Organizational age and organizational change: Evidence from hedge fund product diversification

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Abstract

This study examines the relationship between organizational age and organizational change. Both internal and external factors constrain change as organizations age, but predictions about organizational performance in the periods preceding and following change differ by the locus of primary constraint. Specifically focusing on changes in organizational scope (i.e., product diversification), we consider accounts of structural inertia that privilege either internal or external constraints on change and then test their respective predictions using longitudinal data on 8,887 hedge funds raised by 2,781 firms between 1994 and 2005. Empirical analyses demonstrate that the rate of scope change decreases with age. The results are more consistent with the internal account than with the external account of structural inertia: younger organizations outperform older organizations prior to implementing change and, conditional on changing, after implementing change. We conclude that change is increasingly constrained by internal factors as organizations age.

1. Introduction

A tenet of organizational theory is that organizational behaviors and outcomes vary systematically with organizational age. For example, organizational rates of innovation (Sørensen and Stuart, 2000), growth (Barron, West, and Hannan, 1994), and survival (Ranger-Moore, 1997; Hannan, 1998) all exhibit significant age dependence. Accounts of organizational aging are often intertwined with a theory of organizational change that accounts for structural inertia, or lack of change, in aging organizations (Hannan and Freeman, 1984). Externally, selection pressures encourage organizations to maintain their core features (Hannan and Freeman, 1984). Internally, aging organizations become increasingly proficient with established routines (Nelson and Winter, 1982), and also increasingly reluctant to experiment with new ones (Levitt and March, 1988). Consequently, organizations become less and less likely to change with age.

Despite extensive research on organizational aging and change, the primary locus of constraint on change remains unclear. Both internal and external factors influence rates of organizational change (Hannan and Freeman, 1984: 149; Barnett and Carroll, 1995: 220-223), but theoretical accounts of
organizational change privilege either internal organizational constraints like rigidity (e.g., Henderson and Clark, 1990; Leonard-Barton, 1992) or external constraints like exchange partner obligations (e.g., Card, 1986; Argyres and Liebeskind, 1999). But, because prior work does not explicitly compare internal and external influences on organizational change the locus of primary constraint remains ambiguous.

Similarly unclear are relationships among age, performance, and change. The extensive research program on age dependence primarily examines mortality rates, not change or expansion, over the organizational life cycle (e.g., Hannan, 1998; Le Mens, Hannan, and Pólos, 2011). Typically, positive age dependence in mortality rates is interpreted as evidence that aging organizations become increasingly less capable of adapting to their environments (e.g., Barron, et al., 1994: 414). Some studies do specifically examine the effect of change itself on mortality (e.g., Delacroix and Swaminathan, 1991; Haveman, 1992; Amburgey, Kelly, and Barnett, 1993; Dobrev, Kim, and Hannan, 2001). But, despite the central role of performance in decisions regarding organizational change (Cyert and March, 1963; Miller and Chen, 1994; Greve, 1998), relationships among organizational age, performance, and change are not typically examined within the same study.

We integrate work on organizational change and on age dependence to specifically examine how internal and external constraints alter aging organizations’ propensities to change one core feature (e.g., the scope of its offerings) and how different accounts of the age-change relationship imply different predictions for ex ante and ex post performance (i.e., performance prior to and after implementing change, respectively). Identification of the primary constraint on change in aging organizations is expected to resolve whether internal organizational dynamics (e.g., Abernathy and Utterback, 1978; Kimberly and Miles, 1980) or external factors (e.g., Hannan and Freeman, 1977; 1989) primarily constrain change and may also aid ongoing efforts to reconcile conflicting findings regarding age dependence in mortality rates (Pólos and Hannan, 2002; Le Mens, et al., 2011). We review two theoretical accounts of how internal and external constraints on change, respectively, evolve as organizations age. Connecting age and change to organizational performance then motivates formal predictions about how young and old organizations perform in the periods preceding and following discrete organizational change events (i.e., ex ante and ex post performance).

The internal account of structural inertia emphasizes two constraints that intensify as organizations age: organizational politics and implementation costs. First, with age organizational power becomes increasingly vested with the organization’s dominant coalition (Thompson, 1967; Pfeffer, 1981). Change disrupts the organizational power distribution (Amburgey, et al., 1993). Consequently, dominant coalitions extract concessions in return for supporting changes likely to destabilize its power base. In this way, the expected returns to change are attenuated by organizational politics so that the rate of change decreases as organizations age. Second, organizational routines become more effective with experience
(Stinchcombe, 1965; Nelson and Winter, 1982) and experimenting with new routines distracts from the exploitation of established routines (Penrose, 1959). And change capabilities also decline with age (Whetten, 1987; Ranger-Moore, 1997). If these opportunity and coordination costs of implementing change increase with age, then the rate of change decreases with age.

The external account of structural inertia emphasizes how exchange partners beyond an organization’s boundary but within its activity domain (Thompson, 1967) produce a negative relationship between age and change. With age, organizations become embedded in relationships with customers, employees, suppliers, and evaluators that identify the organization with its established routines and offerings (Amburgey, et al., 1993; Uzzi, 1996; Christensen and Bower, 1996; Hannan, Baron, Hsu, and Kocak, 2006). Changes to these core elements alter an organization’s identity (Hannan and Freeman, 1984), confusing audiences about the organization’s fundamental purpose and reducing its appeal (Zuckerman, 2000; Hsu, 2006). Consequently, exchange partners impose increasing marketing costs of change on aging organizations so that external constraints also render organizations less likely to change with age.

To adjudicate these internal and external accounts of structural inertia, we specifically examine expansions of organizational scope or product diversification (Teece 1980, 1982; Miller 2006). Scope expansion fundamentally alters “the kinds of clients (or customers) to which the organization orients its production and the ways in which it attracts resources from the environment” (Hannan and Freeman, 1984: 1560). Prior research identifies three general constraints on such organizational changes: internal politics (e.g., negotiating change), implementation costs (e.g., opportunity and coordination costs of changing), and marketing costs (e.g., persuading exchange partners of changes’ merits). We consider how each of these factor generally constrain organizational change and also how their influences vary with age, highlighting each account’s implications for organizational performance in the time periods that precede and follow change.

Both internal and external constraints imply that old organizations diversify at lower rates than young organizations. But, internal and external accounts of structural inertia motivate different expectations about (1) how the relationship between ex ante performance and the diversification rate varies with organizational age and (2) how ex post performance varies with age among diversifying organizations. We formulate the minimum number of hypotheses necessary to reconcile the internal and external accounts and graphically illustrate the logic of our predictions.

Previewing our findings, we do indeed document a negative empirical relationship between organizational age and diversification rates. To reconcile the internal and external explanations of this effect, we motivate competing predictions about the relationship between ex ante performance and the diversification rate. The external account of structural inertia suggests that exchange partners will hold
older organizations to higher ex ante performance standards than younger organizations. If aging organizations must increasingly demonstrate exceptional performance to overcome production and factor market skepticism, then good ex ante performance should increase the diversification rate more for older organizations than for younger organizations. Conversely, the internal account suggests that both organizational politics and coordination costs increasingly constrain change as organizations age, independent of ex ante performance. Again previewing our findings, the empirical results are inconsistent with the external account; younger diversifying organizations exhibit higher ex ante performance than older diversifying organizations.

To delineate the multiple internal factors that may account for the age-change relationship, we examine ex post performance among organizations that diversify. The internal politics story suggests that appeasing an aging organization’s dominant coalition necessitates trade-offs between the organizational returns to change and the preservation of coalition power. By selecting some change initiatives based on coalition instead of organizational interests, internal politics introduce political bias to the change evaluation process. As aging organizations increasingly implement change initiatives only partially motivated by expected organizational returns, conditional on diversifying, ex post diversification performance should be decreasing with age.

Conversely, if the opportunity and coordination costs of change are increasing with age then the returns to any given change initiative will be lower the older the focal organization is. But, one may reasonably assume that these implementation costs are known to old organizations considering change. Expecting the returns to change will be diluted by implementation costs, older organizations will disproportionally implement changes drawn from the right tail of the expected returns distribution. Conditional on diversifying, then, ex post diversification performance will be increasing with age. These predictions enable us to identify the locus of primary, not sole, constraint on organizational change in aging organizations. Again previewing our findings, we find stronger support for the organizational politics account; older diversifying organizations exhibit lower ex post performance than older diversifying organizations.

The empirical setting for our inquiry is hedge fund product diversification, where expansions in organizational scope involve discrete change events (i.e., new funds launched by investment firms). We test these arguments with data on 8,887 funds raised by 2,781 U.S. firms between 1994 and 2005.

