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Why Are Firms Rigid? A General Framework and Empirical Tests

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We present a general framework for understanding why firms are slow to make major strategic changes in a wide range of empirical settings. We then apply this framework to investigate, more specifically, the relationship between firm age and scope in hedge funds. Our empirical analyses demonstrate that younger hedge funds outperform older hedge funds both before and after the launch of a new fund. Based on our framework, these results suggest that age-based rigidity in hedge funds is more attributable to internal political frictions that influence project selection than to constraints associated with exchange partners or implementation costs. We conclude by discussing how our framework can be used to identify the dominant source of rigidity in other contexts.

Keywords: organizational economics; organizational capabilities; strategy and firm performance; organizational change; firm scope; diversification
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1. Introduction

Why do established firms resist major strategic changes? Scholars have long noted that rigidity limits firm growth, innovation, and performance (Leonard-Barton 1992). However, because rigidity is the outcome of a typically unobserved organizational process, identifying the primary constraint on strategic adaptation remains challenging despite a venerable research tradition on the impediments to organizational change (e.g., Cyert and March 1963, Hannan and Freeman 1984, Christensen and Bower 1996). Motivated by this challenge, we develop a framework for identifying the main rigidity source across settings.

We begin our investigation by systematically reviewing three prominent accounts in the diverse literatures on organizational rigidity. Generally, firms may resist change because of the difficulties of securing exchange partner support, of negotiating internal politics, or of overcoming deficient change capabilities. Building upon these concepts, we then derive distinct patterns of ex ante and ex post performance for each of the three mechanisms.

Analyzing data from 2,814 hedge fund firms between 1994 and 2005, we focus specifically on how age influences the relationship between major new product launches and performance. To satisfy our theory's key scope condition, we first document a negative relationship between organizational age and the diversification rate. Next we show that older diversifying firms exhibit lower ex ante performance than younger diversifying firms, implying that external performance standards are lower for older diversifying firms than for younger diversifiers. Thus, we infer that, in this setting, the primary age-based constraint on strategic change is internal in nature—either political or operational. To further disentangle political frictions and implementation costs, we focus on ex post performance, where we find that older diversifying firms exhibit lower ex post performance than younger ones. Taken together, the evidence implies that older hedge funds are more constrained by political frictions than younger ones are.

This study makes three primary contributions. First, the idea that organizational politics stifles change dates at least to Cyert and March (1963), but the possibility that change becomes more politicized with age has received limited empirical attention (see Gavetti et al. 2007). Given that hedge funds are probably less bureaucratic than conventional firms, evidence of political frictions in this setting suggests that age might play a larger role in inhibiting change than is commonly acknowledged. Second, we demonstrate that internal politics may be sufficient to reduce product introduction rates in a highly innovative industry. To our knowledge, the political element of rigidity has not yet informed the study of firm scope despite sustained scholarly interest in diversification (e.g., Teece 1982, Silverman 1999, Gartenberg 2014). Third, although most prior research considers sources of rigidity in isolation (e.g., Miller and Chen 1994), our general framework adjudicates multiple accounts. Although context must inform specific interpretations of the empirical tests, our general framework enables scholars to identify, subject to a few basic assumptions and based on observable performance patterns, the primary constraint on strategic change in a wide range of settings.

2. Theoretical Development

Organizational innovation rates (e.g., Sørensen and Stuart 2000), growth (e.g., Evans 1987), size (e.g., Dunne et al. 1989), and survival (e.g., Dunne et al. 1988) vary systematically with organizational age. Prior work demonstrates that age influences organizations both positively and negatively, but the general consensus is that older firms change less often than younger firms. For example, research shows that selection pressures favor organizations that maintain their core features over time (Hannan and Freeman 1984). Although organizational capabilities develop with age (Jovanovic 1982), established routines are repeatedly exploited (March 1991) so that, ceteris paribus, older firms are less prone to change than younger ones (e.g., Amburgey et al. 1993). The literature on age and change highlights several mechanisms that might produce a negative correlation between age and strategic change; our framework disentangles these mechanisms by identifying exclusive predictions for each.

Once the liability of newness is overcome, new organizations institutionalize goals, standardize activities, and hone capabilities so that, over time, reliable routines evolve (Stinchcombe 1965, Nelson and Winter 1982). Changing established routines or developing new ones renders strategic change risky because such change compromises the survival advantages of age (March 1991, Desai 2008). Changes to core organizational features, such as a firm's product portfolio, are especially risky not only because the core routines must be modified, but also because the basis for market evaluations is altered (Zuckerman 1999). Extending prior work, we explicitly evaluate the benefits and costs of change to understand how aging influences one important strategic change: diversification, or the horizontal expansion of an established firm's scope via the introduction of new product offerings (Teece 1982).

Diversification is typically motivated by expected economies of scope borne of cost reductions or revenue enhancements (Campa and Kedia 2002). However, diversification also creates incentive conflicts (Pierce 2012), complicates information processing (Zhou 2011), and distracts managers from their responsibilities (Schoar 2002), arguably contributing to a "diversification discount." Therefore, the diversification decision is illustrative of the challenges organizations face in evaluating major strategic changes. Focusing on the launch of fundamentally new offerings, as opposed to less radical product line extensions, we consider three mechanisms that could produce a negative relationship between age and diversification rates and then consider the implications of each mechanism for firm performance.

2.1. Firm Age and the Rate of Change

Extant research identifies three primary constraints on strategic change: (1) exchange partner reservations, (2) internal political frictions, and (3) implementation costs. The first constraint comes from the difficulties of persuading exchange partners to support change. With age, firms become embedded in relationships with customers, suppliers, investors, and others who associate the firm with its established offerings (Argyres and Liebeskind 1999). New offerings prompt concerns about the firm's commitment to the firm's legacy products or services (e.g., Phillips et al. 2013). Firms must assuage these concerns in order to secure the resources necessary to expand scope. Thus, if exchange partner reservations grow stronger with relational time (e.g., Uzzi 1996), then external constraints on change increase with age.

The second constraint is the politicization of internal decision making. Bureaucracy develops over time, reducing uncertainty and stabilizing the organizational power distribution (Barron et al. 1994). Bureaucracy usually serves the interests of the firm's most powerful employees, enabling them to allocate resources disproportionately to efforts that preserve their power (Pfeffer 1981). Consequently, negotiations between those who support established routines and those who want to develop new ones represent political frictions that must be resolved before change is made. Thus, bureaucracy increasingly constrains as organizations age. In this paper, we focus conceptually and empirically on political frictions that act as a noisy filter on organizational decision making, producing types 1 and 2 errors, errors of omission and commission, in project selection.

The third constraint is an internal operational limitation that we refer to as "implementation costs." Structural features of organizations are difficult to change because routines develop over time and are costly to adapt. Because older firms utilize established routines more heavily than younger ones, implementation costs related to strategic changes should be greater for older firms.[1] Rigidity may, thus, be borne of three constraints: exchange partner reservations, political frictions, and implementation costs. Because each is thought to be increasing in magnitude with age, the key scope condition for our investigation is that the diversification rate is negatively correlated with firm age.[2]

2.2. Age, Change, and Performance

To identify the primary mechanism underlying the negative correlation between age and change, we consider the distinctive implications of each mechanism for firm performance before and after a strategic change. We elucidate theoretical relationships among age, diversification, and performance by developing a simple formalization of the decision to diversify based on three precepts. First, we assume that firms are motivated to diversify when doing so enhances value in expectation. Second, we assume that the distribution of returns to new opportunities (e.g., the arrival of ideas) does not vary with age,[3] and that opportunities are evaluated by risk-neutral decision makers within the firm on the basis of their expected returns. If the expected returns to an opportunity exceed a minimum threshold, i.e., a hurdle rate, then firms implement the change; otherwise, the status quo is maintained. Third, we assume asymmetric information about change opportunities between exchange partners and firms. Firms assess new opportunities on the basis of expected future returns from such opportunities. Conversely, exchange partners decide if they will support change based on the firm's historical performance. These assumptions motivate predictions about performance before and after diversification in settings that satisfy our framework's scope condition.

2.2.1. External Exchange Partner Constraints on Organizational Change and Ex Ante Performance. Firms are generally obligated to exchange partners invested in legacy offerings (Argyres and Liebeskind 1999)) and must renew or develop new relationships to introduce new offerings. Thus, diversifying firms must persuade external parties that a new offering will be successful and will not adversely affect the firm's legacy routines.

External constraints may intensify with age for two reasons. First, given that routines calcify with age (Leonard-Barton 1992), exchange partners will justifiably be concerned that diversification by older firms will compromise established firms' competitive advantages (Rawley 2010). Second, given that executives often feel obligated to inform long-time suppliers of impending changes that may adversely affect their relationship (Uzzi 1996), and older organizations tend to maintain commitments to current customers (Christensen and Bower 1996), exchange partner obligations probably increase with age.

