefits and costs of offering pass-through voting. On the benefit side, pass-through voting generates warm-glow utility for investors, giving the family a non-price competitive advantage that allows it to attract greater market share from its competitors and charge higher fees. On the cost side, the family realizes that pass-through voting comes with reduced shareholder oversight, which decreases firms' payoffs and thus the family's fee revenues. The latter effect arises because

hence equilibrium monitoring, converges to zero.

[27] Moreover, by delegating voting authority to fund investors, asset managers also weaken their own ability to monitor through other channels beyond voting, such as engagement. Engagement in practice relies on the credibility of a voting threat. As one asset manager explains, "voting is an extension of our engagement … [if we hand voting to fund investors,] we lose control of that process," and management teams "ultimately want to deal with whomever is making the decision" (Gomtsian and Gosling 2026).

[28] Note that if u is close to zero, adoption of pass-through voting implies that $\bar{v} \to 0$, and so dollar fees in Eq. (19) can only be attained if f exceeds 100%. To avoid this, in what follows, we assume that u is large enough, so that equilibrium fees stay below 100% even under universal adoption of pass-through voting.

[29] This assumption simplifies the analysis of deviations from the equilibrium, as it implies that the family can keep the monitoring efforts of other families fixed at their equilibrium levels. If, instead, we assumed that decisions about pass-through voting were observable, asset managers would have an additional incentive to adopt it: it would allow the adopting fund to free-ride on the monitoring effort of others. In particular, other families, realizing that the adopting family would no longer monitor, would pick up the monitoring, allowing the deviating family to save on monitoring costs while preserving firm value.

investors, being price and value takers, ignore that lower monitoring by a deviating family reduces firm payoffs. As a result, asset prices do not adjust when the family deviates, so the family partially bears the cost of its weaker monitoring.[30]

The equilibrium outcome depends on the magnitude of warm glow benefits B. When B is sufficiently large, the competitive benefits outweigh the costs, resulting in all families adopting pass-through voting. Conversely, when B is small, the potential market share gains cannot compensate for the associated costs, leading to a unique equilibrium with no pass-through voting adoption. This result is consistent with pass-through voting becoming prominent only in recent years. As polarization over environmental and social issues has intensified – effectively corresponding to an increase in B – investors' demand for value-aligned voting has grown substantially (e.g., Gomtsian and Gosling 2026).[31]

Proposition 5 has two interesting implications. First, under universal adoption of pass-through voting, funds are no longer differentiated along this dimension in equilibrium. As a result, funds cannot charge a premium for offering pass-through voting, and investors fully capture the warm-glow benefits from voting their shares. Nevertheless, equilibrium fees are higher than in the no-pass-through-voting equilibrium. These higher fees do not reflect a direct charge for pass-through voting. Instead, they arise because equilibrium portfolio payoffs are lower, due to the transfer of monitoring responsibilities from fund managers to investors. Since total dollar fees are pinned down by market structure – which is unchanged – and do not depend on the level of monitoring, total fees remain constant. Consequently, fee rates f increase to offset the reduction in payoffs; see Eq. (19).

Second, despite the fact that universal adoption of pass-through voting does not allow for additional differentiation, fund families still prefer to coordinate on adoption. The reason is that pass-through voting effectively commits fund managers not to monitor. Hence, it allows them to charge higher fees and recoup the same dollar revenues, but without incurring the monitoring

[30] Note that even if, instead, all agents fully accounted for the fact that the deviating family no longer engages in monitoring, fund investors would anticipate lower payoffs for the firms previously monitored by that family. Other investors in the market would adjust their expectations as well and reduce their demand for these firms. In equilibrium, prices would decline accordingly, so the net payoff, $v_\beta - p_\beta$, would remain unchanged. As a result, fund investors' choice between funds would be the same as in the setting we consider.

[31] Another reason for the rise of pass-through voting is the decline in its effective cost, which could be modeled as a fixed adoption cost. Technological advances and political pressure have jointly lowered this cost, making pass-through voting technically feasible and politically advantageous for asset managers seeking to reduce the risks of concentrated voting power. See the discussion in Gomtsian and Gosling (2026) and "Technology Advances Facilitate Pass-Through Voting," *Harvard Law School Forum on Corporate Governance*, February 24, 2024.

costs, thereby increasing profits. Moreover, fund investors also benefit from pass-through voting because they capture warm-glow benefits of voting their shares in line with their preferences. At the same time, they are not affected by lower asset returns, because prices adjust in equilibrium to make all assets cheaper. The only agents who lose from pass-through voting are initial owners of the assets. The withdrawal of fund families from monitoring lowers asset values, and hence, the prices at which they sell those assets.

We next show that equilibrium pass-through voting adoption tends to be suboptimally high.[32]

Proposition 6. *For all sufficiently large F, if pass-through voting adoption by all funds is socially optimal for some B, then it also arises in the unique equilibrium of the pass-through voting adoption game; yet, for a range of B, the reverse statement is not true.*

The intuition is as follows. The welfare of all agents in the economy consists of the welfare of fund investors, fund families, and initial asset owners. Pass-through voting is socially optimal when investors' warm-glow benefits exceed the gains from monitoring (net of costs incurred by fund families), $4B \geq 2\pi \left(se - \frac{\gamma}{2}e^2\right)$. However, a fund family's private incentives to adopt pass-through voting differ from the social trade-off. When a single family deviates and is the first to adopt pass-through voting, it can fully extract investors' warm-glow benefits by raising fees. By contrast, the resulting loss from weaker monitoring is shared across all funds and investors in the market, so the deviating family internalizes only part of the associated efficiency loss. As a result, families adopt pass-through voting even when it is not socially optimal.

Overall, this analysis shows that competitive pressures can induce asset managers to adopt pass-through voting without fully internalizing its adverse effects on shareholder oversight. A natural question is why authority over different types of decisions cannot be separated – delegating governance-related issues to asset managers while allowing individual investors to vote on ideological proposals. In practice, such separation does not occur, likely due to both technological and conceptual constraints. First, it is difficult to anticipate ex ante which firms will face ideological proposals and when. Second, governance and ideological considerations often overlap: for example, investors' climate views often influence their votes in director elections. Third, existing voting infrastructure does not easily support splitting voting authority across issues within the same account.

[32] In both Proposition 6and 8, we assume that F is sufficiently large, so that each fund family offers a wide range of funds. This assumption captures well the current competitive structure of the fund industry.

More fundamentally, as we show in Proposition 5 fund families benefit from committing not to actively monitor firms when they universally adopt pass-through voting. If voting on governance-related issues and ideological proposals were separated, with only the latter delegated to individual investors, this commitment would no longer hold. In that case, similar to the baseline model, fund families would incur monitoring costs ex-post, but would not gain from monitoring ex-ante. As a result, even if such separation were practically feasible, it would not be in the interest of the asset manages to implement it.

While our model is designed to capture both passive and actively managed funds, the force toward pass-through voting is likely weaker for actively managed funds. As discussed above, when fund managers possess private information about the firms they plan to trade or influence, monitoring can generate trading profits because the market does not fully anticipate the value created by future intervention. In such settings, monitoring is no longer a pure cost from an ex-ante perspective. As a result, actively managed funds may have stronger incentives to retain centralized control over voting and engagement, consistent with the observation that pass-through voting has so far been adopted primarily by fund families whose assets are predominantly passive.

5.2.2 Delegation to fund managers

We next analyze decentralization via delegation to fund managers, under which voting and monitoring authority is assigned to individual fund managers within a family, rather than to fund investors directly. As in Section 5.2.1, there is both traditional monitoring and voting on value-neutral ideological proposals. We assume that on ideological proposals, fund manager k votes according to its mandate α_k, maximizing the warm glow utility of an investor of type α_k. For monitoring, fund k optimally chooses its effort in each firm β based on its position $x_{\beta,k}$ and fees f, which are set at the family level to maximize fund-level profits (see Eq. (29) in the Appendix). We allow the monitoring efficiency at the fund level to differ from that at the family level: the fund manager's cost parameter is γ_d, which may differ from γ. For example, $\gamma_d < \gamma$ if fund managers have superior firm-specific information relative to the family's stewardship team due to their more concentrated holdings, or $\gamma_d > \gamma$ if large blockholders (i.e., the family relative to the fund) are more effective monitors due to their greater voting power.