2. Theory

Organizational survival depends upon reliably performing in accordance with societal expectations and accounting rationally for performance (Hannan and Freeman, 1977; 1984). To survive, organizations therefore institutionalize goals and routinize their activities so that, over time, reliable
routine systems evolve (Nelson and Winter, 1982; Amburgey, et al., 1993). Change is risky because altering goals and routines compromises reliability and accountability and, therefore, reduces survival chances (Hannan and Freeman, 1989). Changes to core organizational features, such as product offerings, are especially risky not only because the organization’s core routines are altered but also because the basis for exchange partner evaluations is altered (Zuckerman, 1999, 2000; Hannan, 2005). Organizations, therefore, tend to preserve the status quo, generating structural inertia (Hannan and Freeman, 1984).

Routines develop by repeatedly performing activities (Nelson and Winter, 1982). New organizations develop routines that tend to become more reliable with organizational age (Stinchcombe, 1965) while old organizations face strong incentives to continue exploiting established routines instead of developing new ones (March, 1991). Accordingly, older organizations change less often than younger organizations (e.g., Delacroix and Swaminathan, 1991; Amburgey, et al., 1993). Implicitly, research on the relationship between age and change compares the costs of implementing change with the costs of preserving the status quo. We make these comparisons explicit by considering how both internal and external constraints structure the costs associated with one discrete organizational change: expansion of an organization’s horizontal scope.

Organizations expand horizontal scope by diversifying into new product or service offerings. Diversification is of great interest to organizational scholars because of its implications for growth, performance, and market evaluations (Rumelt, 1974; Montgomery and Wernerfelt, 1988; Haveman, 1992; Zuckerman, 1999, 2000). Recent empirical work strongly suggests that diversification is typically motivated by expected positive economies of scope (Campa and Kedia 2002) borne of cost reductions or revenue enhancements. But, diversification also taxes organizations’ information processing capabilities (Zhou, 2011), distracts managers from their responsibilities (Schoar, 2002), and confuses the organization’s market identity (Zuckerman, 1999), contributing to the “diversification discount” (Land and Stulz 1994; Villalonga, 2004) and motivating divestitures (Zuckerman, 2000).

Below, we first discuss how diversification costs vary with organizational age and, therefore, produce systematic empirical relationships between age and diversification rates. We then consider multiple mechanisms that could produce this relationship to motivate predictions about both ex ante and ex post performance to disentangle the internal and external accounts of the age-change relationship.

Internal account: Diversification and organizational age

Extant research on organizational scope identifies three types of diversification costs: internal politics, implementation costs, and marketing costs. We associate the first two costs with internal constraints on change and the third cost with external constraints on change.
The first type, diversification costs, generally increase with organizational age because bureaucracy develops over time and stabilizes the organizational distribution of power (Merton, 1940; Barron, et al., 1994; Amburgey, et al., 1993). Although intended to reduce uncertainty (Weber, 1947; Cyert and March, 1963), bureaucracy is a “vicious circle” that increases organizational rigidity (Crozier, 1964) and, thereby, reduces the likelihood of change. For example, a 100-year Stanford study found that the university rule creation rate exceeded the rule elimination rate and that rules were less likely to change the longer they persisted (Zhou, 1993).

Bureaucratic rigidity serves the dominant coalition’s interests (Pfeffer, 1981); organizational resources are increasingly allocated to established routines that grant the coalition power and decreasingly allocated to developing new routines that compromise coalition power. Accordingly, disagreements between coalitions that support established routines and employees who want to develop new ones often result in employee exits and new organizational founding (Freeman, 1986; Klepper, 2007). If organizations become more bureaucratic with age and dominant coalitions increasingly capable of preserving the status quo, then organizational politics increasingly constrain change as organization age.

The second type of diversification costs are the costs of diverting resources from established routines in order to support new routines; we call these implementation costs. Implementation costs arise from both incurred adaption costs and from gains foregone by allocating resources to new routine development instead of established routine exploitation. These cost include distractions created by increasing the routines that employees must perform (Penrose, 1959; Schoar, 2002), adding complexity to managers’ responsibilities (Zhou, 2011), and/or reformulating existing routines for new purposes (Leonard-Barton, 1992). These costs can be substantial; a study of automobile manufacturers found that changing market segments increased the mortality hazard (Dobrev, et al., 2001), and a study of transportation providers found significant productivity losses for providers that diversified into additional lines of business (Rawley, 2010).

Implementation costs of diversification probably increase with age because organizations develop routines and accumulate knowledge over time (Nelson and Winter, 1982; Cohen and Levinthal, 1990). For example, a study of technology organizations found that older organizations’ patents cite less recent developments than younger organizations’ patents and also that older organizations’ patents are subsequently cited less frequently (Sørensen and Stuart, 2000). These results are consistent with the argument that the opportunity costs of developing new routines increase with organizational age. If older organizations generally utilize more established routines than younger organizations, then the implementation costs of diversification should be greater the older an organization is.
**External account: Diversification and organizational age**

Externally, diversification imposes additional marketing costs of change on organizations. Changing organizations must maintain exchange partner obligations both contractual (Argyres and Liebeskind, 1999) and social (Granovetter, 1985) while also promoting new offerings. For example, organizations’ employment relationships often constrain change (Card, 1986; Nickerson and Silverman, 2003; Hannan, et al., 2006).

Because exchange relationships develop as organizations age, these obligations typically grow with age. For example, executives may feel socially obligated to inform long-standing partners of impending organizational changes that may adversely affect their business (Uzzi, 1996). New ventures may capitalize on technological change more readily than established organizations if long-standing customers command resources that established organizations might otherwise allocate to developing new offerings (Christensen and Bower, 1996). Change, then, imposes greater marketing costs of assuaging exchange partner concerns on older organizations than on younger ones.

Inconsistencies between an organization’s current identity and new offerings also constrain change by imposing marketing costs on older organizations. For example, mass producers of beer (e.g., Anheuser Busch) found it costly to diversify into craft-brewed beer because consumers identified a history of mass production as inconsistent with craft brewing (Carroll and Swaminathan, 2000). If organizational identities and exchange partner expectations solidify over time, then the marketing costs of diversification should be greater the older an organization is.

As discussed above, extant research indicates that internal constraints (i.e., organizational politics and implementation costs) and external constraints (i.e., marketing costs) associated with diversification all increase with organizational age. Therefore, the rate of horizontal scope expansion should decrease with organizational age.

**Hypothesis 1 (Diversification Rates and Age):** The older the organization, the lower the rate of diversification.

**Delineating mechanisms: Age, diversification, and performance**

Both the internal and the external accounts of structural inertia imply that as organizations age, their rates of change decline. In other words, the internal and external accounts do not enable identification of the primary constraint on change. To do so, we consider the implications of each account for ex ante and ex post performance.

We develop a simple formalization of the diversification decision that elucidates empirical relationships among age, diversification, and performance. We make two basic assumptions. First, we assume that as organizations identify opportunities for change, those opportunities are implemented or
rejected on the basis of the expected returns to changing (i.e., diversifying) versus maintaining the status quo (i.e., remaining inert). If the expected returns to a change opportunity exceed a minimum threshold — what we call a **hurdle rate** — the organization implements change; otherwise, the organization remains structurally inert.

Second, we assume differences in the information used by external and internal constituents to evaluate change opportunities. Internal constituents like executives, managers, and employees assess change opportunities on the basis of expected returns; in other words, access to organization-specific information enables prospective evaluation of change opportunities (i.e., **expected ex post performance**). External constituents like investors, suppliers, customers, and analysts lack such organization-specific information and, therefore, decide whether they will support change or not based on the focal organization’s recent performance (i.e., **observed ex ante performance**). We first motivate predictions based on ex ante organizational performance and then consider the ex post performance implications of the internal and external accounts.

**External Constraints and Ex Ante Performance**

Organizations typically become identified with their product and service offerings as well as the market niches to which those offerings are targeted. Generally, an organization’s appeal to exchange partners consider is greater the fewer and more specific niches the organization targets because focused offerings sharpen organizational identities (Zuckerman, 1999, 2000; Hus, 2006). The longer an organization offers a product or service, the more likely it is that exchange partners identify the organization with the offering and the more likely any inconsistencies between the legacy offering and a new offering will reduce organizational appeal. Younger organizations are not similarly burdened by their histories. Consequently, older organizations may face greater external constraints on diversifying than younger organizations due to higher marketing costs of securing support for change. If so, then the hurdle rate based on ex ante organizational performance should be higher for older than younger organizations.

To illustrate this conjecture, consider a simple, reduced-form model where there is an “old” and “young” organization, denoted respectively by \( i \in \{ o, y \} \). Each organization has a single legacy offering and considers diversification by launching one new offering. The legacy offering has a track record of performance \( r_i \) where organizational track records are distributed according to a normal distribution \( f \) with mean \( \mu_r \) and variance \( \sigma_r \). Facing only external constraints imposed by exchange partners (e.g., investors, suppliers, customers), profit-maximizing organizations will seek to diversify in order to allocate fixed costs to a larger number of units. But, such efforts succeed only with exchange partner support.
To capture the idea that organizations select change opportunities from a broad set of possibilities, we assume that each organization generates a single opportunity \( x \), where the expected value of \( x \) is drawn from a normal distribution \( g \) with mean \( \mu_x \) and variance \( \sigma_x \).