Exchange partners are likely skeptical of an established firm's new offerings but will be less so if a diversifying firm has performed well historically. Therefore, if external constraints on diversification are the primary driver of organizational rigidity, then the hurdle rate for a new product or service (i.e., ex ante performance) should be higher for older than for younger firms.[4]

To demonstrate the implications of this argument for a firm's ex ante performance, consider a simple, reduced-form model applied to an "old" and "young" firm, denoted respectively by $i \in \{o, y\}$. Each maintains a single legacy offering and considers launching a new offering. The legacy offering has a track record of performance r_i where track records are distributed according to a normal distribution f with mean μ_r and variance σ_r. Profit-seeking firms are motivated to diversify but must secure exchange partner support in order to do so. Exchange partners evaluate a firm's proposed change based, in part, on the ex ante performance of its legacy offerings. Thus, exchange partners are more likely to support diversification if the firm's recent performance is sufficiently positive (i.e., above a hurdle rate).

We denote the hurdle rate that exchange partners apply for each firm h_i^a where $i \in \{o, y\}$ and the superscript a denotes that the hurdle is on the ex ante performance distribution. Further, we assume that the hurdle rate exceeds the mean of the performance distribution. Figure 1 illustrates this idea, where $f(r)$ represents the distribution of track records and h represents the hurdle rate. Firms launch the new product if $r_i > h_i^a$.

If exchange partners apply a higher standard to older firms than to younger ones then $h_o^a > h_y^a$. This logic motivates a prediction about the relationship between new product introductions and ex ante performance based on age-varying external constraints. For clarity, the indicator variable d denotes a diversification choice, such that $d = 1$ if an organization launches a new product and $d = 0$ if not. We can write the average ex ante performance conditional on diversification as

$$E(r_i \mid r_i > h_i^a) = \int_{h_i^a}^{\infty} r_i f(r)\, dr_f. \tag{1}$$

Given that the normal distribution is single peaked and $h_o^a > h_y^a$, Equation (1) implies

$$E_o(r_o \mid d = 1) > E_y(r_y \mid d = 1). \tag{2}$$

Equation (2) states that the average ex ante performance conditional on diversifying will be higher for

Figure 1 **(Color online) Ex Ante Performance Distribution and Diversification Hurdles**

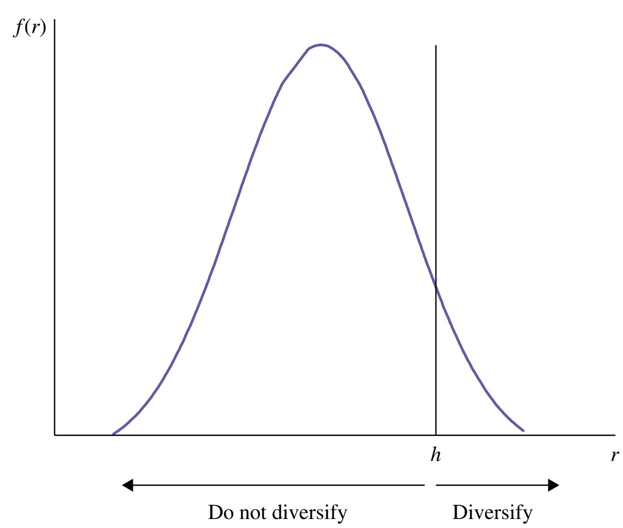
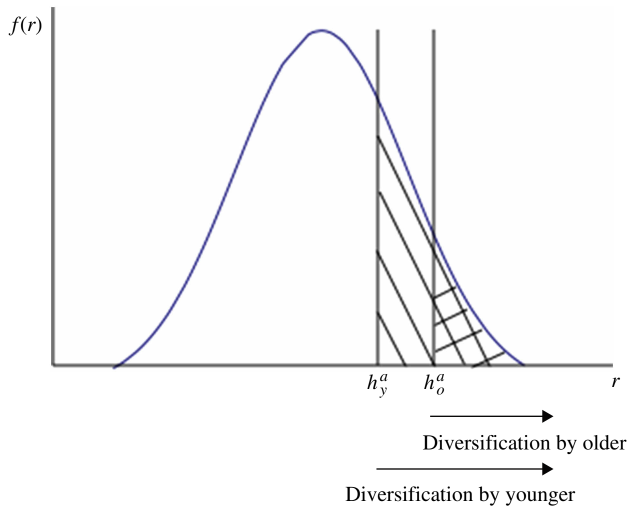


Figure 2 (Color online) External Constraints: Ex Ante Performance Distribution and Diversification by Age



older firms. Figure 2 illustrates the intuition. The average ex ante returns for older firms is the weighted average of performance above the hurdle rate (i.e., the crosshatched area in Figure 2). Because young firms face lower hurdle rates than old ones, the calculation of the young firm mean includes all of the area occupied by older firms and the additional area between the two hurdle rates h_o^a and h_y^a. Because this area originates at lower performance values for younger than for older firms, the expectation, conditional on the hurdle rate, is also lower for younger firms.[5] These arguments motivate our first hypothesis.

Hypothesis 1. *If exchange partner reservations are the primary constraint on change, then the ex ante performance of older diversifiers will be higher than the ex ante performance of younger diversifiers.*

2.2.2. *Political Frictions and Ex Post Profitability.* Organizational decision makers evaluate strategic changes not only on the basis of expected profits, but also on the basis of expected changes to their nonpecuniary benefits (March and Simon 1958, Jensen and Meckling 1976, Ocasio 1994). Indeed, decision makers may be expected to act strategically to secure contested resources for themselves (e.g., Pfeffer 1981, Hayward and Boeker 1998), so that strategic change decisions are influenced not just by the innate quality of new offerings but also by decision makers' vested interests. As organizations age, precedents and prior compromises generate political frictions that impede organizational action (Hannan 1998). Managers generally allocate resources to established routines that produce reliable results and perpetuate their power (Hannan and Freeman 1984) but might support changes that generate private benefits for themselves like job security or additional compensation (e.g., Amihud and Lev 1981).

To understand the implications of political frictions on the ex post profitability of old and young firms in the context of diversification, we assume that firms evaluate opportunities based on expected returns and focus on the expected ex post profitability of a new opportunity. We formalize this idea by assuming that each firm generates a single opportunity x, where the expected value of x is drawn from a normal distribution g with mean μ_x and variance σ_x.

Political frictions influence ex post profitability by injecting noise into the project selection process. Some opportunities with expected values below the "apolitical" hurdle rate (i.e., the hurdle rate that would apply absent political concerns) will be implemented because these opportunities are favored by managers acting in their self-interest. In parallel, some opportunities that exceed the apolitical hurdle rate will be rejected because of their potential to undermine entrenched managerial power. If power accrues to individuals or coalitions as firms age then, relative to younger firms, older firms' decisions will be less sensitive to expected profitability and more often based on political compromise.

Assume as before that both old and young firms draw opportunities from the same distribution of expected values and that fund performance maps directly to profitability. Unless noted, we use identical notation to that above. To capture the idea that young firms are subject to less politicized project selection, we assume that the young firm implements all opportunities whose expected profitability exceeds the hurdle rate; i.e., a new offering is launched when $x > h_y^x$, where the superscript x denotes that the hurdle is on the random variable x or, equivalently, the expected ex post distribution of performance. As a result of internal politics, older firms "sample" from a broader set of opportunities. Therefore, firms will launch a new product with probability $p < 1$ if the opportunity's expected value exceeds a hurdle rate $h_o^x < h_y^x$. This implies that older firms do not launch some new products that would have met the stricter standard, and launch some products that do not meet the stricter standard.

