Agency costs in the market for corporate control: evidence from UK takeovers

Agency Costs in the Market for Corporate Control: Evidence from UK Takeovers

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Abstract

Purpose: This paper examines whether agency costs predict disciplinary takeover likelihood for UK listed companies between 1986 and 2015.
Design/Methodology/Approach: Using survival analysis, our approach is to identify candidates for disciplinary takeover on the basis of Tobin's Q (TQ), which is consistent with the approach advocated by Manne (1965). We then examine how indicators of agency costs affect takeover likelihood within the set of disciplinary candidates.
Findings: We provide evidence of the effectiveness of Tobin's Q, rather than excess return, in identifying disciplinary takeover candidates. Takeover hazard for disciplinary candidates is higher for companies with higher levels of asset utilization and sales growth in particular. Companies with stronger agency problems are relatively less susceptible to disciplinary takeover.
Practical Implications: Given the UK context of our study, where anti-takeover provisions are disallowed, and when compared to findings of US studies, our results imply some support for the effectiveness of an open merger policy.
Originality/Value: While the connection between takeover likelihood and the market for corporate control has been made in previous studies, our study adopts a more explicit agency theory framework than previous studies of takeover likelihood. A key component of our contribution follows from differentiating candidates for disciplinary takeovers from other forms of M&A.

Keywords: Takeover Likelihood; Market for Corporate Control; M&A; Agency Costs; Survival Analysis.
JEL classification: G3, G32, G34, G38.

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1. Introduction

The market for corporate control operates as a disciplinary mechanism which both pressures managers to make decisions in the best interests of shareholders and acts as the *court of last resort* when other corporate governance systems fail (Kini et al., 2004). Through price pressure and threat of takeover, stock markets are a key instrument for disciplining management and reducing agency costs (Manne, 1965). Previous studies have examined whether agency cost indicators determine takeover likelihood for the market as a whole (Palepu, 1986; Comment and Schwert, 1995; Cooley and Quadrini, 2001; Dickerson et al., 2002; Loderer and Waelchli, 2015). Yet, not all takeovers are disciplinary. To date, little work has been done specifically on the set of candidates for disciplinary takeovers. In our framework, companies subject to significant stock price falls, especially relative to asset values, are expected to be subject to market discipline. Our theoretical view is that high agency costs will, when reflected in equity values, result in undervaluation of companies. These disciplinary candidates then become takeover targets. So the purpose of this paper is to answer two questions. First, does underperformance result in increased takeover hazard for the disciplinary set? and second, within the disciplinary set, which agency cost indicators are associated with market discipline?

While the connection between takeover likelihood and the market for corporate control has been made in previous studies (e.g., Dickerson et al. 2002, Kini et al. 2004), our study adopts a more explicit agency theory framework than previous studies of takeover likelihood. A key component of our contribution follows from differentiating candidates for disciplinary takeovers from other forms of M&A. Using a similar albeit more simplistic approach to classification, Dickerson et al. (2002) focus on classifying cases with respect to Jensen's definition of agency costs of free cash flow (Jensen, 1986). Our approach is to identify candidates for disciplinary takeover on the basis of Tobin's Q (TQ), which is consistent with the approach advocated by Manne (1965). We then examine how indicators of agency costs affect takeover likelihood within the set of disciplinary candidates. The agency cost indicators used in this study are identified from a broad review of the takeover likelihood and agency cost literature. These include relative profitability (Jensen and Meckling, 1976; Gompers et al., 2003; Coles et al., 2008), asset utilization (Jensen and Meckling, 1976; Ang et al., 2000; Singh and Davidson III, 2003), cost management (Jensen and Meckling, 1976; Ang et al., 2000; Singh and Davidson III, 2003), dividend policy (Jensen, 1986), leverage (Jensen, 1986; McKnight and Weir, 2009), unused debt capacity (Jensen, 1986; Powell and Yawson, 2007), investment behavior (Jensen, 1986; Yermack, 1996) and growth (Jensen, 1986; Singh and Davidson III, 2003; McKnight and Weir, 2009).

