The End of the Corporate Life Cycle

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This paper asks how takeover and failure hazards change as listed firms get older. The hypothesis is that they increase because firms gradually run out of growth opportunities. We find the opposite. Both takeover and failure hazard drop significantly with age. The decline in takeover hazard can be explained with Loderer, Stulz, and Waelchli's (2013) "buggy whip makers" hypothesis: Because old firms are comparatively well-managed and are affected by limited agency problems, on average, they offer little value added potential to acquirers. Failure hazard drops because to learning. The results are robust to various alternative interpretations and cannot be explained by unobserved heterogeneity. While hazards decline with age, they do not go to zero. This explains why, eventually, all listed firms disappear.

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1. Introduction

Recent studies show that listed firms run out of growth opportunities as they get older. According to Bernstein (2012) and Asker, Ljungqvist, and Farre-Mensa (2012), the decision to go public is associated with a significant drop in innovation and investment. Moreover, after listing, managers appear to focus on assets in place rather than to search for new investment opportunities (Loderer, Stulz, and Waelchli, 2013) (henceforth LSW). One would therefore expect that, as they get older, firms are increasingly exposed to the threat of bankruptcy or takeover (Schumpeter, 1975; Jensen, 2000; Baker and Kennedy, 2002). The purpose of this study is to investigate whether Schumpeter's "perennial gale of creative destruction" sweeps more vigorously over older firms and confronts them with higher hazards of takeover and financial failure.

Using a large sample of U.S. listed firms over the period 1978 to 2009, we show that this is not the case. Both the hazards of financial failure and takeover (defined as merger or acquisition) actually decline significantly with age. The effect is economically tangible. Compared with a 5-year-old firm, for example, the predicted age-induced reduction in exit hazard of a 25-year-old firm (sample median age) can be as much as 35 percent. While average hazard rates decline over time, they do not drop to zero. Our estimates imply, for example, that only approximately 30 percent of the firms that make it to age 20 will celebrate their 40th birthday as independent organizations. This can explain why, eventually, all firms disappear as independent organizations.

The decline in takeover hazard over time can be explained with the evidence in LSW: While firms gradually run out of growth opportunities as they get older, their strategic focus increases and their productivity improves. Moreover, their profitability declines and reverts to average. There is also little evidence of serious agency problems in older firms. Because of these characteristics, there seems to be limited potential for value creation from a takeover of older firms at market prices. Older firms are less interesting merger or acquisition partners.

We show that the age effect in takeover hazard is indeed related to the large group of firms with the characteristics we just mentioned, namely firms older than the median in their industry, with growth opportunities below the industry median, and active in established markets and with established (more replicable) technologies—all characteristics that fit the stereotype of buggy-whip makers (BWM) mentioned in LSW. When we control for this group of companies in our hazard model, the age effect on takeover risk disappears. The firms we identify as BWM are by no means minor. Quite the contrary, they include some of the biggest names in corporate America. In 2009, well-known companies to which this characterization applied included Alcoa, Burlington Northern Santa Fe, Coca Cola, Dow Chemical, GAP, General Dynamics, Hershey, McDonald’s, Nucor, Pepsi, Procter & Gamble, Walt Disney, and Xerox.

The finding of a lower hazard of financial failure over time can be explained with learning. Age enables firms to gain experience and learn, it allows them to expand their business networks, and it helps them establish valuable reputations. Older firms are also better known to investors (Pastor and Veronesi, 2003; LSW) and have easier access to the capital market (Hadlock and Pierce, 2010). Lenders will therefore be more willing to fund older firms and ask for lower risk premiums, which should contribute to a lower probability of financial default. Learning, however, does not completely eliminate financial failure hazard.

Since our findings are conditional on a broad set of control variables, they cannot be explained by age-related changes in size, profitability, financial frictions, and other determinants of exit vulnerability. The extant literature, in particular, posits that takeover vulnerability increases if firms are managed inefficiently (Manne, 1965; Jensen 1986, 1993), own undervalued assets (Jovanovic and Rousseau, 2002), are characterized by an imbalance of growth opportunities and available resources (Palepu, 1986), hold large amounts of cash or substantial borrowing capacity (Stulz and Johnson, 1985), are subject to overinvestment problems (Lehn and Poulsen, 1989), or are simply small (Comment and Schwert, 1995). These factors are not responsible for the age effects we find. Neither can they be explained by unobserved heterogeneity in the exit hazards (Thompson, 2005) or by the age of the CEO or that of the directors. There is also little empirical support for the notion that the market for corporate control frees resources trapped in outdated structures (Schumpeter, 1975; Jensen, 2000): Older firms that keep investing despite below-industry growth opportunities do not face higher takeover risk.

A potential agency explanation for our findings could be that the managers of older firms actively try to keep their firms independent to protect their quasi-rents and their internal career opportunities or to enjoy a quiet life. This resistance on the part of managers would seem to be particularly tempting, as the focusing efforts documented by LSW in older firms gradually reduce the value of outside employment opportunities, and because merger and acquisition often costs managers their jobs (see, among others, Murphy, 1997; Hartzell, Ofek, and Yermack, 2004). It could therefore make sense for the managers of older firms to raise formal takeover barriers with antitakeover provisions (ATP) such as staggered boards, poison pills, and other shark repellants. It could also make sense to avoid the grant of golden parachutes to create stronger incentives to resist. However, this agency explanation of the observed decline in takeover hazards is not supported by the data. There is no evidence that the managers of older firms adopt structural defenses to prevent a loss of independence. More importantly, ATPs and golden parachutes cannot explain the age effect we observe. Neither can the presence of institutional blockholders.

The managers of older firms could also deliberately make their firms less attractive acquisition targets by reducing their cash holdings, avoiding overinvestment, and by investing in firm specific assets (see, for example, Chang and Singh, 1999, and Shleifer and Vishny, 1989). If this were true, however, we would expect the passage of business combination (BC) laws to slow down or invert the attempts at making older firms unattractive. Yet that is not what we find. To the contrary, older firms continue to exhibit significantly smaller increases in cash holdings after the passage of business combination (BC) laws. New BC laws also do not seem to stop the efforts of older firms to streamline their business.

We also find situations, however, in which the exit hazards in question increase for older firms. At times of industry distress, specialized firms are more likely to face financial constraints (Gopalan and Xie, 2011) and unique assets realize lower liquidation proceeds (Acharya, Bharath, and Srinivasan, 2007). Since older firms appear to specialize in what they do best, one would therefore expect them to be more susceptible to adverse shocks in their business environment. Consistent with that, we find that financial failure hazard is positively related to firm age in distressed industries. At the same time, older firms seem to become even less attractive merger partners.

This paper is not the first to study exit risk. Various studies in the industrial organization literature (see, for example, Caves, 1998), the empirical organization literature (see, for example, Hannan, Pólos, and Carroll, 2007) and the management literature (see, for example, Leonard-Barton, 1992) have investigated the death (exit) rates of business units in the context of industry and product life-cycles. In that context, the prevalent finding is that plants’ failure rates decline with age. Dunne, Roberts, and Samuelson (1989), for example, ascribe that phenomenon to declining uncertainty about costs. Agarwal and Gort (1996, 2002) explain it with a tradeoff between increasingly obsolete endowments and learning. Exit in those strands of the literature typically is the firm’s decision to leave a particular industry or a particular product market. It does not necessarily imply that the firm ceases to exist as an independent organization. Our definition of exit differs notably from that. We are interested in financial failure and merger or acquisition, the main exit forms of corporations as legally independent organizations.

All things considered, the paper makes the following five contributions to the literature. First, to the best of our knowledge, ours is the first large-scale empirical study on the relation between firm age and exit risk. We find that both the financial failure and the takeover hazard of firms decline with age. The results should contribute to a better understanding of bankruptcy and takeover as the mechanisms responsible for the reallocation of resources in the economy. Second, the paper helps explain why company age matters in corporate life. Older firms appear to lack the resources necessary for strategic changes and innovations, a situation that makes them unattractive merger partners. Third, the paper complements the work of LSW and provides further evidence about the existence of a corporate life cycle. Although the idea goes back at least to Jovanovic and Rousseau (2002), there does not seem to be an agreement about the existence of the phenomenon let alone its rationale. Ultimately, however, this study should contribute to a better understanding about the dynamics and the characteristics of economic growth. Growth seems to be accompanied by frequent reallocations and recycling of resources via financial default and takeover. However, and that is the fourth contribution, it does not look as if the market for corporate control is very active in recycling the resources of older firms. The same goes for financial default. Finally, our numbers show that, although the various exit hazards decline with company age, they do not go to zero. That explains why, eventually, all firms disappear as independent organizations.

The remainder of the paper is organized as follows. Section 1 describes the sample and discusses the empirical strategy. Section 2 studies the relation between firm age and exit risks. It also discusses the economic relevance of the age-related changes in exit hazards. Section 3 asks whether the negative relation we find could reflect an attempt by the managers of older firms to keep their firms independent to protect their quasi-rents. Section 4 examines other specific alternative interpretations of the evidence, including whether company age is not simply a proxy for management age. Section 5 investigates how shocks in the business environment affect exit risks. Section 6 tests whether the age effect is driven by firms with BWM characteristics. Finally, Section 7 presents conclusions.

2. Sample description and empirical strategy

2.1. Sample Description

The sample consists of all listed firms with data on CRSP, COMPUSTAT, and COMPUSTAT Industry Segment between 1978 and 2009. We exclude utilities as well as firms in the financial sector of the economy (SIC 6000–6999). Moreover, we ignore firm-years with negative total assets or sales, missing data on COMPUSTAT Segments, and cumulative sales on the COMPUSTAT Segments tapes which deviate by more than 1% from the total sales reported on the COMPUSTAT tapes. As very young firms might drive the results (Fama and French, 2004), we omit all firms which have been listed for less than five years. We also do so because of the finding in Bhattacharya, Borisov, and Yu (2011) that "natal financial care" significantly affects firm mortality rates during the first years after listing. In the case of VC financing, this natal care lasts for up to five years.[1] We also drop all 3-digit SIC industry-years with fewer than five observations, as we need to estimate moments of the industry-wide distribution of the variables in the analysis to control for industry effects. The 3-digit SIC industry definition is the one recommended by Giroud and Mueller (2010). The final sample consists of 10,219 firms and 83,790 firm-years. It is the same sample as in LSW.