Voting on ideological proposals. Fund k with mandate α_k votes on ideological proposals to maximize (21) for investor type α_k, which results in the voting strategy $v_\delta = \mathbf{1}\{\cos(\delta - \alpha_k) > 0\} -$

$\mathbf{1}\{\cos(\delta-\alpha_k)<0\}$. As shown in Lemma 13 in the Online Appendix, for an investor of type α, the resulting warm glow utility from investing with fund k is $4B\cos(\alpha_k-\alpha)$. Thus, compared with pass-through voting, decentralization via fund managers captures investors' preferences only partially, reflecting investor heterogeneity within funds. As the number of funds K increases, investors within each fund become more homogeneous, and decentralization through fund managers better reflects investors' individual preferences.

Monitoring. Since monitoring is delegated to funds, concentration of individual fund positions matters for equilibrium monitoring incentives. Lemma 2 in the Appendix shows that any firm $\beta\in(\alpha_k-\pi/K,\alpha_k+\pi/K)$ is monitored by fund k, as it holds the most concentrated position in this firm relative to other funds. This fund exerts effort

$$e_{\beta,k}=\frac{f_d x_{\beta,k}}{K\gamma_d}=\frac{f_d}{K\gamma_d}\left(s+\frac{r}{\eta}\cos(\beta-\alpha_k)\right), \tag{22}$$

where we use subscript d to denote equilibrium quantities when monitoring is delegated to funds. Eq. (22) implies that firms receive different levels of shareholder oversight, with the highest monitoring effort directed at firms where the corresponding fund holds the most concentrated position. This creates a complication in obtaining closed-form analytical expressions; yet, a characterization is possible in the approximation when K is large.

Proposition 7. *Suppose $u=0$. Then,*

$$\frac{\bar{v}_d}{\bar{v}}=\sqrt{\frac{1+r/(\eta s)}{F}\frac{\gamma}{\gamma_d}}+o\left(1/K^3\right), \tag{23}$$

where $\bar{v}_d$ is the average portfolio payoff under delegation to fund managers.

Proposition 7 shows that decentralization via delegation to fund managers has both positive and negative effects on shareholder oversight. On the one hand, centralized monitoring creates a large blockholder with a substantial ownership stake, strengthening monitoring incentives; under delegation, each fund's smaller market share weakens incentives. This effect is reflected in the term F in Eq. (23), which is the ratio of the fund family's market share to that of individual funds. On the other hand, individual funds have more concentrated positions in firms they hold under their mandates, which enhances monitoring compared to a diversified family portfolio. This effect, represented by $r/(s\eta)$ in the numerator of Eq. (23), becomes more important as investor preference intensity r rises. If the monitoring technology under decentralized monitoring is less efficient ($\gamma_d \geq \gamma$), the first effect always dominates.[33] However, if delegation to individual fund managers better leverages fund-level information ($\gamma_d < \gamma$), Eq. (23) implies that stronger fund-level incentives and superior information can make decentralized monitoring preferable.

This logic echoes Glenn Booraem, then Vanguard's Investment Stewardship Officer, who noted that Vanguard decentralized parts of its stewardship after concluding that "integrating proxy voting and engagement activities with the manager's investment strategy is a value-add for our fund investors" (Booraem 2019). It is also consistent with the findings of Herrmann et al. (2025), who show that Vanguard's funds with more concentrated portfolio holdings are more likely to vote independently from proxy advisors after receiving voting authority post-decentralization.

While the above analysis does not explicitly model fund families' strategic decision to decentralize stewardship through delegation to fund managers, it shows that the underlying forces parallel those for pass-through voting. On the one hand, decentralized voting allows families to attract investors from competitors, as specialized funds better represent investors' ideological positions than a centralized stewardship team representing the average interests of the family. On the other hand, as Proposition 7 shows, such decentralization may weaken shareholder oversight, reducing portfolio payoffs and fee revenues. As in the case of pass-through voting, decentralized monitoring would arise when B is sufficiently large, while centralized monitoring would prevail when B is small.

Finally, we compare delegation to fund managers to decentralization via pass-through voting.

Proposition 8. *There exists $\bar{F}$ such that, for any $F > \bar{F}$, delegation to fund managers is more efficient than pass-through voting when γ is sufficiently small or B is sufficiently small. Regardless of which regime is more efficient, fund investor utility and fund family profits are higher under pass-through voting than under delegation to fund managers, while the welfare of initial asset owners is lower.*

Although both forms of decentralization allow some representation of investors' heterogeneous preferences, their governance and efficiency implications differ. When stewardship is delegated to a limited number of fund managers who pool investor capital, hold meaningful stakes, and are sufficiently effective monitors (i.e., when γ is small), shareholder oversight can be preserved. In

[33] This effect may no longer dominate if we allow for short-selling: recall that to prevent short-selling in equilibrium, we imposed $r \leq \eta s$, which implies $1 + r/(\eta s) \leq 2 \leq F$.

this case, unless investors' benefits from voting according to their values are large (i.e., as long as B is not too high), delegation to fund managers is more efficient than pass-through voting. Proposition 8 nevertheless shows that both fund investors and fund families prefer pass-through voting over delegation, even when it comes at a significant loss to initial asset owners. For fund investors, pass-through voting offers better representation of their preferences; for fund families, it allows them to generate the same fee revenues without incurring monitoring costs. As a result, even though governance is stronger under delegation to fund managers, pass-through voting can arise because initial asset owners are not typically represented in decisions over stewardship and voting arrangements.

6 Conclusion

This paper examines how recent developments in the asset management industry – growing heterogeneity and polarization in investor preferences, fund proliferation, and a shift toward decentralized stewardship – affect governance outcomes. Together, these trends fragment ownership structures and raise questions about the implications for shareholder oversight. Our framework highlights that ownership fragmentation driven by asset managers catering to heterogeneous investors is fundamentally different from the earlier era of dispersed individual shareholders. Because investment and monitoring are delegated, fund manager compensation and the internal organization of asset managers play a central role in shaping governance outcomes.

Our analysis has three key implications. First, unlike fund proliferation driven by supply-side factors, demand-driven proliferation—reflecting stronger investor preferences for differentiated investment products—can strengthen shareholder oversight, but only when new funds are launched within incumbent families that centralize stewardship. Second, strong investor preferences can induce asset managers to compete on a new margin – decentralizing stewardship activities to better reflect investors' individual preferences and beliefs, even when such decentralization is inefficient and weakens shareholder oversight. Third, the form of decentralization matters: pass-through voting caters closely to investor preferences but dilutes governance, whereas delegating authority to specialized fund managers who serve those preferences can help sustain effective monitoring. Nevertheless, competitive pressures may lead asset managers to adopt pass-through voting despite its adverse governance effects.

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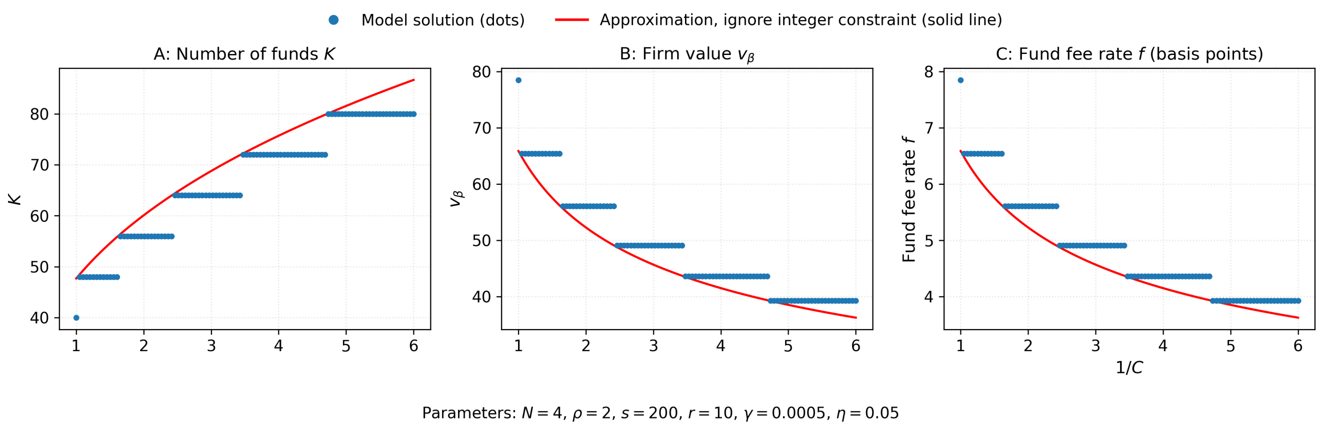
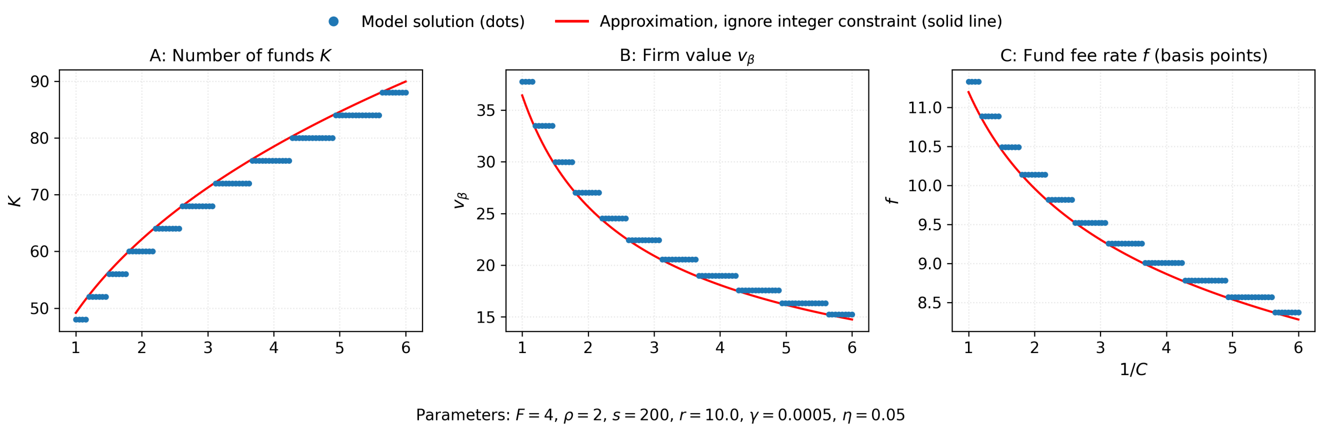
Figures