Our findings help explain the workings of one of the central mechanisms for rectifying systemic and company specific agency costs. We find support for the impact of pre-bid stock return and valuation on takeover likelihood. Firms that experience a

significant fall in share price have a significantly higher takeover likelihood. However, we find no association with agency cost indicators for these takeovers. Stock price falls alone do not indicate a disciplinary effect as stock price effects may indicate a correction to the market value rather than agency costs. Such an effect may arise simply due to investor sentiment (see for example, De Bondt and Thaler, 1985; Dreman and Berry, 1995; Robert, 2000). When we extend the analysis to takeovers with a low market value relative to the replacement costs of assets i.e. Tobin's Q, the results indicate that several of our agency cost indicators are associated with takeover likelihood. Asset utilization and sales growth exhibit positive associations with takeover likelihood. These findings indicate that when compared to non-disciplinary takeovers, the use of assets and the productivity of those assets are higher. And these variables are not significant in the sample as a whole, indicating discipline is the primary determinant. Notably, profitability is negatively associated with the risk of takeover for the disciplinary set. Higher profits indicate a lower probability of a takeover which could be interpreted as an indication that there is little value accretion available from improving management. Such companies are less attractive despite higher profitability i.e. they have low growth prospects. For the non-disciplinary takeovers in our sample, once we control for discipline, company fundamentals have little association with takeover likelihood.

State laws, corporate bylaws and anti-takeover provisions limit the effectiveness of the market for corporate control as a disciplinary tool in US markets and its usefulness as a setting for this study (see for example, Baysinger and Butler, 1985; Bebchuk et al., 2009; Li et al., 2019). Given the UK context of our study, where anti-takeover provisions are disallowed, and when compared to findings of US studies, our results imply some support for the effectiveness of an open merger policy, should regulators desire a functional market for corporate control (Agrawal and Jaffe, 2003; Rhodes-Kropf et al., 2005; Powell and Yawson, 2007; Loderer and Waelchli, 2015). For example, at the time of writing, the UK is considering allowing dual class shares for some firms in order to attract inward investment.[1] This makes our study timely as well as important for understanding the effectiveness of the market for corporate control. The US allows dual class share structures which concentrate control rights in the hands of a few shareholders, or in the case of at least one company (Snapchat), there are no control rights for a large number of ordinary shareholders.[2] For companies with such ownership structures, the market for corporate control is impeded as liquidity limits

[1]See for example, "LSE urges listing rules reform for fast growth companies", Daniel Thomas and Philip Stafford, 6th January 2021 https://www.ft.com/content/358c2138-3b48-4488-8a39-f5a8158268f9.

[2]See SNAP S-1 filing: https://www.sec.gov/Archives/edgar/data/1564408/000119312517029199/d270216ds1.htm.

price discovery and the protection provided by disciplinary takeovers is diminished. Other anti-takeover provisions which are disallowed under UK takeover rules include poison pills and greenmail. Listed UK companies must defend themselves by making the argument. For this reason our study has significant implication beyond the context of the UK. It is relevant for the effectiveness of an open market policy and the desirability of anti-takeover provisions where they are in use.

The remainder of the paper is organized as follows: We continue to review the relevant literature on takeover likelihood and agency costs in Section 2. We then present the hypotheses for this study in Section 3. Issues relating to data collection and takeover likelihood modeling are discussed in Section 4. Section 5 includes the empirical results and a discussion of the findings. The final section provides concluding comments.

2. Literature

Our study brings together three strands of literature. Firstly, we discuss Manne's theory of the market for corporate control which underpins the argument made in this study. We next proceed to the link between takeover likelihood and the market for corporate control before examining the literature more specifically on the determinants of takeover likelihood. The importance of the market for corporate control should not be underestimated. In any market-based system, in which allocative efficiency relies on market valuations and shareholder primacy underpins corporate governance, the market for corporate control is the *court of last resort* (Jensen, 1987; Kini et al., 2004). Perhaps this point is best captured by Manne (1965) when he states that *'Only the takeover scheme provides some assurance of competitive efficiency among corporate managers and thereby affords strong protection to the interests of vast numbers of small, non-controlling shareholders'* (p 113).