Table 1 reports the number of firms that enter and leave the sample during the 31 years under investigation. We start with 1,988 firms in 1978. Turnover is remarkably high: 7,934 firms enter and 6,438 firms leave between 1978 and 2009. That corresponds to an annual rate of entry and exit of 9.4 percent and 7.7 percent, respectively.[2] Churn is therefore substantially higher than in the sample of Baker and Kennedy (2002). This is mostly due to the fact that our sample includes the takeover waves of the late 1990s. The results of our investigation remain the same, however, if we exclude the years 1996-2000.

The table also shows the possible exit reasons based on the delisting codes reported in CRSP. In the case of financial failure, we follow Campbell, Hilscher, and Szilagyi's (2008) broader failure definition and define it as liquidation (400–490), bankruptcy (574), or delisting for financial reasons. The latter category applies when firms are unable to maintain an acceptable share-price level (552) or capitalization amount (560 and 584), or when they

[1] The reputation of the underwriter affects firm survival for up to seven years. Our results are qualitatively the same when we exclude all firms younger than 7 years in terms of listing age.

[2] Note that the sum of firms at the beginning of each subperiod plus new entries minus exits is lower than the number of firms at the beginning of the following subperiod. The difference is due to the firms that drop out of the sample because they cease to meet our sample selection criteria. In particular, we lose many observations because of the restriction of at least five firms in each industry-year.

fail to file financial statements or pay exchange fees (580). As for takeover, in keeping with Rauh (2006), among others, we identify that event with transactions with the delisting codes 200–290. We are unable to tell friendly from hostile deals. Andrade, Mitchell, and Stafford (2001), however, show that even in the 1980s, the era of hostile takeovers, the overwhelming majority of all deals were friendly (see also Servaes, 1991). Moreover, Schwert (2000) finds that "hostility" is mainly motivated by strategic bargaining to extract higher rents, and that hostile and friendly deals are mostly indistinguishable in economic terms. One should keep that in mind when interpreting the results.

Forms of exit other than takeover and failure are comparatively less frequent and include exchanges for other securities, switches to other stock exchanges, going-private transactions, and delistings because of an insufficient number of shareholders or market makers. The fate of these firms is not apparent from CRSP's delisting codes. We treat these firms as a separate group in our competing hazard estimation approach. The results are fairly robust to alternative definitions of this group.

Most firms are taken over or merged (3,494), consistent with Baker and Kennedy (2002). Comparatively few companies (1,831) experience financial failure. Over the whole sample period, takeovers therefore account for roughly 55 percent of all exits, 28 percent are failures, and 17 percent are other kinds of exits. Put differently, of all 10,219 firms present at some time in the sample during 1978–2009, 34 percent are taken over, 18 percent fail, and 11 percent exit for other reasons—the rest survives.

Some of the firms that drop from the exchanges in going-private transactions may list again years later, for example in a reverse LBO. Cao and Lerner (2009) identify 526 such transactions between 1981 and 2003. Firms that relist are typically treated as separate firms. This could bias the results. We follow the extant literature and use Compustat's unique identifier (gvkey) to track companies over time in spite of name or ticker changes. We can therefore measure age from the date of incorporation. Reverse LBOs should therefore not represent a confounding event. Firms typically maintain their incorporation age when they resurface as newly listed entities.

2.2. Research strategy

Ultimately, we want to know whether firms exhibit negative duration dependence. However, negative duration dependence could also be induced by unobserved heterogeneity in exit hazard (e.g., Zorn, 2000). If the exit hazards of firms are conditionally different in ways we do not account for in our model, the mean hazard rate could decline with cohort age because the sample becomes increasingly composed of firms with the lowest exit risk, and not because exit risk declines with age (see also Thompson, 2005). To address this concern, the first part of the empirical investigation estimates discrete time proportional hazard regressions with the Prentice-Gloeckler (1978) model that incorporates a gamma mixture distribution to summarize unobserved individual heterogeneity. These so-called single-destination models are estimated separately for takeover and financial failure hazard.

Our general model has the following form:

$$\lambda_h(t) = \lambda_{0h}(t) \exp(\mathbf{x'}(t)\beta_h).$$

The hazard function $\lambda_h(t)$ is defined as the probability of exit type h in year t given that the firm has survived up to year t–1. $\lambda_{0h}(t)$ denotes the so-called baseline hazard, which is specific to the exit type. $\mathbf{x'}(t)$ represents a set of possibly time-varying explanatory variables. Depending on the coefficients β_h, these variables shift the baseline hazard. In the estimation, we allow for right censoring and correct the standard errors for heteroskedasticity as well as firm clustering. Right censoring occurs because, at the end of the sample period, all we know is when survival time has begun but not when exit (if any) will occur.

The basis for our analysis of financial failure hazard is the regression specification that Bharath and Shumway (2008) propose (their Model 7, Table 3):

Variable	**Description**	**Expected sign**
Age	Number of years (plus one) since incorporation	–
Naïve PD	The “naïve” default probability implied by Merton’s (1974) model	+
ln(E)	The natural log of the firm’s market value of equity	–
ln(D)	The natural log of the firm’s book value of debt	+
1/Vola	The inverse of the standard deviation of return on the firm’s stock	–
Excess return	The firm’s market-adjusted stock return.	–
Profitability	Net income divided by lagged total assets	–

Our takeover hazard model includes a broad range of control variables that have been found to correlate with takeover hazard, namely:

Variable	**Description**	**Expected sign**
Age	Number of years (plus one) since incorporation	–
Sales growth	Relative change in real sales	?
MTB-equity	Market value of equity divided by its book value.	?
Cash	Cash and short-term investments divided by the book value assets	?/+

Debt ratio	Book value of debt divided by market assets	?/–
Profitability	Net income divided by lagged total assets	–
Excess return	Market-adjusted stock return over the previous year	–
Tangibility	Property, plant, and equipment divided by book assets	+
Size	Log of the market value of assets	–
Focus	Herfindahl index of the firm's segment sales	+
Industry concentration	Herfindahl index of the sales of all firms in the same 3-digit SIC industry	–
bActive industry	Indicator variable for industries (4-digit SIC) with takeover activity in the previous year	+
GDP growth	The relative change in the real U.S. gross domestic product	+

Sales growth, equity market-to-book ratios, cash holdings, and debt ratios reflect growth opportunities as well as potential imbalances between growth and available resources (see, for example, Palepu 1986). Their effect cannot be signed a priori. Low debt levels and large cash holdings could also be proxies for free cash flow problems, which could attract takeover (Jensen, 1986). Profitability and excess return are related to management efficiency and reduce takeover threat (Jensen, 1988; Scharfstein, 1988). Asset tangibility (Stulz and Johnson, 1985) increases borrowing capacity and, therefore, should invite takeover. Large (Palepu 1986) and diversified (Agarwal and Gort 1996, 1999, 2002) firms should face lower takeover risk because of the higher integration costs. Finally, greater competition should increase takeover threat (Kole and Lehn, 1997, 1999) and an expanding economy.

Throughout the analysis, all regression arguments are lagged by one year, since exit presumably reacts to its determining factors with a lag. Moreover, to control for industry- and period-specific effects, we standardize all firm-specific variables by industry (using three-digit SIC industry definitions, as recommended by Giroud and Mueller, 2010) and year. The exceptions in the standardization are the variables related to company age and Merton model's "naïve" default probability. Standardization means, we deduct the 3-digit SIC industry average and divide by the industry standard deviation in any given year. Standardized variables are denoted with the prefix s-. When interpreting the evidence, it is important to remember this adjustment. Binary variables have the prefix b-.

Financial failure and takeover could also be competing hazards. Powell and Yawson (2007) show that ignoring competing risks can lead to estimation bias. That could occur if firms, for example, file for bankruptcy to avoid takeover or if takeover serves as an alternative crisis resolution mechanism to financial failure (Stiglitz, 1972; Shrievens and Stevens, 1979; Pastena and Ruland, 1986; Jensen, 2000). We therefore also investigate the relation between firm age and survival in the context of discrete-time competing risk proportional hazard models. When doing so, we assume that the risk of financial distress *conditional* on the effect of the covariates in the model (in particular profitability) is independent of the risk of takeover. The model is implemented as a pooled multinomial logistic model (Jenkins, 2005; Cameron and Trivedi, 2005), an approach that offers the advantage that the likelihood function can be computed more easily. The drawback is that it does not incorporate unobserved heterogeneity.

2.3. Variable Definitions

For listed firms, there are two common definitions of firm age, namely the number of years (plus one) elapsed since the company's IPO year (*listing age*) and the number of years (plus one) elapsed since the year of incorporation (*incorporation age*). Listing age is computed with CRSP data. Information about the firm's incorporation age is partly from Jay Ritter's website and partly hand-collected from *Mergent Webreports*. Because firms are subject to exit risk from the day they start, most of the analysis is carried out with incorporation age. The results, however, remain essentially unchanged when we focus on listing age.

Table 2 shows average incorporation age and, for comparison, listing age. Since CRSP goes back to 1925, the theoretically maximum listing age at the beginning of the sample period in 1978 is 54 years, compared with 85 years at the end of it, in 2009. In the full sample, average listing age is 17 and average incorporation age is 34 (the median values are 13 and 25, respectively). As it turns out, average incorporation age at the time of listing varies substantially over time (see also Jovanovic and Rousseau, 2001; Fink, Fink, Grullon, and Weston, 2010).