Exchange partners evaluate an organization’s proposed change based on the performance track record of the organization’s legacy offering. We assume persistence in performance so that the better the legacy offering’s track record, the higher the expected performance of the new offering.\(^1\) Thus, exchange partners will support diversification if the legacy offering’s recent performance is sufficiently positive. We, therefore, assume that exchange partners only support diversification attempts if the organization’s ex ante performance meets or exceeds the hurdle rate.

We denote the hurdle rate that exchange partners apply for each organization \( h_i^a \) where \( i \in \{o, y\} \) and the superscript \( a \) denotes the hurdle is on the ex ante performance distribution. For simplicity, we assume that this hurdle rate always exceeds the mean of the performance distribution — that, at a minimum, diversification attempts are made by organizations with above-mean track records of performance. Figure 1 illustrates our theorized external account of structural inertia, where \( f(r) \) represents the distribution of organizational track records and \( h \) represents the hurdle rate \( h \). Organizational decisions are straightforward: organizations diversify if \( r_i > h_i^o \).

External constraints imply that exchange partners apply a “higher” standard to older than to younger organizations. This suggests that if external constraints primarily generate structural inertia in aging organizations then the diversification hurdle rate for older organizations exceeds the hurdle rate for younger organizations, or \( h_o^y > h_y^o \). This logic motivates a prediction about the relationship between diversification and ex ante performance given external constraints. For clarity, the indicator variable \( d \) denotes diversification choices, such that \( d = 1 \) if an organization diversifies and \( d = 0 \) if not. Namely, we can write the average ex ante performance conditional on diversification as

\[
E(r_i \mid r_i > h_i^o) = \int_{h_i^o} f(r)dr
\]

\( (1) \)

\(^1\) Following prior research (de Figueiredo and Rawley, 2011), we assume a positive correlation between quality and prior performance. For empirical evidence of performance persistence in a similar context, see Kaplan and Schoar (2005).
Equation (1) expresses the expected *ex ante* average performance of the organizations that diversify, or, in other words the average historical performance of organizations whose performance track record exceeds the exchange partners’ hurdle rates.

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

$$E_o(r_o \mid d = 1) > E_y(r_y \mid d = 1) \quad (2)$$

Equation (2) states that the average *ex ante* performance conditional on diversification will be higher for older organizations than for younger ones. Figure 2 illustrates this intuition. The average *ex ante* returns for older organizations is simply the weighted average of performance above the hurdle, which is illustrated as the cross-hatched area. Since young organizations face lower hurdle rates by assumption, the calculation of their mean includes all of the area occupied by older organizations 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 organizations, the expectation conditional on the hurdle rate is also lower for younger organizations if external factors like marketing costs primarily constrain diversification rates in aging organizations.

These arguments motivate our second hypothesis:

**Hypothesis 2 (External Constraints):** If external constraints primarily generate structural inertia in organizations, then the *ex ante* average performance of older organizations that diversify will be higher than the *ex ante* average performance of younger organizations that diversify.

### Internal Constraints and *Ex Post* Performance

As we noted earlier, internal decision makers access richer information than external constituents. More specifically, internal parties evaluate diversification opportunities not only on the basis of expected organizational returns but also on the basis of expected changes in their intra-organizational status, power, and other pecuniary benefits (March and Simon, 1958). In this sense, diversification decisions are influenced not just by the innate quality of the opportunity under consideration but also by the vested interests of organizational decision makers and, most notably, the dominant coalition. We refer to this internal constraint on change as the *organizational politics* mechanism.

Another internal constraint is presented by the expected costs of implementing an approved change. For example, resources allocated to implementing change are resources not allocated to
exploiting established routines. To the extent that implementing change distracts organizations from performing established, valuable routines, organizational change may be internally-constrained by the expected opportunity costs of changing (Penrose, 1959; March, 1991). In other words, opportunity costs dilute the expected returns to any given organizational change.

Additionally, as organizations age their abilities to implement change are thought to decline. Consequently, change imposes coordination costs on organizations (Zhou, 2011) that probably increase with organizational age. If so, then the expected returns to implementing any given change will be decreasing with age. We refer to this internal constraint on change as the implementation costs mechanism. In what follows we further develop our model’s predictions for ex post performance, first for the organizational politics mechanism and then for the implementation costs mechanism.

Organizational politics. In established organizations, dominant coalitions control organizational resources and will likely make strong cases to continue supporting established routines that produce reliable performance and enhance organizational accountability. Moreover, dominant coalitions’ power bases are typically associated with the organization’s core routines and offerings. However, dominant coalitions may be inclined to support change initiatives that potentially compromise their power if the organization makes concessions that serve the dominant coalition’s interests. Note that such concessions need not serve the organization’s interests in order to obtain coalition support. For example, a study of manufacturers demonstrates that diversified organizations pay higher employee wages than similar organizations that are not diversified, ostensibly due to concessions that diversified organizations make to labor (Schoar, 2002). In manufacturing, laborers are influential because they control production uncertainty (Crozier, 1964).

In order to understand the implications of this organizational politics mechanism on the ex post performance of old and young diversifiers, we utilize the framework outlined previously. We previously assumed that organizations evaluate diversification based a change opportunity \( x \)’s expected value. Here, we instead focus on the expected ex post performance of a change opportunity, whose expectation is characterized by the random variable \( g(x) \) with the same characteristics as the distribution of legacy offering performance.

As a baseline, consider what would happen if two organizations of different age faced identical opportunities and based their decisions purely on expected returns. In this case, organizational decisions would not vary with age: both would implement diversification opportunities with expected values higher than the hurdle rate (e.g., cost of capital) and reject all others.

Organizational politics influence diversification decisions by altering ex post performance expectations because concessions to the dominant coalition dilute the expected returns to any given change opportunity. These concessions introduce political bias to the change evaluation process. Namely,
some change opportunities with expected values below the unbiased hurdle may be implemented in order to satisfy the dominant coalition while others that exceed the unbiased hurdle rate are rejected by the dominant coalition. To the extent that dominant coalitions accumulate power with age, the diversification decisions of older organizations should, therefore, be noisier than those of younger organizations.

Intuitively, assume both an old and a young organization draw change opportunities from the same distribution of expected values as before. Unless noted, we use identical notation as before, i.e. organizations are denoted \( i \) and the expected value of the change opportunity is denoted \( x_i \). To capture the idea that young organizations are less constrained by organizational politics, we assume that the young organization implements all opportunities whose expected returns exceed the hurdle rate, i.e., a new offering is launched when \( x_y > h_y^x \), where the superscript \( x \) denotes the hurdle is on the random variable \( x \) or, equivalently, the expected \textit{ex post} distribution of performance. Due to organizational politics, older organizations “sample” from a broader set of change opportunities. We, therefore, assume that organizations diversify with probability \( p \) if the change opportunity’s expected value exceeds some hurdle \( h_o^x < h_y^x \).

In this case, the expected value of the \textit{ex post} performance of young diversifiers is given by

\[
E(x_y | d = 1) = \int_{y}^{\infty} x_y g(x_y) dx_y
\]  

(3)

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

\[
E(x_o | d = 1) = \frac{1}{p} \int_{0}^{\infty} px_o g(x_o) dx_o
\]  

(4)

Given that \( p \) is constant conditional on \( x_o > h_o^x \), this implies

\[
E(x_o | d = 1) = \int_{0}^{\infty} x_o g(x_o) dx_o
\]  

(5)

Finally given that, \( h_y^x > h_o^x \), comparing (3) and (5) yields the result

\[
E_o(x_o | d = 1) < E_y(x_y | d = 1)
\]  

(6)

In other words, due to organizational politics, the \textit{ex post} performance of older diversifiers is lower than the \textit{ex post} performance of younger diversifiers. As shown in Figure 3, older organizations sample from a broader range of opportunities (in terms of expected organizational returns) and this sampling process effectively shifts down the frequency of any given opportunity above the hurdle rate being implemented (as represented by the heavy dashed line in Figure 3). Older organizations, therefore, impose lower average hurdle rates than younger organizations’ on diversification decisions.
Consequently, the expected *ex post* performance of younger diversifying organizations exceeds that of older diversifying organizations.

These arguments motivate our third hypothesis:

**Hypothesis 3 (Organizational Politics):** If organizational politics primarily generate structural inertia in organizations, then the *ex post* average performance of older organizations that diversify will be lower than the *ex post* average performance of younger organizations that diversify.