In another key insight, Manne (1965) continues that *'The lower the stock price, relative to what it could be with more efficient management, the more attractive the takeover becomes to those who believe that they can manage the company more efficiently'* (p 113). Consistent with this second insight, a stock's value reflects the value of the management of company assets and if values are lower than could be achieved by a more efficient management team, the company becomes a takeover target (Manne, 1965). In theory, after the takeover, inefficient management will be removed and the stock price restored to the true value. Dispersed ownership, index investing strategies and free rider problems lead shareholders to rely on buy and sell decisions instead of monitoring management. Exit (the decision to sell) famously dominates the voice mechanism in market-based systems of governance (Jensen and Ruback, 1983). According to Manne (1965), downward pressure on stock prices resulting from shareholders' decisions to sell their stock follow from inefficient management

of assets and are reflected in the market value. Any deviations from the true value due to inefficient management are agency costs, i.e. costs arising from the separation of ownership and control (Jensen and Meckling, 1976).

While majority of empirical research on the market for corporate control focuses on abnormal returns accruing to target shareholders (Jensen and Ruback, 1983), relatively few studies examine the more specific question of whether the market disciplines firms that perform poorly due to agency costs. Studies of abnormal returns to Mergers & Acquisitions (M&A) do not usually compare disciplinary and non-disciplinary takeovers or targets and non-targets. Instead studies focus on hostile takeovers. However, Schwert (2000) argues that it is not possible to distinguish between friendly and hostile takeovers. Furthermore, takeovers may occur for non-disciplinary reasons (Walsh and Kosnik, 1993; Sinha, 2004). Similarly, no definitive statement can be derived regarding the disciplinary effect of takeovers without comparison between companies that are taken over and those that are not. Such a statement can be made by modeling takeover likelihood.

In addition, Manne's view requires effective, if not necessarily efficient, market pricing. Yet the identification of anomalies, such as the small firm effect (Fama and French, 1993), the neglected firm effect (Arbel et al., 1983), reversal and valuation effects (De Bondt and Thaler, 1985; Dreman and Berry, 1995; Robert, 2000), momentum (Carhart, 1997) and calendar-related effects (French, 1980; Roll, 1983; Keim and Stambaugh, 1984; Kamstra et al., 2000), and the advent of passive investment strategies give rise to concern about whether present market structures continue to protect shareholders from agency costs.

2.1. Takeover Likelihood and the Market for Corporate Control

Takeover likelihood studies have provided insight into the type of companies that are more likely to be taken over. Manne (1965) discusses the mechanism by which poorly performing managers may be removed via the takeover mechanism. He describes this phenomenon as *the market for corporate control*. The pressure from the market may be sufficient to motivate managers to act in the best interest of shareholders. In this framework, inefficiently managed companies should become takeover targets. Poorly performing management should be removed and new, more efficient management installed. Shareholders are thus protected from agency costs since if companies perform sufficiently poorly with the assets of the company, bidders who believe they can improve the market value will compete to acquire the underperforming company leading to stock price increases.

If the market for corporate control is effective, we expect takeover likelihood to increase when management is underperforming. Evidence on this is provided by Wang and Wu (2020) who, recognising the disciplinary role of the market for corporate control, note that underperforming managers respond positively to the threat of

takeover. Their results indicate that an active takeover market enhances the value created by 21%. From a bidders perspective, De Bodt et al. (2018) indicate the presence of overbidding in contested takeover battles, supporting the argument that the market for corporate control protects target company shareholders possibly at a cost to shareholders of the bidder. Several variables may indicate the presence of agency costs in such takeovers. For instance, higher profitability or market valuation may indicate lower levels of agency costs. While it is possible that agency costs and high operating performance may be present simultaneously, such costs are a problem only when shareholders do not receive their required rate of return. Similarly, higher stock returns indicate lower levels of agency costs (Jensen and Meckling, 1976; Jensen, 2001). Empirical results are mixed. Powell and Yawson (2007) and Loderer and Waelchli (2015) find that excess returns are positively associated with takeover probability. Alternatively, Agrawal and Jaffe (2003) observe no relationship between stock returns and takeover risk, whereas Dickerson et al. (2002) report evidence for higher takeover likelihood in low profitability firms.

