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Capital Commitment and Performance: The Role of Mutual Fund Charges

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Abstract

We study how the scarcity of committed capital affects the equilibrium distribution of net alphas in the asset management industry. We propose a model of active portfolio management with different sales fee structures where committed capital is in short supply. In the model, a portfolio's excess return is not fully appropriated by the money manager but shared with long-term investors. Empirically, we show that capital commitment allows funds to hold shares longer and take advantage of slow-moving arbitrage opportunities. Consistent with the model, funds with more committed capital generate higher value added, which, net of fees, accrues to long-term investors.

I. Introduction

Patient capital is in short supply. According to Chatterjee and Thyagaraju (2020), the average holding period of stocks has dropped from approximately 8 years in the 1960s to under 6 months in 2020. Momentum and high-frequency

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trading promote a short-term investment horizon. Even long-term institutional investors must sometimes forgo long-term investments to meet short-term obligations or in response to incentives and governance structures.[1]

We present a model of active portfolio management following Berk and Green (BG) (2004) where long-term *capital commitment* is in short supply. The model predicts that investors' willingness to take on long-term investing should be rewarded. Thus, funds with a higher proportion of committed capital should outperform after fees and generate larger value added by allowing managers to capitalize on long-term investment strategies. We proxy long-term capital commitment by the percentage of shares with sizeable front- and back-load fees. Our empirical tests on actively managed U.S. equity mutual funds support our model's predictions.

We assume two types of investors who differ in their investment horizon and the share class they purchase. The first type has a short-term investment horizon and buys level-load fee shares. The second type has a long-term investment horizon and buys front-load fee shares.[2] As in BG, investors in level-load shares buy or sell shares of funds that, respectively, outperform or underperform a given benchmark over a single period until the fund's expected excess return (net of unit costs and fees) is 0.

We then introduce two innovations relative to BG. First, investors may purchase front-load shares. Investors in these shares plan to hold them longer than a single period. They pay a sales fee upfront that they expect to trade-off against lower annual asset-based sales charges over their investment horizon. We interpret their choice of share class to represent long-term capital commitment. After learning the fee structure, investors in front-load shares decide their optimal supply of capital to maximize the investment's net return after fees over the expected holding period. Unlike investors in level-load shares, the supply of committed capital is not perfectly elastic but decreases with fund fees. Second, we assume that portfolio managers reap higher excess returns over the benchmark and face lower decreasing returns to scale from long-term capital commitment. This reflects the higher profitability of long-term investment strategies as in Shleifer and Vishny (1990), Dow and Gorton (1994), and Van Binsbergen, Han, Ruan, and Xing (2021). Given the front-load fee, funds decide the optimal annual asset-based sales charges of front-load shares (and, implicitly, annual fees of level-load shares and the fund's optimal share of committed capital) to maximize total fund fees.

Under these assumptions, we show that funds may not fully appropriate the excess net (after management fees) performance by raising annual asset-based sales charges of front-load shares, as investors rationally expect them to be lower than in level-load shares. This saving in fees accrues to the investors in front-load shares as compensation for their provision of long-term committed capital. Fund net returns

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[1] Bolton and Samama (2013) report that only a small minority of approximately 10% of institutional shareholders care about long-run performance and are informed about any individual company's fundamental long-term value. Bushee (2004) shows that 60% of institutional investors are "transient" or short-term-oriented.

[2] Although an increasing number of broker-sold funds offer no-load shares, the majority offer a menu of load share classes. It is widely accepted that such a strategy aims to cater to investors with different investment horizons (Nanda, Wang, and Zheng (2009)).

are a weighted average of the excess return on both types of load shares. Thus, excess net returns are shown to increase with the percentage of committed capital in the fund. The fund's expected value added (net of fees) is shown to coincide with the net value added by the committed capital contributed by the investors in front-load shares.

We test this prediction for U.S. multishare class mutual funds over the period of 1992 to 2020. For each fund and year-month in our sample, we define CAPITAL_COMMITMENT as the proportion of a fund's total net assets (TNA) that comes from share classes with sizeable front- or back-load fees. Whether an investor's choice among fee structures reveals capital commitment is ultimately an empirical question. In principle, when financial advisors guide investors in their share class choice, a key element should be how long the investor *expects* to hold the shares. However, the literature has shown that financial advisors may have incentives to guide investors into share classes that maximize advisors' long-term fees rather than those that better suit the investment horizon of their clients (Christoffersen, Evans, and Musto (2013), Chalmers and Reuter (2020)). At the same time, sophisticated investors may also avoid load fees altogether, regardless of their investment horizon (Guercio and Reuter (2014)). Consistent with our hypothesis of higher capital commitment, we find that fund flows are more stable when the percentage of fund TNA from front- and back-load shares increases.

We find robust empirical evidence of our model's predictions. Funds with more committed capital share more rents with their long-term investors: We estimate that almost 60% of all the value added generated by the fund is shared with their more committed investors. We show that this result is robust after including family fixed effects or considering specific control variables such as the percentage of shares in the hands of institutional investors and the actual load fee charged by each share class. In addition, we show that funds use committed capital to generate higher value added to their investors. In economic terms, a 1-standard-deviation increase in capital commitment corresponds to approximately $9 million per year in net value added generated to investors.

Next, we explore the potential channels through which more stable capital affects fund performance by examining the investment horizon and the choices of portfolio managers. Using the portfolio duration measure of Cremers and Pareek (2016), we show that portfolio managers increase their duration when the fund's capital commitment is higher.[3] This suggests that managers exploit their investors' commitment to hold their investment for a longer period. In terms of the investment choices, we find that managers of funds with more committed capital benefit from an illiquidity return premium as they can hold more illiquid stocks (Amihud (2002)). Committed capital also allows funds to capitalize on the return predictability associated with stocks in which R&D investment is more intense.[4] These results are

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[3] Results are similar when we use the horizon measures of Lan, Moneta, and Wermers (2019).

[4] Lev and Sougiannis (1996) and Chan, Lakonishok, and Sougiannis (2001) demonstrate that firms with high ratios of R&D relative to market equity earn subsequent high returns; Eberhart, Maxwell, and Siddique (2004) find that significant increases in R&D expenditures predict positive future abnormal returns, and Hirshleifer, Hsu, and Li (2013) show that firm-level innovative "efficiency" (measured as patents scaled by R&D investment) forecasts future returns. Cohen, Diether, and Malloy (2013) suggest that the mechanism behind the stock return predictability is likely to be the misvaluation of R&D ability.

consistent with the idea that capital commitment allows mutual funds to exploit slow-moving arbitrage opportunities.

Our findings suggest that an optimal matching of investor and fund investment horizons can help overcome a significant impediment to arbitrage that arises in the open-ended mutual fund structure. Stein (2005) argues that competition for investor funds and information asymmetry about managers' ability may lead to more open-end funds, which are subject to a higher risk of early redemption at the cost of profitable, unexploited long-term arbitrage opportunities. Giannetti and Kahraman (2018) present empirical evidence consistent with this hypothesis by comparing portfolio choices of open-end versus closed-end funds. Closed-end funds purchase more underpriced stocks with high arbitrage risk than open-end funds. However, open-ended funds are the dominant organizational structure in the asset management industry both in size and number.[5] Thus, it is important to understand the role of capital commitment in the (open) mutual fund industry and how this mechanism can give portfolio managers more freedom to pursue different investment strategies. We claim that funds with more committed capital are better positioned to engage in risky long-term arbitrage.

Our work contributes to the literature that argues that patient investment strategies pay off, as empirically shown in Cremers and Pareek (2016) and Lan et al. (2019). We add to this by showing that patient strategies not only hold for funds, but also accrue to the benefit of the underlying investors if they are willing to commit to a fund for the long term. To the best of our knowledge, we are the first to generalize BG's model by introducing heterogeneous investor horizons. We show that investors benefit from patience capital in the competitive portfolio management industry. Other authors have recognized heterogeneous liquidity needs across investors (e.g., Johnson (2004), Nanda et al. (2009), but we are the first to model its implications for the equilibrium distribution of net alphas and value added in the mutual fund industry.

Our study also relates to the literature that emphasizes differences in investment horizons across mutual fund managers (Van Binsbergen, Han, Ruan, and Xing (2023), Van Binsbergen et al. (2021) and adds to it by highlighting how the underlying source of capital can be conducive to the portfolio manager's ability to take advantage of long-term investment opportunities.

Our work also adds to the literature that proposes contractual solutions to encourage long-term investment (e.g., Edmans, Gabaix, Sadzik, and Sannikov (2012), Bolton and Samama (2013), and Jin, Kacperczyk, Kahraman, and Suntheim (2022)). In particular, Bolton and Samama (2013) propose a loyalty share class (L-Shares) that rewards long-term investors. In a no-load mutual fund family,

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Such misvaluation is more likely to be reaped by long-term investors, as complexity in information processing can lead to a significant delay in impounding of information into asset prices, as argued by Lauren and Dong (2012), and portfolio managers with short-term horizons have fewer incentives to invest in information acquisition about firms' long-term projects (Dow and Gorton (1994), Goldman and Slezak (2003)).

[5] According to the 2021 ICI Factbook, in the U.S., the total volume of assets in open-end mutual funds in 2020 was $23.9 trillion, whereas the volume of closed-end mutual funds was $279 billion.

Johnson (2004) shows that short-term investors impose liquidity costs on long-term investors. We add to this debate by showing that long-term investors achieve better net performance and that, through different share classes, funds can mitigate the welfare transfer.

Finally, we contribute to the literature on managerial myopia or short termism by demonstrating the important role in the horizon of the underlying capital. Agarwal, Vashishtha, and Venkatachalam (2018), for instance, show that managers may overlook profitable long-term investments for career concern reasons. They show that recent regulation forcing higher disclosure of managers' portfolio holdings exacerbates this concern and causes less investment in R&D in firms where institutional investors have a significant stake. We also investigate the interaction between institutional investors and R&D capital, where we show that underlying mutual fund investor short termism may induce portfolio managers to reduce their exposure to firms with longer-term prospects for success.

The article is organized as follows: Section II presents the model and describes several testable hypotheses. In Section III, we describe the data used to test the model implications and introduce our main measure of capital commitment. Section IV tests the direct predictions of capital commitment on performance, as produced by our model, and the evidence on the mechanisms through which capital commitment influences portfolio managers' investment choices. Section V concludes.

II. The Model

We extend the model in BG to include long-term investors. There are two types of investors who differ in their investment horizon and the share class they purchase. The first type has a short-term investment horizon (one period) and buys level-load fee shares. The second type corresponds to long-term investors who purchase front-load fee shares. Front-load shares are the rational choice of investors who, ex ante, plan to hold their shares for more than one period. Thus, we argue that investors in front-load shares provide committed capital, as opposed to investors in level-load shares, who care only about fund performance next period.

Both share classes are bought through a broker. In the case of level-load shares, the fund pays the broker an annual distribution charge known as a 12b-1 fee. Shares under this fee structure are usually known as *class C shares.* Thus, we use superscript c to denote them.[6] Let q_t^c denote the fund's assets under management (AUM) in level-load shares (e.g., short-term investors) at the beginning of period t.