To reduce the influence of outliers, we winsorize all control variables at the 1st and 99th percentile of their pooled distribution. All variables are measured at year end. Descriptive statistics are in Table 2 and variable definitions in Table 13. Table 3 computes correlation coefficients between pairs of control variables. Older firms, in terms of incorporation age, are larger, report more segments, hold less cash, and have lower stock return volatility (see also Pastor and Veronesi, 2003). To examine the impact of aging on exit hazards, it is therefore important to control for the possible effect of the variables that company age correlates with.

3. Firm age and exit risk

3.1. Financial failure hazard

Table 4 estimates single destination models for financial failure hazard. Model 1 simply replicates the model of Bharath and Shumway (2008). The signs of the control variables are congruent with the findings in that paper. According to the results, greater equity capitalization, and larger excess returns all reduce the odds of financial failure. The same is true of higher profitability, as in Campbell, Hilscher, and Szilagyi (2008). In contrast, a greater *Naïve PD*, higher debt levels, and increased stock return volatility raise those odds.

The hypothesis we want to test is whether company age has a negative impact on the probability of financial failure of older firms. The age coefficients of the regression specifications 2 to 6 are consistent with this prediction. Model 2 omits all control variables and shows that firm age, measured as the log of incorporation age (*ln(Age)*), has a negative and significant association with failure hazard. When we add the control variables back, firm age maintains its negative coefficient (Model 3). The magnitude of the coefficient of *ln(Age)*, however, drops by more than half. This indicates that firm age is correlated in part with other drivers of exit risk, such as size and financial frictions. It also implies, however, that age has an impact on failure unrelated with these variables. As mentioned above, this could reflect learning by the firm or its investors. Note that failure rates decline with age regardless of the functional form we choose. We use alternatively: –1/(1+*Age*), the age metric proposed by Pastor and Veronesi (2003) (Model 4); *Age* and Age^2 (Model 5); and the binary variable, *bOld*, that identifies firms older than the sample median in any given year (Model 6). The coefficients of the control variables are mostly unaffected by the different specification of the age relation.

3.2. Takeover hazard

Table 5 studies the relation between firm age and takeover hazard. As in the case of failure hazard, the first specification (Model 1) focuses on the various control variables and omits firm age. The estimates imply that takeover risk is lower for firms with better growth opportunities (*s Sales growth*; *s MTB-equity*) and for firms with larger cash holdings. Contrary to the hypothesis that takeover disciplines poorly performing firms, however, we find that takeover hazard is actually higher for firms with stronger operating performance (*s Profitability*) and stronger stock market performance (*s Excess return*). The latter finding is consistent with Baker and Kennedy (2002), who show that stocks perform particularly well in the year prior to takeover, an indication that market participants suspect the firm is in play. We are, however, controlling for other dimensions of profitability such as sales growth; as it turns out, stronger *Sales growth* reduces the odds of a takeover. The fact that focus has a positive coefficient could mean that acquirers prefer pure players because of the costs of unwinding undesired activities and divisions. The positive coefficient associated with stronger economic growth suggests that the reallocation of resources via merger is livelier during boom phases of the economy. Not surprisingly, that reallocation is also more vigorous in less concentrated and hence potentially more competitive industries. Size, leverage, and asset tangibility are unrelated with takeover risk.

We hypothesized that takeover rates should fall with firm age because firms become relatively unattractive merger partners. Model 2 to 6 test this prediction with different functional measures of age. The results are consistent with the prediction. The coefficient of age is always negative and significant, regardless of how we measure firm age and whether or not we include the control variables. Interestingly, the coefficient of age does not drop dramatically when we include the control variables. At the same time, adding the age argument leaves the coefficients of the control variables mostly unaffected. Company age is therefore orthogonal to the included drivers of takeover risk.

3.3. Non-parametric regressions

The fact that few firms survive over time makes it harder to assess exit risk at old age. To find out more about the actual form of the relation between firm age and exit hazard, we estimate kernel-weighted local polynomial regressions. This nonparametric approach allows for an unspecified relation between the two dimensions of interest. Figure 1 plots the results of this analysis. The dependent variables in these regressions are the residuals from separate logistic regressions of the two exit hazards (failure and takeover) on the control variables from Table 4 (failure) and Table 5 (takeover), respectively. The shaded area shows the 90% confidence interval. To limit the impact of outliers at higher age, we truncate the sample at incorporation age 75, the 90^{th}-percentile of the age distribution, a procedure that is consistent with Agarwal and Gort (2002).

The results of the estimation confirm that both failure and takeover hazards decline over time. Takeover hazard seems to rebound slightly around age 40, but the increase is not statistically significant. Failure hazard bottoms out around age 45, which marks the 75^{th} percentile of the pooled distribution of incorporation age, but doesn't pick up again. In what follows, we revert to parametric regressions. We measure age alternatively with the log of incorporation age and with the binary variable that identifies firms older than the sample median.

3.4. Competing risk regressions

As mentioned above, single destination models could produce biased estimates if the possible exit risks are competing. To avoid such bias, we reassess the age-dependency of exit risk in the context of competing risk regressions. We distinguish the three exit routes from Table 1. The dependent variable is therefore equal to 0 if the firm survives (the base outcome), 1 if the firm is taken over, 2 if the firm fails, and 3 if it exits for other reasons. The category “other reasons” is included for econometric purposes and is not reported separately in any of the following tables. The regression arguments combine those of the single destination models in Tables 4 and 5. We drop, however, the market value of equity and the book value of debt to avoid collinearity with firm size.

Table 6 shows the results. The first regression specification focuses on firm age and excludes all control variables. Regressions 2 to 4 then study the age-dependence of exit risk conditional on the various control variables and with different functional forms of age. As it turns out, the relation between exit hazards and age does not change when we switch from single destination models to competing risk regressions. All specifications produce a negative and significant relation between firm age and either type of exit risk. Moreover, the age coefficients are statistically identical to the ones from the single destination models. Therefore, competition of exit risks does not seem to be of major concern for our investigation. However, and for the same reason, neither should be unobserved heterogeneity.

By combining the control variables from the failure and the takeover models, we have some new coefficient estimates. In the specification of takeover hazard, the two new control variables are *Naïve PD* and stock return volatility. The coefficient of *Naïve PD* is negative and significant. This finding is inconsistent with the hypothesis that takeover is a substitute crisis-resolution mechanism (Stiglitz, 1972; Shrievens and Stevens, 1979; Pastena and Ruland, 1986). It is possible, however, that mergers are only last-ditch crisis resolution possibilities, after financial failure has occurred. If so, failing firms will exit the sample before we can observe the subsequent mergers, which means that we aren’t able to measure the relation in question. Volatility leaves takeover risk unaffected.

In the specification of failure hazard, there are a number of new control variables as well. Sales growth, cash balances, size, and GDP growth reduce the probability of financial failure. We also find that MTB ratios and leverage increase the odds of financial failure. The same applies to *bActive industry*, an indication that industries with takeover events are industries of corporate restructuring in general. Tangibility of assets and focus have no effect, and neither has industry concentration.

3.5. The impact of age on survival

We can use the coefficient estimates of model 2 in Table 6 to predict the marginal contribution of age to the two exit hazards of interest and assess the economic significance of the relation. Table 7 performs this analysis. All variables except for ln(*Age*) are kept at their average sample value. The first line of the table shows predicted failure and takeover hazards at incorporation age 5 (ln(*Age*) = 1.6094). The second line shows predicted failure and takeover hazards at the median incorporation age 25 (ln(*Age*) = 3.2189). The average difference is –0.67 percentage points in the case of failure hazard, and –0.92 percentage points in the case of takeover hazard. This represents a 25% decline in failure hazard and a 19% reduction in takeover hazard. The lower bound on the 95% confidence interval corresponds to a relative decline of 39% in failure hazard and one of 31% in takeover hazard. Hence, the effect of company age appears to be economically palpable. An alternative way to see this is to compute the increase in the life expectancy of older firms that our estimates imply. An aggregate hazard of 5.84% in the typical 25-year old firm means that it will die before age 75 with probability 0.95—5.84% is the sum of the financial default and takeover hazard estimated for these firms (1.99% and 3.85%, respectively). In contrast, an aggregate hazard of 7.43% for 5-year old firms implies death with 0.95 probability already before age 44—7.43% is the sum of their financial default and takeover hazards (2.66% and 4.77%, respectively). Older firms therefore expect to live significantly longer as independent organizations.

Overall, the evidence is consistent with the hypothesis that older firms are unattractive acquisition targets and that they learn over time. Some alternative interpretations of the evidence have indirectly been addressed by the control variables in the regressions. For example, since we control for profitability, the fact that older firms have comparatively lower profitability (LSW) cannot explain the negative relation between age and exit hazard. Similarly, size, cash holdings, or leverage cannot explain our findings either. The next two sections investigate whether the evidence concerning a declining conditional takeover hazard over time can be explained by the desire of management to maintain independence to protect their quasi-rents, whether it can be explained by an imbalance of growth opportunities and available resources, and whether company age is simply a proxy for the age of management.

4. Firm age and the pursuit of independence

According to Murphy (1997) and Hartzell, Ofek, and Yermack (2004), among others, the managers of target firms often lose their jobs in the aftermath of an acquisition. This prospect could be particularly threatening to the managers of older organizations, since the focusing process that older firms engage in (LSW) could gradually reduce the value of their outside employment opportunities. Remaining with the firm could progressively become the most valuable employment option. Therefore, an agency interpretation of the evidence could be that the managers of older firms try to keep their organizations alive and independent to protect their quasi-rents and their internal career opportunities or to enjoy a quiet life. One way to do so is to raise formal anti-takeover barriers. Alternatively, they could deliberately make their firms unattractive targets of corporate acquisitions. What follows examines these two possibilities.