Several studies examine whether growth opportunities are associated with takeover risk. However, these studies fail to reach a consensus. Jensen (1986) demonstrates that agency costs are associated with free cash flows. High free cash flows in the absence of growth prospects may indicate high agency costs (Jensen, 1986; McKnight and Weir, 2009). Some studies, for example Powell and Yawson (2007), directly examine the effect of variables which might be expected to be associated with company growth such as sales growth and free cash flow on takeover likelihood but find no significant effect. Sales growth, valuation multiples, liquidity and leverage can indicate imbalances between growth opportunities and company resources (Palepu, 1986; Powell and Yawson, 2007). The value of a company with high growth prospects but limited access to necessary resources could be fully realized if that organization were to be acquired by a bidder with suitable resources. Consistent with this view, Palepu (1986) reported higher takeover risk for firms identified as having a growth-resource imbalance.

Other studies more directly investigate the relationship between growth opportunities and company valuation. Bates et al. (2008) and Cremers et al. (2008) observe a small but significant negative effect of Tobin's Q on takeover likelihood, indicating that as growth opportunities increase, the risk of takeover is marginally reduced. On the other hand, Rhodes-Kropf et al. (2005) observe a positive association between the market-to-book ratio and takeover likelihood, which is inconsistent with an agency cost explanation. Both Palepu (1986) and Ambrose and Megginson (1992) find no measurable effect for Tobin's Q.

In work with similarities to the present study, Dickerson et al. (2002) test Jensen's free cash flow hypothesis by examining the level of investment, dividend payment and leverage of high and low Tobin's Q firms compared to other firms. On average, higher

investments lead to a lower takeover risk regardless of the level of Tobin's Q, while there is no relationship between Q and either dividend payments or leverage. In addition, investment levels of low Q firms are negative, offering no support for the free cash flow hypothesis (Jensen, 1986). Also, Edmans et al. (2012) estimate the discount implied by the difference between the potential, optimal firm valuation and market value. While the authors find strong support for an active role of capital markets in a takeover, it is not clear whether the discount is due to agency costs or mispricing.

The level of debt is another variable expected to put pressure on management to use resources more efficiently (Jensen, 1986; Harvey et al., 2004; Berger and Bonaccorsi di Patti, 2006; King and Santor, 2008; Margaritis and Psillaki, 2010). Therefore, higher levels of debt should be associated with lower takeover probability. However, there appears to be limited support for this view in the empirical literature. Bruner (1988) reports that target firms have significantly higher leverage compared to their peers and Nuttall (1999) finds that takeover likelihood increases only slightly as debt increases. Leverage is reported to have an insignificant effect on takeover likelihood in several other studies (Dickerson et al., 2002; Powell and Yawson, 2007; Loderer and Waelchli, 2015).

2.2. Influences on Takeover Likelihood

The likelihood of becoming a takeover target is found to be influenced by several variables. For instance, firm size is considered to have an important influence on takeover likelihood (Palepu, 1986; Comment and Schwert, 1995; Cooley and Quadrini, 2001; Dickerson et al., 2002; Loderer and Waelchli, 2015). Larger firms are viewed as less attractive because they have fewer potential buyers and are harder to integrate with the buyer (Cooley and Quadrini, 2001). Takeover likelihood should, therefore, be greater for small firms. However, empirical studies provide contrasting results. Palepu (1986) and Comment and Schwert (1995) find the expected negative relationship while others report a positive association (Dickerson et al., 2002; Loderer and Waelchli, 2015).

Takeover risk also decreases as firms mature. Mature firms often have lower profitability and fewer growth opportunities, making them less attractive to bidders (Loderer and Waelchli, 2015; Loderer et al., 2016). Such firms have lower levels of investment in research and development (R&D) and higher post-merger integration costs. These firms may also have lower corporate governance standards and higher agency costs as a result (Loderer and Waelchli, 2015). For younger, smaller firms, exit risk is a particular concern (Bhattacharya et al., 2015). The 10-year survival rate for newly listed firms is just above 50%, with the main exit reason being takeover (Fama and French, 2004). Notably, Shumway (2001) find no empirical evidence of a relationship between company age and risk of bankruptcy.

A commonly expressed hypothesis is that high cash reserves invite takeover bids, especially when no growth opportunities are present (Palepu, 1986). Contrary to this expectation, the literature regularly fails to report a significant relationship between liquidity and takeover likelihood (Palepu, 1986; Barnes, 2000; Dickerson et al., 2002). In fact, Loderer and Waelchli (2015) find that takeover likelihood is lower for companies with high cash reserves.