In the case of front-load fee shares, investors pay upfront a percentage τ of their investment as a fee that goes directly to the broker. In fact, the fund manages only the assets net of the front-load fee. Hence, for these shares, the money invested and the AUM do not coincide. In exchange, long-term investors are charged a lower annual 12b-1 fee. These shares are commonly known as *class A shares*, and we use

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[6] According to the Investment Company Institute (ICI) definition, the 12b-1 fee of level-load (Class C) shares is higher than 0.25%. Level-load shares may also charge a front-load fee lower than 1%. In the model, we assume that level-load shares charge no front-load fees. Investors can also buy no-load shares directly from the fund. The ICI classifies no-load shares as those with 12b-1 fees lower than or equal to 0.25%.

superscript a to denote them.[7] Let q_t^a denote the fund's AUM in front-load shares. Therefore, the committed capital invested in font-load shares is $\frac{q_t^a}{1-\tau}$. The fund's total AUM is the sum of level- and front-load shares $q_t = q_t^c + q_t^a$.

Each fund is managed by a single portfolio manager, and managers differ in their skills. Managers' ability is unknown to investors and managers themselves, who learn about it by observing the history of fund net returns. We use α to denote the manager's unobservable skill. We assume that managers can obtain a higher return $\delta > 1$ per unit of long-term committed capital relative to a unit invested in C class shares. This reflects the higher profitability of long-term investment strategies as theoretically argued in Shleifer and Vishny (1990), Dow and Gorton (1994), and Van Binsbergen et al. (2021), and empirically shown in Cremers and Pareek (2016) and Lan et al. (2019). Thus, the fund's excess return above the benchmark before fees will be

$$(1)\qquad \begin{aligned} R_{t+1} &= \left(\frac{q_t^c}{q_t} + \frac{q_t^a}{q_t}\delta\right)(\alpha + \varepsilon_t) \\ &= (1 + (\delta - 1)\theta_t)(\alpha + \varepsilon_t), \end{aligned}$$

where $\theta_t = \frac{q_t^a}{q_t}$ denotes the proportion of total AUM in front-load shares. For $\delta > 1$, a higher proportion of committed capital θ_t leverages the fund's performance by $\delta - 1$. The error term ε_t is normally distributed with zero mean and precision (inverse of the variance) ω. When the fund is first established at date $t = 0$, the (prior) distribution of managerial skill is assumed to be normal with mean ϕ_0 and precision ρ. After that, every period, managers and investors update their beliefs about managerial skills after observing the fund's net return and the AUM in each share class.

Running the fund involves costs unrelated to the manager's skill. These costs are an increasing and convex function of the fund's total AUM multiplied by the weighted average of the marginal cost of managing each share class:

$$C(q_t) = \left(\gamma^c \frac{q_t^c}{q_t} + \gamma^a \frac{q_t^a}{q_t}\right) q_t^2 = \left(\gamma^c q_t^c + \gamma^a q_t^a\right) q_t.$$

The parameters γ^c and γ^a represent, respectively, the marginal cost of managing level- and front-load shares. They are responsible for the decreasing returns to scale of the fund's AUM. We assume that $\gamma^c > \gamma^a$ reflecting the higher turnover and liquidity needs of front- versus level-load shares. These costs are shared across investors proportionally to the AUM in each share class. Let f_t^c (alternatively, f_t^a) denote the expense ratio paid by investor per unit invested in class C (alternatively, class A) shares in period t, including the management fee and 12b-1 distribution charges.

The timing of the model is as follows. Let $\xi_t = \frac{R_t}{(1+(\delta-1)\theta_t)}$. We assume that δ and θ_t are public information known to the investors. The fund enters period t with q_{t-1} funds under management and an estimate of manager ability

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[7] The ICI includes in this class shares with front-load fees higher than 1% and 12b-1 fees lower than or equal to 0.25%.

$\phi_{t-1} = E(\alpha | \xi_1, \ldots, \xi_{t-1})$. Investors and managers observe the fund's performance R_t. Given (1), they update their expectations of the manager's ability to $\phi_t = E(\alpha | \xi_1, \ldots, \xi_t)$.

A. Optimal Provision of Capital in Level-Load Shares

The total payout (*TP*) to investors in level-load shares at the end of period t is

$$\begin{aligned} \mathrm{TP}_{t+1}^c &= q_t^c\left(1 + R_{t+1} - f_t^c\right) - \frac{q_t^c}{q_t}\left(\gamma^c q_t^c + \gamma^a q_t^a\right) q_t \\ &= q_t^c\left(1 + R_{t+1} - f_t^c - \gamma^c q_t^c - \gamma^a q_t^a\right). \end{aligned}$$

Dividing $\mathrm{TP}_{t+1}^c - q_t^c$ by q_t^c, we obtain the net return after fees and costs of level-load shares:

$$r_{t+1}^c = R_{t+1} - f_t^c - \gamma^c q_t^c - \gamma^a q_t^a. \tag{2}$$

The participation constraint of investors in level-load shares at time t is

$$E_t\left(r_{t+1}^c\right) \geq 0. \tag{3}$$

We assume, as do BG, that capital flows elastically into the fund if condition (3) is met, and flows out of the fund otherwise, until constraint (3) is binding. Then, given (1) and (2), this implies

$$q_t^c\left(\phi_t \frac{q_t^c + \delta q_t^a}{q_t} - \gamma^c q_t^c - \gamma^a q_t^a\right) = q_t^c f_t^c. \tag{4}$$

To maximize fees, managers choose the amount of capital invested in level-load shares that maximizes the left-hand side of equation (4). At the optimal, q_t^c must satisfy the following condition:

$$q_t^c\left(q_t^a\right) = \frac{\phi_t}{2\gamma^c}\left(1 + (\delta - 1)\theta_t^2\right) - \frac{\gamma^a}{2\gamma^c} q_t^a. \tag{5}$$

Equation (5) implicitly defines q_t^c as a function of the model parameters and the dollar supply of committed capital q_t^a (notice that $\theta_t = \frac{q_t^a}{q_t^c(q_t^a) + q_t^a}$ is also a function of q_t^a). If $q_t^a = \theta_t = 0$, the optimal capital invested in level-load shares increases with the manager's expected ability ϕ_t and decreases with the marginal cost γ^c. As long as $\delta > 1$, a higher percentage of committed capital θ_t leverages the fund's overall performance. This increases the optimal AUM in level-load shares. On the other side, since the costs of running the fund depend on the total AUM, an increase in committed capital q_t^a increases the marginal cost of the funds invested in level-load shares, hence decreasing the fund's optimal amount of the latter share class.

Replacing (5) into (4), we can solve (implicitly) for the optimal expense ratio f_t^c as a function of q_t^a. This is the fee that the mutual fund must set to extract all economic surplus from investors in level-load shares:

$$f_t^c\left(q_t^a\right) = \phi_t(1 + (\delta - 1)\theta_t) - \gamma^c q_t^c\left(q_t^a\right) - \gamma^a q_t^a. \tag{6}$$

B. Optimal Provision of Capital in Front-Load Shares

Front-load shares are different on two accounts. In the first place, the broker is compensated with a front-load fee defined as a percentage τ of the funds invested. This fee goes to the broker upfront, so only a proportion $(1-\tau)$ of the capital invested in front-load shares is managed by the fund. In exchange, the investor pays a lower annual distribution fee, paid directly to the fund. The second important difference is that committed capital is in short supply, which implies that it is inelastic with respect to the fund's return.

Investors buy front-load shares, pay a front-load fee τ, and expect to hold shares for T years. Let r^a_{t+s} denote the 1-year excess net return after fees and costs per dollar invested in front-load shares at the beginning of year $t+s-1$, for $s=1,2,\ldots,T$. Like in (2), we define

$$r^a_{t+s} = R_{t+s} - f^a_{t+s} - \gamma^c q^c_{t+s} - \gamma^a q^a_{t+s}. \tag{7}$$

Then, if the AUM in this share class at time t is q^a_t, the fund's total payout at the end of year $t+T$ corresponding to front-load shares will be

$$\mathrm{TP}^a_{t+T} = q^a_t \prod_{s=1}^{T} \left(1 + r^a_{t+s}\right). \tag{8}$$

Let $r^a_{t,T}$ denote the cumulative annual net excess return above the benchmark for investors in front-load shares at the beginning of period t over the expected holding period of T years after costs, annual expenses, and load fees. Then, $r^a_{t,T}$ is such that the committed capital invested in period t compounded at the excess net return $r^a_{t,T}$ equals the total payout at the end of T years for long-term investors:

$$\mathrm{TP}^a_{t+T} = \frac{q^a_t}{1-\tau}\left(1 + r^a_{t,T}\right)^T. \tag{9}$$

Given that the left-hand side of equations (8) and (9) coincide, the right-hand side must also coincide. Thus, we can write

$$\left(1 + r^a_{t,T}\right)^T = (1-\tau)\prod_{s=1}^{T}\left(1 + r^a_{t+s}\right).$$

Taking logarithms on both sides, $r^a_{t,T}$ is given (approximately) by the expression[8]

$$r^a_{t,T} = \frac{1}{T}\sum_{s=1}^{T} r^a_{t+s} - \tau_T, \tag{10}$$

where $\tau_T = \frac{\tau}{T}$ denotes the annually prorated front-load fee. In other words, the expected annualized net excess return over the T periods net of front-load fees is (approximately) an average of the pre-load returns over the same period minus the prorated front-load fee over the expected investment horizon.

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[8] $\log(1+x)$ is approximately equal to x for small x.

Assuming no new fund performance is observed, given (1) and (7),

$$E_t\left(r^a_{t+s}\right) = E_t\left(r^a_{t+1}\right) = \phi_t \frac{q^c_t + \delta q^a_t}{q_t} - f^a_t - \gamma^c q^c_t - \gamma^a q^a_t,$$

for any $s = \{2, 3, \ldots, T\}$. Replacing the later equation in (10) and taking expectations,

$$E_t\left(r^a_{t,T}\right) = \phi_t \frac{q^c_t + \delta q^a_t}{q_t} - \gamma^c q^c_t - \gamma^a q^a_t - \left(\tau_T + f^a_t\right). \tag{11}$$

We assume that the market for front-load shares is segmented from the market for level-load shares. Investors in the latter type of share class supply capital to outperforming funds with perfect elasticity. They behave, therefore, like the representative investors in the BG model. At the same time, we assume that investors in front-load shares plan to hold them longer than a single period. They pay a sales fee upfront that they expect to trade-off against lower annual asset-based sales charges over their investment horizon. We interpret their choice of share class to represent long-term capital commitment. These investors observe τ and f^a_t at the beginning of every period t and decide their optimal supply of committed capital $\frac{q^a_t}{1-\tau}$ to maximize the expected value added of their investment over their holding period net of fees, $E_t\left(\mathrm{TP}^a_{t+T} - q^a_t/(1-\tau)\right)$. The supply of committed capital is not unbounded since we assume that there is a limited number of investors willing to hold their portfolio long enough to optimally choose front-load shares and pay the corresponding load fee upfront. Investors in this share class will, therefore, require a premium to invest for the long term, similar in spirit to the liquidity-level premium in Amihud and Mendelson (1986).