Anti-takeover barriers take mostly the form of antitakeover provisions (ATP) in the corporate charter and the corporate bylaws. There are two main rationales for ATPs in the literature and both are predicated on the assumption that ATPs have the potential to increase the costs of takeover. The first relates to managerial entrenchment and the attempt to stave off takeover. Field and Karpoff (2002) examine ATPs during the first five years after listing and find that their presence reduces the probability of acquisition. Other empirical studies with different samples reach different conclusions (e.g., Comment and Schwert, 1995, and Core, Guay, and Rusticus, 2006).[3] The second rationale for the existence of ATPs claims that they confer management better bargaining power in merger negotiations (Grossman and Hart, 1980, DeAngelo and Rice, 1983, and Harris, 1990). This rationale has no obvious implications for the probability of takeover, since ATPs signal willingness to entertain offers. Either way, ATPs should have a deterring potential.

We test whether older firms are more likely to protect themselves with ATPs. We also test whether these managers have stronger incentives to resist merger and acquisition in the

[3] For a comprehensive review of the literature, see Klepper and Thompson (2006).

absence of golden parachutes that deploy in the case of takeover. Furthermore, we ask whether they actively try to make their firms unattractive merger and acquisition targets.

4.1. The relevance of structural takeover defenses

In principle, poison pills are the most formidable defense against takeover there is. As it turns out, ever since the Delaware Supreme Court stated that pills were legitimate in 1985, almost all firms can adopt one very quickly even after a takeover bid has been made (Coates, 2000). Almost all companies therefore have a "shadow pill" readily available. In fact, almost all firms have charter provisions in place authorizing blank check preferred stock, "the most common source of the securities used to create a poison pill," when they go public (Daines and Klausner, 2001, pp. 114-115). The shadow pill has made other defenses, such as fair price and supermajority vote provisions, unimportant (Coates, 2000). The problem is that it only takes a board decision to repeal a poison pill. Hence, to be a credible defense mechanism, a poison pill has to be accompanied by provisions that make it difficult for the bidding party to replace an incumbent board—or there must be provisions that protect a board likely to adopt a poison pill in the case of a takeover bid.

Following Daines and Klausner (2001), we examine ATPs that can "delay a hostile bid above and beyond the ubiquitous pill" (p. 88): dual-class stock, staggered board, and inability of shareholders to act by written consent or to call a special meeting. We also examine poison pills and blank check preferred stock authorizations. Even though the shadow pill is ubiquitous, pills that are in place or ostensibly readily deployable could be an important signal of the board's intentions to resist takeover, especially when combined with staggered boards. Finally, we test whether older firms are less likely to grant their managers golden parachutes to encourage them to resist mergers and acquisitions. Data on governance provisions are from Risk Metrics.

We also examine the presence of institutional blockholders and test whether it offsets the influence of possibly entrenched managers and directors and increases the takeover hazard of older firms. The relative absence of such blockholders in older firms could explain our results. Data on institutional ownership are from CDA Spectrum. As in Cremers and Nair (2004), institutional blockholders own more than 5 percent of the outstanding shares.

4.2. Antitakeover protection at old age

Panel A of Table 8 reports the popularity of the various antitakeover devices. Because Risk Metrics starts in 1990, the sample period is 1990 – 2009. More than 90 percent of all firms have either a poison pill or a blank check preferred stock authorization in place. This is comparable with what Daines and Klausner (2001) report for their IPO firms. The frequency of the other provisions is similarly comparable to that of previous studies. About 10 percent of the sample firms have multiple classes of stock, almost 60 percent have staggered boards (almost always in combination with pills or blank check preferred stock), and almost 40 percent have voting restrictions. Golden parachutes are granted in about 60 percent of the cases. Finally, there are institutional blockholdings in almost 4 out of every 10 firms in the sample.

To test whether old firms are more likely to have these antitakeover provisions in place, we run conditional logistic regressions of binary variables that flag the existence of any given provision on firm age and the control variables from the takeover model in Table 5. We include industry-year fixed effects to account for time and industry effects. For each ATP, we estimate two separate regressions with two alternative measures of incorporation age, namely *ln*(*Age*) and *bOld*. Because of space limitations, we report only the coefficients associated with age (also Panel A of Table 8).

According to the evidence, older firms are more likely to have dual-class stock, which, in principle, enables incumbent managers and directors to maintain control. As shown above, however, this ownership structure is fairly rare to begin with. All the remaining evidence is inconsistent with entrenched managers and directors in old firms. In particular, older firms are actually less likely to have staggered boards. They are also less likely to have pills or to combine staggered boards with pills. In addition, they are less prone to restrict the ability of their shareholders to act by written consent or the power to call special meetings (*b Voting restriction*). Similarly, they more often give their top managers golden parachutes. Consistent with all that, the last line of the panel shows that institutional blockholdings appear to be more widespread in older firms, although this finding holds only when measuring firm age with *ln*(*Age*).

Taken together, the results therefore imply that firms are generally fairly well protected from takeover. However, and contrary to the hypothesis of managerial entrenchment in older firms, takeover protection is weaker there. There is little evidence that older firms erect takeover barriers to maintain independence.

To confirm these findings, we test whether the actual introduction or removal of antitakeover provisions is related to company age. This test relies on logistic regressions in which the dependent variable equals 1 if a given firm adopts or removes a particular antitakeover provision in a given year, and equals 0 otherwise. Firms that have a specific provision in place are excluded in the analysis of adoptions; conversely, those that do not have a given provision are excluded in the analysis of removals. The regression arguments include the old firm dummy (*bOld*) and the standard set of control variables from Table 5. As before, we report only the coefficient of company age (Panel B of Table 8). Overall, and consistent with Panel A, we find little evidence that older firms beef up their structural takeover defenses. If anything, the weight of the evidence is the opposite. Older firms are less likely to put poison pills in place, and more inclined to remove staggered boards and to dismantle the combination of staggered boards and poison pills. They also tend to eliminate voting restrictions. There is, however, some evidence that golden parachutes become marginally more popular and that institutional investors reduce their holdings in older firms.

4.3. Antitakeover protections and takeover risk

The fact that older firms have fewer ATPs in place and seem to break them down over time does not imply that they don't benefit from the ATPs they do have. These ATPs could have been responsible for their survival. We therefore test whether the age effect found in the hazard regressions can be explained by the presence of ATPs. We repeat the estimation of the regressions in Table 6 with the addition of the various ATPs discussed in Table 8. Because almost all firms have a pill or a blank check preferred stock, we include these provisions only in combination with staggered boards.

Table 9 shows the estimates that refer to takeover hazard. As one can see, the addition of ATP dummies to the regression arguments does not erase the significance of the age coefficient (regressions 1 to 5). If anything, that coefficient becomes numerically stronger. Interestingly, the various structural defenses have essentially no impact on the probability of takeover. Golden parachutes, however, appear to predispose firms to accept being acquired or merged, and so does the presence of an institutional blockholder.

Regression 6 includes all takeover provisions simultaneously and produces consistent estimates. Finally, regression 7 asks whether the various provisions could have different effects in young versus old firms. To this end, we interact each individual provision with *bOld* and add these interaction terms to the regression. The conclusions, however, do not change. The relation between firm age and takeover hazard remains negative, equally strong (if not stronger), and statistically significant. None of the takeover provisions and their interaction terms is significantly different from zero at customary levels of confidence. The only coefficient that remains positive and significant is that associated with the presence of golden parachutes.

Overall, there is no evidence that older firms boost their defenses over time. More important, ATPs are unable to explain the age effect we find. The observed decline in exit hazard seems to be unrelated to any preference for independence that the managers of older firms might have.

4.4. Informal antitakeover defenses

The alternative agency explanation of the evidence we mentioned is that the managers of older firms take deliberate actions to render their firms unattractive merger partners. Shleifer and Vishny (1989) argue, for example, that managers can entrench themselves by making manager-specific investments. With a similar logic, older firms could avoid accumulating or wasting free cash flows, and they could focus their activities to avoid attracting takeover. If so, an exogenous reduction in takeover threat should induce them to relax these activities. The passage of business combination (BC) laws represents such an exogenous shock (see also LSW).

In untabulated tests, we investigated whether the passage of BC laws is accompanied by a comparative increase in cash holdings and a reduction of cash payouts to stockholders. Moreover, we tested whether the focusing efforts of older firms in the form of the sale of non-core assets slow down with that event. Neither, however, is the case.

5. Other interpretations of the age effect on takeover hazard

There are other alternative interpretations of the evidence concerning the takeover hazard one could offer. Palepu (1986) and Powell and Yawson (2007), for example, argue that takeover threats materialize because of an imbalance between growth opportunities and available resources. If these imbalances declined over time, company age could be a proxy for them. Panel A of Table 10 tests that possibility.   We assume there is an imbalance between growth and available resources (*bGrowth-resource imbalance*) when a firm exhibits one of the following characteristics: a) below-average growth opportunities and above-average cash holdings; or b) above-average growth opportunities and below-average cash holdings. We add this new variable to our standard competing risk model in Table 6 (Model 4). Moreover, we interact it with *bOld* as well as with the control variables. For reading convenience, the panel shows only the coefficient of firm age, the coefficient of the variable in question, and the coefficient of the interaction term with *bOld*. The results show that *bOld* maintains its negative and significant coefficient, which suggests that the age effect is unrelated to imbalances between growth and resources. Interestingly, both *bGrowth-resource imbalance* and its interaction with *bOld* have coefficients that are statistically zero. Therefore, imbalances between growth and resources do not seem to be a significant determining factor of takeover risk.

It could also be that the market for corporate control frees resources trapped in inadequate structures (Schumpeter, 1975; Jensen, 2000). If this situation became less acute over time, it would correlate with firm age and could explain our results. We measure trapped resources with an interaction term of high discretionary investments and low growth opportunities. Discretionary investments are, alternatively, R&D activities and capital expenditures (see, for example, Minton and Schrand, 1999). We add the interaction term to our competing risk model. We also interact it with *bOld*. The results of the two regressions are in Panel B of the table. As one can see, the coefficient of company age is unaffected. It remains negative and significant. We also find that firms that keep investing despite modest growth opportunities do not face significantly higher exit risk, not even when they are older. It does not look as if the market for corporate control is particularly active in freeing trapped resources.