We can now consider the political friction effect on the observed ex post performance of diversifying firms. The expected ex post performance of young diversifiers is

$$E_y(x \mid d=1) = \int_{h_y^x}^{\infty} x g(x)\, dx. \tag{3}$$

For the older diversifiers, the expected ex post performance is given by

$$E_o(x \mid d=1) = \int_{h_o^x}^{\infty} x g(x)\, dx. \tag{4}$$

Finally, given that, $h_y^x > h_o^x > \mu_x$, comparing (3) and (4) yields

$$E_o(x \mid d=1) < E_y(x \mid d=1). \tag{5}$$

If internal politics distort the selection process and more so in older firms, then the ex post performance of older

Figure 3 (Color online) Political Frictions: Ex Ante Performance Distribution and Diversification by Age

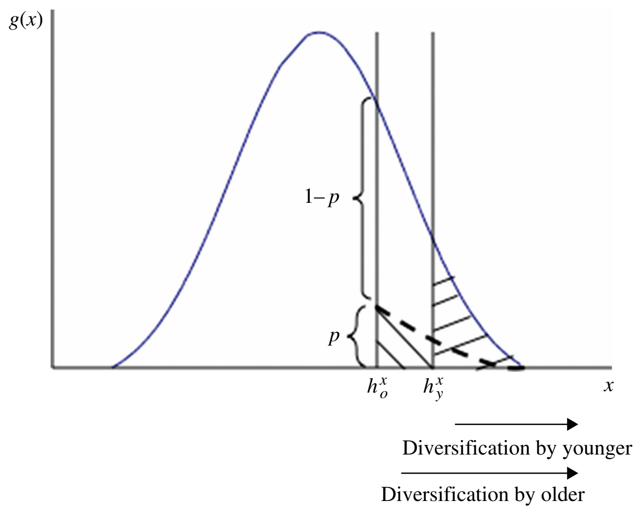
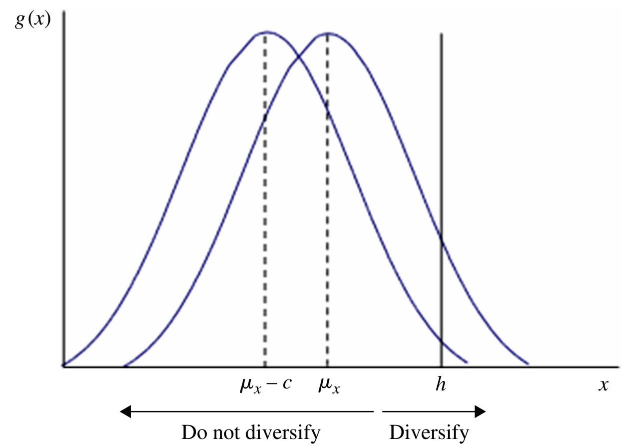


Figure 4 (Color online) Implementation Costs: Ex Post Performance Distribution and Diversification by Age



diversifiers is lower than that of younger diversifiers, as Figure 3 shows. This noisy filter reduces the frequency of any given opportunity above the apolitical hurdle rate being implemented and increases the probability of a "bad" project being implemented (as represented by the heavy dashed line in Figure 3). Even without any degradation in a firm's ability to implement change over time, older firms will impose a lower mean hurdle rate on diversification choices than younger ones. Consequently, the expected performance of younger diversifiers will exceed that of older ones.[6]

Hypothesis 2. *If political frictions with respect to project selection are the primary constraint on change, then the ex post performance of older diversifiers will be lower than the ex post performance of younger diversifiers.*

2.2.3. Implementation Costs and Ex Post Performance. Political frictions act as a noisy filter on project selection and are manifest in lower-quality opportunity evaluation. In contrast, implementation costs are manifest as an execution penalty that reduces expected project profitability but does not diminish a project's innate quality, or ex post returns excluding implementation costs. As firms age, their ability to adapt may decline because old firms rely extensively on established routines and tacit knowledge from years of trial and error. New offerings disrupt these routines so that the expected profitability of implementing a given strategic change decreases with age. To evaluate the implications of implementation costs on project selection, we extend our previous analysis to show that equivalent hurdle rates can produce age-varying ex post performance (i.e., performance excluding implementation costs) after diversification.

We assume that firms of all ages apply equivalent hurdle rates, but older firms incur greater costs of implementing change than younger firms do. Consequently, the net expected value a firm extracts from a given change is decreasing with age. We denote the older firm's implementation cost differential c. Thus, if the expected benefit of a young firm implementing change is x, then the expected value for an old firm that makes the same change is $x - c$.

As shown in Figure 4, the effect of implementation costs on firm adaptation shifts the distribution of expected performance from diversifying generated by older firms leftward by the amount c, although the hurdle rate is the same for both firms. Therefore, the expected ex post performance conditional on diversification for younger firms is given by

$$E_y(x \mid x > h) = \int_h^\infty x g(x)\, dx; \tag{6}$$

for older firms it is given by

$$E_o(x - c \mid x - c > h) = \int_h^\infty (x - c) g(x - c)\, dx. \tag{7}$$

Based on the properties of the normal distribution and that $h > \mu_x$, comparing (6) to (7) implies that

$$E_y(x \mid x > h) < E_o(x - c \mid x - c > h). \tag{8}$$

Given higher implementation costs, older firms select higher-quality change opportunities, and average ex post project performance is higher for older firms, although profits are lower. Both the specific implementation and the fundamental rigidity effects are depicted in Figure 4. Consistent with our scope condition, older firms diversify at lower rates (i.e., the area under the curves above the hurdle rate is clearly smaller for older firms), but because the change opportunities that older firms select are drawn from points deeper in the right tail of the quality distribution, average ex post project performance is higher. Implementation costs force older firms to select fewer, but better, opportunities than younger firms.

Here, the distinction between political frictions in project selection and implementation costs is clarified. Implementation costs impact a firm's ability to realize the returns to an equivalent opportunity, but political frictions in project selection influence the firm's propensity to select the highest-quality opportunities. Higher implementation costs lead older firms to focus more narrowly on the highest-quality opportunities. This logic motivates our third hypothesis.

HYPOTHESIS 3. *If implementation costs are the primary constraint on change, then the ex post performance of older diversifiers will be higher than the ex post performance of younger diversifiers.*

Each hypothesized effect also implies a negative correlation between age and the diversification rate. Support for the scope condition *and* either Hypothesis 1, 2, or 3 is, therefore, a crucial feature of our framework. Valid alternative explanations must not only motivate a prediction equivalent to Hypothesis 1, 2, or 3; they must also be consistent with a negative correlation between organizational age and the change rate in order to satisfy the framework's scope condition.

3. Data and Institutional Context

Hedge funds are, like mutual funds, firms that pool investors' capital for the purpose of investing in financial securities and other assets (Smith 2011, Chatterji et al. 2015). In the United States, the $2.4 trillion hedge fund industry is regulated by the Securities Exchange Commission, but unlike mutual funds, hedge funds are legally constructed to facilitate extensive short selling, a high degree of leverage, and nonlinear performance-based compensation measures (Hedge Fund Research 2013, de Figueiredo et al. 2015). Although not required to report their performance, a large number of hedge funds voluntarily report investor returns to private companies that provide data to subscribers. Investor returns, as opposed to returns to the hedge fund, accurately captures the ex ante performance metric that external partners (e.g., investors) care about, and, therefore, are a good measure for testing Hypothesis 1. Moreover, since it does not incorporate implementation costs, ex post performance is a good measure of project quality, allowing us to test Hypotheses 2 and 3 directly.[7]

The data set used in this paper integrates two of the most widely used hedge fund databases from Lipper TASS (TASS) and Hedge Fund Research (HFR). The data series begins in 1977 but only includes "graveyard" funds (i.e., funds that stopped reporting to the data providers) from 1994. We use the 1994–2005 subsample of the data that is free of survivorship bias, although our results are robust to using the full sample. Between TASS and HFR, our data cover 165,379 firm-months for 2,814 firms (nearly 25% of all firms for 1994–2005).[8]

The hedge fund setting is particularly appealing for studying organizational rigidity. Launching new funds is an important growth strategy for most hedge funds, because it allows them to put capital at risk in a way that increases the chances that the firm will earn additional fees. As in other private capital markets (e.g., Rider 2009), investors impose meaningful constraints on hedge fund product diversification by withholding capital from firms that market unpersuasive value creation strategies (Shadab 2013). In interviews, hedge fund investors expressed reticence about firms diversifying beyond their core strategy, particularly because they typically do not invest in multiple funds from the same firm due to portfolio diversification concerns. Furthermore, the possibility that internal frictions are increasing in older hedge funds is plausible given de Figueiredo and Rawley's (2011) finding that age is negatively correlated with performance in diversifying firms, and based on interviews with hedge fund executives.[9] For example, managers note that in multifund firms the same salespeople are typically responsible for selling multiple funds. Multifund firms must coordinate sales efforts within and between sales people contemporaneously and over time so that allocating a salesperson to a fund implies reduced sales effort for another fund.[10] Consequently, legacy fund managers hold political interests in preventing new fund launches that divert resources from their fund.

Compliance coordination costs are similar. Compliance personnel are responsible for a firm's adherence to antifraud and antimanipulation laws and laws governing insider trading, short selling, margin requirements, etc. In hedge funds, compliance typically also encompasses risk management and sometimes information technology. These activities are central to a hedge fund's day-to-day operations. Our interviews suggest that multifund architecture is substantially more complex to manage, in part because of the importance of ensuring that trading activity is properly linked to funds.

Although coordination costs are easy to identify conceptually and anecdotally in hedge funds, the precise manifestation of these costs can be difficult for different constituencies to evaluate. External stakeholders use a firm's track record, a clearly observable signal of firm quality, to anticipate how coordination costs associated with diversification might shape their future investment returns. Politically motivated and powerful insiders consider how coordination costs influence their compensation. Additionally, internal principals will focus on future expected coordination costs. Interestingly, these types of coordination issues exist in virtually all diversified firms.