Thus, given (9) and τ_T, investors in front-load shares solve the following problem:

$$\max_{q^a_t \geq 0} E_t\left(\frac{q^a_t}{1-\tau}\left(\left(1 + r^a_{t,T}\right)^T - 1\right)\right).$$

Provided there exists an interior solution $q^a_t > 0$ to this problem, given (5) and (11), this is approximately equivalent to choosing $q^a_t\left(f^a_t\right)$ such that[9]

$$\frac{\partial}{\partial q^a_t} q^a_t \left(\phi_t \frac{q^c_t(q^a_t) + \delta q^a_t}{q^c_t(q^a_t) + q^a_t} - \gamma^c q^c_t\left(q^a_t\right) - \gamma^a q^a_t - \left(\tau_T + f^a_t\right)\right) = 0. \tag{12}$$

Notice that the supply of committed capital that solves (12) is not unbounded. It decreases with the prorated front-fee τ_T and the expense ratio f^a_t. Multiplying $q^a_t\left(f^a_t\right)$ times f^a_t, we obtain the expected dollar value of fees from front-load shares. When the fund increases f^a_t, it raises the dollar value of the fees collected from each front-load share it sells. However, simultaneously, the demand for those shares decreases, as shown in (12). Through q^a_t, the front-load expense ratio f^a_t affects the optimal supply of level-load shares in (5) and the optimal expense ratio of these shares in (6). We study this in the following subsection.

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[9] $(1+x)^T$ is approximately equal to $1 + Tx$ for small x.

C. Optimal Expense Ratios

The expected net return after fees on front-load shares in (11) can be written as a function of θ_t as follows:

$$E_t\left(r_{t,T}^a\right) = \phi_t(1+(\delta-1)\theta_t) - \gamma^c q_t^c\left(q_t^a\right) - \gamma^a q_t^a - \left(\tau_T + f_t^a\right). \quad (13)$$

In equilibrium, $f_t^c(q_t^a)$ is such that the participation constraint for investors in level-load shares (3) is binding, and $E_t(r_{t+1}^c) = 0$. Replacing (6) into (13),

$$E_t\left(r_{t,T}^a\right) = f_t^c\left(q_t^a\right) - \left(\tau_T + f_t^a\right). \quad (14)$$

In other words, investors in front-load shares expect a net return on their investment equal to the savings in the annual fees relative to the fees paid by investors in level-load shares. Since investors in front-load shares can always invest in level-load shares, in equilibrium, $E_t\left(r_{t,T}^a\right) \geq 0$. Given (14), this implies

$$f_t^a \leq f_t^c\left(q_t^a\right) - \tau_T. \quad (15)$$

Finally, given ϕ_t, γ^c, γ^a, δ, and τ_T, the fund chooses f_t^a to maximize the dollar value of total annual fees subject to restriction (15). That is, the fund solves the following problem:

$$\begin{aligned} \max_{f_t^a} \quad & q_t^c\left(q_t^a\right) \times f_t^c\left(q_t^a\right) + q_t^a \times f_t^a \\ s.t. \quad & 0 \leq f_t^a \leq f_t^c\left(q_t^a\right) - \tau_T \end{aligned}, \quad (16)$$

where $q_t^c(q_t^a)$, $f_t^c(q_t^a)$, and $q_t^a = q_t^a\left(f_t^a\right)$ are the functions implicitly defined in (5), (6), and (12), respectively. We cannot solve analytically for the optimal f_t^a. Heuristically, funds must compete for long-term capital, which is in short supply. The supply of this capital increases with the manager's expected skill ϕ_t and decreases with f_t^a. When (15) is not binding, funds cannot extract all the economic surplus from front-load shares for all ϕ_t, as they do with level-load shares. Otherwise, if restriction (15) is binding, then $E_t\left(r_{t,T}^a\right) = 0$.[10]

D. Testable Predictions on the Fund Performance

We now present the two testable implications on fund performance derived from our model. We define the fund's net performance after fees, r, as a weighted average of the net performance from the two share classes:[11]

$$r_{t+1} = (1-\theta_t) r_{t+1}^c + \theta_t r_{t,T}^a. \quad (17)$$

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[10] Appendix B shows a numerical solution to problem (16) for 3 different values of ϕ_t. For the lowest value considered ($\phi_t = 1.0$), there is no demand for front-load shares, and the fund's excess return is 0. For the other 2 values considered ($\phi_t = 1.5$ and $\phi_t = 2.0$), the numerical solution shows that long-term investors demand front-load shares with a strictly positive excess return net of fees that increases with ϕ_t.

[11] Consistently with our empirical tests, we estimate fund performance net of the prorated front-load fee τ_T.

Taking expectations in (17) and given (13), the change in the fund's net expected performance after fees, with respect to the fund's percentage of committed capital, is

$$\frac{\partial}{\partial \theta_t} E_t(r_{t+1}) = E_t\left(r^a_{t,T}\right) + \phi_t(\delta - 1). \tag{18}$$

Since we just showed that $E_t\left(r^a_{t,T}\right) \geq 0$, the right-hand side of (18) is strictly positive if $\phi_t > 0$ and $\delta > 1$. Given (13), a fund with $\phi_t \leq 0$, positive fees, and a nonnegative $E_t\left(r^a_{t,T}\right)$ would necessarily have at least one share class with negative AUM ($q^a_t < 0$ and/or $q^c_t < 0$), which is impossible. Thus, the manager's expected ability must be positive ($\phi_t > 0$) for any fund that has not been closed at the beginning of period t. This leads to our first empirical prediction:

Prediction 1. Provided that committed capital allows managers to reap abnormal returns (i.e., $\delta > 1$), funds with a higher proportion of committed capital are expected to exhibit higher net performance after fees.

Following Berk and Van Binsbergen (2015), we define the fund's value added, VA, as the product of the fund AUM times the net return before fees. Taking expectations at the beginning of period t,

$$E_t(\mathrm{VA}_{t+1}) = q_t E_t\left(R_{t+1} - \gamma^c q^c_t - \gamma^a q^a_t\right).$$

Given (1), the latter equation can be written as

$$E_t(\mathrm{VA}_{t+1}) = q_t\left(\phi_t(1 + \theta_t(\delta - 1)) - \gamma^c q^c_t - \gamma^a q^a_t\right). \tag{19}$$

Taking the derivative of (19) with respect to the percentage of committed capital in the fund, θ_t, we obtain

$$\frac{\partial}{\partial \theta_t} E_t(\mathrm{VA}_{t+1}) = q_t \phi_t(\delta - 1). \tag{20}$$

From (20), $\frac{\partial}{\partial \theta_t} E_t(\mathrm{VA}_{t+1}) > 0$ if and only if $\delta > 1$. Intuitively, a necessary condition for committed capital to add value is that front-load shares allow the manager to obtain a return higher than level-load shares.

Finally, we investigate how much value added after fees goes to patient investors in front-load shares versus short-term investors in level-load shares. After fees, the expected net value added (NVA) in (19) becomes

$$E_t(\mathrm{NVA}_{t+1}) = q_t\left(\phi_t(1 + \theta_t(\delta - 1)) - \gamma^c q^c_t - \gamma^a q^a_t\right) - q^c_t f^c_t - q^a_t\left(f^a_t + \tau_T\right). \tag{21}$$

In equilibrium, the participation constraint of investors in level-load shares is binding. From (4), this implies that $q^c_t\left(\phi_t(1 + \theta_t(\delta - 1)) - \gamma^c q^c_t - \gamma^a q^a_t - f^c_t\right) = 0$. Given (13), equation (21) becomes

$$E_t(\mathrm{NVA}_{t+1}) = q^a_t E_t\left(r^a_{t,T}\right),$$

which is the objective function of problem (12) with $q^a_t = q^a_t\left(f^a_t\right)$ evaluated at the optimal f^a_t. This leads to the second prediction:

Prediction 2. Net of annual and front-load fees, the fund's value added accrues to the long-term, committed capital.

In the following sections, we test both predictions. We conjecture that front-load shares proxy for long-term committed capital in short supply. Our model predicts that committed capital should be rewarded with a net alpha higher than 0 and that this adds value to the suppliers of committed capital by enabling the manager to implement long-term investment strategies with superior performance.

III. Data

We obtain data on open-ended U.S. mutual funds from 1992 to 2020. The data on annual mutual fund characteristics and monthly returns come from the CRSP Survivor Bias-Free U.S. Mutual Fund database. We focus on actively managed diversified equity funds: funds with CRSP objective codes EDYG (Growth), EDYB (Blend), EDYI (Value), EDCM (Mid-Cap), EDCS (Small-Cap), and EDCI (Micro-Cap). To avoid passive funds, we eliminate funds with the CRSP objective code EDCL (S&P 500 Index Objective Funds). We also eliminate funds if their names include the words "index," "S&P," or "ETF." Finally, to exclude possible hedge funds, we do not consider funds with the CRSP objective codes EDYH (Long/Short Equity Funds) or EDYS (Dedicated Short Bias Funds). As we are interested in understanding the impact of investors' sales fee structure choice on fund performance, we restrict our sample to funds that offer a multiclass investment structure.[12] Our sample totals 2,149 funds offered by 495 asset management companies.

Fund returns are net of total cost. We compute the annual total fund cost as the expense ratio plus front-load fees divided by 9.[13] We calculate fund TNAs as the sum of assets across all share classes, and we compute the value-weighted average of a fund's characteristics across shares classes.[14]

We create our primary independent variable using the share classification system of the ICI.[15] An important factor in investor preference among a fund's

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[12] To be more conservative, we further drop funds with more than 95% of AUM from no-load or institutional share classes. We also mitigate the Evans (2010) incubation bias by removing a fund from the sample if it is less than 3 years old or it has under $15 million in TNAs.

[13] Since we consider a 9-year holding period, to account for usual practices, we assume that effective back-load fees are 0.

[14] We aggregate returns, turnover, and expenses, weighting each share class by its TNA. Fund age is computed as of the month-end relative to the fund's first offer date. For the qualitative attributes of the funds, such as name or investment objective, we choose that of the oldest among all share classes. We identify share classes of a given fund using the WFICN identifier available in MFLINKs.

[15] There are broadly three load fee structures. Class A shares typically impose a front-load fee when shares are purchased. While there may also be an annual asset-based sales charge, this annual charge is generally lower than the charge imposed by the other share classes. Class B shares typically do not charge a front-load fee, but include a contingent deferred sales charge (CDSC) to be paid when shares are redeemed. This charge can be waived if the investment is held for a long predetermined period. Finally, investors may pay higher asset-based sales charges for Class C shares, but they are exempt from paying a front-load fee. This structure may include a relatively low CDSC if shares are liquidated during the first year.

share classes will be the investment horizon (Nanda et al. (2009)). Thus, we conjecture that investors who select share classes with sizeable front-load fees reveal a rational ex ante capital commitment to hold such an investment longer than investors who select share classes with no front-load fees but higher annual fees (henceforth level-load shares). For every fund, we define CAPITAL_COMMITMENT as the fraction of the fund TNA that comes from front- and back-load shares in a given period. While the model cites only front-load shares, a similar theory on long-term horizon would apply to back-load fees, so we include both front- and back-load share classes in our definition of capital commitment.[16] All variables are defined in Appendix A.

Panel A of Table 1 reports the sample mean, standard deviation, and distribution of TNA by share class. On average, 32.85% of fund TNA are committed capital, of which 30.72% have front-load fees and only 2.13% have back-load fees. Level-load share classes represent, on average, approximately 17.59% of fund TNA. On average, approximately 20.47% of fund TNA comes from institutional investors.