Finally, Panel C investigates whether the firm age effect we observe could be related to the age of the management team. LSW report that older firms have older managers. To the extent that older managers are more likely to cling to their jobs and resist loss of independence, what looks like a firm age effect could actually be a management age effect. To find out, we collect data on CEO and director age from ExecuComp and Risk Metrics, respectively.[4] We then reestimate the competing risk model with the alternative addition of two binary variables that measure above average ages of CEO and directors, respectively. According to the panel, firms with old boards (first row, *bOld board*) face indeed a significantly lower takeover risk. Also firms with old CEOs (second row, *bOld CEO*) face a slightly lower hazard, although the coefficient is significant only in a one-sided test. More important, however, the coefficient of firm age remains negative and significant in both

[4] Data on CEO age start in 1992, and data on director age are available from 1996.

regressions. If anything, it is numerically larger. Moreover, the interaction terms of firm age and age of CEO and directors are statistically insignificant. The company age effect we observe is therefore a separate effect, independent of the effect that the age of the people in the organization seems to have.

6. Industry distress, firm age, and exit risk

The argument so far is that, since they run out of growth opportunities and increasingly focus on what they do best (LSW), and since they don't seem to be affected by comparatively large agency problems, older firms are unattractive merger partners or acquisition targets. If so, that should be particularly the case during times of industry distress. What follows explains why and tests that prediction.

Several recent papers investigate how firms are affected by shocks in their business environment. For example, Gopalan and Xie (2011) find that diversified firms are more likely to avoid financing constraints in times of industry distress because they can cross-subsidize distressed activities with cash flows from non-distressed business lines. Similarly, Acharya, Bharath, and Srinivasan (2007) document that industry distress makes it harder for firms to dispose of unique assets. Since older firms tend to be specialized with little excess cash, we would expect them to find it particularly hard to refinance themselves internally or via asset liquidation in times of industry distress. This should lead to higher failure rates of older firms. At the same time, the market for corporate control should have particularly little appetite for older firms and their comparatively low growth opportunities when the whole industry is not doing well.

Table 11 tests these predictions. We follow Opler and Titman (1994) and Gopalan and Xie (2011), among others, and classify an industry as distressed if median sales growth is negative and median stock return is below –30 percent. As in the other studies, industry distress is quite rare and occurs in approximately 4 percent of all cases. The first regression specification (M-Logit 1) extends the competing risk regression 4 from Table 6 with a binary variable that identifies firm years in distressed industries, *bIndustry distress*, and interacts that variable with the old-firm dummy, *bOld*. When we do so, the coefficient of *bOld* remains negative for both hazards. Moreover, in the case of takeover, the negative and significant coefficient of the interaction term *bOld* × *bIndustry distress* indicates that the hazard is further reduced if the industry is in distress. Therefore, older firms appear to be particularly unattractive merger partners in distressed industries, consistent with the prediction. Note that, conditional on the variables in the model, industry distress itself does not seem to affect takeover risk. As shown below, however, this depends on the regression specification. The evidence is also consistent with the prediction of an increased failure hazard. The interaction term *bOld* × *bIndustry distress* is positive and highly significant. Here, too, the coefficient of *bIndustry distress* is positive but statistically insignificant at customary levels in a two-sided test.

In the first regression specification, we restrict the coefficients of the control variables to be the same in distressed and non-distressed industries. In the second regression specification (M-Logit 2) we relax this restriction and include *bIndustry distress* with all control variables. The age-related coefficients, however, remain essentially the same. Interestingly, the coefficients of the variable that identifies distressed industries are now negative and significant across hazard types. We also performed the estimation only for firms in distressed industries (M-Logit 3). The age coefficient is still negative and significant—its value corresponds roughly to the age coefficient in the preceding specifications plus the coefficient of the interaction term between age and the distressed industries dummy. We therefore conclude that, in times of industry distress, old age accelerates failure hazard and reduces takeover hazard substantially.

7. BWM characteristics and the age effect on takeover hazard

The characteristics of older firms implied by LSW are low growth opportunities and comparatively little uncertainty about their business models (and therefore easier replicability). The last step in our analysis tests whether the age effect on takeover hazard we uncover is driven by these particular firms with BWM characteristics.

To perform the analysis, we estimate the competing risk model in Table 6 (Model 4) with the addition of a binary variable that identifies these firms. We measure growth opportunities as the fraction of the share price that cannot be explained by the value of the firm's equity in place. To compute the value of the equity in place, we follow Richardson (2006). Business risk is approximated with the volatility of the firm's assets, using a definition similar to that used in Bharath and Shumway (2008). With this information, we define the interaction variable *bLow growth & stable* that identifies firms with below-average growth opportunities and below-average business uncertainty. BWM-type firms are identified by interacting this variable with *bOld*. We also add interaction terms of *bOld* with the remaining control variables.

For simplicity, the Table 12 shows only the coefficient of firm age (*bOld)*, the coefficient of *bLow growth & stable*, and the coefficient of the interaction term of these two binary variables. As a comparison, the panel also reports the company age coefficient from the original regression specification in Table 6. As one can see, adding the variable *bLow growth & stable* causes the coefficient of old age to lose its statistical significance. The coefficient of *bLow growth & stable* per se is also statistically zero. Low growth and stability per se do not induce or discourage corporate restructuring. The combination of *bLow growth & stable* and *bOld*, however, is negative and significant. It is the older firms with low growth opportunities and stability that are unattractive targets of corporate restructuring. It is these firms that drive the negative age effect on takeover hazard. The results remain the same when we use alternative definitions of growth opportunities. For example, we use sales growth or the difference between the firm's share price minus the present value of a level perpetuity of cash payouts (in percentage of the share price). The results are also robust with respect to alternative measures of performance, such as stock returns.

8. Conclusions

We started out with the question of how company age affects the exit hazards of firms. Takeover and financial failure hazard should increase because firms gradually run out of growth opportunities as they get older. The evidence does not support this prediction. Both hazards of takeover and financial failure drop significantly with firm age. The decline in exit hazard is mainly driven by the tendency of older firms to become BWM (old age, low growth opportunities, and replicable business models), a situation that discourages takeover. Learning explains why failure hazards decline. The effects, however, are not strong enough to reduce those exit hazards to zero. This explains why firms do not make it to older age. Eventually, all lose their independence and are either liquidated or recycled in new organizations.

We do not find any evidence that older firms actively try to resist recycling and protect themselves against takeover with corporate charter provisions. Moreover, the ATPs they do have cannot explain the company age effect we document. Hence, there is little reason to believe that the decline in exit hazards over time reflects a managerial preference for independence or a quiet life.

Our findings imply at least three considerations. First, exit hazards decline during the course of a company's life, although they don't go to zero. Interestingly, in biology, the probability of death is a convex function of age. In the case of firms, that probability declines more or less monotonically. Second, the lower takeover hazard of older firms does not seem to be the result of active resistance by firm managers but rather the reflection of the fact that older firms are comparatively unattractive merger partners. Hence, not only do older firms run out of profitable investment opportunities, they also become unattractive corporate investment opportunities themselves. Third, older firms are more likely to survive in spite of the fact that they are unable to replicate their original success. Hence, the "perennial gale of creative destruction" that sweeps over the economy (Schumpeter, 1975) seems to abate when it comes to older companies.

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Figure 1: The Relation Between Age and Exit Hazard: Kernel Regressions

The figure investigates the relation between age and exit hazards with kernel-weighted local polynomial regressions. The dependent variables in these regressions are the residuals from logistic regressions of the two exit hazards (failure and takeover) on the control variables from the first model in Table 4 (failure) Table 5 (takeover), respectively. The smoothed values represented in the graph are then obtained from local polynomial regressions of these residuals on firm age, using an Epanechnikov kernel function with a "rule-of-thumb" bandwidth estimator and local-mean smoothing. The shaded area shows the 90% confidence interval. The sample period is 1978 – 2009.

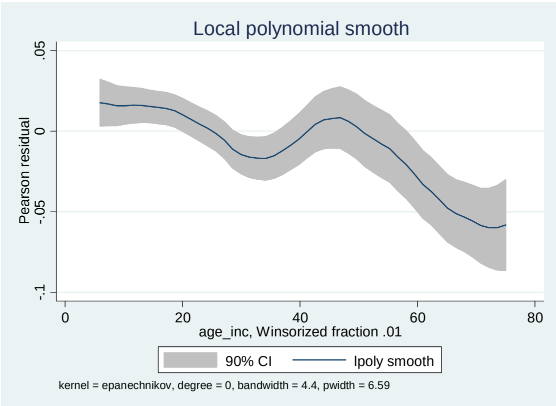	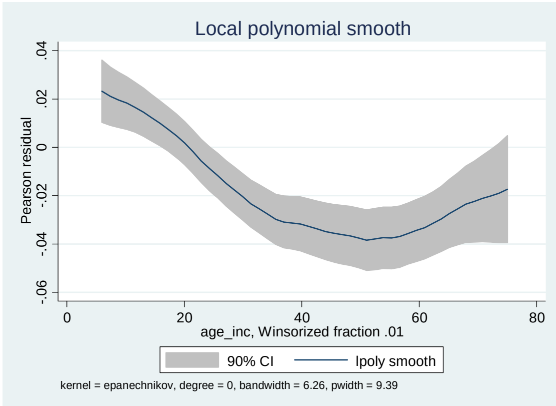
Firm age and takeover hazard	Firm age and failure hazard

Table 1: Turnover and Exit Reasons

The table distinguishes various subperiods and shows the number of sample firms at the beginning of each period as well as the number of entering and exiting firms. The last three columns to the right show the reasons why firms leave the sample. Using the delisting codes reported on the CRSP tapes, we distinguish among three exit reasons: takeover, failure, and other reasons. Failure is assumed if a firm is liquidated (delisting codes 400–490), drops from the exchange because of bankruptcy (574), or fails to maintain an acceptable share-price level (552) or capitalization (560 and 584), fails to file financial statements, or fails to pay exchange fees (580). Takeovers are identified with the delisting codes 200–299. "Other" delistings are mainly exchanges for other securities, switches to other stock exchanges, or delistings because of an insufficient number of shareholders or market makers. The sample period is 1978 – 2009.