**Implementation costs.** Organizational politics motivate one prediction regarding the relationship between organizational age and the *ex post* performance of diversifying organizations; implementation costs motivate a counter-prediction. While organizational politics influence *ex post* performance via opportunity selection, implementation costs influence *ex post* performance post-selection or after the organization implements change. This distinction is important. With respect to organizational change, Barnett and Carroll (1995) refer to the former as the “process” of change and the latter as “content” of change. This distinction motivates consideration of the possibility that older and younger organizations vary in terms of their abilities to extract returns from established offerings while implementing new ones. Importantly, our argument implies that organizational variance in implementation costs (“content) will feedback into selection (“process”).

To illustrate the *ex post* performance one might expect if older organizations extract less value than younger organizations do from implementing the same innately-valued change, we return to the model of *ex post* performance developed above. Previously, internal or external constituents affected the selection of change opportunities to implement through the application of (effective) hurdle rates. As demonstrated earlier, when effective hurdle rates vary with age across organizations *ex post* performance will also differ.

The implementation costs mechanism, however, does not imply that organizations make different decisions regarding a change opportunity with some fundamental value $x$. If implementation costs increase with age, then the net value an organization extracts from a given change opportunity is simply decreasing with age. Therefore, we assume that while all organizations use the same hurdle rate $h$, older organizations incur greater implementation costs of change than younger organizations do. This cost is denoted by $c$ when a given change opportunity $x$ is approved. In other words, if the expected value of a young organization implementing a given change is $x$, then the expected value of an old organization implementing the same change is $x-c$. 
As shown in Figure 4, in this instance the mean of the distribution of ideas generated by older firms is shifted left by $c$, even though the hurdle rate is the same for both firms. Therefore, the expected ex post performance conditional on diversification is given by

$$E_y(x \mid x > h) = \int x g(x) dx$$

(6)

for younger organizations and

$$E_o(x - c \mid x - c > h) = \int (x - c) g(x - c) dx$$

(7)

for older organizations. Based on the properties of the normal distribution and that $h > \mu_o$, comparing (6) to (7), implies

$$E_y(x \mid x > h) < E_o(x - c \mid x - c > h)$$

(8)

In other words, older diversifying organizations exhibit greater *ex post* performance than younger diversifying organizations.

Figure 4 provides graphical intuition behind this claim. Note that the hurdle rate for all organizations, young and old, is fixed at $h$ so that all changes (regardless of the distribution) meet or exceed the hurdle rate. By shifting the distribution to the left, implementation costs place most implemented changes in the right tail of the expected performance distribution. In these tails, the outcomes are more evenly spread because the probability density function is not sloped as steeply as it is towards the center. Therefore, conditional on the implemented change exceeding the hurdle rate, the average ex post performance of older organizations will be higher than the ex post performance of younger organizations.

This argument motivates our fourth hypothesis:

**Hypothesis 4 (Implementation Costs):** If implementation costs primarily generate structural inertia in organizations, then the ex post average performance of older organizations that diversify will be higher than the ex post average performance of younger organizations that diversify.

**Summary of Theoretical Predictions**

All three accounts predict that younger organizations will diversify more frequently than older organizations (H1).\(^2\) The accounts diverge, however, in their predictions concerning performance. The

\(^2\) It is worthwhile noting that while we focus on the expected performance given diversification in the development of our formal predictions in H2 through H4, the models also have implications for diversification rates as well.
external account of structural inertia implies that older diversifiers exhibit higher \textit{ex ante} performance than younger diversifiers (H2). The internal account of structural inertia implies two competing predictions. The organizational politics mechanism implies that that older diversifiers exhibit lower \textit{ex post} performance than younger diversifiers (H3). The implementation costs mechanism implies that that older diversifiers exhibit lower \textit{ex post} performance than younger diversifiers (H4). Note that support for Hypothesis 1 is necessary to test the other hypotheses, that Hypothesis 2 reconciles the external and internal accounts, and that Hypotheses 3 and 4 disentangle two plausible internal mechanisms.

3. Data and institutional context

Hedge funds are investment organizations that, like mutual fund providers, pool investors’ capital for the purpose of investing in securities and other assets. As of March 2012 the hedge fund industry managed approximately $2.1 trillion, which is remarkable considering that the industry only managed about $50 billion as of 1990 (Hedge Fund Research 2010). In the United States, the hedge fund industry is regulated by the Securities Exchange Commission (SEC), but unlike mutual funds, hedge funds are legally constructed to facilitate extensive short selling, leverage (i.e., debt financing), and non-linear performance-based compensation measures. In order to be exempt from the stricter investment and compensation restrictions that mutual funds face hedge funds can only raise assets from “qualified purchasers,” individuals whose net investable assets are greater than $5 million or institutional investors whose net investable assets are greater than $25 million.\footnote{The number of investors in individual hedge funds is also limited by regulation; however, in practice, this limit is rarely binding as mechanisms exist that allow firms to pool individual investors into limited partnerships that count as only a single investor. Importantly, hedge fund strategies shape investor perceptions of these organizations and also influence evaluations of fund performance (Smith, 2011).}

Hedge funds are closed to the general public and are not required to publicly report their returns. But, a large number of funds voluntarily report their returns to one or more private companies that make

Importantly, each of the mechanisms developed in H2 through H4 are consistent with the negative correlation between age and diversification rates posited in H1. Under external constraints, because the hurdle rate is lower for younger organizations, diversification cases are a superset of those for older organizations. The organizational politics mechanism implies that while the “effective” hurdle rate is lower for older organizations, older organizations only diversify in a subset of the cases above the hurdle—thus if $p$ is sufficiently low, older organizations will diversify at a lower rate than younger organizations. Finally, for the implementation costs mechanism, the hurdle rates are identical. But, because older organizations have a lower mean, older organizations select change opportunities from a more extreme part of the quality distribution. Thus, because their implemented changes are further in the tail of the expected returns distribution, older organizations diversify less frequently than younger ones.

\footnote{Although this is the most general case, funds may submit to more significant registration and supervisory requirements. If they do so, investors must be “accredited,” which is a less stringent standard than “qualified purchaser.” For an individual investor to be “accredited,” for example, they must have a net worth greater than $1 million, or have an income of greater than $200,000 for the previous two years.}
their data available by subscription. Our data on hedge funds, from Lipper-TASS (TASS) and Hedge Fund Research (HFR), was provided to us for research purposes by a major financial institution. The data from the TASS and HFR data series begin in 1977, but only includes “graveyard” funds—funds that stopped reporting to the data providers for any reason, including fund failure—from 1994. We use the survivor bias free subsample of the data 1994-2005 as our main sample, though our results are robust to using the full sample as well. Taking TASS and HFR together, we have coverage on 167,559 firm-months, from 2,781 firms, representing nearly 25 percent of the firms in the industry, over the period 1994-2005.

Amongst all the datasets used in the hedge fund literature, TASS and HFR are considered the most comprehensive (Li, Zhang, and Zhao 2008). We integrate these two datasets—most researchers rely on either one or the other—making our dataset the largest survivor-bias free dataset assembled to date on hedge funds. However, the data do have some important limitations. Firms choose whether to report their data to HFR and TASS, therefore, the data may be subject to selection bias. Based on our discussions with hedge fund managers, we believe hedge funds are more likely to self-report to TASS and HFR when they are interested in raising capital at some future date for expansion. Thus, our results may not generalize to hedge funds that do not require external capital to expand.

Measures

Consistent with the standard definition of diversified firms as multiproduct firms (Teece 1982) and with the literature on mutual fund product diversification (Siggelkow 2003), we consider hedge fund firms to be diversified when they operate multiple funds. With the exception of onshore/offshore and currency twin funds, which we consider a single fund in our sample, hedge funds generally launch new funds with distinct investment objectives and/or trading strategies compared to their existing funds. Thus, diversification is usually distinct from fund expansion. We use two measures of diversification, an instantaneous measure (Diversify), which is a dummy variable that is equal to one in the month in which a firm launches a new fund and zero otherwise, a categorical variable (Diversified) that is equal to one in all months subsequent to the firm’s first diversification event, and zero otherwise. There are 2,302 diversification events in our sample involving 1,424 firms—about 30 percent of firms experience multiple diversification events—and 51 percent of firm-months are contributed by diversified firms.

4 Where differences arise between TASS and HFR, we use data from the provider that captures a longer history of returns on a fund by fund basis.
5 Another potential limitation of the data is that it may be reported inaccurately. However, annual returns reported to investors are audited and can easily be compared to self-reported monthly returns, which limits the scope for misrepresentation for most firms.
Our key explanatory variable is firm age, measured as the number of years since the firm was founded or, non-parametrically, as a vector of categorical variables. Age also enters as an interaction term with Diversify, as dummy variable \((\text{age\_old})\) that is equal to one when a firm diversifies when it is above the median age and is zero otherwise. The sample includes 1,339 diversification events for firms that were older than the median age at the time of diversification and 963 diversification for firms that were younger than the median age at the time of diversification.

Our second and third hypotheses evaluate the relationships amongst 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.