Consistent with the standard definition of diversified firms as multiproduct entities (Teece 1982, Siggelkow 2003), we consider hedge fund firms to be diversified when they operate multiple distinct funds. Defining diversification based on product scope is particularly appropriate in this context, because many hedge funds operate their portfolios of funds more like business units than do traditional multiproduct firms. Although some functions are almost always shared within a multifund firm, almost every fund exhibits some degree of independence. Thus, there are ambiguities as to whether a new hedge fund is a "major" new offering that embodies a fundamental change to firm scope or, rather, a relatively "minor" product line extension. Although we cannot observe the magnitude of diversification directly in our data, we can observe a straightforward empirical measure of distinctiveness: correlation across investment returns. Below we describe our method for evaluating fund distinctiveness.

3.1. Measures

To ensure that a new fund is indeed a major diversification event, we measure distinctiveness based on the pairwise correlation of the time series of raw returns between each fund and every other fund in the firm's portfolio. We also use an alternative measure based on the correlations among or between funds' excess returns. We use these two correlation measures to compute three tiers of relatedness for all 2,302 new fund launches in our sample.

New funds with returns that are less correlated with other funds in the firm than with an index of "passive" predicted returns are considered to be major new product offerings. The intuition for using the index, based on common factors, as a benchmark for measuring distinctiveness is that if a new fund is more similar to another fund in the same firm than to a "typical" fund, then the new fund is closely related to the firm's legacy offerings. The converse is also true: if a fund is less related to every other fund in the same firm than it is to the index, then the new fund is a distinctive new offering. Thus, we call a distinct diversification event with a within-firm return correlation below the pairwise return correlation between the new fund and the passive index—on average 0.35—"explorative" diversification in the language of March (1991). There are 573 such explorative new fund launches.

At the other end of the correlation spectrum, there are 1,250 new fund launches that are "highly related" to existing funds in the same firms, which we define as having a raw return correlation of 0.75 or above. This cutoff follows directly from our measure of explorative diversification, and it approximates a conservative but natural breakpoint, a 0.50 excess return correlation, the point at which a new fund is half-correlated and half-uncorrelated with an existing fund.[11] Because highly related diversification events may be more similar in spirit to product line extensions, rather than core changes to the firm's set of product offerings, we do not treat these new fund launches as major diversification events.[12]

New funds with a return correlation of less than 0.75, but above the correlation with the passive benchmark, based on the common factors, are in an intermediate zone. These 479 diversification events are essentially new, but related, business units and are therefore properly recognized as major diversification events that represent core changes in the internal organization of the firm. Yet, because these funds are more similar to the firm's existing offerings than the explorative diversification events, we call these new fund launches "exploitative" (major) diversification events. For our main analyses we use all 1,152 (573 + 479) major diversification events, but in subsequent analyses we use the exploration/exploitation dichotomy to further probe rigidity mechanisms in our sample, as well as to provide a robustness check on our definition of major diversification events.

Based on the definition of a major diversification event described above, we use two measures of diversification, an instantaneous measure (*Diversify*), a dummy variable that is equal to one in the month in which a firm launches a new fund and zero otherwise, and a categorical variable (*Diversified*) that is equal to one in all months subsequent to the firm's first diversification event, and zero otherwise.[13]

Our key explanatory variable is firm age, measured as the number of years since the firm was founded or, nonparametrically, as a vector of categorical variables. Age also enters as an interaction term with *Diversify*, and as a dummy variable (*age_old*) that is equal to one when a firm launches a new product and is above the median age and is zero otherwise. The sample includes 522 major new product introductions for firms that were older than the median age at the time of diversification and 630 major new product introductions for firms that were younger than the median age at the time of diversification.

Our hypotheses evaluate the relationships among diversification, age, and performance. Because there is general agreement in the literature that investors price financial assets controlling for systematic risk exposure, we use risk-adjusted excess returns from a standard asset pricing model as our baseline measure of firm performance. However, hedge funds may also be exposed to nonsystematic risks that are not priced by standard market benchmarks. If funds take on significant nonsystematic risks they may appear to generate higher average excess returns that are really an artifact of model mispricing. We, therefore, account for the nonsystematic riskiness of a fund's underlying investments by using an alternative performance measure: a dynamic version of the information ratio, which divides the fund's excess return in any time period by the standard deviation of the fund's excess returns.

Our baseline performance benchmark follows the emerging standard for assessing hedge fund performance, based on Fung and Hsieh's (2001) seven-factor asset pricing model, which is specifically designed for pricing risk in hedge funds by controlling for exposures to equity-, bond-, commodity-, and option-based risk factors. We augment Fung and Hsieh's (2001) model by including a "traded liquidity factor," which controls for a fund's exposure to illiquidity risk. Excess returns are defined by

$$R_{it} = a_i + R_{ft} + \mathbf{X}_t \mathbf{B}_i + e_{it}, \tag{9}$$

where i and t index funds and time (in months), respectively; R_i is a fund's raw return from TASS and HFR; and the vector $\mathbf{X}$ contains the seven risk factors from Hsieh's data library and the traded liquidity factor.[14] The term a_i is the time-invariant component of a fund's excess performance and e is a mean-zero residual. We compute a, the coefficients on $\mathbf{X}$, and e by running fund-level longitudinal regressions. Excess returns Y for firm i in any period t are defined as $Y_{it} = a_i + e_{it}$, where excess returns captures the combination of a fund's skill and luck relative to a market benchmark. We call the resulting measure "eight-factor excess returns." We then compute the information ratio as excess returns (Y_{it}) divided by the standard deviation of excess returns (de Figueiredo et al. 2013). Finally, firm performance is the arithmetic average of fund performance in multi-fund firms.

Hypothesis 1 predicts that, conditional on launching a new product, older firms' ex ante performance will exceed that of younger firms. To test this prediction we use a standard measure of average historical excess returns, average cumulative abnormal returns (*CAR*), as an explanatory variable in our regressions of ex ante performance and age on diversification. At the fund level $CAR = \Sigma Y_{in}/n$, the sum of n lagged excess returns divided by the number of months the fund was in operation at time t, up to a maximum of 24 months. An equal weighted average of fund returns gives a firm-level *CAR*. For Hypotheses 2 and 3 we define ex post returns analogously.

3.2. Descriptive Statistics

Table 1 shows descriptive statistics for the main sample at the firm-month level. Average age is 5.6 years, the average number of funds is 2.6, average excess returns are 44 basis points per month (or 0.44%), and the average information ratio is 18 basis points per month. Table 1 also shows descriptive statistics for the control variables that might influence diversification rates or performance directly or indirectly, including the following: firm size (assets under management); the waiting time measure (log time since the firm's last fund launch) of Amburgey et al. (1993); firm scope (number of funds); the standard deviation of firm ex ante performance; three variables that measure the firm's product mix; a dummy for whether the firm entered a multifund firm; time (year); and region (U.S. headquarters dummy). *CAR* also enters as a control in the baseline regression predicting diversification and in the matching model. The mean of assets under management (*AUM*) is \$3.2 billion, with a maximum of \$63.8 billion. To control for trading strategy composition effects, we use a continuous variable (*Specialist*) [0, 1] that captures the fraction of funds in the firm's portfolio, by month, that are devoted to specialty trading practices. To calculate *Specialist* we categorize funds into three sets: (1) funds of funds that invest in other hedge funds; (2) long/short funds that take long positions in assets, much like a mutual fund, and short assets (typically equities) that fund managers believe are overvalued; and (3) all other funds, which we call "specialty funds." *Specialist* is the fraction of specialist funds within a firm-month. We also include a categorical variable that is equal to one if a firm's headquarters is in the United States and zero otherwise (*HQ_USA*) and a

Table 1 Descriptive Statistics and Correlations for Key Variables

$n = 165{,}379$ firm-months	Mean	Std. dev.	Min	Max
Monthly diversification rate	0.008	0.087	0	1
Age (years)	5.63	4.24	1	28
24-month avg. cumulative abnormal returns (*CAR*)	0.52	1.05	−8.82	10.42
8-factor excess returns	0.44	3.62	−11.58	13.84
Information ratio	0.18	0.91	−2.43	3.01
Standard deviation of firm performance	2.81	2.02	0.02	12.53
Funds managed by focal firm	2.67	3.95	1	114
Assets under management (*AUM*) (\$ billion)	3.15	6.82	0.01	63.80
Missing AUM (proportion)	0.18	0.38	0	1
Wait time between new fund launches (months)	3.19	11.59	0	148
Diversified entrant (proportion)	0.14	0.34	0	1
Year	2001	3	1995	2005
Headquartered in United States	0.71	0.45	0	1
Specialist funds (proportion)	0.60	0.46	0	1
Fund of funds (proportion)	0.20	0.38	0	1
Long/short funds (proportion)	0.19	0.37	0	1

categorical variable (*Diversified_entrant*) that is equal to one if a firm is diversified upon entry.