Period	Firms Beginning	New Entrants	Total Exits	Exit Reasons		
				Takeover	Failure	Other
1978–1984	2,324	1276	788	488	107	193
1985–1989	2,414	1512	1,042	532	279	231
1990–1994	2,777	1315	834	329	387	118
1995–1999	3,030	1928	1,364	825	339	200
2000–2004	3,018	1435	1,303	606	495	202
2005–2009	2,611	468	1,107	714	224	169
Total		7,934	6,438	3,494	1,831	1,113

Table 2: Descriptive Statistics

The table provides descriptive statistics for the variables of relevance in the analysis. All control variables are winsorized at the 5th and 95th percentile of their pooled distribution across all firm-years. Variable definitions are in Table 13.

	Mean	Median	Min	Max	Stev	N
				Company Age		
Listing age	17.5	13.0	5.0	85.0	13.91	83,790
Incorporation age	34.4	25.0	5.0	193.0	26.01	69,982
Age at listing	16.4	9.0	19.9	1.0	156.0	7,590
				Control Variables		
bActive industry	0.475	–	–	–	–	83,238
Cash	0.153	0.074	0.000	0.840	0.187	83,787
Debt	360.359	23.128	0.000	7804.689	1,100.246	83,532
Debt ratio	0.192	0.147	0.000	0.727	0.184	83,532
Equity	1,266.421	129.947	1.589	28,390.150	3,854.685	83,790
Excess return	0.033	-0.113	-0.977	4.314	0.772	82,589
Focus	0.836	1.000	0.245	1.000	0.241	83,790
GDP growth	0.029	0.032	-0.026	0.072	0.019	83,790
Industry concentration	0.207	0.161	0.029	0.965	0.157	81,280
MTB-Equity	2.475	1.627	-9.006	24.042	3.736	83,787
Naïve PD	0.092	0.000	0.000	0.905	0.204	70,540
Profitability	-0.010	0.039	-1.056	0.364	0.207	82,408
Sales growth	0.098	0.040	-0.705	2.638	0.415	82,894
Size	2,076.478	236.119	4.499	44,174.280	6,101.449	83,790
Tangibility	0.297	0.243	0.009	0.895	0.223	83,725
Volatility	0.152	0.140	0.050	0.362	0.066	81,874

Table 3: Correlations between Pairs of Variables

	Age (list)	Age	bAct. ind	Cash	Debt	Debt ratio	Equity	Excess return	Focus	GDP growth	Ind. Conc.	MTB-equity	Naïve PD	Profita-bility	Sales growth	Size	Tangibi-lity
Age	0.616	1.000															
bActive ind	-0.154	-0.218	1.000														
Cash	-0.150	-0.223	0.188	1.000													
Debt	0.401	0.247	-0.028	-0.125	1.000												
Debt ratio	-0.002	0.030	-0.090	-0.368	0.151	1.000											
Equity	0.378	0.232	-0.002	-0.023	0.704	-0.126	1.000										
Excess return	-0.037	-0.049	0.017	0.090	-0.027	-0.148	-0.006	1.000									
Focus	-0.321	-0.271	0.104	0.137	-0.177	-0.041	-0.158	0.012	1.000								
GDP growth	-0.011	-0.001	0.050	-0.054	-0.023	-0.008	-0.008	-0.065	0.010	1.000							
Ind. Conc.	0.064	0.123	-0.313	-0.162	-0.009	0.074	-0.032	-0.022	-0.065	0.000	1.000						
MTB-equity	-0.030	-0.077	0.074	0.175	0.017	-0.242	0.152	0.169	0.049	0.020	-0.052	1.000					
Naïve PD	-0.100	-0.106	0.002	-0.134	-0.017	0.557	-0.129	-0.043	0.061	-0.087	0.012	-0.149	1.000				
Profitability	0.147	0.201	-0.121	-0.218	0.073	-0.074	0.141	0.099	-0.107	0.030	0.091	-0.074	-0.231	1.000			
Sales growth	-0.102	-0.122	0.063	0.081	-0.006	-0.084	0.016	0.123	0.046	0.100	-0.038	0.142	-0.128	0.013	1.000		
Size	0.421	0.257	-0.013	-0.052	0.825	-0.060	0.967	-0.014	-0.179	-0.013	-0.028	0.116	-0.099	0.125	0.006	1.000	
Tangibility	0.056	0.086	-0.017	-0.327	0.162	0.287	0.064	-0.041	0.031	0.019	0.027	-0.071	0.073	0.095	-0.025	0.086	1.000
Volatility	-0.369	-0.449	0.208	0.288	-0.236	-0.014	-0.258	0.155	0.194	-0.046	-0.142	0.096	0.290	-0.438	0.089	-0.261	-0.214

Table 4: Company Age and Failure Hazard

The table investigates the relation between firm age and failure hazard. Variable definitions are in Table 13 at the end of the paper. We estimate the Prentice and Gloeckler (1978) discrete-time proportional hazard models incorporating a gamma mixture distribution to summarize unobserved firm heterogeneity (Meyer, 1990). Regression 1 estimates a hazard model similar to "Model 7" of Bharath and Shumway (2008). In regressions 2, we only control for firm age. In regressions 3 to 6, we include all control variables and add alternative definitions of firm age to inquire into alternative functional forms of the relation between firm age and failure hazard, namely: ln(*Age*) in regression 2; the age measure proposed by Pastor and Veronesi (2003), 1/(1+ *Age*), in regression 3; *Age* and Age^2 in regression 4 (for reading convenience, we multiply the coefficient of the quadratic term with 100); and the old-firm dummy (*bOld*) in regression 5. Standard errors are reported in parentheses. The symbols ***, **, and * indicate statistical significance with 0.99, 0.95, and 0.90 confidence, respectively.

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5	Regression 6
ln(Age)		–0.713***	–0.275***			
		(0.044)	(0.046)			
–1/(1+Age)				–4.588***		
				(0.891)		
Age					–0.022***	
					(0.005)	
$Age^2/100$					0.015***	
					(0.005)	
bOld						–0.239***
						(0.066)
Naïve PD	1.534***		1.556***	1.554***	1.560***	1.578***
	(0.098)		(0.112)	(0.111)	(0.112)	(0.113)
s ln(E)	–0.961***		–1.065***	–1.043***	–1.065***	–1.075***
	(0.056)		(0.066)	(0.065)	(0.066)	(0.066)
s ln(D)	0.100**		0.203***	0.181***	0.202***	0.188***
	(0.043)		(0.050)	(0.049)	(0.050)	(0.050)
s 1/Volatility	–0.256***		–0.263***	–0.283***	–0.259***	–0.275***
	(0.044)		(0.056)	(0.055)	(0.056)	(0.056)
s Excess return	–0.157***		–0.214***	–0.214***	–0.214***	–0.212***
	(0.027)		(0.033)	(0.033)	(0.033)	(0.033)
s Profitability	–0.529***		–0.502***	–0.501***	–0.502***	–0.515***
	(0.023)		(0.026)	(0.026)	(0.026)	(0.027)
Constant	–5.037***	–1.638***	–4.378***	–5.467***	–4.799***	–5.156***
	(0.051)	(0.132)	(0.159)	(0.075)	(0.103)	(0.069)
Observations	69,920	57,898	57,898	59,229	57,909	57,909

Table 5: Company Age and Takeover Hazard

The table investigates the relation between firm age and takeover hazard. Variable definitions are in Table 13 at the end of the paper. We estimate the Prentice and Gloeckler (1978) discrete-time proportional hazard models incorporating a gamma mixture distribution to summarize unobserved firm heterogeneity (Meyer, 1990). Regression 1 estimates a hazard model without firm age. In regressions 2, we only control for firm age. In regressions 3 to 6, we include all control variables and add alternative definitions of firm age to inquire into alternative functional forms of the relation between firm age and failure hazard, namely: ln(*Age*) in regression 2; the age measure proposed by Pastor and Veronesi (2003), 1/(1+ *Age*), in regression 3; *Age* and Age^2 in regression 4 (for reading convenience, we multiply the coefficient of the quadratic term with 100); and the old-firm dummy (*bOld*) in regression 5. Standard errors are reported in parentheses. The symbols ***, **, and * indicate statistical significance with 0.99, 0.95, and 0.90 confidence, respectively.

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5	Regression 6
ln(Age)		–0.172***	–0.129***			
		(0.028)	(0.032)			
–1/(1+Age)				–2.434***		
				(0.671)		
Age					–0.006**	
					(0.003)	
$Age^2/100$					0.002	
					(0.003)	
bOld						–0.117***
						(0.042)
s Sales growth	–0.116***		–0.116***	–0.114***	–0.116***	–0.111***
	(0.020)		(0.023)	(0.023)	(0.023)	(0.023)
s MTB-equity	–0.139***		–0.148***	–0.147***	–0.148***	–0.146***
	(0.021)		(0.024)	(0.024)	(0.024)	(0.024)
s Cash	–0.052**		–0.066***	–0.066***	–0.066***	–0.062***
	(0.021)		(0.024)	(0.023)	(0.024)	(0.024)
s Debt ratio	0.010		0.005	0.010	0.004	0.007
	(0.021)		(0.023)	(0.023)	(0.023)	(0.023)
s Profitability	0.083***		0.091***	0.094***	0.089***	0.087***
	(0.021)		(0.024)	(0.024)	(0.024)	(0.024)
s Excess return	0.098***		0.089***	0.087***	0.089***	0.089***
	(0.017)		(0.020)	(0.020)	(0.020)	(0.020)
s Tangibility	–0.025		–0.019	–0.024	–0.019	–0.019
	(0.020)		(0.022)	(0.022)	(0.022)	(0.022)
s Size	0.000		0.017	0.010	0.020	0.007
	(0.020)		(0.024)	(0.023)	(0.024)	(0.023)
s Focus	0.124***		0.116***	0.120***	0.114***	0.121***
	(0.021)		(0.024)	(0.023)	(0.024)	(0.023)
Industry concentration	–0.298**		–0.446***	–0.462***	–0.438***	–0.472***
	(0.126)		(0.150)	(0.147)	(0.149)	(0.149)
bActive industry	0.244***		0.295***	0.301***	0.292***	0.311***
	(0.037)		(0.044)	(0.043)	(0.044)	(0.043)
GDP growth	7.935***		7.203***	7.248***	7.250***	7.205***
	(0.975)		(1.146)	(1.128)	(1.145)	(1.136)
Constant	–3.461***	–2.667***	–3.126***	–3.657***	–3.378***	–3.492***
	(0.056)	(0.092)	(0.121)	(0.065)	(0.081)	(0.062)
Number of observations	77,971	65,658	65,658	67,055	65,658	65,658