Hedge funds may also be exposed to non-systematic risks that are not priced by standard market benchmarks. If funds take on significant non-systematic risks, perhaps through aggressive use of leverage, they may appear to generate higher average excess returns that are really an artifact of model mispricing. We, therefore, account for the non-systematic riskiness of a fund’s underlying investments 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 time-series of the fund’s excess returns. We also control for biases that may arise due to self-reporting, including serial correlation in the time series of returns using an autoregressive lag one (AR1) correction and for reporting biases, particularly backfill and timing biases, by dropping the first twelve reported monthly returns and the last ten months of reported data (January-October 2006).

Our baseline performance benchmark follows the emerging standard for assessing hedge fund performance (Sadka 2010). The performance measure is developed based on Fung and Hsieh’s (2001) 7-factor asset pricing model, which is specifically designed for pricing risk in hedge funds by controlling for exposures to linear and non-linear equity, bond, commodity and option-based risk factors. We augment Fung and Hsieh’s (2001) model by including a “traded liquidity factor” from Pastor and Stambaugh (2003), which controls for a fund’s exposure to illiquidity risk.\(^6\) Excess returns are the sum of a time-invariant fund-specific term \(\alpha\) plus a mean zero residual \(\epsilon\) from the regression:

\[
R_{it} = \alpha_i + R_{bt} + \mathbf{X}_t B_i + \epsilon_{it},
\]

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 from Stambaugh’s website.\textsuperscript{7} The term $a_i$ is the time invariant component of a fund’s performance and $e$ is the residual. We compute $a$, the coefficients on $X$ 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 return captures the combination of a fund’s skill and luck relative to a market benchmark. We call the resulting measure “8-factor excess returns.” We then compute the information ratio as excess returns ($Y_{it}$) divided by the standard deviation of excess returns. Both the information ratio and excess returns are winsorized at the 1% and 99% level to control for extreme values, though doing so has no meaningful impact on our results. We then take the equal weighted average of fund returns and the information ratio within a firm to calculate firm performance.

Hypothesis 2 predicts that, conditional on diversifying; older firms’ \textit{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 \textit{ex ante} performance and age on diversification. At the fund level $CAR = \Sigma Y_{it}/n$, 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 twenty four months. We then take the equal weighted average of fund returns to calculate a firm-level CAR. Using a maximum of two-years in our CAR calculation represents an imperfect tradeoff between including more information about the fund’s historical track record by including longer performance lags and reducing the amount of stale information in the firms track record data.\textsuperscript{8}

\textit{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 43 basis points per month (or 0.43%), and the average information ratio is 16 basis points per month. Table 1 also shows descriptive statistics for the control variables including size, measured by assets under management, three variables that measure the firm’s product mix, time (year) and regional location (USA headquarters dummy). The mean of assets under management (AUM) is $3.2B, with a maximum of $63.8 billion. In our analysis we take the non-normality of AUM into account by using AUM size deciles from the overall distribution of all firms. AUM is missing for 18 percent of firm-months. We control for such omissions using a missing AUM dummy variable. To control for trading strategy composition effects we use a continuous variable (\textit{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. Fund of funds are products that invest in other hedge funds. Long/short funds are general purpose hedge funds that take

\textsuperscript{7} Hsieh’s data library is available at http://faculty.fuqua.duke.edu/~dah7/HFData.htm
\textsuperscript{8} CAR measures with longer time lags produce results similar to those reported here.
long positions in assets, much like a mutual fund and short assets (typically equities) that fund managers believe are overvalued. All other strategies are grouped together as specialty funds, and specialist is the fraction of specialist funds within a firm in a given month. We also include a categorical variable that is equal to one if a firm’s headquarters is in the USA and zero otherwise (HQ_USA), and a categorical variable (diversified_entrant), that is equal to one if a firm enters the market as a diversified (multiproduct) hedge fund.

4. Empirical design
We theorize that older organizations expand scope less frequently than younger organizations. To estimate the impact of age on an organization’s propensity to diversify we estimate four models of age’s effect on diversification: a pooled cross-sectional linear probability model, a differences-in-differences estimator with firm fixed effects, a Cox proportional hazards model and a piecewise exponential survival-time model where age enters non-parametrically.

The two OLS models are of the form:

\[ DIVERSIFY_{it} = \alpha + \lambda_i + T_t + \beta_1AGE_{it} + X_{it}B_c + \epsilon_{it}, \]  

(2)

where \( i \) indexes firms, and \( t \) calendar time (in months), \( \lambda \) is a firm fixed effect, it is included in the differences-in-differences specification, \( T \) is a vector of year fixed effects, \( AGE \) is our key explanatory variable, and \( X \) is a vector of controls as described above, and \( \epsilon \) is the residual. Standard errors are robust and clustered at the firm level. We include OLS specifications in addition to survival-time models for two reasons: first, the differences-in-differences specification allows us to control for unobservable firm-specific sources of heterogeneity; and second, by comparing the pooled cross-sectional coefficient on AGE with the coefficient in the differences-in-differences specification we can determine the direction of the bias from omitting firm fixed effects in the survival time models.

We use survival time, or duration, models for our main test of the first hypothesis. Duration models are well suited for our analysis because they explicitly adjust the standard errors on the coefficient estimates for right censoring, a problem that could be important in the context of hedge fund diversification. Furthermore, survival time models correct the coefficient estimates in the model to account for binary dependent variables, whereas OLS can generate predicted values that are outside the feasible range (i.e., larger than 1 or less than zero). Although OLS coefficient estimates are unbiased in
the absence of omitted variables, they may be inconsistent, while duration models, if properly specified, generate unbiased and consistent estimates.

Duration models estimate the relationship between covariates and the instantaneous hazard rate of diversification for firm $i$ at any point in time $t$. Our baseline estimate of the hazard rate uses the semi-parametric exponential survival-time model:

$$ DIVERSIFY_{it} = h(t)\exp(X_{it}\beta), $$

where $h(t) = \lambda_0(t)$, a constant baseline hazard rate common to all firms for each calendar month $t$, $X$ includes $AGE$ and the vector of time-varying and time-invariant controls from (2) and the $\beta$s measure the impact of $X$ or changes in $X$ on changes in the hazard rate. Standard errors are robust and clustered by firm. We verify that the exponential model estimates are robust to alternative specifications of $h(t)$ using the standard parametric assumption that $h(t)$ is distributed according to a Weibull distribution, and allowing $h(t)$ to be estimated non-parametrically using a Cox proportional hazard model (Cox 1972). Finally, we also show results using a piece-wise exponential specification that allows the effect of $AGE$ to enter $X$ flexibly. We also correct for any correlations in the error structure that may bias the standard errors on the $\beta$ estimates by allowing for shared frailty at the firm-level.

The key econometric assumption in expression (3) is that age is exogenous so that changes in age cause changes in the diversification rate. Because age is not a strategic variable for the firm—at least once the firm is founded—the potential for the explanatory variable to be endogenous due to managerial choices is less severe in our context. Still, unobservable firm-specific factors correlated with age and diversification could bias our coefficient estimates on $AGE$. We address this concern by comparing the pooled OLS results with the differences-in-differences estimates to sign the bias on the baseline estimates due to omitted variables.

Once we establish that firms diversify at a slower rate as they age (i.e., Hypothesis 1), we want to distinguish between the internal and external accounts of structural inertia (Hypotheses 2, 3, and 4). To do so we first examine how ex ante performance, measured by cumulative abnormal return, $CAR$, influences the instantaneous diversification rate for young versus old firms. To allow for a flexible set of coefficient estimates on the explanatory variable and the controls given the different states the firm could be in any point in time $t$, we compare the ex ante performance of young diversifiers against old diversifiers relative to non-diversifiers using the multinomial model:

$$ Pr(y=j|X_{it}) = \frac{\exp(XB_{ijt})}{1 + \sum_h \exp(XB_{ihit})}, $$

(4)
where \( i \) indexes firms, \( t \) indexes time (years), \( j = 1, \ldots, J \), indexes discrete change in scope outcomes, \( h \) counts from 1 to \( J \); \( X \) contains the same vector of controls as in (2), including the explanatory variable \( CAR \); \( y = 0 \) in firm-months where there is no diversification, and \( y = J \) when firms reduce their scope. In our baseline specification \( y = I \) when the firm diversifies when it is below the median age, and \( y = 2 \) when the firm diversifies when it is above the median age. We also compare firms that diversify when they are in the youngest age quartile against firms that diversify when they are in the oldest age quartile by expanding \( j \) to include four values (one for each quartile) in addition to \( y = 0 \) and \( y = J \). Standard errors are robust and clustered by firm.

The coefficient on \( CAR \) in model (4) tells us how the firm’s track record influences its diversification decisions. 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 compared to younger firms it would suggest that investors value long track records and so will fund diversification efforts of older firms even when their most recent observable performance lags behind younger firms.