4. Empirical Design

We theorize that major organizational changes are particularly challenging for older firms, inducing them to launch new products less frequently than younger firms. To validate the scope conditions for this premise, we estimate the impact of age on a hedge fund's propensity to launch a new fund by using several different empirical specifications: a pooled cross-sectional linear probability model, a differences-in-differences estimator with firm fixed effects, a pooled discrete response regression, a logit model with firm fixed effects, and two specifications focusing on the firm's first diversification event.

Because unobservable firm-specific heterogeneity (e.g., firm-specific quality) is potentially confounding for causal estimation, our baseline ordinary least squares (OLS) estimator includes a firm fixed-effect of the form

$$Diversify_{it} = a + \lambda_i + \mathbf{T}_t + \beta_1 Age_{it} + \mathbf{X}_c \mathbf{B}_c + \varepsilon_{it}, \tag{10}$$

where i indexes firms and t indexes calendar time (in months), λ is a firm fixed effect, $\mathbf{T}$ is a vector of year fixed effects, *Age* is our key explanatory variable, $\mathbf{X}_c$ is a vector of controls as described above, and ε is the residual. Other specifications (e.g., logit, proportional hazards) are standard as well, and all include the same set of controls and use robust standard errors clustered at the firm level.

The differences-in-differences estimator corrects for time-invariant firm-specific heterogeneity, but it cannot control directly for time-varying sources of heterogeneity that may be correlated with both firm age and the decision to diversify. Although we do not have a pure experimental design, we do include time-varying controls that should be correlated with quality, *CAR* and *AUM*, which reduce the risk of bias from changes in firm quality that may be correlated with product diversification.

Once we establish that firms diversify at a slower rate as they age, we turn to our main research question: why is adaptation difficult? To do so we first examine how ex ante performance, measured by cumulative abnormal returns (*CAR*) influences the instantaneous diversification rate for young versus old firms using multinomial logit and OLS specifications.

To allow for a flexible set of coefficient estimates on the explanatory variable *CAR* for multiple dependent variables, we compare the ex ante performance of young diversifiers against old diversifiers relative to nondiversifiers using the multinomial model:

$$\Pr(y = j \mid \mathbf{X}_{it}) = \exp(\mathbf{XB}_{ijt})/[1 + \Sigma_h \exp(\mathbf{XB}_{iht}), \tag{11}$$

where i indexes firms, t indexes time (years), $j = 1, \ldots, J$, indexes discrete change in scope outcomes, and h counts from 1 to J; $\mathbf{X}$ contains the same vector of controls as in (10), including the explanatory variable *CAR*; and $y = 0$ in firm-months where there is no diversification, and $y = J$ when firms reduce their scope. In our baseline specification $y = 1$ when the firm diversifies and is below the median age, and $y = 2$ when the firm diversifies and is above the median age. Standard errors are robust and clustered by firm. To be certain the effects are not being driven by fund closures through churning effects, we also estimate the same relationship excluding firms that close at least one fund.

The coefficient on *CAR* tells us how the firm's track record influences its diversification decisions for old and young firms. If the coefficient on *CAR* is larger for older firms compared to younger firms, it would indicate that investors punish older firms by forcing them to outperform young firms in order to earn the right to diversify. On the other hand, if the coefficient on *CAR* is smaller for older firms, it would suggest that investors value long track records and fund the diversification efforts of older firms, even when their most recent observable performance lags behind younger firms.

A multiple dependent variable specification has some advantages, given the nature of our predictions, but we do want to verify that the results are not being driven by unobservable firm-specific heterogeneity (e.g., young firms are higher-quality firms). Unfortunately fixed effects estimation is computationally intensive and difficult to interpret in a multinomial logit specification; however, because the key comparison of interest is between the performance of old and young diversifiers, we can test Hypothesis 1 using OLS by constructing a sample that consists of just the set of diversification events, and redefining the dependent variable to be equal to one when there is a diversification event above the median age and zero for all other diversification events. By including or excluding firm fixed effects in this OLS specification (with firm fixed effects, identification comes from comparing the performance of the same firm that diversified when it was "young" versus when it was "old"), we can explicitly test whether firm-specific heterogeneity biases the results. If there is no bias from firm-specific effects, then a negative difference between the coefficients on *CAR* in the multinomial logit specification can be interpreted as the premium that young firms must generate to be on equal footing with older firms in external capital markets. As above, in establishing our scope condition, we also specify an OLS regression restricting the set of major diversification events to include first-time diversifiers to facilitate between-firm comparisons.

Finally, to test our second and third hypotheses we evaluate how young and old firms perform after they diversify. In the ideal experiment we would randomly assign identical old and young firms new funds and measure the difference in their subsequent performance.

In practice, we do not have random assignment. Firms choose whether to diversify, based on how exchange partners external to the firm perceive them and how they expect to perform ex post. We can, however, control for selection effects that might bias naïve estimates of age's effects on diversification and performance by matching treatment (i.e., old diversifiers) to control (i.e., young diversifiers) group observations based on observable ex ante differences between old and young firms that subsequently diversify. In the absence of omitted variable bias from unobservable differences between firms, we can interpret the matched sample correlation between age and ex post performance as a causal relationship.

Before controlling for selection on observables we estimate the (endogenous) correlation between age and diversification with the pooled cross-sectional model:

$$Y_{it} = a + Diversified_{it} + \beta_1 Age_{it} + \beta_2 (Age_{it} \times Diversified_{it}) + \mathbf{X}_c \mathbf{B}_c + \varepsilon_{it}, \quad (12)$$

where i and t index firms and years, respectively; Y is firm performance, measured as either excess returns or the information ratio; *Diversified* is a dummy if a firm has previously diversified; *Age* is as above; and $\mathbf{X}_c$ contains the same vector of control as above (including year fixed effects). In expression (12), performance is measured ex post, following diversification, whereas in expression (11) we focus on ex ante performance (measured by *CAR*) as either a control variable or an explanatory variable influencing the instantaneous diversification rate. Thus, to estimate how old diversifiers perform relative to young diversifiers, we consider both the main effect of *Age* and the marginal effect of *Age* × *Diversified*.

However, we know that (12) is subject to bias due to the endogeneity of the firm's scope decisions. Therefore, we implement a test on ex post performance that controls for selection bias by matching old diversifiers to young diversifiers on all their observable ex ante characteristics using coarsened exact matching (CEM). CEM matches old and young diversifiers that have the exact same ex ante characteristics, as opposed to matching on the probability of selecting into the treatment (i.e., diversifying when old) as in the more familiar propensity score matching (Iacus et al. 2012). Using CEM to generate the matched sample suits our purposes because it allows us to include multiple diversification events on the same firm in a computationally efficient way: creating a valid counterfactual without balancing on a covariate-by-covariate basis.

We specify that the number of control group matches must be proportional to the number of treatment group observations on a strata-by-strata basis, based on performance deciles, quartiles of the standard deviation of ex ante firm performance, size deciles, calendar time quartiles, firm scope deciles, a U.S. headquarters dummy, management fee and incentive fee quartiles, and median splits of fund of funds and long/short trading strategy proportions. This approach creates 343 strata with at least one observation.

The matching works well in the sense that it eliminates the statistical differences between most of the covariates in old versus young diversifying firms. Before matching, 11 of 13 covariates were statistically different; after matching, only 3 were statistically different, and 2 of those 3 covariates were far more similar after matching than before (see Table 2). After treatment group to control group observations are successfully matched, all the observations are conditioned on the firms being diversified, which allows us to drop *Diversified* and *Age* × *Diversified* from (12) and estimate the causal effect of age on performance in diversified firms directly by simply examining the coefficient on *Age*.

Table 2 ***t*-Tests on Covariate Means Before and After Matching**

	Before matching		Matched sample
	t-test on means (young-old)	Bins	*t*-test on means (young-old)
Cumulative abnormal returns (*CAR*)	4.5	10	0.4
Standard deviation of firm performance	4.1	4	−0.3
Funds managed by focal firm	−9.5	10	−2.0
Assets under management (*AUM*) ($ billion)	−9.7	10	−1.4
Missing AUM (proportion)	−2.4	2	0.2
Wait time between new fund launches	−10.0	4	−2.0
Year	−3.0	4	0.1
Headquartered in United States	−2.5	2	−3.6
Fund of funds (proportion)	−0.4	2	−0.2
Long/short funds (proportion)	−1.6	2	−1.0
Management fee	−5.4	4	0.7
Incentive fee	−4.0	4	0.0
Strata		343	
Matched strata		78	
Young diversifiers	540		231
Old diversifiers	512		231

To probe the results further, we also use the same matched sample to estimate the effect of age on ex post performance at the fund level in two ways. First, we perform the fund-level analogue of our firm-level analysis, by evaluating the performance of new funds from old firms compared to new funds from young firms. Second, we test to see whether diversification influences the performance of existing funds differently in old diversifiers compared to existing funds in young diversifiers.