(a) Family expansion



(b) New family entry

Figure 3: Effect of supply factors: Comparative statics with respect to C

A Appendix: Equilibrium formalization

A.1 Equilibrium definition

In this section, we fully describe the game, formalizing asset managers' fee setting and monitoring decisions, and define the equilibrium.

Baseline model. In the analysis of symmetric equilibria, the only relevant histories at $\tau = 2$ are those where all fund families set the same equilibrium fees or where at most one fund family deviates from the equilibrium fee. For both histories, since families set uniform fees across all their funds and no fund family owns two neighboring funds, the market share of any fund k in family n depends only on the fees set by other fund families, that is,

$$m_k\left(f_k, f_{-k}\right) = m\left(f_n, f_{-n}\right) \text{ where } k \in F_n,$$

for some function m. Recall that, abusing slightly notation, we denote by f_k the fees offered by fund k and f_n the uniform fees set by fund family n. Hence,

$$\sum_{k \in F_n} f_k m_k\left(f_k, f_{-k}\right) x_{\beta,k} = f_n m\left(f_n, f_{-n}\right) F X_{\beta,n} = f_n M_n \bar{x}_{\beta,n},$$

where

$$\bar{x}_{\beta,n} \equiv \frac{1}{|F_n|} \sum_{k \in F_n} x_{\beta,k} = \frac{1}{F} \sum_{k \in F_n} x_{\beta,k},$$

is the average investor holding of asset β for family n, and

$$M_n = M\left(f_n, f_{-n}\right) \equiv \sum_{k \in F_n} m_k\left(f_k, f_{-k}\right) = F m\left(f_n, f_{-n}\right) \tag{24}$$

is the aggregate client mass of family n. Thus, we can re-write the objective function of family n in Eq. (5) as

$$\int_0^{2\pi} f_n M_n \bar{x}_{\beta,n}\left(u + v\left(e_{\beta,n}, \boldsymbol{e}_{\beta,-n}\right)\right) d\beta - c\left(\boldsymbol{e}_n\right).$$

As noted in the setup, we assume that competitors' fees are unobservable, and hence when choosing its monitoring effort at $\tau = 2$, each family n knows its own fee f_n (set at $\tau = 1$) but not the fees of its competitors. In addition, since monitoring decisions are assumed to happen simultaneously with investors choosing between funds, the family does not know the masses of its own or its competitors' clients when choosing monitoring. This implies that M_n is computed taking all f_{-n} to be equal to the equilibrium fee rate f, and all $\boldsymbol{e}_{-n}$ are believed to be at their equilibrium level $\boldsymbol{e}(f)$. Therefore, at $\tau = 2$, asset manager n chooses $\boldsymbol{e}_n$ to maximize

$$\max_{\boldsymbol{e}_n} f_n M_n v_n(\boldsymbol{e}_n, \boldsymbol{e}_{-n}) - c(\boldsymbol{e}_n), \tag{25}$$

where

$$v_n(\boldsymbol{e}_n, \boldsymbol{e}_{-n}) = \int_0^{2\pi} \bar{x}_{\beta,n}\left(u + v\left(e_{\beta,n}, \boldsymbol{e}_{\beta,-n}\right)\right) d\beta$$

is the average portfolio payoff of fund family n. Denoting

$$\Lambda_n \equiv f_n M_n, \tag{26}$$

we can re-write problem (25) as

$$V(\Lambda_n) = \max_{\boldsymbol{e}_n} \Lambda_n v_n(\boldsymbol{e}_n, \boldsymbol{e}_{-n}) - c(\boldsymbol{e}_n).$$

Then, at the fee-setting stage, $\tau = 1$, family n chooses a uniform fee f_n for all its funds to maximize

$$\begin{aligned} &\max_{f_n} V(\Lambda_n) \\ &\text{s.t. } \Lambda_n = f_n F m(f_n, f_{-n}). \end{aligned} \tag{27}$$

We can now formally define equilibrium.

Definition 1. *The equilibrium consists of (i) equilibrium fees f and monitoring strategy $\boldsymbol{e}(f)$ chosen by fund families; (ii) investors' fund choices $\kappa(\alpha) \in \{1, \ldots, K\}$; and (iii) asset prices p_β and investor beliefs about v_β that satisfy*

1. *(Investor rationality) For any fee configuration $(f_1, \ldots, f_K)$ and given p_β and v_β for all β, $\kappa(\alpha)$ maximizes (2).* Fund market shares are consistent with investor choices: for all k,

$$m_k(f_k, f_{-k}) = |\alpha : \kappa(\alpha) = k|.$$

2. *(Asset managers' sequential rationality) Equilibrium fee f solves (27), and for any fund family n and fee f_n set at $\tau = 1$, $\boldsymbol{e}(f_n)$ solves (25).*

3. *(Market clearing) Asset prices clear the market*

$$\sum_{k=1}^{K} x_{\beta,k} m_k(\phi_k, \phi_{-k}) = s. \tag{28}$$

Decentralized monitoring. In Section 5.2, we consider the model with decentralized monitoring. The difference from the baseline model is that monitoring decisions are made at the fund level (rather than fund family). Formally, fund k chooses $\boldsymbol{e}_k$ to maximize its profits

$$\max_{\boldsymbol{e}_k} \int_0^{2\pi} f_k m_k \left(f_k, f_{-k}\right) x_{\beta,k} v\left(\vec{e}_\beta\right) d\beta - c\left(\boldsymbol{e}_k\right). \tag{29}$$

By the same argument as above, we can re-write it as

$$\max_{\boldsymbol{e}_k} f_k m_k v_k\left(\boldsymbol{e}_k, \boldsymbol{e}_{-k}\right) - c\left(\boldsymbol{e}_k\right), \tag{30}$$

where $m_k\left(f_k, f_{-k}\right)$ is the client mass of fund k given its own fee f_k and the fees of other funds f_{-k} and

$$v_k\left(\boldsymbol{e}_k, \boldsymbol{e}_{-k}\right) = \int_0^{2\pi} x_{\beta,k}\left(u + v\left(\vec{e}_\beta\right)\right) d\beta.$$

The definition of the equilibrium above is augmented in that equilibrium $\boldsymbol{e}(f_k)$ solves (30) rather than (25), but otherwise is unchanged.

A.2 Microfoundation for the free-entry condition in the family expansion case

In this section, we provide a simple microfoundation for the free-entry condition $\Pi^S(F) = C$ for the model in which existing fund families expand the numbers of their funds. Specifically, suppose that at time $\tau = 1$ (i.e., after the fund families determine the numbers of funds $K = FN$, and simultaneously with incumbent families setting their fees), there is a large number of potential entrants. Each potential entrant can pay an entry cost $\hat{C}$ to set up one fund in a location (mandate) of its choice and offer it to fund investors. We assume that existing fund families do not observe entry of these potential entrants when deciding on their fees and monitoring efforts, and thus we can keep these quantities fixed at the equilibrium level when evaluating a potential entrant's payoff. We also assume that the new entrant does not engage in governance (when $\rho \geq 2$, this follows automatically from the fact that the entrant has lower incentives to engage than one of the incumbent families). At time 0, the incumbent fund families choose the number of their funds F to deter potential entrants. As Betermier et al. (2023) argue, this deterrence theory matches the observed patterns of new fund launches in the mutual fund industry: they conclude that "launching numerous funds on an increasingly granular style grid allows incumbent families to congest the product space and deter market entry."