Two further issues are worthy of consideration. First, M&A activity tends to occur in waves (DePamphilis, 2010). During merger waves, or periods of high takeover activity, takeover risk increases. These effects are closely related to economic growth and industry concentration. Both of these factors can precipitate takeover waves, and economic growth is often accompanied by high investor sentiment and greater availability of funds. Loderer and Waelchli (2015) observe a significant impact of industry wide acquisition activity on takeover likelihood. Increasing industry concentration can trigger strategic competition and herding behavior, which increases takeover likelihood. As industry concentration increases, competitors gain market share and benefit from economies of scale. Such environments can lead to *eat or be eaten* situations where competitors race to gain market share by acquisition (Schoenberg and Reeves, 1999). Powell and Yawson (2007) find that industry concentration, as measured by the Herfindahl Index, has a positive impact on takeover likelihood.[3]

Second, a strand of the literature focuses on the availability of merger partners and the influence on takeover hazard. For instance, Hoberg and Phillips (2010) examine the presence of firms with similar product ranges as a proxy for merger partner availability. The authors report significantly higher takeover likelihood when rivals to potential targets had similar product ranges, particularly if there are only a few competitors. Rhodes-Kropf and Robinson (2008) find that companies with similar market-to-book ratios are often M&A partners and Loderer and Waelchli (2015) observe a positive effect on takeover likelihood when merger partners are of similar size.

A large literature has developed examining the variables which influence takeover likelihood. We summarize the findings of relevant studies of takeover likelihood in Table 1. However, we emphasize that none of these studies examines the disciplinary set specifically. In Panel A, we identify the market value determinants of takeover likelihood along with the effect identified in previous studies. Panel B lists the firm fundamental variables.

INSERT Table 1 Here

[3]The Herfindahl Index is calculated as the sum of squared market shares of all competitors in a market. A higher value indicates greater industry concentration.

3. Hypotheses

Consistent with Manne (1965), our prime indicator of disciplinary takeover risk is a change in market value. We test this in two ways. First, we examine the effect on disciplinary takeover risk arising from unexpected changes in the stock price and second, a change in Tobin's Q, that is, the market value relative to the replacement cost of assets. These variables are the basis of our main propositions. Specifically, we examine whether a significant discount indicates high takeover risk and argue that increases in takeover likelihood following significant reductions in valuation provide support for the effectiveness of the market for corporate control. However, given that stock price falls may be corrections to the true value of the firm, we expect agency cost indicators to be relatively weakly associated with disciplinary takeover risk. Hence, rather than using excess return for our primary hypothesis, we argue that disciplinary takeover risk is associated with Tobin's Q. We provide the results for excess return for comparison and as a robustness test. Hence, our null hypothesis is that takeover likelihood is unaffected by changes in Tobin's Q and are thus not associated with agency costs. Thus, our primary hypotheses (H_1 and H_2) are:

- H_1: Disciplinary takeover likelihood is not related to Tobin's Q.
- H_2: Disciplinary takeover likelihood is negatively related to Tobin's Q.

The third hypothesis (H_3) tests whether takeover likelihood is driven by specific measures of agency costs. In this view, and again consistent with Manne (1965), agency costs drive market value discounts which in turn, activate the market for corporate control and increase takeover likelihood. We argue that it is these firm fundamentals that drive disciplinary takeovers. Hence, our third hypothesis is:

- H_3: The likelihood of disciplinary takeover is positively related to agency cost indicators.

As discussed above, previous studies (see Table 1) have identified a number of firm-specific fundamental variables which indicate the level of agency costs. The variables include relative profitability (Jensen and Meckling, 1976; Gompers et al., 2003; Coles et al., 2008), asset utilization (Jensen and Meckling, 1976; Ang et al., 2000; Singh and Davidson III, 2003), cost management (Jensen and Meckling, 1976; Ang et al., 2000; Singh and Davidson III, 2003), dividend policy (Jensen, 1986), leverage (Jensen, 1986; McKnight and Weir, 2009), unused debt capacity (Jensen, 1986; Powell and Yawson, 2007), investment behavior (Jensen, 1986; Yermack, 1996) and growth (Jensen, 1986; Singh and Davidson III, 2003; McKnight and Weir, 2009). Table 1 summarizes the previous literature on determinants of takeover likelihood. We hypothesize that disciplinary takeover likelihood will be higher when the level of agency costs is higher. The direction of the relationship between disciplinary takeover likelihood and agency cost indicators is noted in Table 1.