5. Results

Table 3 displays the results for the OLS and survival-time models of *Age* on *Diversify*. Column 1 shows that the new product introduction rate falls by a precisely estimated seven one-hundredths of 1% for each additional year the firm ages in a pooled cross-sectional specification. Relative to the baseline new product introduction rate of 0.63% (1,052/167,559), increasing age by one year reduces the baseline new product introduction rate by approximately 12%. The differences-in-differences estimate of the effect of *Age* on *Diversify* in column (2) reveals that omitting the firm fixed effect from the estimate of age on the propensity to introduce a new product biases the coefficient estimate on age toward zero: the effect size is more than three times the size (more negative) after controlling for firm-specific heterogeneity and is still precisely estimated. These results are further corroborated by the logit and fixed effects logit models of the same sign and significance as the OLS estimates (columns (3) and (4), respectively).

Restricting the set of major diversification events to include only the first event from each firm generates a smaller, although still precisely estimated, point estimate on age in the pooled OLS regression (column (5)) of minus four one-hundredths of 1%, but the economic interpretation remains very similar: a one-year increase in firm age leads to a 12% decline in the firm's initial diversification rate (i.e., their first major expansion from one to two funds). Using the same sample but controlling for right censoring with an exponential model (column (6)) generates a coefficient estimate of −0.175, which means that, as firms age one year from the mean age (5.6 years), their propensity to diversify falls by 6% ($e^{5.6\times -0.175} - e^{6.6\times -0.175}$).

We also want to understand the relative magnitude of internal versus external factors in the decision to introduce a new fund. Column 1 of Table 4 shows the results of a multinomial logit of ex ante performance on the decision to diversify for firms that were older than the median age compared to firms that were younger than the median age at the time of diversification, conditioning out months when firm scope was reduced because of fund closures, compared to the baseline case of no changes in firm scope. Marginal effects are reported. Although younger firms outperform in the 24 months before launching a new fund, older diversifiers' ex ante performance is indistinguishable from the baseline. The difference between the two coefficients is negative 0.00062 (−0.062%) and is precisely estimated, and the specification passes the independence of irrelevant alternatives test. The interpretation of the difference in the coefficients is that a young firm is approximately 10% less likely to diversify (-0.062%/0.63%) than an older firm with the same ex ante performance.

Column 2 of Table 4 reports that the OLS analysis on just the 1,052 major diversification events from the 591 diversifying firms. The coefficient on *CAR* is −0.078 and is precisely estimated: older diversifiers underperform younger diversifiers by 8 basis points per month on average. Including firm fixed effects in column (3)

Table 3 Scope and Age

Dependent variable $Y_{it} = 1$ if firm i launches a new fund in month t, and 0 otherwise						
	(1)	(2)	(3)	(4)	(5)	(6)
Specification:	OLS	Dif-in-dif	Logit	F.E. logit	OLS 1st diversification	Exponential 1st diversification
Sample:	Full	Full	Full	Full	event	event
Age (in years)	**−0.0007***	**−0.0024***	**−0.126***	**−0.325***	**−0.0004***	**−0.175***
	(**0.0001**)	(**0.0005**)	(**0.013**)	(**0.081**)	(**0.0000**)	(**0.016**)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	No	Yes	No	Yes	No	No
N (firm-months)	165,379	165,379	165,379	52,955	164,885	164,885
Firms	2,814	2,814	2,814	591	2,814	2,814
Diversification events	1,052	1,052	1,052	1,052	558	558

Notes. The economic magnitudes of the coefficient estimates in columns (3), (4), and (6) are not comparable with the OLS/differences-in-differences estimates. Please see the text for a description of the economic interpretation of the different coefficient estimates. Controls include the following: year fixed effects, number of funds (log), assets under management (log), cumulative abnormal returns (*CAR*), standard deviation of ex ante firm returns, waiting time between "events" (1–4), and three product mix controls (proportions). All time-varying covariates except age are lagged one month. Regressions without firm effects include categorical variables for headquarters located in the United States and whether the firm entered with multiple funds. Robust standard errors are clustered at the firm level. The coefficients associated with the key explanatory variable(s) are in bold.

*$p < 0.05$ (two-tailed tests).

Table 4 Age, Scope, and Ex Ante Performance

	(1)			(2)	(3)	(4)	(5)
Specification:	Multinomial logit			OLS	Dif-in-dif	Multinomial logit	OLS
Sample:	Full sample			Diversification events only		Excluding firms with fund closures	1st diversificaiton event only
Dependent Variable:	*Below median age at diversification date*	*Above median age at diversification date*	*Difference (above − below)*	*Above median age at diversification date*	*Above median age at diversification date*	*Difference (above − below)*	*Above median age at diversification date*
CAR	**0.00055*** (**0.00012**)	−**0.00007** (**0.00007**)	−**0.00062*** (**0.00014**)	−**0.078*** (**0.016**)	−**0.071*** (**0.028**)	−**0.00059*** (**0.00015**)	−**0.080*** (**0.018**)
Controls		Yes		Yes	Yes	Yes	Yes
Firm fixed effects		No		No	Yes	No	No
N (firm-months)		165,379		1,052	1,052	103,517	558
Firms		2,814		591	591	1,793	558
Diversification events		1,052		1,052	1,052	575	558

Notes. Controls include the following: year fixed effects, number of funds (log), assets under management (log), cumulative abnormal returns (*CAR*), standard deviation of firm returns, waiting time between "events," and funds. All time-varying covariates except age are lagged one month. Regressions without firm fixed effects include categorical variables for headquarters located in the United States and whether the firm entered with multiple investment strategy controls. Marginal effects are reported for multinomial logit specifications and are not directly comparable to the OLS/difference-in-differences (Dif-in-dif) estimates. Robust standard errors are clustered at the firm level. The coefficients associated with the key explanatory variable(s) are in bold.

*$p < 0.05$ (two-tailed tests).

has a small impact on the point estimate (−0.071), and it remains precisely estimated, but the interpretation is slightly different: as a firm ages, its ex ante hurdle rate required to launch a new fund falls by 7 basis point per month.

In column (4) of Table 4, we show that the results are robust to excluding the 1,011 firms that closed funds at some point to make sure that the results are not driven by firms launching new funds and subsequently closing legacy funds ("churning"). Although the number of major events in the sample is reduced by 45%, the results are very similar. Finally, in column (5) we restrict the sample to first-time diversification events only and find a result very similar to the regression in column (2). In all five specifications the results are qualitatively the same: capital markets reward firms with longer track records, allowing them to diversify even when their performance is worse than younger firms by an economically and statistically significant margin. Thus, the ex ante performance results in Table 4 suggest that external investors' requirements are not the primary constraint on horizontal expansion in aging hedge funds.

In Table 5 we present estimates of the effect of new product launches and age on ex post firm and fund performance. The baseline (endogenous) results on the full sample of firms are equivocal; performance, as measured by excess returns, is negatively correlated with *Age* × *Diversified* (column (1)) but is positively correlated with performance, as measured by the information ratio (column (2)). However, the main effect of age swamps the marginal effect of age on diversification. Of course, endogenous selection effects are likely to lead to a significant bias in our estimates. In columns (3) and (4) we estimate of the effect of age on ex post performance in diversified firms, after adjusting for selection effects, by matching exactly on all observable firm characteristics in the data ex ante. The matched sample results show that older firms underperform ex post, as measured by excess returns (column (3)) or the information ratio (column (4)), at a precisely estimated rate of approximately 1 basis point per month.

At the fund level we find that diversification negatively impacts ex post performance through two channels. New fund performance is worse in older diversifiers than in younger diversifiers by four-tenths of a basis point per month (column (5)), suggesting that older firms choose lower-quality projects than younger firms. Interestingly, diversification also leads to lower performance in legacy funds in older firms compared to legacy funds in younger diversifiers by seven-tenths of a basis point per month (column (6)), which suggests that old firms also choose projects that have less synergy with their existing product portfolio. The fund-level results are interesting because they suggest that the "noisy filter" of political frictions not only saddles older firms with lower-quality projects on a stand-alone basis, but also robs the firm of opportunities to create value at the corporate level through interfund coordination.

Of course, the estimates in Table 5 are still potentially biased from the effect of omitting unobservable firm characteristics that are correlated with both age and performance. Fortunately, the most likely threat to infer should work against finding support for our hypotheses.