Panel B of Table 1 reports fund and family characteristics. The average fund has $2,860 million TNA in a family with an average of nine funds. The average fund is almost 16 years old and has an annual turnover of 76%. On average, funds

TABLE 1

Summary Statistics

Table 1 reports the mean, standard deviation, 25th percentile, median, and 75th percentile of share class size in the sample of multishare class funds in Panel A and fund characteristics in Panel B. The definitions of all variables are provided in Appendix A. The sample consists of actively managed U.S. domestic equity mutual funds that offer a multiclass investment structure. Our sample period runs from Jan. 1992 to Dec. 2020.

	Mean	Std. Dev.	p25	p50	p75
Panel A. Total Net Assets by Share Class					
CAPITAL_COMMITMENT	32.85	28.95	10.77	26.87	43.23
FRONT_INVESTORS	30.72	28.71	9.18	25.22	39.47
BACK_INVESTORS	2.13	7.30	0.00	0.00	0.27
LEVEL_INVESTORS	17.59	24.01	0.98	6.72	24.83
INSTITUTIONAL_INVESTORS	20.47	24.86	0.00	6.38	38.70
Panel B. Fund and Family Characteristics					
TNA ($MM)	2,859.70	7,336.21	99.96	489.20	2,261.25
FAMILY_SIZE ($MM)	35,648.78	63,161.89	1,267.37	9,560.26	43,360.12
FAMILY_FUNDS	9.20	7.20	3.00	7.00	14.00
EXP_RATIO (%)	1.26	0.43	1.00	1.21	1.49
TURNOVER (%)	76.32	66.51	32.00	58.00	100.00
AGE (MONTHS)	188.88	183.08	67.00	138.00	240.00
FUND_FLOWS (MONTHLY %)	1.39	11.35	−1.53	−0.40	1.29
FUND_FLOW_VOLATILITY	7.80	9.32	2.07	4.37	8.87
CASH (%)	3.26	5.18	0.33	1.72	4.22
FEE_DISPERSION (%)	0.30	0.13	0.22	0.31	0.40
CAPM (ANNUAL %)	−0.86	24.61	−12.42	−0.99	10.31
FF3 (ANNUAL %)	−1.30	18.99	−10.66	−1.28	7.95
FF4 (ANNUAL %)	−1.26	18.01	−10.27	−1.22	7.64
VA (NET) ($MM)	1.12	5.62	−0.12	0.03	0.59
VA (GROSS) ($MM)	3.24	10.86	−0.01	0.30	1.98
ILLIQUIDITY (AMIHUD)	0.66	2.53	0.01	0.03	0.17
TRADING_DURATION	2.52	1.47	1.43	2.26	3.35
R&D_STOCKS ($B)	698.58	3,288.32	1.36	10.58	93.24

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[16] Back-load fees are sometimes waived for certain investors, so we expect these to be a more ambiguous proxy of long-term investment horizon. It is, nevertheless, important to control for them.

have an annual expense ratio of 1.26%. They hold approximately 3.26% of their AUM in cash, and their after-fee performance is negative. The median fund in our sample generates approximately $120,000 ($300,000) in net (gross) value added per month.

IV. Empirical Analysis

To test the empirical support for our model predictions, first, in Section IV.A, we examine whether our empirical measure of capital commitment does indeed capture a long-term engagement of investors. Subsequently, we take the two empirical predictions from the model predictions to the data in Section IV.B, where we test whether funds with a higher percentage of committed capital have higher net alphas, generate more value added, and this value, net of fees, is appropriated by investors in front-load shares. In Section IV.C, we present the mechanism through which the performance materializes by examining the fund's investment horizon and strategy choices in the advent of more committed capital.

A. Capital Commitment and Flow Stability

We conjecture that investors who select share classes with sizeable front-load fees reveal a rational ex ante capital commitment to hold the investment longer than investors who select share classes with no front-load fees but higher annual fees. To validate our measure of capital commitment, we examine how capital commitment influences fund flow volatility. We would expect that if capital commitment captures long-term engagement by retail investors, funds with more capital commitment should have more stable flows. Other research on mutual fund share classes points in this direction. For instance, Chordia (1996) argues that load fees can be structured to dissuade redemptions. Nanda et al. (2009) postulate by contrast that the launch of level- and no-load shares may increase the level and volatility of fund inflows and attract investors with short and uncertain investment horizons.

More recent research suggests that brokers may prioritize their compensation incentives over the interest of their clients (Christoffersen et al. (2013), Chalmers and Reuter (2020)). If the conflict is strong enough, ill-advised investors may choose the wrong share class. Additionally, the choice of front-load fee shares may be driven by discounts in the sales fee if the initial or future invested amount surpasses certain breakpoints, independent of the investor's horizon. We expect that share classes reveal no differential information about the underlying investor horizon in all these cases.

We take flow volatility to proxy for investor capital commitment at the fund level. The underlying assumption is that more stable fund flows reflect more committed capital and longer investor horizons. To test the relation between flow volatility and capital commitment, we run a pooled regression for every fund i and every month t:

$$\begin{aligned}(22)\qquad \text{FUND\_FLOW\_VOLATILITY}_{it} = {} & \beta\text{CAPITAL\_COMMITMENT}_{it-1} \\ & + \gamma X_{it-1} + \delta_{st} + \sigma_f + \varepsilon_{it},\end{aligned}$$

where FUND_FLOW_VOLATILITY is the standard deviation of monthly flows in the following 24 months. CAPITAL_COMMITMENT is the proportion of total AUM coming from the addition of front- and back-load share classes. We also replace CAPITAL_COMMITMENT with, simultaneously, the variables FRONT_INVESTORS and BACK_INVESTORS, which represent the percentage of fund TNAs in the corresponding share class. We standardize all the continuous share class variables to have zero mean and unit standard deviation. We apply this transformation to make it easier to compare each variable's impact, where estimated coefficients denote the effect of a 1-standard-deviation change in the explanatory variable.

X_{it-1} represents a matrix of fund i characteristics measured at the end of month $t-1$, including fund and family size, number of funds in the family, fund age, fund flows, and cash holdings. We also add style-by-time fixed effects (δ_{st}) and fund family fixed effects (σ_f), which absorb any time-varying differences across styles and unobservable characteristics at the family level that may correlate with flow volatility. To account for serial correlation of fund flow volatility, we cluster standard errors at the fund level.

The object of interest is the coefficient β in equation (22). Under the null hypothesis, share classes with higher capital commitment are unrelated to flow volatility. Column 1 of Table 2 strongly rejects the null hypothesis. Funds with

TABLE 2

Flow Stability and Capital Commitment

Table 2 presents the results of regressing the fund's flow volatility on the percentage of the fund TNA in investor capital commitment and fund characteristics. The dependent variable is the standard deviation of monthly flows in the following 24 months. CAPITAL_COMMITMENT is the percentage of fund TNA in share classes with either front- or back-load fee. FRONT_INVESTORS and BACK_INVESTORS represent the percentage of fund TNA in share classes with front- and back-load fees, respectively. The main explanatory variables are standardized with a mean of 0 and a standard deviation of 1. Additional control variables are defined in Appendix A. The sample consists of actively managed U.S. domestic equity mutual funds that offer a multiclass investment structure. Our sample period runs from Jan. 1992 to Dec. 2020. Standard errors are clustered at the fund level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	FUNDS_FLOW_VOLATILITY			
	1	2	3	4
CAPITAL_COMMITMENT	−0.856*** (−8.37)		−1.365*** (−9.48)	
FRONT_INVESTORS		−0.852*** (−8.33)		−1.348*** (−9.18)
BACK_INVESTORS		−0.197** (−2.11)		−0.365*** (−2.78)
FUND_SIZE	−0.856*** (−14.37)	−0.855*** (−14.36)	−0.950*** (−15.57)	−0.950*** (−15.57)
FAMILY_SIZE	0.332*** (3.74)	0.331*** (3.70)	0.101 (0.75)	0.102 (0.76)
FAMILY_FUNDS	−0.168 (−0.91)	−0.166 (−0.90)	0.083 (0.32)	0.082 (0.32)
FUND_AGE	−0.069*** (−9.16)	−0.069*** (−9.15)	−0.055*** (−7.18)	−0.055*** (−7.16)
FUND_FLOWS	0.226*** (47.39)	0.226*** (47.38)	0.207*** (43.51)	0.207*** (43.51)
CASH	0.009 (0.55)	0.009 (0.56)	0.001 (0.03)	0.000 (0.03)
Style × time FE	Yes	Yes	Yes	Yes
Family FE	No	No	Yes	Yes
No. of obs.	212,982	212,982	212,982	212,982
Adj. R^2	0.193	0.193	0.263	0.263

higher capital commitment exhibit, on average, less fund flow volatility over the following 24 months. A 1-standard-deviation increase in capital commitment is associated with 8.56% lower flow volatility.

In column 2 of Table 2, we replace the commitment variable in equation (22) with the standardized percentage of the fund TNA held, separately, by *Back* and *Front Investors*. Flow volatility is significantly lower for every 1-standard-deviation increase in the percentage of fund TNA in the hands of, respectively, front- and back-load investors. The results remain robust and strongly significant at the 1% level even after controlling for unobservable characteristics at the fund family level in columns 3 and 4. This suggests that fund family distribution channels do not drive our results and that both front- and back-load investors indeed contribute to the future stability of the fund flows.[17]

B. Capital Commitment and Fund Performance

Next, we investigate whether asset managers share the rents with investors when they invest for the long term. With a limited supply of committed capital, investors in front-load shares do not compete away the excess return from investing, so capital commitment should be positively related to net fund returns. Our model also predicts that skilled managers who can reap higher returns from long-term investment strategies should add more value to fund shareholders and that this value, after fees, accrues to the suppliers if committed capital.

1. Baseline Results

The evidence in Del Guercio and Tkac (2010) and Del Guercio et al. (2014) strongly suggests that broker-sold funds (mostly load funds) underperform funds sold directly. Thus, under the null hypothesis, there should be no difference in performance whether investors in broker-sold funds invest primarily in front- or back-load shares versus level-load shares. At the same time, a higher percentage of front- or back-load shares represent greater investor capital commitment, which, following the model's first prediction, should lead to higher risk-adjusted returns net of fees, provided the supply of committed capital is limited and longer-term outperform short-term investment strategies.

To test whether capital commitment is associated with superior fund performance, we regress fund-level returns on our measure of capital commitment. Specifically, we run the fund-level regression:

$$R_{it} = \beta \text{CAPITAL\_COMMITMENT}_{it} + \gamma X_{it} + \delta_{st} + \sigma_f + \varepsilon_{it}, \tag{23}$$

where the dependent variable, R_{it}, represents the annualized fund net performance of fund i, measured as of month t. For each fund, we compute risk-adjusted returns using three different models. We use the CAPM (ALPHA 1F), the 3-factor model (ALPHA 3F) of Fama and French (1993), and the Carhart (1997) 4-factor model

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[17] In an untabulated set of robustness results, we separate fund flows into inflows and outflows as obtained from NSAR filings. FUND_FLOW_VOLATILITY in (22) is replaced with, respectively, the volatility (standard deviation in the next 24 months) of monthly inflows, outflows, and total flows. The negative relation between flow volatility and our measure of capital commitment is robust across all specifications.

(ALPHA 4F). We use a rolling 60-month window to estimate the factor loadings. The CRSP value-weighted stock index net of the 1-month Treasury rate is used as the market factor. The SMB (size factor), HML (book-to-market factor), and WML (momentum factor) factors are obtained from Kenneth French's website.