We consider two cases. In the first, simpler, case, a potential entrant cannot choose its fee and is required to set it at the equilibrium level charged by all incumbent fund families. As we show in Online Appendix C.3, when $u = 0$, this simple case is equivalent to the free-entry condition $\Pi^S(F) = \tilde{C}$, where $\Pi^S(F)$ is the per-fund profit of an incumbent fund family for some $\tilde{C}$. This is the baseline case that we use to justify the free-entry condition (20). In the second case, a potential entrant can optimize over its fee as well. In Online Appendix C.3, we show that this second case is equivalent to the free-entry condition $\Pi^S(F) = \tilde{C}(F)$ for some function $\tilde{C}(F)$, and that this equation has a unique solution in F.

B Appendix: Proofs

B.1 Baseline model

Proof of Lemma 1. As argued in the main text, funds' portfolios are given by Eq. (6).[34] Hence, the fund family n's demand for asset β equals

$$\begin{aligned}\sum_{k\in F_n} x_{\beta,k} m_k &= \sum_{k\in F_n} \frac{1}{\eta}\left(v_\beta - p_\beta + r\cos(\beta - \alpha_k)\right) m_k \\ &= \frac{1}{\eta}(v_\beta - p_\beta)\sum_{k\in F_n} m_k + \frac{r}{\eta}\underbrace{\sum_{k\in F_n}\cos(\beta-\alpha_k)\, m_k}_{=0} \\ &= \frac{1}{\eta}(v_\beta - p_\beta)\sum_{k\in F_n} m_k.\end{aligned}$$

Here, we used the fact that if fund family n owns both fund with mandate α_k and $\alpha_k + \pi$, and so, their portfolio tilts cancel out (the second term in the second line is zero). Combining this equation with Eq. (28), we get

$$\sum_{n=1}^{N}\sum_{k\in F_n} x_{\beta,k} m_k = \frac{1}{\eta}(v_\beta - p_\beta) = s, \tag{31}$$

which gives Eq. (8). Plugging (8) into (6), we get (7). □

Proof of Lemma 2. Since monitoring costs and benefits are integrated across all assets, we can consider the monitoring game between fund families for each particular asset β in isolation. We consider assets

[34] Observe that given our assumptions, Eq. (6) is fund k's portfolio even in the off-equilibrium subgame when funds deviate to off-equilibrium fee at $\tau = 1$. This is because (i) by assumption, fund investors take v_β and p_β as given at their equilibrium values – hence, if investors see an off-equilibrium fee, they do not change their beliefs about v_β and p_β; (ii) also by assumption, fund k picks the portfolio that would be optimal for investor α_k given the investor's beliefs, and since those beliefs are fixed at the equilibrium v_β and p_β, the fund's portfolio does not change.

$\beta \in [0, 2\pi]\backslash\mathcal{B}_0$, where $\mathcal{B}_0 = \{2\pi/K, k = 1, \ldots, K\}$. Assets in $\mathcal{B}_0$ are of zero measure and do not have aggregate implications.

By Eq. (7), there is a unique k that maximizes $x_{\beta,k}$. Our equilibrium refinement implies that there is a unique $\hat{n}$ such that $\xi_{\beta,\hat{n}} > \xi_{\beta,n}$ for all $n \neq \hat{n}$. At $\tau = 2$, when choosing its monitoring effort, each fund family manager knows her own fees. Since competitors' fees are unobservable and monitoring decisions are made simultaneously with fund investor choices (and hence masses of investors are not yet observable), she believes that other fund families set fees at the equilibrium level. Consider fund family n and let $\boldsymbol{e}_{\beta,-n}$ be equilibrium monitoring efforts chosen by families other than n. Then, the manager of fund family n solves

$$\boldsymbol{\pi}\left(e_{\beta,n}\right) \equiv \gamma\xi_{\beta,n}\left(u + v\left(e_{\beta,n}\boldsymbol{e}_{\beta,-n}\right)\right) - \frac{\gamma e_{\beta,n}^2}{2} \rightarrow \max_{e_{\beta,n}} \tag{32}$$

The first-order condition for (32) is

$$\boldsymbol{\pi}'\left(e_{\beta,n}\right) = \gamma\xi_{\beta,n}\left(\sum_{j=1}^{N} e_{\beta,j}^{\rho}\right)^{1/\rho-1} e_{\beta,n}^{\rho-1} - \gamma e_{\beta,n} = 0,$$

which is satisfied by $e_{\beta,n} = 0$ or $e_{\beta,n} > 0$ that solves

$$\left(\sum_{j=1}^{N} e_{\beta,j}^{\rho}\right)^{(1-\rho)/\rho} = \frac{e_{\beta,n}^{2-\rho}}{\xi_{\beta,n}}. \tag{33}$$

The second-order condition for (32) is

$$\boldsymbol{\pi}''\left(e_{\beta,n}\right) = \gamma\xi_{\beta,n}\left[\left(\sum_{j\in\mathcal{N}} e_{\beta,j}^{\rho}\right)^{1/\rho-2}\left(1-\rho\right)e_{\beta,n}^{2\rho-2} + \left(\sum_{j\in\mathcal{N}} e_{\beta,j}^{\rho}\right)^{1/\rho-1} e_{\beta,n}^{\rho-2}\left(\rho-1\right)\right] - \gamma \leq 0. \tag{34}$$

When $e_{\beta,n} > 0$ solves (33), the second-order condition can be equivalently written as

$$\begin{aligned}
\boldsymbol{\pi}''\left(e_{\beta,n}\right) &= \gamma\xi_{\beta,n}\left[\left(\sum_{j\in\mathcal{N}} e_{\beta,j}^{\rho}\right)^{1/\rho-2}\left(1-\rho\right)e_{\beta,n}^{2\rho-2} + \left(\sum_{j\in\mathcal{N}} e_{\beta,j}^{\rho}\right)^{1/\rho-1} e_{\beta,n}^{\rho-2}\left(\rho-2\right)\right] + \pi'\left(e_{\beta,n}\right)/e_{\beta,n} \\
&= \gamma\xi_{\beta,n}\left(\sum_{j\in\mathcal{N}} e_{\beta,j}^{\rho}\right)^{1/\rho-2} e_{\beta,n}^{\rho-2}\left[\sum_{j\in\mathcal{N}} e_{\beta,j}^{\rho}\left(\rho-2\right) - e_{\beta,n}^{\rho}\left(\rho-1\right)\right] \\
&= \gamma\xi_{\beta,n}\left(\sum_{j\in\mathcal{N}} e_{\beta,j}^{\rho}\right)^{1/\rho-2} e_{\beta,n}^{\rho-2}\left[\sum_{j\in\mathcal{N}\backslash n} e_{\beta,j}^{\rho}\left(\rho-2\right) - e_{\beta,n}^{\rho}\right] \leq 0.
\end{aligned} \tag{35}$$

Denote by $\mathcal{N}$ the subset of fund families with positive equilibrium monitoring efforts, $e_{\beta,n} > 0$, and by $\mathcal{N}_0 \equiv \{0, \ldots, N\} \backslash \mathcal{N}$ – the remaining fund families. Suppose $\rho \neq 2$. For all $n \in \mathcal{N}$, Eq. (33) implies

$$e_{\beta,n} = (\xi_{\beta,n})^{1/(2-\rho)} \left(\sum_{j \in \mathcal{N}} e_{\beta,n}^{\rho} \right)^{\frac{(1-\rho)}{(2-\rho)\rho}} = (\xi_{\beta,n})^{1/(2-\rho)} \left(v\left(\boldsymbol{e}_{\beta}\right)\right)^{\frac{1-\rho}{2-\rho}}.$$

Hence,

$$v\left(\boldsymbol{e}_{\beta}\right) = \left(\sum_{j \in \mathcal{N}} e_{\beta,j}^{\rho} \right)^{1/\rho} = v\left(\boldsymbol{e}_{\beta}\right)^{\frac{1-\rho}{2-\rho}} \left(\sum_{j \in \mathcal{N}} (\xi_{\beta,j})^{\rho/(2-\rho)} \right)^{1/\rho},$$

and so,

$$v\left(\boldsymbol{e}_{\beta}\right) = \left(\sum_{j \in \mathcal{N}} \xi_{\beta,j}^{\rho/(2-\rho)} \right)^{(2-\rho)/\rho}$$

and

$$e_{\beta,n} = \xi_{\beta,n}^{1/(2-\rho)} \left(\sum_{j \in \mathcal{N}} \xi_{\beta,j}^{\rho/(2-\rho)} \right)^{(1-\rho)/\rho}. \tag{36}$$