Table 6: Company Age and Competing Exit Risks

The table estimates pooled multinomial logit regressions with standard errors corrected for heteroskedasticity and firm clustering. We distinguish between takeover and failure hazard as well as other exit reasons (not reported). Regression 1 only controls for firm age (ln(Age)). In regressions 2 to 4, we add the control variables and estimate various functional forms of the relation between age and exit hazard. ln(Age) in regression 2; Age and Age2 in regression 3 (for reading convenience, we multiply the coefficient of the quadratic term with 100); and the old-firm dummy (*bOld*) in regression 4. Standard errors are reported in parentheses. Variable definitions are in Table 13. The symbols ***, **, and * indicate statistical significance with 0.99, 0.95, and 0.90 confidence, respectively.

	M-Logit 1		**M-Logit 2**		**M-Logit 3**		**M-Logit 4**	
	Takeover	**Failure**	**Takeover**	**Failure**	**Takeover**	**Failure**	**Takeover**	**Failure**
ln(Age)	–0.193***	–0.736***	–0.134***	–0.239***				
	(0.031)	(0.043)	(0.035)	(0.051)				
Age					–0.008**	–0.021***		
					(0.003)	(0.005)		
$Age^2/100$					0.004	0.015***		
					(0.003)	(0.005)		
bOld							–0.114**	–0.193***
							(0.049)	(0.071)
Naïve PD			–0.288**	2.216***	–0.284**	2.216***	–0.275*	2.240***
			(0.142)	(0.138)	(0.142)	(0.138)	(0.141)	(0.137)
s Size			–0.014	–0.647***	–0.013	–0.650***	–0.022	–0.663***
			(0.028)	(0.053)	(0.028)	(0.053)	(0.028)	(0.053)
s Debt ratio			0.070**	0.097**	0.069**	0.098**	0.070**	0.093**
			(0.028)	(0.039)	(0.028)	(0.039)	(0.028)	(0.039)
s 1/Volatility			–0.014	–0.395***	–0.013	–0.393***	–0.021	–0.400***
			(0.031)	(0.065)	(0.031)	(0.065)	(0.031)	(0.064)
s Excess return			0.097***	–0.276***	0.097***	–0.276***	0.097***	–0.276***
			(0.021)	(0.039)	(0.021)	(0.039)	(0.021)	(0.039)
s Profitability			0.049*	–0.566***	0.047*	–0.566***	0.047*	–0.572***
			(0.028)	(0.026)	(0.028)	(0.026)	(0.028)	(0.026)
s Sales growth			–0.116***	–0.053*	–0.115***	–0.054*	–0.110***	–0.043
			(0.026)	(0.032)	(0.026)	(0.032)	(0.026)	(0.032)
s MTB-equity			–0.113***	0.054*	–0.113***	0.054*	–0.111***	0.058*
			(0.026)	(0.031)	(0.026)	(0.031)	(0.026)	(0.031)
s Cash			–0.082***	–0.258***	–0.081***	–0.259***	–0.079***	–0.252***
			(0.028)	(0.048)	(0.028)	(0.048)	(0.028)	(0.048)
s Tangibility			–0.014	–0.036	–0.014	–0.036	–0.014	–0.033
			(0.024)	(0.033)	(0.024)	(0.033)	(0.024)	(0.033)
s Focus			0.112***	0.044	0.111***	0.042	0.117***	0.051
			(0.027)	(0.039)	(0.027)	(0.039)	(0.027)	(0.039)
Industry conc.			–0.380**	–0.269	–0.375**	–0.261	–0.405**	–0.300
			(0.161)	(0.239)	(0.161)	(0.238)	(0.161)	(0.239)
bActive industry			0.317***	0.174**	0.315***	0.172**	0.333***	0.195***
			(0.047)	(0.070)	(0.047)	(0.070)	(0.047)	(0.070)
GDP growth			4.763***	–5.660***	4.798***	–5.651***	4.755***	–5.408***
			(1.373)	(1.879)	(1.373)	(1.880)	(1.361)	(1.858)
Constant	–2.540***	–1.473***	–2.980***	–4.355***	–3.229***	–4.697***	–3.366***	–5.045***
	(0.101)	(0.124)	(0.135)	(0.194)	(0.093)	(0.134)	(0.072)	(0.104)
Observations	55'503		55'503		55'503		55'503	
Pseudo R2	0.080		0.187		0.188		0.187	

Table 7: The Economic Impact of Company Age on Exit Hazard

The table shows predicted failure and takeover hazards from Model 2 of Table 6. All variables except for ln(*Age*) are kept at their average value. The first line of the table shows predicted failure and takeover hazard at incorporation age 5 (ln(*Age*) = 1.6094). The second line of the table shows predicted failure and takeover hazard at incorporation age 25 (ln(*Age*) = 3.2189).

	Failure hazard	**Takeover hazard**
Age = 5	Prediction: 2.66% (Standard error: 0.17%)	4.77% (0.28%)
Age = 20	1.99% (0.06%)	3.85% (0.08%)
Difference	1.99–2.66 = –0.67%	3.95–4.67 = –0.92%
Standard error of difference	0.18%	0.29%
Left-hand side interval limit	–0.67 – 2*0.18= –1.03%	–0.92 – 2*0.29= –1.50%

Table 8: Company Age and Formal Takeover Defenses

The table investigates the relation between firm age and corporate antitakeover provisions. Panel A examines the popularity of each provision (Sample mean) and investigates its relation with firm age. Each row reports the result of two separate regressions of the governance on firm age (*ln(Age*) and *b Old*, respectively) and the set of control variables of Model 1 in Table 5. For reading convenience, we report only the coefficients of firm age. We estimate conditional logit regressions with industry-year fixed effects and robust standard errors. The governance variables except for institutional ownership are provided by IRRC on a bi- or triannual basis, starting in 1990. To increase sample size, we interpolate those variables for missing sample years. Data on institutional ownership is from CDA Spectrum. Panel B lists the frequency of changes in governance provisions and investigates whether these changes are related with firm age, conditional on the control variables. The dependent variables in those regressions are binary variables that measure whether a given provision was added or removed in a given year, respectively. Firms that have a specific provision in place are excluded in the column labeled Adoptions; those that do not have it are excluded in the column labeled Removals. The control variables are again obtained from Model 1 in Table 5. Variable definitions are in Table 13. Standard errors are reported in parentheses. The symbols ***, **, and * indicate statistical significance with 0.99, 0.95, and 0.90 confidence, respectively.

Panel A: Company age and takeover defenses

	Sample mean	ln(Age)		bOld	
b Dual class	0.097	0.137**	(0.069)	0.322***	(0.091)
b Staggered board	0.565	–0.062	(0.038)	–0.065	(0.051)
b Pill	0.917	–0.325***	(0.074)	–0.224**	(0.101)
b Staggered board & b Pill	0.537	–0.101***	(0.037)	–0.138***	(0.050)
b Voting restriction	0.354	–0.153***	(0.039)	–0.245***	(0.055)
b Golden parachute	0.572	0.238***	(0.038)	0.193***	(0.052)
b Institutional blockholder	0.361	0.082***	(0.018)	–0.016	(0.023)

Panel B: Frequency of changes in antitakeover protection

Provisions	Adoptions		Removals		Firm years
	Observations	Coefficient *bOld*	Observations	Coefficient *bOld*	
Dual class	21	–	44	–	12,060
Staggered board	72	0.036	111	0.767**	12,060
Pill	57	–0.833**	32	0.336	12,060
Staggered board & Pill	87	–0.051	113	1.047***	12,060
Voting restriction	396	0.096	248	–0.577***	12,039
Golden parachute	674	–0.220**	424	–0.131	12,023
Institutional blockholder	4,361	–0.150***	2,673	–0.203***	79,116

Table 9: Company Age Effect on Takeover Hazard and Antitakeover Provisions

The table investigates whether the age effect we observe in Table 6 is related to the presence of antitakeover defenses. We replicate the pooled multinomial logit regressions with standard errors corrected for heteroskedasticity and firm clustering of Model 2 in that table. The arguments include the antitakeover defenses examined in Table 8. Because almost all firms have a (shadow) pill, we include this provision only in combination with staggered boards. For reading convenience, we report only the coefficients of firm age and those of the individual defense provisions. Variable definitions are in Table 13. Standard errors are reported in parentheses. The symbols ***, **, and * indicate statistical significance with 0.99, 0.95, and 0.90 confidence, respectively.