CAPITAL_COMMITMENT is the percentage of fund TNA in share classes with either front- or back-load fee. Both explanatory variables are standardized with a mean of 0 and a standard deviation of 1. X_{it} is a matrix of fund characteristics, including fund and family size, number of funds in the family, fund age, flows, cash holdings, and fund flow volatility. We also add style-by-time fixed effects (δ_{st}), which absorb any time-varying differences across styles.

Results are reported in Table 3. Panel A describes baseline specification results. In Panel B, we introduce fund family fixed effects (σ_f) to control for unobservable characteristics at the family level that may correlate with fund performance. We cluster standard errors by time (year-month) to account for the cross-sectional correlation of fund returns.

Regardless of the specification, the coefficient on CAPITAL_COMMITMENT is positively and significantly (at the 1% level) related to net fund performance. Thus, we confirm that returns net of fee increase with the percentage of committed capital. A 1-standard-deviation increase in capital commitment (approximately 30% of the portfolio) is associated with an increase in the annualized alpha of up to 22 BPS. When separating the fraction of the fund TNA that comes from front- and back-load shares, we show that the effect is mainly driven by front-load investors.

In Panel B of Table 3, we observe that the effect becomes stronger when comparing funds managed by the same management company. A 1-standard-deviation increase in capital commitment is associated with an increase in annualized alpha of up to 35 BPS when controlling for family fixed effects.

Evans and Fahlenbrach (2012) show that the presence of institutional investors in a fund can reduce agency conflicts and might have a positive impact on fund performance. Thus, the outperformance of funds with higher capital commitment might be due to the presence of more institutional investors. Thus, we need to control for the percentage of fund TNA in institutional share classes.

In results consistent with prior research, we find that the presence of institutional investors is associated with better fund performance in Table 4. More interesting, we show that controlling for institutional share class makes the coefficient on front loads even higher. Additionally, because there might be considerable variation in the level of load fees across funds in the same share class, we also explicitly control for front- and back-load fees. This way, we can compare how capital commitment affects fund performance for funds that offer also economically similar share-class structures. In economic terms, a 1-standard-deviation increase in the percentage of fund TNA in share classes with front-load fees is associated with an increase in annualized alpha of up to 30 BPS.

2. Fund Value Added

Our model conjectures that committed capital adds value to fund investors by enabling the manager to implement long-term investment strategies with superior performance ($\delta > 1$). Thus, provided the manager's skill, the fund's expected value

TABLE 3

Fund Performance and Capital Commitment

Table 3 reports the results of regressing *Fund Performance* on the percentage of the fund TNA in investor capital commitment and fund characteristics. Fund returns are calculated after fees and expenses. The dependent variable is annualized fund performance measured by the alpha from CAPM (CAPM), the Fama–French 3-factor model (FF3), and Carhart's 4-factor model (FF4). CAPITAL_COMMITMENT is the percentage of fund TNA in share classes with either front- or back-load fee. FRONT_INVESTORS and BACK_INVESTORS represent the percentage of fund TNA in share classes with front- and back-load fees, respectively. The main explanatory variables are standardized with a mean of 0 and a standard deviation of 1. Additional control variables are defined in Appendix A. The sample consists of actively managed U.S. domestic equity mutual funds that offer a multiclass investment structure. Our sample period runs from Jan. 1992 to Dec. 2020. Standard errors are clustered by time (year-month). *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	CAPM	FF3	FF4	CAPM	FF3	FF4
	1	2	3	4	5	6
Panel A. Baseline Specification						
CAPITAL_COMMITMENT	0.215***	0.140**	0.175***			
	(2.70)	(2.14)	(2.78)			
FRONT_INVESTORS				0.218***	0.136**	0.176***
				(2.69)	(2.04)	(2.77)
BACK_INVESTORS				0.021	0.056	0.023
				(0.39)	(1.17)	(0.51)
FUND_SIZE	0.047	0.012	0.002	0.047	0.012	0.002
	(0.89)	(0.29)	(0.05)	(0.88)	(0.30)	(0.04)
FAMILY_SIZE	0.117**	0.152***	0.133***	0.119**	0.151***	0.134***
	(2.05)	(2.86)	(2.61)	(2.11)	(2.83)	(2.64)
FAMILY_FUNDS	−0.185	−0.223*	−0.185*	−0.188	−0.222*	−0.186*
	(−1.39)	(−1.92)	(−1.69)	(−1.41)	(−1.91)	(−1.70)
FUND_AGE	−0.015***	−0.014***	−0.016***	−0.015***	−0.014***	−0.016***
	(−3.20)	(−3.26)	(−3.99)	(−3.21)	(−3.24)	(−3.98)
FUND_FLOWS	0.070***	0.040***	0.036***	0.070***	0.040***	0.036***
	(4.37)	(4.54)	(4.39)	(4.37)	(4.54)	(4.39)
CASH	0.005	0.002	0.009	0.005	0.002	0.009
	(0.28)	(0.13)	(0.63)	(0.27)	(0.13)	(0.63)
FUND_FLOW_VOLATILITY	0.015	0.029***	0.030***	0.015	0.029***	0.030***
	(1.56)	(3.73)	(4.18)	(1.55)	(3.73)	(4.17)
Style × time FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	199,469	199,469	199,469	199,469	199,469	199,469
Adj. R^2	0.300	0.161	0.160	0.300	0.161	0.160
Panel B. Family Fixed Effects						
CAPITAL_COMMITMENT	0.353***	0.259***	0.230***			
	(3.19)	(2.94)	(2.76)			
FRONT_INVESTORS				0.404***	0.287***	0.256***
				(3.66)	(3.23)	(3.03)
BACK_INVESTORS				−0.189*	−0.086	−0.081
				(−1.96)	(−1.12)	(−1.16)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Style × time FE	Yes	Yes	Yes	Yes	Yes	Yes
Family FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	199,456	199,456	199,456	199,456	199,456	199,456
Adj. R^2	0.303	0.164	0.165	0.303	0.164	0.165

added should increase with the percentage of committed capital, levered by the extra return from long-term capital relative to level-load shares, both before and after fees. We show empirically that, supporting our model's premise, funds' value added increases with committed capital. This is consistent with our assumption $\delta > 1$. We then examine the distribution of value added between fund managers and fund investors in different share classes. More specifically, how much value added goes to the providers of committed capital (front-load shares), that is, the value added after costs and load fees to the patient investors. According to the model, fund

TABLE 4

Performance and Capital Commitment: Institutional Investors and Load Fees

Table 4 reports the results of regressing *Fund Performance* on the percentage of the fund TNA in investor capital commitment and fund characteristics. Fund returns are calculated after fees and expenses. The dependent variable is annualized fund performance measured by the alpha from CAPM (CAPM), the Fama–French 3-factor model (FF3), and Carhart's 4-factor model (FF4). CAPITAL_COMMITMENT is the percentage of fund TNA in share classes with either front- or back-load fee. FRONT_INVESTORS and BACK_INVESTORS represent the percentage of fund TNA in share classes with front- and back-load fees, respectively. *Institutional Investors* represent the percentage of fund TNA in institutional share classes. *Front Load Fee* and *Back Load Fee* measure the actual front-load and back-load fees of the fund, respectively. The main explanatory variables are standardized with a mean of 0 and a standard deviation of 1. Additional control variables include fund size, family size, number of funds in the family, fund age, flows, cash, and flow volatility, and are defined in Appendix A. The sample consists of actively managed U.S. domestic equity mutual funds that offer a multiclass investment structure. Our sample period runs from Jan. 1992 to Dec. 2020. Standard errors are clustered by time (year-month). *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	CAPM	FF3	FF4	CAPM	FF3	FF4
	1	2	3	4	5	6
FRONT_INVESTORS	0.276***	0.183***	0.235***	0.300***	0.239***	0.270***
	(3.39)	(2.63)	(3.49)	(3.76)	(3.28)	(3.81)
BACK_INVESTORS	0.040	0.072	0.042	0.127**	0.138**	0.112**
	(0.73)	(1.48)	(0.91)	(2.01)	(2.57)	(2.17)
INSTITUTIONAL_INVESTORS	0.188***	0.154***	0.191***	0.192***	0.168***	0.199***
	(3.18)	(3.18)	(4.08)	(3.06)	(3.41)	(4.14)
FRONT_LOAD_FEE				−0.147***	−0.173***	−0.144***
				(−3.50)	(−4.67)	(−4.17)
BACK_LOAD_FEE				−0.349***	−0.265***	−0.278***
				(−3.18)	(−3.15)	(−3.41)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Style × time FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	199,469	199,469	199,469	199,469	199,469	199,469
Adj. R^2	0.300	0.161	0.160	0.300	0.161	0.160

managers should charge all the value added from their skill through fees, but the value added from investing patient capital should be shared with the patient investors in front-load shares.

Following Berk and Van Binsbergen (2015), we compute the value added by multiplying the difference between the fund return and the return of the fund's corresponding Vanguard index by the fund's AUM at the end of the previous period.[18] The value added, net of front load fees, is constructed using a holding period of 9 years.

It is worth noting that the model's Prediction 2 on value added after fees is not necessarily the same as that on net performance (Prediction 1) because of the decreasing returns to scale, particularly when, as assumed in the model and the numerical analysis, the decreasing returns to scale parameters of long-term investing (the marginal cost γ^a) are substantially lower than those of short-term investing (γ^c).

Results are presented in Table 5. Panel A reports univariate comparisons of the average value added for the bottom and top quintile levels of capital commitment. While funds in the top quintile of capital commitment add a net value of more than \$1.8 million per month, funds in the bottom quintile have a net value added that is almost 4 times smaller. The difference in gross and net value added is statistically significant across the 2 quintiles and much bigger for Front-Load than Back-Load Investors. Moreover, before fees (gross) value added is economically smaller suggestive that the economically significant part goes to the long-term investors.

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[18] AUMs are in \$ million and inflation-adjusted by expressing them in 2020 dollars.