We consider separately two cases: $\rho = 2$ and $\rho > 2$. First, when $\rho = 2$, Eq. (33) becomes

$$\sum_{j \in \mathcal{N}} e_{\beta,j}^{2} = \xi_{\beta,n}^{2}. \tag{37}$$

By the equilibrium refinement, $e_{\beta,n}$ is increasing in $\xi_{\beta,n}$. Since $\xi_{\beta,\hat{n}} > \xi_{\beta,n}, n \neq \hat{n}$,

$$e_{\beta,n} = \begin{cases} \xi_{\beta,\hat{n}}, & n = \hat{n}, \\ 0, & n \neq \hat{n}. \end{cases} \tag{38}$$

Second, if $\rho > 2$, $e_{\beta,n}$ defined in (36) is decreasing in $\xi_{\beta,n}$, which contradicts the monotonicity of equilibrium strategies. Thus, the only candidate for equilibrium is (38). To verify optimality of this equilibrium strategy, for fund family $\hat{n}$,

$$\boldsymbol{\pi}'\left(e_{\beta,\hat{n}}\right) = \gamma \xi_{\beta,\hat{n}} - \gamma e_{\beta,\hat{n}},$$

which is decreasing in $e_{\beta,\hat{n}}$, and hence, $e_{\beta,\hat{n}} = \xi_{\beta,\hat{n}}$ is optimal for $\hat{n}$. Consider fund family $n \neq \hat{n}$ and

$e_{\beta,n} > 0$. Letting $z = e_{\beta,\hat{n}}/e_{\beta,n}$, we have

$$\begin{aligned}
\boldsymbol{\pi}'\left(e_{\beta,n}\right) &= \gamma e_{\beta,n}\left(\xi_{\beta,n}\left(e_{\beta,\hat{n}}^{\rho}+e_{\beta,n}^{\rho}\right)^{(1-\rho)/\rho}e_{\beta,n}^{\rho-2}-1\right) \\
&= \gamma\left(\frac{\xi_{\beta,n}}{e_{\beta,n}}\left(\frac{e_{\beta,\hat{n}}^{\rho}}{e_{\beta,n}^{\rho}}+1\right)^{(1-\rho)/\rho}-e_{\beta,n}\right) \\
&< \gamma\left(\frac{\xi_{\beta,\hat{n}}}{e_{\beta,n}}\left(\frac{e_{\beta,\hat{n}}^{\rho}}{e_{\beta,n}^{\rho}}+1\right)^{(1-\rho)/\rho}-e_{\beta,n}\right) \\
&= \gamma\left(z\left(z^{\rho}+1\right)^{(1-\rho)/\rho}-1\right).
\end{aligned}$$

The second-order condition (35) is equivalent to

$$e_{\beta,\hat{n}}^{\rho}\left(\rho-2\right)\leq e_{\beta,n}^{\rho},$$

or

$$\left(\rho-2\right)z^{\rho}\leq 1.$$

Lemma 11 in the Online Appendix then implies that $z\left(z^{\rho}+1\right)^{(1-\rho)/\rho} < 1$ whenever $\left(\rho-2\right)z^{\rho}\leq 1$,and hence, $\boldsymbol{\pi}'\left(e_{\beta,n}\right) < 0$, proving that $e_{\beta,n} = 0$ is indeed optimal for $n \neq \hat{n}$.

Thus, we have shown that for $\rho \geq 2$,

$$e_{\beta,n} = \begin{cases} \xi_{\beta,\hat{n}}, & n = \hat{n}, \\ 0, & n \neq \hat{n}. \end{cases}$$

In the limit $\epsilon \to 0$, $\xi_{\beta,\hat{n}} \to \xi_{\beta,n}$. On the equilibrium path, all fund families charge the same fees f, have symmetric market shares $1/N$, and by Eq. (9) hold the same average asset positions. Thus, $\xi_{\beta,n} = \frac{sf}{\gamma N}$, which implies Eq. (12). Eq. (13) then follows from the fact that only a single shareholder monitors in equilibrium. Eq. (14) follows from v_{β} being constant across β and Lemma 1. □

Proof of Lemma 3. Recall that investors take portfolio payoffs as given and equal to $\bar{v}$ given by Lemma 2. Eq. (15) is proved in Lemma 12 in the Online Appendix. The indifference condition of investor type α between portfolios $x_{\beta,k}$ and $x_{\beta,k+1}$ is given by

$$\frac{r^2\pi}{\eta}\cos\left(\alpha-\alpha_k\right) = \frac{r^2\pi}{\eta}\cos\left(\alpha-\alpha_{k+1}\right),$$

which holds for $\alpha = \alpha_k + \pi/K$. $\square$

Lemma 4. *For $\Lambda_n' > \Lambda_n$, $V(\Lambda_n') > V(\Lambda_n)$, where Λ_n is defined by (26).*

Proof of Lemma 4. Let $\boldsymbol{e}_n$ and $\boldsymbol{e}_n'$ be optimal choices of monitoring efforts for Λ_n and Λ_n', respectively. We have

$$\begin{aligned}
V(\Lambda_n) &= \Lambda_n v_n(\boldsymbol{e}_n, \boldsymbol{e}_{-n}) - c(\boldsymbol{e}_n) \\
&< \Lambda_n' v_n(\boldsymbol{e}_n, \boldsymbol{e}_{-n}) - c(\boldsymbol{e}_n) \\
&\leq \Lambda_n' v_n\left(\boldsymbol{e}_n', \boldsymbol{e}_{-n}\right) - c\left(\boldsymbol{e}_n'\right) \\
&= V\left(\Lambda_n'\right).
\end{aligned}$$

The strict inequality follows from the fact that, in equilibrium, some funds choose to enter, and hence, $v_n(\boldsymbol{e}_n, \boldsymbol{e}_{-n}) > 0$. $\square$

Proof of Proposition 1. We derive Eq. (19) in Lemma 8 in the Online Appendix. By Lemma 2,

$$t = f\bar{v} = f\left(u + \frac{sf}{\gamma N}\right),$$

which implies eq. (17). Since f is increasing in t, eq. (19) implies that f is increasing in r, decreasing in η and decreasing in K when holding N fixed. Further, holding K (and hence, t) fixed,

$$\begin{aligned}
\frac{\partial f}{\partial N} =& \left(\frac{\gamma N}{2s}\left(-u + \sqrt{u^2 + \frac{2t}{\pi\gamma N}}\right)\right)_N' \\
=& \frac{\gamma}{2s}\left[-u + \sqrt{u^2 + \frac{2t}{\pi\gamma N}} - \frac{\frac{2t}{\pi\gamma N}}{2\sqrt{u^2 + \frac{2t}{\pi\gamma N}}}\right] \\
=& \frac{\gamma}{2s}\frac{u^2 + \frac{t}{\pi\gamma N} - u\sqrt{u^2 + \frac{2t}{\pi\gamma N}}}{\sqrt{u^2 + \frac{2t}{\pi\gamma N}}} \\
=& \frac{\gamma}{2s}\frac{\sqrt{u^4 + \frac{2t}{\pi\gamma N}u^2 + \left(\frac{t}{\pi\gamma N}\right)^2} - \sqrt{u^4 + \frac{2t}{\pi\gamma N}u^2}}{\sqrt{u^2 + \frac{2t}{\pi\gamma N}}} \geq 0.
\end{aligned}$$

Hence, f is increasing in N. Next,

$$\begin{aligned}
\frac{\partial f}{\partial \gamma} &= \frac{N}{2s}\left(-u + \frac{2u^2\gamma + 2t/(\pi N)}{2\sqrt{u^2\gamma^2 + 2t\gamma/(\pi N)}}\right) \\
&= \frac{u^2\gamma + t/(\pi N) - u\sqrt{u^2\gamma^2 + 2t\gamma/(\pi N)}}{2s/N\sqrt{u^2\gamma^2 + 2t\gamma/(\pi N)}} \\
&= \frac{\sqrt{u^4\gamma^2 + 2tu^2\gamma/(\pi N) + t^2/(\pi N)^2} - \sqrt{u^4\gamma^2 + 2tu^2\gamma/(\pi N)}}{2s/N\sqrt{u^2\gamma^2 + 2t\gamma/(\pi N)}} \geq 0,
\end{aligned}$$

and so, f is increasing in γ. Finally, we derive the profits per fund Π, which are equal to the fee revenues per fund, t/K, minus monitoring costs per fund, denote them by MC. We have

$$\begin{aligned}
MC =& \frac{1}{F}\int_0^{2\pi} \frac{\gamma e_{\beta,n}^2}{2} d\beta \\
=& \frac{1}{F} \cdot \frac{\gamma}{2N}\int_0^{2\pi}\left(\frac{f}{\gamma N}\bar{x}_{\beta,n}\right)^2 d\beta \\
=& \frac{1}{F} \cdot \frac{\pi f^2 s^2}{\gamma N^3} \\
=& \frac{\pi}{KN^2}\frac{f^2 s^2}{\gamma} \\
=& \frac{t}{K} \cdot \frac{1}{2N}\left(1 - \frac{2\pi s u}{\bar{v}}\right),
\end{aligned}$$

where we used

$$f\left(u + \frac{sf}{\gamma N}\right) = \frac{t}{2\pi s} \implies 2\pi s\frac{f^2 s}{\gamma N} = t - 2\pi s u\frac{t}{\bar{v}}.$$

Thus, Eq. (18) obtains. □

The following result is a simple corollary of Proposition 1 that characterizes equilibrium in the case $u = 0$.