Table 5 Age, Scope, and Ex Post Performance

OLS regressions:	(1)	(2)	(3)	(4)	(5)	(6)
Sample:	Full	Full	Matched	Matched	Matched new funds only	Matched ex-new funds
Unit of analysis:	Firm-month	Firm-month	Firm-month	Firm-month	Fund-month	Fund-month
Dependent variable:	*Excess returns*	*Info ratio*	*Excess returns*	*Info ratio*	*Info ratio*	*Info ratio*
Age (in years)	**−0.030***	**−0.013***	**−0.015***	**−0.010***	**−0.004***	**−0.007***
	(**0.003**)	(**0.001**)	(**0.006**)	(**0.004**)	(**0.002**)	(**0.002**)
Diversified	**0.030**	**0.090***				
	(**0.033**)	(**0.012**)				
Diversified × *Age*	**−0.020**	**0.092***				
	(**0.013**)	(**0.007**)				
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	165,379	165,379	20,086	20,086	26,742	47,508
Firms	2,814	2,814	358	358	358	358
Diversification events	1,052	1,052	462	462	462	462

Notes. In the matched sample, treatment group observations (i.e., old diversifiers) are matched to control group observations (i.e., young diversifiers) at the time of diversification. There are 231 diversification events where the firm was older than the median age and 231 diversification events where the firm was younger than the median age; 67 firms have multiple diversification spells in the matched sample because each diversification event is treated as a unique observation for the purposes of matching. Controls include the following: year fixed effects, number of funds (log), assets under management (log), cumulative abnormal returns (*CAR*), standard deviation of firm returns, waiting time between "events," and investment strategy controls. Regressions without firm fixed effects include categorical variables for headquarters located in the United States and whether the firm entered with multiple funds. All time-varying covariates except age are lagged one month. Robust standard errors are clustered at the firm level. The coefficients associated with the key explanatory variable(s) are in bold.

*$p < 0.05$ (two-tailed tests).

Presumably, older firms possess certain positive qualities that are unobservable to the econometrician, but that are observable to investors, which facilitate their survival. This unobservable appeal of older firms might also explain why older firms can diversify with poorer track records than younger firms (as shown in Table 4). Thus, the most obvious bias from endogeneity should attenuate the age effects and bias our results toward zero.

To further probe the evidence for the mechanisms, we also split the sample based on whether major new fund launches are characterized as exploration versus exploitation, and we evaluated the results on each subsample of major diversification events. If older firms are better at exploitation than exploration because of the difficulties older firms have in adapting long-standing routines (Sørensen and Stuart 2000), then predictions about the relative effect of age on explorative versus exploitative diversification events follow naturally from the model. Given higher implementation costs and, therefore, lower chances of diversification success if either internal implementation costs or external constraints are the primary source of rigidity in our sample, age effects should be more negative for explorative than for exploitative diversification. On the other hand, because political frictions, with respect to project selection, will be more severe when a new product necessitates more extensive coordination, the prediction is reversed if political frictions are the key driver of rigidity. Similarly, because of anticipated adaptation costs, following the logic of Hypothesis 1, ex ante performance should be better for explorative than for exploitative diversification, if external constraints are the primary source of rigidity.

Table 6 runs each of our main analyses from Tables 3–5 on explorative and exploitative diversification events. In all cases the results hold for each subsample and the estimates are never statistically different from one another by subsample, but are nevertheless informative. Age is negatively correlated with propensity to diversify, and precisely estimated, for both explorative and exploitative diversification events (columns (1) and (2), respectively). The coefficient on *Age* is two times larger (in absolute value) for exploitative diversification (−0.0016) compared to explorative diversification (−0.0008). Although the two point estimates are not statistically different from one another—the t-statistic on the difference is 1.60—the results are more consistent with political frictions with respect to project selection than with implementation costs or external constraints. Ex ante performance (i.e., *CAR*) is more negative for explorative diversification than for exploitative (columns (3) and (4), respectively), which is also inconsistent with the external constraints mechanism, although the point estimates are not statistically different. Finally, for completeness we also report that matched ex post performance is slightly worse for exploitative diversification at −1.4 basis points per month (column (6)) than for explorative diversification, which comes in at −1.1 basis points per month. Both point estimates are precisely estimated, but here again the difference between the point estimates is not statistically significant. In general the relative uniformity of the results across the two subsamples speaks to the importance of political frictions with

Table 6 Exploration versus Exploitation

	(1)	(2)	(3)	(4)	(5)	(6)
Specification:	*Dif-in-Dif*		*Multinomial logit*		*OLS*	
Sample:	Explore	Exploit	Explore	Exploit	Explore (matched)	Exploit (matched)
Dependent variable:	*New fund launch categorical*		*Difference (above median age coefficient – below median age coefficient)*		*Information ratio*	
Compare to:	Table 3		Table 4		Table 5	
Age (in years)	−0.0008*	−0.0016*	−0.00034*	−0.00025*	−0.011*	−0.014*
	(0.0004)	(0.0003)	(0.00010)	(0.00008)	(0.005)	(0.004)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	No	No	No	No
N (firm-months)	165,379	165,379	165,379	165,379	9,240	8,670
Firms	2,814	2,814	2,814	2,814	192	165
Diversification events	573	479	573	479	224	188

Notes. Controls include the following: year fixed effects, number of funds (log), assets under management (log), cumulative abnormal returns (*CAR*), standard deviation of firm returns, waiting time between "events," and investment strategy controls. Regressions without firm fixed effects include categorical variables for headquarters located in the United States and whether the firm entered with multiple funds. All time-varying covariates except age are lagged one month. Marginal effects are reported for multinomial logit specifications. Robust standard errors are clustered at the firm level. The coefficients associated with the key explanatory variable(s) are in bold.
*$p < 0.05$ (two-tailed tests).

respect to project selection as a source of organizational rigidity in the context of hedge funds.

In sum, the results indicate that older hedge funds diversify less often than younger hedge funds, with worse track records ex ante, and tend to underperform ex post, suggesting that rigidity in older firms is primarily attributable to internal factors, specifically, to political frictions that influence project selection.

6. Discussion

The evidence from our study is consistent with the idea that hedge fund diversification efforts are primarily constrained by political frictions that inject noise into older firms' evaluation processes. However, political frictions with respect to project selection are not observed directly, raising the question of whether or not alternative explanations that make observationally equivalent predictions are viable, or if other plausible assumptions motivate different predictions. For example, we assume that political frictions with respect to project selection are germane to many potential projects but political frictions might be more salient when a project's expected return is "near" the hurdle rate. However, our simplifying assumption is fairly innocuous: even if the selection process is such that better projects are more likely to pass through the political process than worse projects, all of the framework's predictions still hold.

We also assume that exchange partners hold older firms to a higher standard than younger firms, demanding higher ex ante performance in return for supporting a new project. One might alternatively assume that younger firms are held to a higher standard (e.g., Stinchcombe 1965). Here, the importance of our key scope condition—that the rate of change is declining in older firms—becomes clear. Unless older firms change less often than younger firms, our framework does not apply. This condition is unlikely to hold if older firms are held to lower standards than younger ones. Thus, we do not dispute that the liability of newness will dominate the liability of senescence in a particular setting. Nor do we claim that exchange partners always hold older firms to a higher standard; we only assert that exchange partner reservations about older firms is the correct hypothesis to test when our scope condition is met. Relatedly, we would not expect that the rigidity effect will always be so severe as to lead older firms to exit an industry whenever confronted by a major strategic change. Rather, we think that, on the margin, older firms will be more rigid and therefore less likely to adapt to environmental shocks. Although our conceptual framework follows directly from that (testable) premise, our framework does not apply to every circumstance where political frictions with respect to project selection are the key driver of rigidity in a firm (i.e., because the context will fail the scope condition when p is "too high").[15]

Yet another assumption that might warrant more scrutiny relates to exactly how political frictions operate. Consistent with Gibbons's (1999) observation that firms are messy (i.e., first-best outcomes are not always realized) but not a mystery (i.e., outcomes are predictable), we characterize political frictions as noisy filters that exclude some projects above the "apolitical" hurdle rate and also include some projects below that apolitical hurdle rate, leading to a lower realized hurdle rate on project selection. Politics might also act in other ways. For example, an internal market for project selection could be effectuated by side payments between powerful insiders. Side payments that are simply redistributive among insiders are incorporated into the concept of political frictions we test. However, under certain conditions, side payments may represent a political cost that is conceptually different from the noisy filter concept and is, therefore, best treated by our model as an implementation cost. For example, if side payments act as a tax on the firm, instead of simply redistributing value among insiders, the "tax" will lower the expected profitability of any particular new project and, consequently, firms will select deeper into the right tail of the performance distribution. Thus, we characterize this study's results as being consistent with "noisy filter" politics.