TABLE 5

Fund Value Added and Capital Commitment

Panel A of Table 5 reports univariate comparisons of the average value added, for low and high (bottom and top quintiles) levels of capital commitment. In Panel B, we present the results of a multivariate analysis where we regress Value Added on the percentage of the fund TNA in investor capital commitment and fund characteristics. We follow Berk and Van Binsbergen (2015) in constructing the value added of funds, using the set of index funds offered by The Vanguard Group as the next-best alternative investment opportunity. We multiply the benchmark-adjusted realized monthly return by the real size of the fund (AUM adjusted by inflation by expressing them in 2020 dollars) at the end of the previous period to obtain the realized value added. Gross (net) returns used to constructed value added is before (after) fees, including expense ratio and load fees. The value added net of front load fees is constructed using a holding period of 9 years. CAPITAL_COMMITMENT is the percentage of fund TNA in share classes with either front- or back-load fee. FRONT INVESTORS and BACK_INVESTORS represent the percentage of fund TNA in share classes with front- and back-load fees, respectively. The main explanatory variables are standardized with a mean of 0 and a standard deviation of 1. Additional control variables include fund size, family size, number of funds in the family, fund age, flows, cash, and flow volatility, and are defined in Appendix A. The sample consists of actively managed U.S. domestic equity mutual funds that offer a multiclass investment structure. Our sample period runs from Jan. 1992 to Dec. 2020. Standard errors are clustered at the fund level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Univariate Results

	CAPITAL_COMMITMENT			FRONT_INVESTORS			BACK_INVESTORS		
	Low	High	Diff	Low	High	Diff	Low	High	Diff
VA (GROSS)	2.467***	3.344***	−0.877***	2.441***	3.193***	−0.752***	3.223***	3.823***	−0.599***
VA (NET)	0.480***	1.805***	−1.324***	0.486***	1.732***	−1.246***	1.028***	1.450***	−0.422***

Panel B. Multivariate Results

	VA (GROSS)		VA (NET)	
	1	2	3	4
CAPITAL_COMMITMENT	1.369***		0.784***	
	(5.61)		(5.64)	
FRONT_INVESTORS		1.378***		0.797***
		(5.61)		(5.70)
BACK_INVESTORS		0.107		−0.036
		(0.67)		(−0.41)
Controls	Yes	Yes	Yes	Yes
Time × style	Yes	Yes	Yes	Yes
No. of obs.	175,028	175,028	175,028	175,028
Adj. R^2	0.217	0.218	0.146	0.147

In Panel B of Table 5, we present the results of a multivariate analysis where we regress value added on the percentage of the fund TNA in investor capital commitment and fund characteristics. Consistent with the second prediction of our model, we observe that the scarcity of committed capital is priced. A 1-standard-deviation increase in capital commitment corresponds to approximately $9.4 million (784,000 × 12) per year in net value added to investors. The results are clearly driven by FRONT_INVESTORS (the coefficients on BACK_INVESTORS are nonsignificant). Combined with the baseline results, these regressions confirm that investors gain from the overall wealth created when they commit ex ante to a fund and that the extra return from long-term capital relative to level-load shares is high enough to cover the prorated front-load fee. When comparing the net value added to the gross value added, the results show that funds share almost 60% of all the value added generated from investing committed capital with their more committed investors.

3. Additional Robustness

While the previous analyses focus on the cross-sectional variation of capital commitment, we test now whether our results are robust to measuring capital commitment in first differences. Table 6 reports the results. We show that monthly changes in capital commitment positively impact both fund performance and value added. In economic terms, a 1-standard-deviation increase in ΔCAPITAL_COMMITMENT (0.03) increases the fund's 1-factor-alpha net return by 36 BPS (0.03 × 11.943) per year. This is mainly associated with an increase in front-end investors. Similarly, in terms of value added, Panel B of Table 6 reports that the

TABLE 6

Changes in Capital Commitment

Table 6 reports the results of regressing *Fund Performance* in Panel A and Value Added in Panel B on the percentage of the fund TNA in investor capital commitment change and fund characteristics. Fund returns are calculated after fees and expenses. The dependent variable is annualized fund performance measured by the alpha from CAPM (CAPM), the Fama–French 3-factor model (FF3), and Carhart's 4-factor model (FF4). ΔCAPITAL_COMMITMENT, ΔFRONT_INVESTORS, and ΔBACK_INVESTORS are the first difference of CAPITAL_COMMITMENT, FRONT_INVESTORS, and BACK_INVESTORS variables previously defined. Additional control variables are defined in Appendix A. The sample consists of actively managed U.S. domestic equity mutual funds that offer a multiclass investment structure. Our sample period runs from Jan. 1992 to Dec. 2020. Standard errors are clustered by time (year-month) in Panel A and by fund in Panel B. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Fund Performance

	CAPM	FF3	FF4	CAPM	FF3	FF4
	1	2	3	4	5	6
ΔCAPITAL_COMMITMENT	11.943*** (3.44)	7.902*** (3.21)	7.235*** (3.14)			
ΔFRONT_TNA				12.017*** (3.65)	8.117*** (3.22)	7.422*** (3.21)
ΔREAR_TNA				10.498 (0.68)	3.689 (0.35)	3.582 (0.37)
FUND_SIZE	0.037 (0.71)	0.005 (0.11)	−0.007 (−0.19)	0.037 (0.71)	0.005 (0.11)	−0.007 (−0.19)
FAMILY_SIZE	0.092 (1.61)	0.139** (2.57)	0.116** (2.25)	0.092 (1.62)	0.139** (2.58)	0.116** (2.25)
FAMILY_FUNDS	−0.164 (−1.26)	−0.218* (−1.85)	−0.176 (−1.59)	−0.164 (−1.27)	−0.218* (−1.86)	−0.176 (−1.59)
FUND_AGE	−0.012*** (−2.76)	−0.012*** (−3.01)	−0.014*** (−3.70)	−0.012*** (−2.76)	−0.012*** (−3.01)	−0.014*** (−3.70)
FUND_FLOWS	0.090*** (4.49)	0.052*** (4.86)	0.047*** (4.61)	0.090*** (4.48)	0.052*** (4.87)	0.047*** (4.60)
CASH	0.005 (0.29)	0.003 (0.15)	0.010 (0.68)	0.005 (0.29)	0.003 (0.16)	0.010 (0.68)
FUND_FLOW_VOLATILITY	0.011 (1.14)	0.027*** (3.46)	0.027*** (3.72)	0.011 (1.14)	0.027*** (3.47)	0.027*** (3.73)
Style × time FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	198,532	198,532	198,532	198,532	198,532	198,532
Adj. R^2	0.300	0.161	0.160	0.300	0.161	0.160

Panel B. Value Added

	VA (GROSS)		VA (NET)	
	1	2	3	4
ΔCAPITAL_COMMITMENT	5.532*** (5.80)		2.241*** (4.20)	
ΔFRONT_TNA		5.372*** (5.60)		2.130*** (3.95)
ΔREAR_TNA		9.160*** (2.61)		4.764*** (2.59)
Controls	Yes	Yes	Yes	Yes
Style × time FE	Yes	Yes	Yes	Yes
No. of obs.	174,287	174,287	174,287	174,287
Adj. R^2	0.208	0.208	0.133	0.133

same increase in capital commitment increases the fund's net value added by \$806,760 ($0.03 \times 2.241 \times 12$) per year. This result in monthly changes is consistent with the idea that the scarcity of the committed capital is priced.

C. Mechanism Evidence: Investment Horizon and Long-Term Strategies

Funds with more committed capital perform better. They have higher risk-adjusted returns and generate more value added before and net of fees. This raises the following questions: Where this performance comes from? What can funds with committed capital do differently from funds that do not enjoy this stable source of capital? In our model, we assume that investors' choice among share classes helps managers deliver performance by capitalizing on long-term investment strategies (Shleifer and Vishny (1990)). Our results on the link between capital commitment and fund performance in the previous section are consistent with this assumption. In this section, we explicitly test whether capital commitment affects fund trading horizon and stock selection.

We hypothesize that the percentage of capital commitment influences fund investment horizon, such that managers can pursue more long-term strategies by holding stocks longer in a portfolio. Lan et al. (2019) and Cremers and Pareek (2016) show that a longer investment horizon has a positive impact on fund performance. Thus, we will also test the relation between capital commitment and fund performance via the fund manager's investment horizon.

1. Trading Duration

To test the relation between investors' capital commitment and the managers' trading duration, we run the following regression for every fund i and quarter t:

$$\text{TRADING\_DURATION}_{i,t} = \beta\text{CAPITAL\_COMMITMENT}_{it} + \gamma X_{it} + \delta_{st} + \sigma_f + \varepsilon_{it}, \quad (24)$$

where TRADING_DURATION, introduced by Cremers and Pareek (2016), is based on quarter-end holdings and measures the average length of time (weighted by the size of each stock position) that the fund has held equities in the portfolio over the last 5 years. CAPITAL_COMMITMENT is defined as before. We also replace capital commitment with the percentage held by BACK_INVESTORS and FRONT_INVESTORS separately. The main explanatory variables are standardized with a mean of 0 and a standard deviation of 1. X_{it} is a matrix of fund characteristics, including fund and family size, number of funds in the family, fund age, flows, cash holdings, and expense ratio. We also add style-by-time fixed effects (δ_{st}), which absorb any time-varying differences across styles, and fund family fixed effect (σ_f) to control for unobservable characteristics at the family level. Standard errors are clustered at the fund level. Results are reported in Table 7.

Under the null hypothesis, managers disregard the share class information because it is redundant or lacks adequate incentives to exploit it. Thus, under the null, β is no different from zero.[19] The evidence, however, strongly rejects the

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[19] Using client-level data on fund share transactions, Johnson (2004) shows that fund managers can make inferences about their clients even in the absence of load shares. The evidence in Del Guercio et al. (2014) suggests that managers of broker-sold funds (more likely to use load shares) have weaker incentives to generate alpha than those sold directly (more likely to use no-load shares).

TABLE 7

Trading Duration and Capital Commitment

Table 7 reports the results of regressing TRADING_DURATION on the percentage of the fund's TNA in investors' capital commitment and fund characteristics. TRADING_DURATION, introduced in Cremers and Pareek (2016), is based on quarter-end holdings and measures the weighted average (weighted by the size of each stock position) length of time that the fund has held equities in the portfolio over the last 5 years. CAPITAL_COMMITMENT is the percentage of fund TNA in share classes with either front- or back-load fee. FRONT_INVESTORS and BACK_INVESTORS represent the percentage of fund TNA in share classes with front- and back-load fees, respectively. The main explanatory variables are standardized with a mean of 0 and a standard deviation of 1. Additional control variables are defined in Appendix A. The sample consists of actively managed U.S. domestic equity mutual funds that offer a multiclass investment structure. Our sample period runs from Jan. 1992 to Dec. 2020. Standard errors are clustered at the fund level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	TRADING_DURATION			
	1	2	3	4
CAPITAL_COMMITMENT	0.140*** (4.38)		0.086*** (2.87)	
FRONT_INVESTORS		0.138*** (4.46)		0.090*** (3.09)
BACK_INVESTORS		0.042 (0.68)		−0.002 (−0.05)
FUND_SIZE	0.110*** (6.12)	0.110*** (6.12)	0.125*** (7.95)	0.126*** (7.94)
FAMILY_SIZE	0.030 (1.33)	0.029 (1.32)	0.052** (2.11)	0.053** (2.15)
FAMILY_FUNDS	−0.285*** (−5.51)	−0.285*** (−5.65)	−0.113** (−2.27)	−0.114** (−2.29)
FUND_AGE	−0.006** (−2.09)	−0.006** (−2.09)	−0.009*** (−3.68)	−0.009*** (−3.68)
FUND_FLOWS	−0.005*** (−7.32)	−0.005*** (−7.32)	−0.004*** (−7.92)	−0.004*** (−7.89)
CASH	0.014*** (3.17)	0.014*** (3.17)	0.010*** (2.76)	0.010*** (2.74)
EXP_RATIO (%)	−0.059 (−0.69)	−0.061 (−0.70)	−0.023 (−0.30)	−0.014 (−0.18)
Style × time FE	Yes	Yes	Yes	Yes
Family FE	No	No	Yes	Yes
No. of obs.	59,664	59,664	59,651	59,651
Adj. R^2	0.105	0.105	0.276	0.276

null hypothesis. There is a positive correlation between capital commitment and managers' holding horizons. In column 1 of Table 7, a 1-standard-deviation increase in capital commitment is associated with 0.14 higher trading duration, which is equivalent to a 5.6% (0.14/2.52) increase over the mean holding period. We also see a positive correlation when separating capital commitment into back- and front-end load AUM in column 2. All coefficients on these variables are statistically significant at the 1% level. When we control for family fixed effects, coefficients on CAPITAL_COMMITMENT remain positive and significant at the 5% level.