Finally, we evaluate how young and old firms perform after they diversify. In the ideal experiment we would randomly assign otherwise identical old and young firms new products and measure the difference in their subsequent performance. In practice, we do not have random assignment in the data. Firms choose whether to diversify, based on how external exchange partners 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 (Rosenbaum and Rubin 1983).

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

\[
Y_{it} = a + DIVERSIFIED_{it} + \beta_1 AGE_{it} + \beta_2 (AGE_{it} \times DIVERSIFIED_{it}) + X_c B_c + \epsilon_{it} \tag{5}
\]

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 categorical that turns on when the firm first becomes diversified, and \( AGE \) is years from inception, as above. The interaction term \( AGE \times DIVERSIFIED \) captures the marginal effect of age on diversification. \( X_c \) contains the same vector of control as above (including year fixed effects). Expression (5) reverses the direction of causality between performance and age compared to expressions (2) and (3), but in expression (5) performance is measured ex post—
following diversification (i.e., when $DIVERSIFEID = 1$), whereas in expressions (2) and (3) we focus on \textit{ex ante} performance (as measured by CAR) as either a control variable or an explanatory variable influencing the instantaneous diversification rate (i.e., $DIVERSIFY=1$). Thus, to estimate how old diversifiers perform relative to young diversifiers we consider both the main effect of $AGE$ and the marginal effect of $AGE \times DIVERSIFIED$.

However, we know that (5) is subject to bias due to the endogeneity of the firm’s scope decisions (Campa and Kedia 2002, Villalonga 2004). Therefore, we implement a test on \textit{ex post} performance that is free of selection bias (on all the observables in our data set) by first matching old diversifiers to young diversifiers on all their observable \textit{ex ante} characteristics using Coarsened Exact Matching (CEM). CEM matches old and young diversifiers that have the exact same \textit{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, King and Porro 2009). After matching treatment group to control group observations all the observations are conditioned on the firms being diversified, which allows us to drop $DIVERSIFIED$, and $AGE \times DIVERSIFIED$ from (5) and estimate the causal effect of age on performance in diversified firms directly by simply examining the coefficient on $AGE$.

5. Results

Table 2 displays the results for the OLS and exponential survival-time models of $AGE$ on $DIVERSIFY$. Column 1 reveals that the diversification rate falls by one tenth of 1% for each additional year the firm ages in a pooled cross-sectional specification. Relative to the baseline diversification rate of 1.4\% (2,302/167,559), aging by one year reduces the baseline diversification rate by about 7%. The differences-in-differences estimate of the effect of $AGE$ on $DIVERSIFY$ reveals that omitting the firm fixed effect from the estimate of age on the propensity to diversify biases the coefficient estimate on age toward zero. Column (2) shows that the differences-in-differences estimator is more than three times the size (more negative), which gives us comfort that the magnitude of our point estimates will not be overstated in the duration models, which are estimated without firm fixed effects.

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9 Using CEM to generate the matched sample suits our purposes because we want to include multiple diversification events on the same firm, and doing so would be cumbersome with other matching methods like propensity score matching. CEM is also computationally efficient and creates 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 (CAR) quartiles, size (AUM) quartiles, a missing AUM dummy, calendar time quartiles, firm scope (number of funds in a firm) quartiles, a USA headquarters dummy, and a fund of funds dummy. The advantage of proportional matching is that we do not have to reweight our sample by the inverse probability of selection when specifying our model of \textit{ex post} returns. The disadvantage of proportional matching is that the matched sample generated by CEM is not identical across runs, since the program randomly selects which extra control group observations to drop. We verify that our results are not sensitive to randomly dropping different control group observations from the final match.
The OLS results control for firm-specific heterogeneity, but not right censoring. The exponential model in column (3) controls for censoring. The interpretation of the coefficient estimate of -0.07 is that as firms age one year from the mean age (5.6 years) their propensity to diversify falls by 5% \((e^{5.6 \times -0.07} - e^{6.6 \times -0.07})\). Running the same test using a piecewise exponential model with age entering non-parametrically by deciles shows that the diversification rate falls almost linearly with age for firms above the first age decile. For example moving from first to the third age decile reduces the firm’s diversification rate by 23% \((1 - e^{0.25})\), while moving from the fifth age decile to the seventh age decile reduces the firm’s propensity to diversify by 22% \((e^{0.35} - e^{0.72})\). Differences between the point estimates are of the correct sign and consistently estimated between every pair of age dummies that are at least three deciles apart, except one (age decile 3 compared to age decile 6). The results are consistent with the first hypothesis, predicting that aging causes the firm’s rate of horizontal expansion to slow.

We also want to understand the relative magnitude of internal organizational factors compared to external effects on the decision to diversify. Table 3 Panel A shows the results of a multinomial logit of \textit{ex ante} performance on the decision to diversify for firms that were older than the median age at the time of diversification compared to firms that were younger than the median age at the time of diversification, conditioning out months where firm scope was reduced due to fund closures, compared to the baseline case of no changes in firm scope. While younger firms outperform the baseline by 14 basis points a month in the twenty-four months prior to launching a new fund (column 1) older diversifiers’ \textit{ex ante} performance is indistinguishable from the baseline (column 2). In other words, capital markets reward firms with longer track records, allowing them to diversify even when their track record is worse than younger firms by a significant margin: 17 basis points per month on average (column 3). Panel B replicates Panel A but with finer grained potential outcomes. Instead of splitting scope expansion outcomes into two at the median age, we split diversification into four groups by age quartile. The results are even larger. Diversifiers in the youngest age quartile outperform diversifiers in the oldest quartile by 40 basis points per month. The \textit{ex ante} performance results suggest that internal factors primarily constrain horizontal expansion in aging firms.

Taken together the evidence on performance, diversification, and age supports the idea that capital markets favor older firms in general. Older firms can diversify with weaker track records \textit{ex ante}. The implication of the \textit{ex ante} performance result is that the effect of age on the firm’s diversification rate
appears to be caused by organizational politics that prevent the firm from profitably expanding horizontally with age. Because these results are most consistent with Hypothesis 3, we conclude that structural inertia in aging organizations is primarily attributable to internal factors and, more specifically, organizational politics.

In Table 4 we present estimates of the effect of diversification and age on ex post firm performance. The baseline (endogenous) results on the full sample show that performance declines with age, conditional on being diversified, at a rate of two basis points per month (Model 12), or one basis point per month per unit of risk for each one year increase in age (Model 13). However, age effects swamp the marginal effect of age on diversification, which suggests that conditional on age better firms tend to diversify. The question is whether endogenous selection effects lead to a significant bias in our estimates. Models 14 and 15 answer this question showing estimates of the effect of age on ex post performance in diversified firms, after matching exactly on all observable firm characteristics in the data ex ante. The matched sample results are smaller in magnitude (less negative), but still precisely estimated at approximately minus one basis point per month per year of firm age before and after controlling for systematic risk.

The estimates in Table 4 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 inference should work again finding support for our hypotheses. Presumably, older firms possess certain positive qualities that are unobservable to the econometrician, but 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. Thus, the most obvious bias from endogeneity should attenuate the age effects and bias our results toward zero.

6. Conclusion

Organizations change less as they age. Both internal and external factors constrain change, but prior work does not identify the primary locus of constraint. Departing from age dependence studies that examine organizational mortality, we focused on change as the dependent phenomenon and examined organizational performance in the periods prior to and following change events. By integrating the classic work in organizational theory with the formal approach of economics, we demonstrate the potential of such integrative efforts to resolve long-standing, organizational puzzles (e.g., Gibbons, 1999).
We found that older organizations do indeed diversify at lower rates than younger organizations. Inconsistent with the external account of structural inertia, age attenuates the tendency of organizations to change when ex ante performance is strong. This suggests that exchange partners do not necessarily hold older organizations to higher ex ante performance standards in return for supporting change. Consistent with the internal account of structural inertia we also find that, conditional on diversifying, older organizations exhibit lower ex post performance than younger organizations. We interpret this result as evidence that dominant coalitions constrain change in aging organizations and also prioritize the coalition’s private objectives over broader organizational interests when supporting change. Thus, we primarily attribute structural inertia in old organizations to internal factors.

The external account of structural inertia should not be dismissed; we only infer that the primary constraint is internal in nature. Age dependence research primarily investigates the relationship between organizational age and environmental changes. In our analyses, year fixed effects control away such influences so that only independent firm-specific effects of age and performance are identified. Future research on hedge funds might examine how changes in regulations or economic conditions alter the age-change and age-performance relationships we document using difference-in-difference analyses.

Recent work on age dependence theorizes how initial organizational performance evolves to influence organizational mortality rates through internal mechanisms like learning and external mechanisms like environmental shocks (Le Mens, et al., 2011). This work assumes that organizations attempt to appeal to one market segment. Our study on age dependence examines how aging, through both external and internal mechanisms, influences organizational attempts to appeal to multiple market segments (i.e., diversify). Integrating these approaches to analyze performance, change, and mortality hazards will likely aid further development of the organizational theory of age dependence.