Our approach accommodates or falsifies alternative assumptions, but alternative explanations warrant consideration. For example, if older firms have higher implementation costs and, therefore, attempt fewer diversifications and are less successful at the ones they do attempt, then one might observe similar results. If our theory concerned only new fund profitability, then it would be difficult to distinguish between implementation costs and the noisy filter of political frictions. However, the implementation costs hypothesis (Hypothesis 3) does not make a prediction about project profitability but, rather, a prediction about the quality of projects selected and, therefore, ex post project performance (i.e., excluding implementation costs). For tests of external constraints (Hypothesis 1) and political frictions (Hypothesis 2), there is a direct relationship between project quality and profitability because implementation frictions do not operate through these channels. However, for Hypothesis 3 implementation costs drive a wedge between profitability and project quality. As a result, implementation costs always lead to higher quality projects ceteris paribus (e.g., in terms of returns to investors), although all projects face the same profitability hurdle. Thus, ex post performance will be higher, not lower, when firms face implementation costs.

Another possibility is that older firms are more bureaucratic and, hence, slower to make diversification decisions but also have more slack resources that allow them to sample from a broader set of opportunities. If true, then we would observe both a lower diversification rate and relatively poor postdiversification performance among older firms. Although bureaucratic frictions may be conceptually equivalent to political frictions when they are intentional (e.g., when the hurdle rate is lowered on a case-by-case basis to favor pet projects), or to implementation costs when the costs of bureaucracy are anticipated (e.g., when bureaucracy drives a wedge between project quality and profitability in expectation) and therefore are accommodated by our model, it is plausible that latent bureaucratic frictions, coupled with slack resources, could confound our analysis. For example, if a firm had slack resources and its governing bureaucrats were "lazy" or erratic, in the sense that they selected projects in a relatively haphazard manner, independent of expected implementation costs and their own personal motivations, it would be difficult to separate bureaucratic frictions from political frictions empirically. However, the context militates against this possibility: almost all new hedge funds require substantial external capital and are not funded solely by free cash flows. Thus, slack resources do not play a major role in our empirical setting, and the observed "sampling" behavior is more consistent with a political-frictions explanation than with a slack-resources explanation. We do caution, however, that bureaucratic frictions that are neither politically motivated nor well anticipated are potentially important to consider, particularly in settings where firms have market power and can fund projects out of free cash flows.

Multiple alternative explanations might account for why older firms perform worse than younger firms beforebefore diversifying (e.g., organizational learning, legitimacy, and "problemistic search"). Crucially, however, viable alternatives must not only generate the performance results predicted by Hypothesis 1, 2, or 3; they must also satisfy the scope condition that older firms diversify at a lower rate than younger firms. Standard alternative explanations (and many nonstandard explanations) satisfy only one of these conditions. In this way, our framework's single-scope condition enables researchers to adjudicate among diverse theoretical arguments motivated by prior work in organizational theory and strategic management while also allowing for these arguments to be supported in other settings.

7. Conclusion

We examine how three commonly invoked, rigidity-producing mechanisms—exchange partner constraints, political frictions, and implementation costs—influence the rate of strategic change and generate different patterns of firm performance. Applying our framework to age-based rigidity in hedge fund product diversification, we identify political frictions with respect to project selection as the dominant source of firm rigidity. The results are consistent with the classic literature on organizational decision making (Cyert and March 1963), which conceptualizes the firm as a collection of interest groups with competing objectives, and the literature on organizational change (e.g., Hannan and Freeman 1984), which recognizes politics and aging as rigidity-generating mechanisms. However, the idea that aging catalyzes bureaucratic processes by subjecting project evaluation to a noisy filter is novel.

The hedge fund context presents a conservative test of political influences on firm decision making because hedge funds typically exhibit limited hierarchical differentiation of personnel and strong incentive alignment between managers and investors. Moreover, our operationalization of political frictions is conservative, because we limit ourselves only to noisy filter effects, and not political effects associated with implementation costs. That we find hedge funds subject to political frictions suggests that organizational politics play a broader role in rigidity than has been previously documented.

Although the hedge fund setting fits our framework well, our framework can be applied to many strategic changes across a wide range of settings. For example, one could use the framework to study innovation, information technology adoption, divestitures, or policy changes, and our framework can guide studies of how other organizational characteristics (e.g., size or location) contribute to rigidity. Others might similarly extend the framework to study other organizational events that are often generated by political frictions, like spinoffs (e.g., Klepper 2007).

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Endnotes

[1]If the implementation of a new idea requires concessions independent of project selection (e.g., bonuses) to secure internal support for change, then such concessions are considered implementation costs, not political frictions.

[2]Although the arguments above imply that this scope condition is commonly satisfied, it will not *always* be met. Older firms might, in some settings, leverage their superior resources and capabilities to expand horizontal scope faster than their younger counterparts.

[3]Our hypotheses about ex post performance do not depend on the rate of idea generation. We elaborate on the implications of relaxing this assumption in the discussion of the results.

[4]Alternative theories that posit the opposite implication of each age-based mechanism are potentially valid null hypotheses. For example, in some cases external exchange partner constraints may be stronger for younger firms.

[5]Our emphasis on using ex ante performance to infer the strength of external constraints does not suggest that internal issues do not affect ex ante performance. Rather, our model exploits the information content of forward-looking decisions, by both internal and external stakeholders, to infer the sources of firm rigidity. Although internal constraints may influence ex ante performance, they only matter to internal decision makers if they affect expected ex post performance, whereas external exchange partners, who lack inside information, can only make inferences about firms based on their track records.

[6]Two related aspects of our assumptions are important for our framework. First, we assume that p is "not too high" to satisfy our scope condition. Second, we assume that p applies constantly to all projects above the hurdle. Although not completely general, both assumptions allow a very large set of potential parameters, including those that are likely most relevant to most empirical contexts, including the one we study. In terms of the first of these assumptions, the political frictions mechanism implies that, although the "political" hurdle rate is lower for older organizations, older organizations only diversify in a subset of the cases above the hurdle. Thus, p must be sufficiently low for our scope condition and Hypothesis 2 to hold. Formally, to satisfy the scope condition, we must have $p/(1-p) < \int_{h_y^x}^{\infty} g(x)\,dx / \int_{h_o^x}^{\infty} g(x)\,dx$. In other words, we need some combination of "small enough" p and "big enough" h_o^x for the rate of change to be lower in older firms, an assumption we test by studying diversification rates empirically. Second, in making the assumption that all projects above the hurdles $h_i^x i \in \{o, y\}$ are subject to political frictions in constant proportion, we are also implicitly assuming that the frequency of projects selected is declining in x. Although this assumption simplifies the exposition, a more natural assumption might be that there is some probability p that a project will be passed, and that p is an increasing function of the distance a project's return is from a fixed hurdle (e.g., h_o^x). In this alternative setting, $p(x - h_o^x)$ would have to satisfy conditions such as being bounded below and above by zero and one, respectively, and would have to be such that $p(x)$ is not so convex such that it is very low between h_o^x and h_y^x and then increases sharply above h_y^x. In other words, as long as p does not have a very particular form around the apolitical hurdle, the results will hold (e.g., even if p is increasing in x).

[7]Investor returns capture the quality of a firm's underlying investments and thus are equivalent to project quality. In the absence of implementation costs, project quality maps directly to firm profitability (Hypothesis 2), because of the fee structure of hedge funds (i.e., performance fees increase linearly with positive returns). However, implementation costs drive a wedge between project quality and firm profitability (Hypothesis 3). Thus, investor returns, as a measure of ex post performance, will always capture project quality in our setting, but can only be interpreted as a measure of profitability in the absence of implementation costs.

[8]Although the data sets are widely considered the most comprehensive, they do suffer limitations, including back-fill bias and redundancies in fund reporting, which we address in ways consistent with the prevailing literature.

[9]This research is distinct from and complementary to de Figueiredo and Rawley (2011). Their study shows that diversifying hedge funds see a drop in performance after diversification, but the performance declines are less severe than in firms with a similar return history that did not diversify. In this paper, our main tests are cross-sectional comparisons between diversifiers before and after diversification. Although our results are broadly consistent with theirs, we address a different question: why is the diversification rate negatively correlated with age?

[10]These problems can be exacerbated by the fact that sales people are typically paid on commissions. For example, the fund managers for one firm we interviewed indicated that the sales people would typically sell the "hot" product, often new product launches, leaving the others with very limited capital raising efforts. This causes a great deal of influence activity with respect to new fund launches and the management of sales people.

[11]The results are robust to alternative breakpoints.

[12] All of the results are robust to including these 1,250 diversification events in the analysis. The results are also robust to more or less restrictive definitions of "highly related" (e.g., lower- or higher-correlation cutoff values).

[13] Approximately 35% of firms launch more than one distinctive new fund and therefore experience multiple major diversification events. The results are not sensitive to restricting the event space to first diversification events only, or to excluding firms that subsequently close one or more funds.

[14] Hseih's data library is available at http://faculty.fuqua.duke.edu/~dah7/HFData.htm. The traded liquidity data are available from Robert Stambaugh at http://finance.wharton.upenn.edu/~stambaug/liq_data_1962_2008.txt.

[15] We also assume that firms hold asymmetric information regarding their own quality, which is not fully communicated to external exchange partners.

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