In untabulated results, we corroborate the trading duration findings using alternative horizon proxies like the fund's annual TURNOVER ratio from CRSP and three duration measures from Lan et al. (2019). In general, a fund that trades frequently tends to have a high turnover and a short holding horizon. Consistently, we find a negative and significant relation between the assets managed with entry

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Del Guercio and Tkac (2010) show that broker-sold funds cater to a clientele that values nonperformance characteristics. Following these arguments, we should expect no relation between fund investors' capital commitment and fund managers' investment horizon.

and exit loads and fund turnover. Regardless of the duration measure used, we document a positive and significant correlation between the manager's trading duration and CAPITAL_COMMITMENT.

2. Stock Selection

How does capital commitment relate to managers' investment decisions and the type of stocks they select? In particular, do fund managers invest differently when their underlying investors explicitly provide a long-term capital commitment? Are managers more likely to invest in illiquid stocks if their investors' horizon increases? Is the lack of explicit capital commitment an impediment to exploiting slow-moving trading opportunities that are riskier for funds subject to more volatile flows? We analyze two broad strategies whose implementation may vary with the amount of committed capital to answer these questions.

Illiquid assets provide a return premium, but are costly to liquidate in the advent of unexpected investor redemptions (fire sales). We investigate whether managers with more committed capital are less concerned with fire-sale externalities and hold more illiquid stocks to enhance fund performance. We use, as a proxy for the illiquidity of a fund's stock portfolio, the monthly average of the daily Amihud (2002) FUND_ILLIQUIDITY measure.

Funds could also invest in mispriced stocks that are risky to arbitrage because convergence to fundamental value might be slow. Porter (1992) and Hall, Hall, Heaton, and Mankiw (1993) suggest that investors with short time horizons fail to anticipate the rewards from long-term investments such as R&D. Dow and Gorton (1994) and Goldman and Slezak (2003) argue that the short-term horizons of portfolio managers make them less prone to invest in information acquisition about firms' long-term projects, such as investment in R&D. As a proxy for (long-term) project duration, we use investment-related variables as R&D expenses in the previous year over lagged assets for each stock from Compustat. We calculate the value-weighted average of R&D expenses across the fund portfolio holdings to obtain a fund-level quantification of this amount of R&D expense and call this variable R&D_STOCKS. We expect higher proportions of committed capital to be positively associated with an investment in these long-term strategies.

We run a regression for every fund i and quarter t:

$$\text{STOCK\_CHARACTERISTIC}_{i,t}^{s} = \beta \text{CAPITAL\_COMMITMENT}_{it} + \gamma X_{it} + \delta_{st} + \sigma_f + \varepsilon_{it}, \tag{25}$$

where $\text{STOCK\_CHARACTERISTIC}_{i,t}^{s}$ represents the investment strategy: FUND_ILLIQUIDITY or R&D_STOCKS for fund i at quarter t. CAPITAL_COMMITMENT is the percentage of fund TNA in share classes with either front- or back-load fee. Both explanatory variables are standardized with a mean of 0 and a standard deviation of 1. X_{it} is a matrix of fund characteristics, including fund and family size, number of funds in the family, fund age, flows, cash holdings, and expense ratio. We also add style-by-time fixed effects (δ_{st}), which absorb any time-varying differences across styles. Standard errors are clustered at the fund level. Results are presented in Tables 8 and 9.

TABLE 8

Portfolio Illiquidity and Capital Commitment

Table 8 presents the results of regressing FUND_ILLIQUIDITY on the percentage of the fund's TNA in investors' capital commitment and fund characteristics. The dependent variable is the weighted average of the Amihud (2002) illiquidity measure across portfolio stocks. CAPITAL_COMMITMENT is the percentage of fund TNA in share classes with either front- or back-load fee. FRONT_INVESTORS and BACK_INVESTORS represent the percentage of fund TNA in share classes with front- and back-load fees, respectively. The main explanatory variables are standardized with a mean of 0 and a standard deviation of 1. Additional control variables are defined Appendix A. The sample consists of actively managed U.S. domestic equity mutual funds that offer a multiclass investment structure. Our sample period runs from Jan. 1992 to Dec. 2020. Standard errors are clustered at the fund level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	FUND_ILLIQUIDITY			
	1	2	3	4
CAPITAL_COMMITMENT	0.513**		0.427**	
	(2.42)		(2.03)	
FRONT_INVESTORS		0.439**		0.348*
		(2.03)		(1.91)
BACK_INVESTORS		0.602		0.499
		(0.80)		(0.82)
FUND_SIZE	0.182**	0.175**	0.029	0.027
	(2.17)	(2.20)	(0.47)	(0.44)
FAMILY_SIZE	−0.365*	−0.411**	−0.336	−0.351
	(−1.74)	(−2.28)	(−1.40)	(−1.55)
FAMILY_FUNDS	0.656**	0.705**	0.813	0.829
	(2.28)	(2.16)	(1.52)	(1.49)
FUND_AGE	−0.016*	−0.015*	−0.020**	−0.020**
	(−1.65)	(−1.72)	(−2.39)	(−2.38)
FUND_FLOWS	−0.001	−0.001	−0.000	−0.000
	(−0.12)	(−0.10)	(−0.06)	(−0.08)
CASH	0.068	0.068	0.066**	0.067**
	(1.45)	(1.45)	(2.22)	(2.24)
EXP_RATIO (%)	2.844**	2.661**	0.256	0.098
	(2.02)	(2.18)	(0.19)	(0.09)
Style × time FE	Yes	Yes	Yes	Yes
Family FE	No	No	Yes	Yes
No. of obs.	60,004	60,004	59,992	59,992
Adj. R^2	0.010	0.011	0.023	0.023

The higher the fraction of assets in share classes with front- and back-load fees, the more illiquid the holdings of the mutual funds tend to be, as measured by the Amihud (2002) FUND_ILLIQUIDITY variable. In particular, a 1-standard-deviation increase in capital commitment is associated with an increase of 0.51 fund illiquidity, which is equivalent to almost 80% (0.51/0.66) of the average holdings illiquidity. This is robust to including family fixed effects in columns 3 and 4 of Tables 8 and 9.

At the same time, funds with more committed capital invest more per standard deviation of capital commitment in innovative firms as measured by the R&D intensity within their portfolio choice, as reported in Table 9. As the dependent variable is the logarithm of the total portfolio's value-weighted R&D expense, the effect is equivalent to an increase between 16% and 23% in average R&D intensity in fund-level holdings. This effect is either with a higher fraction of assets in front- or back-end loads.

Overall, our results are consistent with our hypothesis that front- and back-load fee structures give managers greater freedom to pursue long-term investment strategies, invest in more illiquid stocks, and stocks with more long-term investment prospects as measured by R&D intensity.

TABLE 9

R&D Stocks and Capital Commitment

Table 9 presents the results of regressing R&D_STOCKS on the percentage of the fund's TNA in investors' capital commitment and fund characteristics. The dependent variable is the logarithm of the total portfolio's value-weighted R&D expense from Compustat. CAPITAL_COMMITMENT is the percentage of fund TNA in share classes with either front- or back-load fee. FRONT_INVESTORS and BACK_INVESTORS represent the percentage of fund TNA in share classes with front- and back-load fees, respectively. The main explanatory variables are standardized with a mean of 0 and a standard deviation of 1. Additional control variables are defined in Appendix A. The sample consists of actively managed U.S. domestic equity mutual funds that offer a multiclass investment structure. Our sample period runs from Jan. 1992 to Dec. 2020. Standard errors are clustered at the fund level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	R&D_STOCKS			
	1	2	3	4
CAPITAL_COMMITMENT	0.162*** (3.12)		0.230*** (3.82)	
FRONT_INVESTORS		0.147*** (2.79)		0.192*** (3.16)
BACK_INVESTORS		0.146** (2.21)		0.220** (2.52)
FUND_SIZE	0.784*** (20.20)	0.783*** (20.12)	0.847*** (27.04)	0.845*** (26.92)
FAMILY_SIZE	0.146*** (3.21)	0.138*** (3.03)	−0.011 (−0.20)	−0.016 (−0.28)
FAMILY_FUNDS	−0.078 (−0.76)	−0.074 (−0.72)	−0.064 (−0.58)	−0.062 (−0.56)
FUND_AGE	0.014*** (4.21)	0.014*** (4.23)	0.011*** (3.29)	0.011*** (3.31)
FUND_FLOWS	−0.010*** (−5.04)	−0.010*** (−5.03)	−0.008*** (−4.57)	−0.008*** (−4.58)
CASH	−0.013 (−1.32)	−0.013 (−1.30)	−0.012 (−1.48)	−0.011 (−1.41)
EXP_RATIO (%)	−0.472* (−1.73)	−0.516* (−1.85)	0.028 (0.18)	−0.048 (−0.30)
Style × time FE	Yes	Yes	Yes	Yes
Family FE	No	No	Yes	Yes
No. of obs.	48,248	48,248	48,234	48,234
Adj. R^2	0.536	0.536	0.584	0.584

V. Conclusion

We argue that investors' willingness to invest (commit capital) for the long run should be rewarded. We extend the model of active portfolio management in BG to allow for long-term capital commitment invested in mutual fund shares classes with front-load fees. This capital is assumed to outperform short-term capital (provided by investors in level-load shares) and is optimally supplied by profit-seeking investors. Thus, committed capital is inelastic with respect to fund returns. We show that this behavior can prevent funds from appropriating all economic surplus as in BG.

Consistent with the model's predictions, we show that funds' net performance improves with the percentage of committed capital. The reward for capital commitment is statistically significant and robust. In a fully rational model, with no moral hazard or asymmetric information, committed capital is rewarded and, more importantly, shared with investors. A 1-standard-deviation increase in capital commitment corresponds to approximately $9 million per year in net value added generated to investors.

We find that the lack of explicit capital commitment affects investment horizon and stock selection. The information embedded in investor load fee choice helps managers deliver performance by capitalizing on long-term investment choices. Our results show that mutual funds with more committed capital hold stocks for longer periods, hold more illiquid stocks, and invest in long-term oriented firms as proxied by the R&D intensity within their portfolio choice.

While we focus on open-end mutual funds, the same intuition should apply to alternative, even more illiquid, investment vehicles like private equity, where alternative contractual solutions could be explored to reward investor patience. Extensions of the model to other sources of investor heterogeneity or alternative proxies for investment horizons (e.g., target-date retirement funds) should be of interest for future research.

Appendix A. Variable Definitions

Total Net Assets by Share Class

BACK_INVESTORS: Percentage of fund's TNA invested in shares with a back-load fee (CDSC) >2% (typically, class B).

CAPITAL_COMMITMENT: Percentage of fund's TNAs invested in shares with a front-load fee >1% (typically, class A) or shares with a CDSC >2% (typically, class B).

FRONT_INVESTORS: Percentage of fund's TNA invested in shares with a front-load fee >1% (typically, class A).

INSTITUTIONAL_INVESTORS: Percentage of fund's TNA invested in institutional shares class.

LEVEL_INVESTORS: Percentage of fund's TNA invested in shares with a 12b-1 fee >0.25% (typically, class C).

Fund and Family Characteristics

AGE: Number of months since fund inception date.

CASH: Fund's TNA invested in cash (in %).