Corollary 1. *When* $u = 0$*,*

$$f = \sqrt{\frac{t\gamma N}{2\pi s^2}}, \tag{39}$$

and

$$\bar{v} = \sqrt{\frac{2\pi s^2 t}{\gamma N}}, \tag{40}$$

and

$$\Pi = \frac{t}{K}\left(1 - \frac{1}{2N}\right). \tag{41}$$

Proof of Proposition 2. By Corollary 1, when $u = 0$,

$$\Pi = \frac{t}{K}\left(1 - \frac{1}{2N}\right) = \frac{t}{F}\left(\frac{1}{N} - \frac{1}{2N^2}\right).$$

By Eq. (19), t is decreasing in K and η, and increasing in r. Hence, Π is increasing in r, decreasing in η, decreasing in F holding N fixed, and decreasing in N holding F fixed.[35] Thus, the free-entry condition (20) implies the statements of the proposition. □

Proof of Proposition 3. By Proposition 2, when C decreases, K increases in both models of entry (either through increase in N or F). By Eq. (19), dollar fees t decrease. Hence, by Corollary 1, f and $\bar{v}$ decrease as well. □

Proof of Proposition 4. We present the proof for r and the argument is symmetric for η, as both of them enter Π only through t. First, consider the family expansion model of entry: N is fixed and K is pinned by Eq. (20) through adjustments in F. By Proposition 2, when r increases, K increases. Eq. (20) and Corollary 1 imply that

$$\frac{t}{K}\left(1 - \frac{1}{2N}\right) = C,$$

and so, t increases with r. By Corollary 1, f and $\bar{v}$ are increasing in t, and so, they also increase with r.

Second, consider entry by new families: F is fixed and K is pinned by Eq. (20) through adjustments in N. By Proposition 2, N increases as r increases. By Eq. (20) and Corollary 1,

$$t = \frac{NFC}{1 - 1/(2N)} = \frac{FC}{1/N - 1/(2N^2)},$$

and so, t is increasing with N, and so it is also increasing with r. By Corollary 1,

$$f = \sqrt{\frac{\gamma N^3}{2\pi s^2 (N - 1/2)}},$$

which is increasing with N, and hence, with r. By Corollary 1,

$$\bar{v} = \sqrt{\frac{2\pi s^2 FNC}{\gamma (N - 1/2)}}$$

[35] To see the latter, note that

$$\left(\frac{1}{N} - \frac{1}{2N^2}\right)'_N = -\frac{1}{N^2} + \frac{1}{N^3} < 0.$$

which is decreasing with N, and hence, with r. $\square$

B.2 Pass-through voting

In what follows, we use abbreviation PTV for pass-through voting.

Proof of Proposition 5. **No-pass-through-voting equilibrium.** By Proposition 1,

$$\Pi^* \equiv \frac{t}{K}\left[1-\frac{1}{2N}\left(1-\frac{\bar{u}}{\bar{v}}\right)\right],$$

is the per fund profit in the no-PTV equilibrium. Consider a deviation by family 1 to PTV adoption and dollar fees $\tilde{t}$ at $t=1$. By Lemma 3, the cutoff investor type who is indifferent between investing in two adjacent funds of families 1 and 2, denote it $a_1\left(\tilde{t}\right)$, is given by

$$\frac{\pi r^2}{\eta}\cos\left(a_1\left(\tilde{t}\right)-\alpha_1\right)-\tilde{t}+4B=\frac{\pi r^2}{\eta}\cos\left(a_1\left(\tilde{t}\right)-\alpha_2\right)-t.$$

Using Lemma 10 in the Online Appendix, we can re-write this equation as

$$\tilde{t}=t+4B-\zeta^{-1}\sin\left(a_1\left(\tilde{t}\right)-\alpha_1-\pi/K\right), \tag{42}$$

where $\zeta=\frac{\eta}{2\pi r^2\sin(\pi/K)}$. Then, fund family 1 chooses $\tilde{t}$ to maximize its per fund profit:

$$\Pi_{PTV}=\frac{1}{F}\max_{\tilde{t}}\frac{2F\tilde{t}\left(a_1\left(\tilde{t}\right)-\alpha_1\right)}{2\pi}\frac{\bar{v}(1-1/N)+\bar{u}/N}{\bar{v}}, \tag{43}$$

where $\tilde{t}$ is given by Eq. (42). We can equivalently re-write it as follows

$$\Pi_{PTV}=\frac{1}{F}\max_{\tilde{\omega}}\frac{2F\left(t+4B-\zeta^{-1}\sin\left(\tilde{\omega}\pi/K\right)\right)\left(1+\tilde{\omega}\right)\pi/K}{2\pi}\frac{\bar{v}(1-1/N)+\bar{u}/N}{\bar{v}}, \tag{44}$$

where $\tilde{\omega}$ is given by $a_1\left(\tilde{t}\right)-\alpha_1=\left(1+\tilde{\omega}\right)\pi/K$.[36] The envelope theorem then implies

$$\frac{d\Pi_{PTV}}{dB}=\frac{4\left(1+\tilde{\omega}\right)}{K}\frac{\bar{v}(1-1/N)+\bar{u}/N}{\bar{v}}>0.$$

[36]We show in Lemma 14 in the Online Appendix that there is a constant $\boldsymbol{B}$ such that, as long as $B\leq\boldsymbol{B}$, $\tilde{\omega}\leq 2$, that is, fund family 1 by deviating to PTV adoption attracts at most clients from its immediate neighbors.

Hence, Π_{PTV} is continuous and strictly increasing in B. Note that

$$\Pi_{PTV}(0) = \frac{t}{K}\left[1 - \frac{1}{N}\left(1 - \frac{\bar{u}}{\bar{v}}\right)\right].$$

Hence,

$$\Pi_{PTV}(0) - \Pi^* = \frac{t}{K}\left[1 - \frac{1}{N}\left(1 - \frac{\bar{u}}{\bar{v}}\right)\right] - \frac{t}{K}\left[1 - \frac{1}{2N}\left(1 - \frac{\bar{u}}{\bar{v}}\right)\right] = -\frac{t}{2NK}\left(1 - \frac{\bar{u}}{\bar{v}}\right).$$

Therefore, there exists $B^* > 0$, such that the deviation to PTV is not profitable if and only if $B < B^*$. Hence, for $B < B^*$, there exists an equilibrium in which none of the funds offer PTV.