	Takeover hazard						
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
bOld	–0.533***	–0.532***	–0.526***	–0.138***	–0.554***	–0.516***	–1.055**
	(0.129)	(0.129)	(0.129)	(0.050)	(0.128)	(0.128)	(0.485)
b Dual class	–0.084					0.015	–0.073
	(0.199)					(0.200)	(0.303)
× bOld							0.264
							(0.430)
b Staggered board & b Pill		0.118				0.039	0.247
		(0.120)				(0.124)	(0.184)
× bOld							–0.389
							(0.267)
b Voting restriction			0.106			0.056	0.065
			(0.123)			(0.125)	(0.185)
× bOld							0.106
							(0.271)
b Institutional block.				0.763***		0.522***	–0.212
				(0.048)		(0.139)	(0.282)
× bOld							0.585
							(0.437)
b Golden parachute					0.542***	0.511***	0.559***
					(0.126)	(0.127)	(0.194)
× bOld							0.091
							(0.289)
Controls	Included	Included	Included	Included	Included	Included	Included
Observations	9'614	9'614	9'614	53'126	9'577	9'577	7'009
Pseudo R2	0.544	0.544	0.544	0.196	0.547	0.551	0.571

Table 10: Alternative interpretation of the age effect on takeover hazard

The table investigates alternative interpretations of the effect of company age on takeover hazar. Each row in the table reports coefficient estimates for the standard competing risk model of Table 6 (Model 4) when adding the variable listed in the first column to the control variables. Moreover, we add interaction terms of *bOld* with that variable as well as with the control variables. For reading convenience, we show only the coefficient of firm age, the coefficient of the variable in question, and the coefficient of the interaction term with *bOld*. Panel A focuses on potential imbalances between growth and available resources. Panel B asks whether the takeover market frees resources trapped in outdated structures. Finally, Panel C investigates the relevance of management age for exit risk. Standard errors are in parentheses. Variable definitions are in Table 13 at the end of the paper. The symbols ***, **, and * indicate statistical significance with 0.99, 0.95, and 0.90 confidence, respectively.

	bOld	Variable	Interaction	Controls and interactions
Panel A: Growth-resource imbalance				
bGrowth-resource imbalance	–0.173**	–0.134	0.106	Included
	(0.067)	(0.147)	(0.100)	
Panel B: Trapped resources				
bHigh R&D & bLow growth	–0.101**	0.157	–0.402	Included
	(0.049)	(0.543)	(0.361)	
bHigh capex & bLow growth	–0.101**	0.361	–0.286	Included
	(0.051)	(0.279)	(0.178)	
Panel C: Old management team				
bOld board	–0.545**	–1.185**	0.361	Included
	(0.220)	(0.580)	(0.327)	
bOld CEO	–0.435**	–0.672	–0.034	Included
	(0.159)	(0.456)	(0.240)	

Table 11: Firm Age and Exit Risk in Distressed Industries

The table asks how industry distress affects exit risk at old age. As in Opler and Titman (1994) and Gopalan and Xie (2011), among others, an industry is assumed to be in distress if median sales growth is negative and median stock return is below –30%. Distressed industries are identified with the binary variable *bIndustry distress*. Regression 1 adds *bIndustry distress* as well as an interaction term with the old–firm dummy to the standard competing risk regression model from Table 6. Regression 2 also includes interaction terms for all other control variables (not shown). Regression 3 estimates the standard competing risk regression in the subsample of firms that operate in distressed industries. To preserve space, we do not report the coefficients of the control variables. The symbols ***, **, and * indicate statistical significance with 0.99, 0.95, and 0.90 confidence, respectively.

	Full sample				Distressed industries	
	M–Logit 1		M–Logit 2		M–Logit 3	
	Takeover	Failure	Takeover	Failure	Takeover	Failure
bOld	–0.098**	–0.258***	–0.095*	–0.269***	–0.891***	0.589**
	(0.049)	(0.074)	(0.049)	(0.074)	(0.335)	(0.272)
bIndustry distress	–0.047	0.264	–0.798**	–0.997**		
	(0.175)	(0.185)	(0.399)	(0.468)		
bOld × bIndustry distress	–0.671**	0.689***	–0.797**	0.858***		
	(0.315)	(0.265)	(0.338)	(0.283)		
Other controls	Included		Included		Included	
Other cont. × bInd. distress	Excluded		Included		Excluded	
Observations	55,503		55,503		1,827	
Pseudo R2	0.186		0.188		0.201	

Table 12: The Source of the Company Age Effect on Takeover Hazard

The table investigates the source of the company age effect on takeover hazards. Panel A shows the prevalence of firms with BWM characteristics in our sample. Panel B controls for firms with BWM characteristics in the relation between firm age and takeover risk. We estimate the standard competing risk model of Table 6 (Model 4) when adding the interaction term *bLow growth & bStable* to the control variables. Moreover, we add interaction terms of *bOld* with *bLow growth & bStable* as well as with the control variables. We focus on takeover. For reading convenience, we show only the coefficient of firm age, the coefficient of the variable in question, and the coefficient of the interaction term with *bOld*. Standard errors are in parentheses. Variable definitions are in Table 13 at the end of the paper. The symbols ***, **, and * indicate statistical significance with 0.99, 0.95, and 0.90 confidence, respectively.

Panel A: Prevalence of firms with BWM characteristics

	Proportion of firm years with *bLow growth & bStable* = 1
Full sample	0.231
Sub-sample of old firms (*bOld* = 1)	0.306
Sub-sample of young firms (*bOld* = 0)	0.148

Panel B: Controlling for BWM in the relation between age and takeover hazard

Variable added to the specification of Model 4 in Table 6	bOld	Variable	Interaction	Controls and interactions
No variable added	–0.114** (0.081)			
bLow growth & bStable	0.013 (0.053)	0.035 (0.192)	–0.555*** (0.141)	Included

Table 13: Variable Definitions

Variable	Definition
Panel A: Firm age	
Age	Age is computed as one plus the difference between the year under investigation and the firm's year of incorporation;
bOld	a dummy variable that identifies firms older than the median in any given year;
Panel B: Control variables	
bActive industry	Binary variable equal to 1 if at least on acquisition occurred in a firm's 4–digit SIC industry during the previous year. Otherwise, the variable is set equal to 0;
Cash	The firm's cash and short–term investments (che) divided by the book value of its total assets (at – ceq + csho×prcc_f – txdb);
D	The firm's book value of debt (dltt + dlc);
Debt ratio	Ratio of the book value of debt (*D*) to the market value of the firm's assets;
E	The firm's market value of common equity (csho×prcc_f);
Excess return	The firm's market–adjusted stock return. The market is the CRSP value–weighted NYSE/AMEX index;
Focus	The Herfindahl index, H_E, captures the degree of specialization based on the sales in the firm's different segments, as reported on the COMPUSTAT Segment tapes: $H_E = \sum_{i=1}^{N} p_i^2$, where N is the number of segments, the subscript i identifies the segments, and p_i is the fraction of the firm's total sales in the segment in question. Focus is a binary variable equal to 1 if the firm's Herfindahl index is 1, otherwise it equals 0;
GDP growth	The relative change in the U.S. gross domestic product. The data are from the Bureau of Economic Analysis of the U.S. Department of Commerce;
Industry concentration	We follow Giroud and Mueller (2010), among many others, and measure the lack of competition of the firm's industry (3–digit SIC) with a Herfindahl index, H_E: $H_E = \sum_{i=1}^{N} s_i^2$, where N is the number of firms in the same 3–digit SIC industry, the subscript i identifies the firms, and s_i is the firms' market share based on sales (sale). The higher the index, the less competitive the industry becomes. To correct for potential misclassification, we drop the top 2.5% of the firm–years at the right tail of the distribution (Giroud and Mueller, 2010);
MTB–Equity	The firm's market value of equity (*E*) divided by its book value of equity (ceq). We use this ratio as a proxy for Tobin's Q;
Naïve PD	The "naïve" default probability implied by Merton's (1974) model (see Bharath and Shumway, 2008);
Profitability	Net income (ni) divided by book value total assets (ta);
Sales growth	The ratio of the firm's current sales (sale) divided by the sales of the previous year minus 1. Sales figures are expressed in 2009 dollars;
Size	The log of the market value of the firm's assets (at – ceq + csho×prcc_f – txdb);
Tangibility	The firm's property, plant, and equipment (ppent) divided by *Size*.
Volatility	The annualized standard deviation of the firm's monthly stock return. We calculate volatility over a 5–year window. The data are from the monthly CRSP tapes;
Panel C: Antitakeover protection	
bDual class	Binary variable that identifies firms with multiple classes of stock outstanding;
bGolden parachute	Binary variable that identifies firms with golden parachutes;
bInstitutional blockholder	Binary variable that identifies firms with an institutional blockholder than owns more than 5 percent of the firm's outstanding shares. The data are from CDA Spectrum.
bPill	Binary variable that identifies firms that have a poison pill or a blank check preferred stock authorization;
bStaggered board	Binary variable that identifies firms with classified boards;
bVoting restrictions	Binary variable that identifies firms with restrictions on shareholders to vote by written consent or to call a special meeting
Panel D: Other variables	
bGrowth–resource imbalance	Binary variable that identifies firms with either one of the following two characteristics: a) *bLowgrowth* = 1 and *Cash* larger than the industry average; or b) *bLowgrowth* = 0 and *Cash*

	smaller than the industry average.
bHigh R&D	Binary variable that identifies firms with R&D expenses (xrd) larger than the industry average. We standardize R&D expenses by sales.
bHigh capex	Binary variable that identifies firms with capital expenditures (capx) larger than the industry average. We standardize capital expenditures expenses by sales.
bIndustry distress	Binary variable that identifies industries with negative median sales growth and median stock return below -30 percent;
bLowgrowth	Binary variable that identifies firms with growth opportunities smaller than the industry average in any given year. Growth opportunities are defined as the firm's share price (prcc_f) minus the present value of the equity in place, expressed in % of the share price. To obtain the value of the equity in place, we follow Richardson (2006) and compute it as (1–1.24×0.12) ×ceq+1.24×1.12×oiadp–1.24×0.12×dvc;
bOldCEO	a dummy variable that identifies firms with CEO age higher than the industry average in any given year;
bOldboard	a dummy variable that identifies firms with average director age higher than the industry average in any given year;
bProfitable	Binary variable that identifies firms with *Profitability* > 0.
bStable	Binary variable that identifies firms with Asset volatility below the industry average in any given year. Asset volatility is the weighted average of equity volatility and debt volatility. Debt volatility is assumed be 5% + 0.25**Volatility*. The weights are the ratio of book equity and book debt in the firm's capital structure (defined as sum of book value of debt and equity). See Barath and Shumway (2008);