7. References


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Figure 1. Ex Ante Performance Distribution and Diversification Hurdles

Figure 2. Marketing Costs: Ex Ante Performance Distribution and Diversification By Age

Figure 3. Organizational Politics: Ex Post Performance Distribution and Diversification By Age

Figure 4. Implementation Costs: Ex Post Performance Distribution and Diversification by Age
Table 1. Descriptive statistics and correlations for key variables (n = 167,559 firm-months).

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<th>Variable</th>
<th>Mean</th>
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<th>Max</th>
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<td>Age (years)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Assets under management (AUM) $B</td>
<td>3.22</td>
<td>6.91</td>
<td>0.00</td>
<td>63.80</td>
<td>0.27</td>
<td>0.44</td>
<td>0.00</td>
<td>0.02</td>
<td>-0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing AUM (proportion)</td>
<td>0.18</td>
<td>0.38</td>
<td>0</td>
<td>1</td>
<td>0.07</td>
<td>0.01</td>
<td>0.26</td>
<td>0.01</td>
<td>0.02</td>
<td>0.00</td>
<td>0.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diversified entrant (proportion)</td>
<td>0.13</td>
<td>0.34</td>
<td>0</td>
<td>1</td>
<td>0.03</td>
<td>-0.05</td>
<td>0.21</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.10</td>
<td>0.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>2001</td>
<td>3.18</td>
<td>1994</td>
<td>2005</td>
<td>0.02</td>
<td>0.19</td>
<td>0.11</td>
<td>0.00</td>
<td>0.02</td>
<td>0.04</td>
<td>-0.07</td>
<td>-0.06</td>
<td>0.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headquartered in U.S.</td>
<td>0.71</td>
<td>0.45</td>
<td>0</td>
<td>1</td>
<td>-0.02</td>
<td>0.11</td>
<td>-0.07</td>
<td>0.02</td>
<td>0.02</td>
<td>0.07</td>
<td>-0.05</td>
<td>-0.07</td>
<td>-0.07</td>
<td>-0.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialist funds (proportion)</td>
<td>0.61</td>
<td>0.46</td>
<td>0</td>
<td>1</td>
<td>-0.02</td>
<td>0.02</td>
<td>-0.05</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.04</td>
<td>0.00</td>
<td>-0.09</td>
<td>-0.03</td>
<td>0.03</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>Fund of funds (proportion)</td>
<td>0.20</td>
<td>0.38</td>
<td>0</td>
<td>1</td>
<td>0.04</td>
<td>0.05</td>
<td>0.14</td>
<td>-0.03</td>
<td>0.00</td>
<td>-0.12</td>
<td>0.09</td>
<td>0.12</td>
<td>0.09</td>
<td>0.02</td>
<td>-0.16</td>
<td>-0.63</td>
<td></td>
</tr>
<tr>
<td>Long/short funds (proportion)</td>
<td>0.19</td>
<td>0.37</td>
<td>0</td>
<td>1</td>
<td>-0.03</td>
<td>-0.08</td>
<td>-0.08</td>
<td>0.01</td>
<td>-0.02</td>
<td>0.07</td>
<td>-0.09</td>
<td>-0.01</td>
<td>-0.05</td>
<td>-0.05</td>
<td>0.07</td>
<td>-0.59</td>
<td>-0.26</td>
</tr>
</tbody>
</table>

*Of the 2,302 diversification events in the sample, 1,339 events involve firms that were older than the median sample age at the time of diversification, and 963 events involve firms that were younger than the median sample age at the time of diversification.*
### Table 2. Models of firm diversification.

**Dependent variable** $Y_{it}$ = 1 if firm $i$ launches a new fund in month $t$; 0 otherwise.

<table>
<thead>
<tr>
<th>Model</th>
<th>(1) OLS</th>
<th>(2) OLS</th>
<th>(3) Exponential</th>
<th>(4) Exponential</th>
<th>(5) Exponential</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (in years)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age decile 1 (13-20 months)</td>
<td>-0.001 ***</td>
<td>-0.003 ***</td>
<td>-0.067 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age decile 2 (21-28 months)</td>
<td>0.091 (0.104)</td>
<td>0.086 (0.109)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age decile 3 (29-37 months)</td>
<td>-0.248 ** (0.113)</td>
<td>-0.246 ** (0.113)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age decile 4 (38-47 months)</td>
<td>-0.219 ** (0.109)</td>
<td>-0.222 ** (0.110)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age decile 5 (48-58 months)</td>
<td>-0.312 *** (0.118)</td>
<td>-0.305 *** (0.111)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age decile 6 (59-71 months)</td>
<td>-0.380 *** (0.115)</td>
<td>-0.365 *** (0.110)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age decile 7 (72-88 months)</td>
<td>-0.653 *** (0.119)</td>
<td>-0.614 *** (0.113)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age decile 8 (89-109 months)</td>
<td>-0.638 *** (0.115)</td>
<td>-0.603 *** (0.113)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age decile 9 (110-142 months)</td>
<td>-0.729 *** (0.119)</td>
<td>-0.723 *** (0.116)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age decile 10 (143-346 months)</td>
<td>-0.895 *** (0.141)</td>
<td>-0.833 *** (0.126)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Scope quartile 1 (smallest)</strong></td>
<td>-0.032 (0.025)</td>
<td>0.010 (0.003)</td>
<td>-1.754 *** (0.091)</td>
<td>-1.790 *** (0.091)</td>
<td>-1.430 *** (0.094)</td>
</tr>
<tr>
<td>Scope quartile 2</td>
<td>-0.028 (0.025)</td>
<td>0.003 (0.003)</td>
<td>-1.160 *** (0.084)</td>
<td>-1.176 *** (0.084)</td>
<td>-0.871 *** (0.081)</td>
</tr>
<tr>
<td>Scope quartile 3</td>
<td>-0.023 (0.027)</td>
<td>-0.001 (0.003)</td>
<td>-0.735 *** (0.086)</td>
<td>-0.742 *** (0.085)</td>
<td>-0.5059 *** (0.081)</td>
</tr>
<tr>
<td><strong>CAR</strong></td>
<td>0.000 (0.002)</td>
<td>0.01 (0.000)</td>
<td>0.038 (0.032)</td>
<td>0.037 (0.031)</td>
<td>0.037 (0.031)</td>
</tr>
<tr>
<td>Specialist funds</td>
<td>0.001 (0.001)</td>
<td>-0.015 *** (0.132)</td>
<td>0.339 *** (0.097)</td>
<td>-0.338 *** (0.097)</td>
<td>-0.338 *** (0.097)</td>
</tr>
<tr>
<td>Fund of funds</td>
<td>0.001 (0.002)</td>
<td>0.001 (0.002)</td>
<td>0.649 *** (0.120)</td>
<td>0.640 *** (0.119)</td>
<td>0.640 *** (0.119)</td>
</tr>
<tr>
<td>Diversified entrant</td>
<td>-0.006 *** (0.002)</td>
<td>-0.330 *** (0.098)</td>
<td>-0.338 *** (0.097)</td>
<td>-0.338 *** (0.097)</td>
<td>-0.338 *** (0.097)</td>
</tr>
<tr>
<td>Firm headquartered in U.S.</td>
<td>0.001 (0.001)</td>
<td>-0.054 (0.081)</td>
<td>0.062 (0.081)</td>
<td>0.062 (0.081)</td>
<td>0.062 (0.081)</td>
</tr>
<tr>
<td><strong>Fixed effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm fixed effects</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Gamma shared frailty (firm)</td>
<td>--</td>
<td>--</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>11 Size fixed effects (by AUM)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>11 year fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N (firms)</td>
<td>2,781</td>
<td>2,781</td>
<td>2,781</td>
<td>2,781</td>
<td>2,781</td>
</tr>
<tr>
<td>N (firm-months)</td>
<td>167,559</td>
<td>167,559</td>
<td>167,559</td>
<td>167,559</td>
<td>167,559</td>
</tr>
<tr>
<td>N (diversification events)</td>
<td>2,302</td>
<td>2,302</td>
<td>2,302</td>
<td>2,302</td>
<td>2,302</td>
</tr>
<tr>
<td>R²/Adjusted R²</td>
<td>0.02</td>
<td>0.06</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Log pseudolikelihood</td>
<td>--</td>
<td>--</td>
<td>2,434</td>
<td>2,437</td>
<td>2,635</td>
</tr>
</tbody>
</table>

All time-varying covariates except age are lagged one month.
Robust standard errors clustered at the firm level.
*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$; two-tailed tests.
Table 3. Age, scope and ex ante performance

Multinomial logit regressions (coefficients reported, not marginal effects)