EXP_RATIO: Total annual expenses and fees divided by year-end TNA (in %).

TNA: Fund's total net AUM ($ million).

FAMILY_FUNDS: Number of funds in the fund family.

FAMILY_SIZE: TNA of all funds in the family, excluding the fund itself ($ million).

FEE_DISPERSION: Standard deviation of expense ratio across all the share classes of a fund in a given period (in %).

FUND_FLOWS: Net growth in fund assets beyond reinvested dividends over the past 1 month (in %).

FUND_FLOW_VOLATILITY: Standard deviation of monthly flows in the following 24 months (in %).

FUND_ILLIQUIDITY: The weighted average of the Amihud (2002) illiquidity measure across portfolio stocks.

FUND_SIZE: Natural logarithm of fund's TNA.

CAPM: Annualized fund performance measured by the alpha from CAPM (in %). Fund returns are net of all management expenses, 12b-1 fees, and front-load fees. Front-load fees are annualized, assuming a 9-year investment horizon.

FF3: Annualized fund performance measured by the alpha from the Fama and French (1993) 3-factor model (in %). Fund returns are net of all management expenses, 12b-1 fees, and front-load fees. Front-load fees are annualized, assuming a 9-year investment horizon.

FF4: Annualized fund performance measured by the alpha from the Carhart (1997) 4-factor model (in %). Fund returns are net of all management expenses, 12b-1 fees, and front-load fees. Front-load fees are annualized, assuming a 9-year investment horizon.

R&D_STOCKS: The total portfolio's value-weighted R&D expense from Compustat ($ million).

TRADING_DURATION: Introduced in Cremers and Pareek (2016), is based on quarter-end holdings, and measures the weighted-average (weighted by the size of each stock position) length of time that the fund has held equities in the portfolio over the last 5 years.

TURNOVER: Minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year (in %).

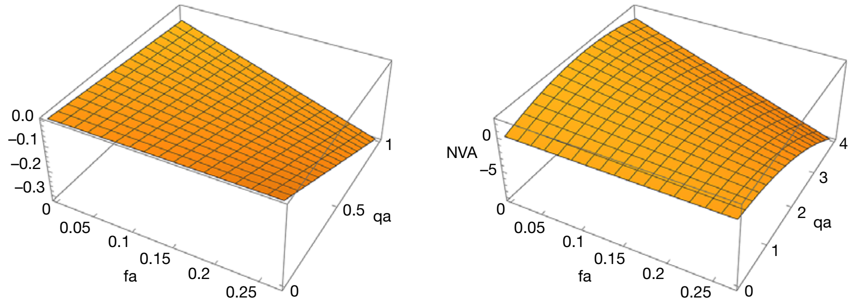
VA (GROSS/NET): We follow Berk and Van Binsbergen (2015) in constructing the monthly value added of funds, using the set of index funds offered by The Vanguard Group as the next-best alternative investment opportunity. We multiply the benchmark-adjusted realized gross return by the real size of the fund (AUM adjusted by inflation by expressing them in 2020 dollars) at the end of the previous period to obtain the realized value added ($ million). Gross value added uses fund return before fees. Net value added uses fund return after front-load fees. The value added net of front load fees is constructed using a holding period of 9 years.

Appendix B. Numerical Solution for 3 Different Values of ϕ_t

Appendix B presents a numerical solution to the fund's optimal f^a in problem (16). We assume the following parameter values: $\tau = 5$ percentage points and $T = 9$ years, consistent with the average values in our sample. This yields a value of the annually prorated front-load fee $\tau_T = 0.55$ percentage points. We also assume $\delta = 1.05$. That is, the manager can obtain 5% higher return per unit of long-term committed capital relative to a unit invested in C class shares. The decreasing returns to scale parameters are assumed to be $\gamma^c = 0.1$ and $\gamma^a = 0.01$. Given (2), γ^c (alternatively, γ^a) can be interpreted as a reduction of 10 BPS (alternatively, 1 BPS) in the expected return of level-load shares per additional unit of AUM q^c (alternatively, q^a) invested in level-load

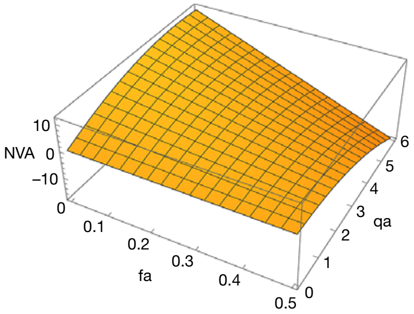
FIGURE A1

Each graph of Figure A1 represents (vertical axis) the value added net of fees (NVA) in the objective function of problem (12) for a grid of pairs (f^a, q^a) in the horizontal axes. $\tau_T = 0.55$; $\delta = 1.05$; $\gamma^a = 0.01$; $\gamma^c = 0.1$. Graph A assumes $\phi = 1.0$; Graph B assumes $\phi = 1.5$; Graph C assumes$\phi = 2.0$.



Graph A. ϕ = 1.0

Graph B. ϕ = 1.5



Graph C. ϕ = 2.0

(alternatively, front-load) shares. Finally, we consider 3 values of the expected manager's skill $\phi = \{1.0,1.5,2.0\}$.

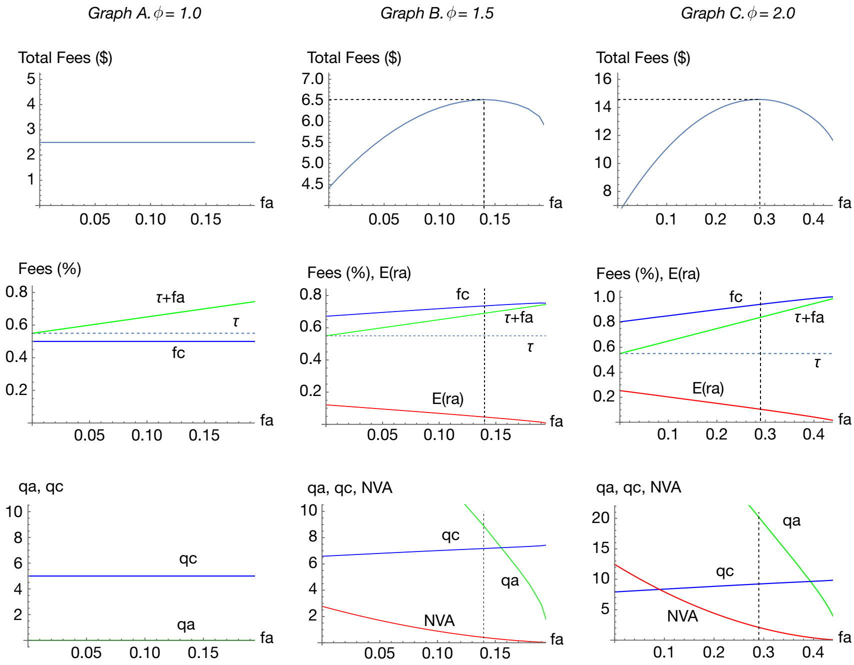
For each f^a, fund investors choose the holdings of front-load shares that maximize their value added net of fees in problem (12). We first obtain the objective function in (12) for a grid of values for f^a and q^a. Notice that q^c is implicitly defined as a function of q^a in equation (5). Figure A1 plots the value added net of fees for the grid of pairs (f^a, q^a) and the 3 values of the parameter ϕ.

For each value of f^a, the optimal $q^a(f^a)$ in problem (12) yields the highest net value added. Notice that when $\phi = 1.0$, $q^a(f^a) = 0$ across all values of f^a. That is, when the manager's expected skill is relatively low, it is suboptimal for long-term investors to invest in front-load shares. We will see next that, given τ_T, this share class becomes "too expensive" when ϕ is not high enough. We then replace $q^a(f^a)$ into equation (5) to obtain the optimal AUM in level-load shares $q^c(q^a)$. Replacing $q^a(f^a)$ and $q^c(q^a)$ into equation (6), we obtain the optimal $f^c(q^a)$. For every $f^a \leq f^c(q^a) - \tau_T$, we calculate the total dollar value of fees $q^c(q^a) \times f^c(q^a) + q^a(f^a) \times f^a$ (the objective function in problem (16)) and look for the value of f^a that maximizes it.

The top row of plots in Figure A2 plots, in the vertical axis, the total dollar value of fees from the objective function in problem (12) as a function of f^a, in the horizontal axis. The middle plots plot the level-load percentage fee f^c, the annually prorated front-fee τ_T

FIGURE A2

The top row of plots in Figure A2 represents the total dollar fees (the objective function in problem (16)) as a function of f^a. Provided it exists, the vertical dashed line identifies the optimal f^a, whereas the horizontal dashed line identifies the maximum total value of dollar fees. The middle plots represent f^c and $\tau+f^a$ as a function of f^a. It also represents the excess return net of fees on front-load shares $E\left(r^a_{t,T}\right)$ as a function of f^a. The bottom plots represent q^c, q^a, and the fund's value added net of fees, NVA, as a function of f^a. $\tau_T=0.55$; $\delta=1.05$; $\gamma^a=0.01$; $\gamma^c=0.1$. Graph A assumes $\phi=1.0$; Graph B assumes $\phi=1.5$; Graph C assumes $\phi=2.0$.



as a dashed line, and the addition of τ_T+f^a, all as a function of f^a. In the same graph, we include the expected net return after fees of front-load shares $E\left(r^a_{t,T}\right)=f^c-\left(\tau_T+f^a\right)$. The bottom plots plot q^c, q^a, and the fund's value added net of fees $\text{NVA}=q^aE\left(r^a_{t,T}\right)$ as a function of f^a.

In Graph A of Figure A2, for $\phi=1.0$, $q^a\left(f^a\right)=0$ for all f^a. Then, from equation (5), $q^c=\frac{\phi}{2\gamma^c}=5$, and from equation (6), $f^c=\phi-\gamma^cq^c=0.5$. Thus, the dollar total fee is $5\times0.5=2.5$ for all f^a. Notice that $\tau_T+f^a>f^c$ for all $f^a\geq0$. Front-load shares in this case are too expensive and, therefore, there is no demand for them. Consequently, the fund's excess return and the value added net of fees are both 0, like in the model of BG with no committed capital. In Graph B, when $\phi=1.5$, the top plots show the optimal $f^a=0.14\%$ with a total maximum value of dollar fees equal to 6.52. The middle plot shows that $\tau_T+f^a<f^c$ for all $f^a<0.27\%$. The expected return net of fees on front-load shares is positive and decreasing in f^a. At the optimal, $f^c=0.73\%$ and $E\left(r^a_{t,T}\right)=f^c-\left(\tau_T+f^a\right)=0.045\%$. In the bottom plots, the demand for front-load shares decreases, whereas the demand for level-load shares increases with f^a. At the optimal, $q^a=8.9$ and $q^c=7.17$. At the optimal, the fund's value added net of fees is $\text{NVA}=0.40$. Finally, we repeat the same analysis in Graph C for $\phi=2.0$. In this case, total fees are maximized at $f^a=0.29\%$; the optimal demand of front-load shares is $q^a=20.2$; the optimal supply of level-load shares is $q^c=9.22$, induced by a level-load fee $f^c=0.94\%$. At the optimal, the excess return net of fees on front-load shares is $E\left(r^a_{t,T}\right)=0.104\%$ and the fund's value added net of fees is $\text{NVA}=2.10$.

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