All-pass-through-voting equilibrium. In this case, no family monitors and $\bar{v} = \bar{u} \equiv 2\pi su$. Let

$$\Pi^{**} \equiv \frac{t}{K},$$

which by Proposition 1 is the profit per fund in the all-PTV equilibrium. Consider a deviation of family 1 to voting its shares. This deviation would lower its market share and result in it incurring monitoring costs, but monitoring will increase each asset payoff by $\bar{e} > 0$. Family 1 chooses dollar fees $\bar{t}$ and monitoring effort $\bar{e}$ to maximize its per fund profit

$$\Pi_{noPTV}(B) = \frac{1}{F}\max_{\bar{t},\bar{e}}\left\{\underbrace{\frac{2F\left(\bar{a}_1(\bar{t}) - \alpha_1\right)}{2\pi}}_{\text{market share}}\underbrace{\bar{t}\frac{u+\bar{e}}{u}}_{\text{dollar fees}} - \frac{2\pi\gamma}{2}\bar{e}^2\right\},$$

where, similar to above, $\bar{a}_1(\bar{t})$ solves

$$\sin\left(\bar{a}_1(\bar{t}) - \alpha_1 - \pi/K\right) = \zeta\left(t - \bar{t} - 4B\right).$$

We can equivalently re-write the maximization problem in terms of $\bar{\omega}$ given by $\bar{a}_1(\bar{t}) - \alpha_1 = (1+\bar{\omega})\pi/K$:

$$\Pi_{noPTV}(B) = \frac{1}{F}\max_{\bar{\omega},e}\left\{\frac{2F\left(t - 4B - \zeta^{-1}\sin\left(\bar{\omega}\pi/K\right)\right)(1+\bar{\omega})\pi/K}{2\pi}\frac{u+e}{u} - \frac{2\pi\gamma}{2}e^2\right\}. \tag{45}$$

Denoting by $\bar{e}$ the optimal effort, the envelope theorem then implies

$$\frac{d\Pi_{noPTV}}{dB} = -\frac{4(1+\bar{\omega})}{K}\frac{u+e}{u} < 0.$$

Thus, Π_{noPTV} is continuous and strictly decreasing in B. Note that when $B = 0$ and the fund family deviates, it is optimal to set $\bar{t} = t$. Thus,

$$\Pi_{noPTV}(0) - \Pi^{**} = \frac{1}{F}\max_{e}\left\{\frac{t}{N}\frac{e}{u} - \frac{2\pi\gamma}{2}e^2\right\} > 0.$$

Hence, the deviation is profitable for a sufficiently low B. If B is sufficiently high, then $\bar{a}_1(\bar{t}) - \alpha_1$ becomes arbitrarily close to zero, and thus $\Pi_{noPTV}(0)$ also becomes arbitrarily close to zero. Hence, the deviation is unprofitable if B is sufficiently high. By monotonicity of Π_{noPTV} and the intermediate value theorem, there exists $B^{**} > 0$, such that the deviation to no PTV is profitable if and only if $B < B^{**}$.

Combining two cases. Let $\underline{B} = \min\{B^*, B^{**}, \boldsymbol{B}\}$ and $\bar{B} = \max\{B^*, B^{**}\}$.[37] Then, if $B < \underline{B}$, there exists an equilibrium in which all fund families do not offer PTV and there does not exist an equilibrium in which all fund families offer PTV. Hence, in the unique symmetric equilibrium in pure strategies, all fund families do not adopt PTV. Similarly, if $B > \bar{B}$, then there exists an equilibrium in which all fund families adopt PTV and there is no equilibrium in which all fund families do not adopt PTV. Hence, in the unique symmetric equilibrium in pure strategies, all fund families adopt PTV.

To show the second statement, when all funds adopt PTV, fees are equal

$$f_{PTV} = \frac{t}{\bar{u}} > \frac{t}{\bar{v}} = f.$$

Further, the fund profits are equal

$$\Pi^{**} = \frac{t}{K} > \frac{t}{K}\left(1 - \frac{1}{2N}\left(1 - \frac{\bar{u}}{\bar{v}}\right)\right) = \Pi.$$

The investor utility is equal to

$$U^{**} = \bar{U} + \frac{r^2\pi}{\eta}\cos\left(\alpha - \alpha_{k(\alpha)}\right) - t + B,$$

where $k(\alpha)$ is the closest fund to investor type α. We have that U^{**} exceed the utility in the baseline model by B. Finally, the welfare of asset owners is equal

$$\bar{u} - 2\pi\eta s^2 < \bar{v} - 2\pi\eta s^2.$$

□

Proof of Proposition 6. Let us first compute welfare with and without PTV. Without PTV, asset

[37] As we show in Lemma 14 in the Online Appendix, $B^* < B^{**}$ for all sufficiently large F, and so $\underline{B} = B^*$ and $\bar{B} = B^{**}$.

owners get in equilibrium

$$W_O = s \int_0^{2\pi} p_\beta d\beta = s \int_0^{2\pi} (v_\beta - \eta s)\, d\beta = \bar{v} - 2\pi\eta s^2.$$

By Eq. (15), investors get

$$\begin{aligned} W_I &= \int_0^{2\pi} \left(\frac{\pi r^2}{\eta} \cos\left(\alpha - \alpha_{k(\alpha)}\right) - f\bar{v} + \pi\eta s^2 - \frac{\pi r^2}{2\eta} \right) d\frac{\alpha}{2\pi} \\ &= \frac{r^2 K}{\eta} \int_0^{\pi/K} \cos(\gamma)\, d\gamma - t + \pi\eta s^2 - \frac{\pi r^2}{2\eta} \\ &= \frac{r^2 K}{\eta} \sin(\pi/K) - t + \pi\eta s^2 - \frac{\pi r^2}{2\eta}, \end{aligned}$$

where $k(\alpha)$ is the fund with the closest mandate to α. By Proposition 1, funds families' total profits are equal

$$W_F = t\left[1 - \frac{1}{2N}\left(1 - \frac{\bar{u}}{\bar{v}}\right)\right].$$

Therefore, the total welfare without PTV equals

$$W = \bar{v} + \frac{r^2 K}{\eta} \sin(\pi/K) - \pi\eta s^2 - \frac{\pi r^2}{2\eta} - \frac{t}{2N}\left(1 - \frac{\bar{u}}{\bar{v}}\right).$$

Now, with PTV, asset owners get

$$W_{O,PTV} = s \int_0^{2\pi} p_\beta d\beta = s \int_0^{2\pi} (v_\beta - \eta s)\, d\beta = \bar{u} - 2\pi\eta s^2 < W_O,$$

investors get

$$W_{I,PTV} = \frac{r^2 K}{\eta} \sin(\pi/K) - t + \pi\eta s^2 - \frac{\pi r^2}{2\eta} + 4B > W_I,$$

and funds families get $W_{F,PTV} = t > W_F$. Thus, the total welfare is

$$W_{PTV} = \bar{u} + \frac{r^2 K}{\eta} \sin(\pi/K) - \pi\eta s^2 - \frac{\pi r^2}{2\eta} + 4B.$$

PTV adoption by all funds is socially optimal if and only if $W_{PTV} \geq W$, or more explicitly

$$4B \geq \bar{v} - \bar{u} - \frac{t}{2N}\left(1 - \frac{\bar{u}}{\bar{v}}\right) = \bar{v} - \bar{u} - \frac{\gamma}{2} \int_0^{2\pi} e^2 d\beta,$$

where $e = \frac{sf}{N\gamma}$ is the equilibrium effort without PTV. Then, PTV is efficient if and only if

$$2\pi se - \pi\gamma e^2 \leq 4B.$$

We denote by $B^e \equiv \left(2\pi se - \pi\gamma e^2\right)/4$ the critical B such that for $B \geq B^e$ implementing PTV is efficient.

We analyze this condition for the approximation of the model, when F is large. By Proposition 1, as $F \to \infty$, $K \to \infty$ and $t \to \infty$. Hence, by (17)

$$f = \frac{t}{2\pi su} + o(t).$$

By Lemma 2 and $\rho \geq 2$,

$$e = \frac{s}{\gamma N}\frac{t}{2\pi su} + o(t).$$

Thus, $B^e = \frac{st}{4\gamma uN} + o(t)$.

Lemma 1 in the Online Appendix shows that, for sufficiently large F, B^* and B^{**} introduced in the proof of Proposition 5 are both of order t^2 and $B^* < B^{**}$. Thus, $B^* < B^{**} < B^e$. This implies that, for $B > B^{**}$, PTV-equilibrium is unique, but it is only efficient for $B \geq B^e$, which is the desired conclusion. □

B.3 Delegated monitoring

Lemma 5. *Under decentralized monitoring, on the equilibrium path, each firm is monitored by the fund whose mandate is "closest" to the firm, that is, fund k monitors all assets β for which $|\alpha_k - \beta|$ is minimal among all k and exerts effort*

$$e_{\beta,k} = \frac{x_{\beta,k} f_d}{\gamma_d K} = \frac{f_d}{\gamma_d K}\left(s + \frac{r_d}{\eta}\cos\left(\beta - \alpha_k\right)\right). \tag{46}$$

Further, the payoff of firm β is

$$v_{\beta,d} = u + \frac{x_{\beta,k} f_d}{\gamma_d K}, \text{ where } k \text{ minimizes } |\alpha_k - \beta|,$$

and the payoff of any portfolio $x_{\beta,k}$ is constant across k.