Panel A: Performance for diversifying firms below and above median age.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Below median age at diversification date</th>
<th>Above median age at diversification date</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR</td>
<td>0.145 ***</td>
<td>-0.029</td>
<td>0.174 **</td>
</tr>
<tr>
<td>(0.044)</td>
<td>(0.051)</td>
<td>(0.067)</td>
<td></td>
</tr>
<tr>
<td>Scope quartile 1 (smallest)</td>
<td>-0.995 ***</td>
<td>-2.497 ***</td>
<td>1.502 ***</td>
</tr>
<tr>
<td>(0.291)</td>
<td>(0.152)</td>
<td>(0.328)</td>
<td></td>
</tr>
<tr>
<td>Scope quartile 2</td>
<td>-0.744 ***</td>
<td>-1.361 ***</td>
<td>0.617 ***</td>
</tr>
<tr>
<td>(0.012)</td>
<td>(0.118)</td>
<td>(0.119)</td>
<td></td>
</tr>
<tr>
<td>Scope quartile 3</td>
<td>-0.461 ***</td>
<td>-0.785 ***</td>
<td>0.324 *</td>
</tr>
<tr>
<td>(0.135)</td>
<td>(0.112)</td>
<td>(0.175)</td>
<td></td>
</tr>
<tr>
<td>Specialist funds</td>
<td>0.092</td>
<td>0.596 **</td>
<td>-0.504</td>
</tr>
<tr>
<td>(0.155)</td>
<td>(0.238)</td>
<td>(0.284)</td>
<td></td>
</tr>
<tr>
<td>Fund of funds</td>
<td>0.477 ***</td>
<td>0.893 ***</td>
<td>-0.416</td>
</tr>
<tr>
<td>(0.177)</td>
<td>(0.193)</td>
<td>(0.261)</td>
<td></td>
</tr>
<tr>
<td>Diversified entrant</td>
<td>0.258 *</td>
<td>-0.510 *</td>
<td>0.768 ***</td>
</tr>
<tr>
<td>(0.147)</td>
<td>(0.128)</td>
<td>(0.195)</td>
<td></td>
</tr>
<tr>
<td>Firm headquartered in U.S.</td>
<td>-0.290 ***</td>
<td>-0.790 ***</td>
<td>0.500 ***</td>
</tr>
<tr>
<td>(0.106)</td>
<td>(0.122)</td>
<td>(0.162)</td>
<td></td>
</tr>
<tr>
<td>11 Size fixed effects (by AUM)</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>11 year fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>N (firms)</td>
<td>2,781</td>
<td>2,781</td>
<td></td>
</tr>
<tr>
<td>N (firm-months)</td>
<td>167,559</td>
<td>167,559</td>
<td></td>
</tr>
<tr>
<td>N (diversification events)</td>
<td>2,302</td>
<td>2,302</td>
<td></td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.14</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>Log pseudolikelihood</td>
<td>-16,584</td>
<td>-16,584</td>
<td></td>
</tr>
</tbody>
</table>

Panel B: Performance for diversifying firms in the youngest and oldest quartiles.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Youngest quartile at diversification date</th>
<th>Oldest quartile at diversification date</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR</td>
<td>0.218 ***</td>
<td>-0.185 **</td>
<td>0.403 ***</td>
</tr>
<tr>
<td>(0.062)</td>
<td>(0.087)</td>
<td>(0.107)</td>
<td></td>
</tr>
<tr>
<td>Scope quartile 1 (smallest)</td>
<td>-0.392 *</td>
<td>-2.840 ***</td>
<td>2.448 ***</td>
</tr>
<tr>
<td>(0.216)</td>
<td>(0.231)</td>
<td>(0.316)</td>
<td></td>
</tr>
<tr>
<td>Scope quartile 2</td>
<td>-0.428 **</td>
<td>-1.481 ***</td>
<td>1.052 ***</td>
</tr>
<tr>
<td>(0.195)</td>
<td>(0.153)</td>
<td>(0.248)</td>
<td></td>
</tr>
<tr>
<td>Scope quartile 3</td>
<td>-0.120 *</td>
<td>-1.024 ***</td>
<td>0.904 ***</td>
</tr>
<tr>
<td>(0.199)</td>
<td>(0.152)</td>
<td>(0.251)</td>
<td></td>
</tr>
<tr>
<td>Specialist funds</td>
<td>0.173</td>
<td>0.982 ***</td>
<td>-0.809 *</td>
</tr>
<tr>
<td>(0.199)</td>
<td>(0.395)</td>
<td>(0.442)</td>
<td></td>
</tr>
<tr>
<td>Fund of funds</td>
<td>0.767 ***</td>
<td>1.254 ***</td>
<td>-0.487</td>
</tr>
<tr>
<td>(0.220)</td>
<td>(0.347)</td>
<td>(0.410)</td>
<td></td>
</tr>
<tr>
<td>Diversified entrant</td>
<td>0.400 *</td>
<td>-0.771 ***</td>
<td>1.172 ***</td>
</tr>
<tr>
<td>(0.188)</td>
<td>(0.196)</td>
<td>(0.272)</td>
<td></td>
</tr>
<tr>
<td>Firm headquartered in U.S.</td>
<td>-0.338 **</td>
<td>-0.075</td>
<td>-0.263</td>
</tr>
<tr>
<td>(0.131)</td>
<td>(0.173)</td>
<td>(0.217)</td>
<td></td>
</tr>
</tbody>
</table>

All covariates except age are lagged one month and all models include year fixed effects.
All models include dummies by size (AUM) deciles and dummies for total firm funds managed (1, 2, 3, or 4).
Robust standard errors clustered at the firm level.

Coefficients are from multinomial logit models with four dependent variables: no change in scope {0}, young x diversify {1}, old x diversify {2}, reduction in firm scope {3}. There are 1,346 diversification events for firms older than the median age and 997 diversification events for firms younger than the median age. Size fixed effects are based on assets under management (AUM) deciles. Scope fixed effects are quartiles of the number of funds managed by the firm.
<table>
<thead>
<tr>
<th>Sample</th>
<th>Returns</th>
<th>Info Ratio</th>
<th>Returns</th>
<th>Info Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (in years)</td>
<td>-0.033 ***</td>
<td>-0.012 ***</td>
<td>-0.012 ***</td>
<td>-0.008 ***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.002)</td>
<td>(0.004)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Diversified</td>
<td>0.386 ***</td>
<td>0.147 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.117)</td>
<td>(0.032)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diversified x Age</td>
<td>0.017 ***</td>
<td>-0.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.002)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scope quartile 1 (smallest)</td>
<td>0.691 ***</td>
<td>0.228 ***</td>
<td>-0.190</td>
<td>-0.058</td>
</tr>
<tr>
<td></td>
<td>(0.116)</td>
<td>(0.031)</td>
<td>(0.156)</td>
<td>(0.046)</td>
</tr>
<tr>
<td>Scope quartile 2</td>
<td>0.128 ***</td>
<td>0.063 ***</td>
<td>0.136 **</td>
<td>0.073 ***</td>
</tr>
<tr>
<td></td>
<td>(0.033)</td>
<td>(0.012)</td>
<td>(0.059)</td>
<td>(0.023)</td>
</tr>
<tr>
<td>Scope quartile 3</td>
<td>0.097 **</td>
<td>0.057 ***</td>
<td>0.185 ***</td>
<td>0.070 ***</td>
</tr>
<tr>
<td></td>
<td>(0.038)</td>
<td>(0.013)</td>
<td>(0.054)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>Specialist funds</td>
<td>-0.042</td>
<td>0.045 ***</td>
<td>0.185 ***</td>
<td>0.185 ***</td>
</tr>
<tr>
<td></td>
<td>(0.038)</td>
<td>(0.010)</td>
<td>(0.054)</td>
<td>(0.054)</td>
</tr>
<tr>
<td>Fund of funds</td>
<td>-0.250 ***</td>
<td>0.048 ***</td>
<td>-0.168 **</td>
<td>-0.168 **</td>
</tr>
<tr>
<td></td>
<td>(0.036)</td>
<td>(0.012)</td>
<td>(0.066)</td>
<td>(0.066)</td>
</tr>
</tbody>
</table>

11 Size fixed effects (by AUM) | Yes | Yes | Yes | Yes
11 year fixed effects | Yes | Yes | Yes | Yes
N (firms) | 2,781 | 2,781 | 741 | 741
N (firm-months) | 167,559 | 167,559 | 66,209 | 66,209
N (diversification events) | 2,302 | 2,302 | 1,692 | 1,692
R² | 0.01 | 0.01 | 0.02 | 0.02

All time-varying covariates except age are lagged one month and all models include year fixed effects. Robust standard errors clustered at the firm level.

*** p < 0.01; ** p < 0.05; * p < 0.10; two-tailed tests.

Note: The full sample includes firms that are diversified and firms that are not. The matched sample includes only diversified firms. 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. In this matched sample, there are 846 diversification events involving firms older than the median age and 846 diversification events involving firms younger than the median age. Because each diversification event is treated as a unique observation for matching purposes, 345 firms contribute multiple diversification spells to the matched sample.