Proof. The proof of Eq. (46) follows the same steps as that of Lemma 2. The expression for $v_{\beta,d}$ then follows immediately from Eq. (46). We first show that $v_{\beta,d}$ is periodical with period π, i.e., $v_{\beta,d} = v_{\beta+\pi,d}$

for $\beta \in [0, \pi)$. For any $\beta \in [0, \pi)$ and $k = 1, \ldots, K$,

$$x_{\beta+\pi,k} = s + r/\eta \cos(\beta + \pi - \alpha_k) = \begin{cases} s + r/\eta \cos\left(\beta - \alpha_{k+K/2}\right), & \text{for } k = 1, \ldots, K/2; \\ s + r/\eta \cos\left(\beta - \alpha_{k-K/2}\right), & \text{for } k = K/2 + 1, \ldots, K. \end{cases}$$

Hence,

$$\max_k \frac{x_{\beta,k} f_d}{\gamma_d K} = \max_k \frac{x_{\beta+\pi,k} f_d}{\gamma_d K}.$$

Thus, indeed, $v_{\beta,d} = v_{\beta+\pi,d}$. We have

$$\begin{aligned}
\int_0^{2\pi} x_{\beta,k} v_{\beta,d} d\beta &= \int_0^{2\pi} s v_{\beta,d} d\beta + \frac{r}{\eta} \int_0^{2\pi} \cos(\beta - \alpha_k) v_{\beta,d} d\beta \\
&= \int_0^{2\pi} s v_{\beta,d} d\beta + \frac{r}{\eta} \int_0^{\pi} \cos(\beta - \alpha_k) v_{\beta,d} d\beta + \frac{r}{\eta} \int_{\pi}^{2\pi} \cos(\beta - \alpha_k) v_{\beta,d} d\beta \\
&= \int_0^{2\pi} s v_{\beta,d} d\beta + \frac{r}{\eta} \int_0^{\pi} \cos(\beta - \alpha_k) v_{\beta,d} d\beta + \frac{r}{\eta} \int_0^{\pi} \cos\left(\tilde{\beta} + \pi - \alpha_k\right) v_{\tilde{\beta}+\pi,d} d\tilde{\beta} \\
&= \int_0^{2\pi} s v_{\beta,d} d\beta + \frac{r}{\eta} \int_0^{\pi} \cos(\beta - \alpha_k) v_{\beta,d} d\beta - \frac{r}{\eta} \int_0^{\pi} \cos\left(\tilde{\beta} - \alpha_k\right) v_{\tilde{\beta},d} d\tilde{\beta} \\
&= \int_0^{2\pi} s v_{\beta,d} d\beta \equiv \bar{v}_d.
\end{aligned}$$

□

Proposition 9. *Under decentralized monitoring, in equilibrium, funds charge fees*

$$f_d = \frac{-u + \sqrt{u^2 + \frac{2t}{\pi \gamma_d K}\left(1 + \frac{r}{\eta s}\right)}}{\frac{2}{\gamma_d K}\left(s + \frac{r}{\eta}\right)} + o\left(1/K^3\right), \tag{47}$$

and earn profit per fund of

$$\Pi_d = \frac{t}{K}\left[1 - \frac{1}{2K}\left(1 - \frac{\bar{u}}{\bar{v}_d}\right)\left(1 + \frac{r}{s\eta}\right)\right] + o\left(1/K^5\right), \tag{48}$$

where

$$t \equiv f_d \bar{v}_d = \frac{2\pi^2 r^2 \sin(\pi/K)}{K\eta} \tag{49}$$

are the same as in the baseline model with centralized monitoring. Further,

$$\bar{v}_d = \bar{u} + \frac{2\pi s f_d}{\gamma_d K}\left(s + \frac{r}{\eta} \frac{\sin(\pi/K)}{\pi/K}\right). \tag{50}$$

Proof. See Online Appendix. □

Proof of Proposition 7. By Propositions 1 and 9, when $u = 0$,

$$f = \sqrt{\frac{\gamma N}{2\pi s^2} t} \text{ and } f_d = \sqrt{\frac{\gamma_d K}{2\pi s \left(s + \frac{r}{\eta}\right)} t} + o\left(1/K^3\right).$$

Thus,

$$\frac{\bar{v}_d}{\bar{v}} = \frac{f}{f_d} = \sqrt{\frac{1 + r/(\eta s)}{F} \frac{\gamma}{\gamma_d}} + o\left(1/K^3\right).$$

□

Proof of Proposition 8. Using the computations as in the proof of Proposition 6, under delegated monitoring, the welfare of asset owners equals

$$W_{O,d} = \bar{v}_d - 2\pi\eta s^2 > \bar{u} - 2\pi\eta s^2 = W_{O,PTV}.$$

Investors get

$$\begin{aligned} W_{I,d} &= \int_0^{2\pi} \left(\frac{\pi r^2}{\eta} \cos\left(\alpha - \alpha_{k(\alpha)}\right) - f\bar{v} + \pi\eta s^2 - \frac{\pi r^2}{2\eta}\right) d\frac{\alpha}{2\pi} + \underbrace{\int_0^{2\pi} 4B \cos\left(\alpha_{k(\alpha)} - \alpha\right) d\left(\frac{\alpha}{2\pi}\right)}_{\text{warm glow benefits}} \\ &= \frac{r^2 K}{\eta} \sin(\pi/K) - t + \pi\eta s^2 - \frac{\pi r^2}{2\eta} + \frac{2K}{2\pi} \int_0^{\pi/K} 4B \cos(\alpha)\, d\alpha \\ &= \left(4B + \frac{r^2\pi}{\eta}\right) \frac{\sin(\pi/K)}{\pi/K} - t + \pi\eta s^2 - \frac{\pi r^2}{2\eta} \\ &< 4B + \frac{r^2 K}{\eta} \sin(\pi/K) - t + \pi\eta s^2 - \frac{\pi r^2}{2\eta} = W_{I,PTV} \end{aligned}$$

where $k(\alpha)$ is the fund with the closest mandate to α. By Proposition 9, funds families' total profits are equal

$$W_F = t\left[1 - \frac{1}{2K}\left(1 - \frac{\bar{u}}{\bar{v}_d}\right)\left(1 + \frac{r}{s\eta}\right)\right] + o\left(1/K^4\right) < t = W_{F,PTV}.$$

Therefore, the total welfare under delegated monitoring equals

$$W_d = \bar{v}_d - \frac{t}{2K}\left(1 - \frac{\bar{u}}{\bar{v}_d}\right)\left(1 + \frac{r}{s\eta}\right) + \left(4B + \frac{r^2\pi}{\eta}\right)\frac{\sin(\pi/K)}{\pi/K} - \pi\eta s^2 - \frac{\pi r^2}{2\eta} + o\left(1/K^4\right).$$

From the proof of Proposition 6

$$W_{PTV} = \bar{u} + \frac{r^2 K}{\eta} \sin(\pi/K) - \pi\eta s^2 - \frac{\pi r^2}{2\eta} + 4B.$$

Thus, Eq. (50),

$$\bar{v}_d = \bar{u} + \frac{2\pi s f_d}{\gamma_d K}\left(s + \frac{r}{\eta}\frac{\sin(\pi/K)}{\pi/K}\right).$$

$$\begin{aligned}
W_d - W_{PTV} &= \bar{v}_d - \bar{u} - \frac{t}{2K}\left(1 - \frac{\bar{u}}{\bar{v}_d}\right)\left(1 + \frac{r}{s\eta}\right) + 4B\underbrace{\left(\frac{\sin(\pi/K)}{\pi/K} - 1\right)}_{=-\frac{2B}{3}(\pi/K)^2 + o(1/K^3)} + o\left(1/K^4\right) \\
&= \frac{2\pi s f_d}{\gamma_d K}\left(s + \frac{r}{\eta}\right) - \frac{t}{2K}\left(1 - \frac{\bar{u}}{\bar{v}_d}\right)\left(1 + \frac{r}{s\eta}\right) - \frac{2B}{3}(\pi/K)^2 + o\left(1/K^3\right) \\
&= \left(1 + \frac{r}{s\eta}\right)\left\{\frac{2\pi s u f_d}{K}\frac{s}{\gamma_d u} - \frac{t}{2K}\left(1 - \frac{\bar{u}}{\bar{v}_d}\right)\right\} - \frac{2B}{3}(\pi/K)^2 + o\left(1/K^3\right) \\
&= \frac{t}{K}\frac{s}{\gamma_d u}\left(1 + \frac{r}{s\eta}\right) - \frac{2B}{3}(\pi/K)^2 + o\left(1/K^3\right)
\end{aligned}$$

where we used $2\pi s u f_d = t + o\left(1/K^2\right)$ and $\bar{v}_d = \bar{u} + o\left(1/K^2\right)$ derived in the proof of Proposition 9. Thus, for sufficiently large F, PTV is superior because the term at B is of order $1/K^2$, while the gain in monitoring of order only $1/K^3$. Further, for sufficiently small γ_d or small B, decentralized monitoring dominates PTV. □