4. Methodology

4.1. Sample Characteristics

Data for this study is collected for all UK companies - excluding financial companies and utilities - which have a primary listing in London and were listed at any point during 1986 to 2015. The starting point of 1986 was determined by the end of the previous regime (the UK Companies Act 1985) and the availability of agency costs data on Thomson One. The date for the end of the sample coincides with the 'Brexit' referendum and the later negotiations which continued up to the final exit of the UK from the EU at the end of 2020. Given the length of the observation period, we do not anticipate any significant contribution from the effort in extending the period and any changes in the results might be attributed to the Brexit transition, which is not part of our study. Company fundamental data is collected from Thomson Reuters DataStream and information regarding takeover bids is collected from Thomson ONE Banker. The announcement date is taken as the date of the takeover bid and the completion date is defined as the effective date of the merger or acquisition. Only successful takeovers where 100% of equity is owned by the bidder after completion are included.[4] The initial sample includes 6,016 takeovers of UK public targets with 874 failed attempts. Details of the sample construction are provided in Table 2. Panel A lists exclusions from the sample due to missing or inadequate data regarding the number of firms and takeovers. Numbers of firm-year observations, firms and takeovers in the final sample are provided in Table 2 Panel B. Note that around one-third of sample companies are taken over.

INSERT Table 2 Here

Other firm-specific variables are standardized by industry-year group and we use ICB industry classifications to identify industry groupings. All models include lagged values for estimation of current takeover hazard. We also control for several variables that are expected to affect takeover likelihood. We include market-wide variables such as industry concentration, takeover intensity and macroeconomic growth in the estimation, along with firm-specific factors such as the availability of similarly sized and valued competitors as previous studies have demonstrated that these factors are relevant to takeover risk (Loderer and Waelchli, 2015). Variable definitions are listed in Table 3.[5]

INSERT Table 3 Here

[4] Acquisitions of smaller percentages of control, e.g. 75%, are negligible in our sample.

[5] An important issue with the model we use is the basis for calculating duration. We calculate duration as the difference in years between financial year end and the first available year of data or the date of the most recent relevant event. The earliest available year of data for UK companies in DataStream is 1964. Accordingly, our data are effectively winsorized such that all companies are

4.2. Cox Proportional Hazards (Cox PH) Model

While traditional takeover likelihood studies rely on probit or logistic models (Palepu, 1986; Ambrose and Megginson, 1992), more recent studies use survival analysis (Dickerson et al., 2002; Loderer and Waelchli, 2015). A similar methodological shift has been observed in the bankruptcy prediction literature (Shumway, 2001). Survival models respect the panel nature of the data and allow for censoring of observations, both of which are hard to accomplish with logistic regression (Klein and Moeschberger, 2005). We use the Cox Proportional Hazards (Cox PH) model to estimate the effect of our explanatory variables (see Table 3) on takeover hazard. The initial Cox PH model is defined as follows:

$$h(t|x,y,z) = h_0(t)\exp(\beta\prime x + \gamma\prime y + \epsilon\prime z) \tag{1}$$

where $h(t|x,y,z)$ is the hazard at time t conditional on vectors of covariates x, y and z, $h_0(t)$ is the baseline hazard which, in the case of Cox PH, is nonparametric and β, γ and ϵ are the vectors of coefficients to be estimated. x is a vector of firm-level, market-value-based variables, y is a vector of firm-level fundamental variables and z is a vector of firm, industry and macro-level control variables. Covariates are lagged by one period. All models incorporate firm-specific (clustered) fixed effects. We include the *start* variable in all specifications to capture possible survivorship bias for companies established before 1964.

The assumption of proportional hazard states that the effect of a covariate on hazard is proportional over time, i.e. the covariate introduces a constant relative hazard. We test this assumption by requiring a non-zero slope in a generalized linear regression of scaled Schoenfeld residuals over a function of duration (Schoenfeld, 1982). Where the assumption is violated, we attempt to restore proportionality by including an interaction term between the problematic covariate and duration.

To address the second research question, we interact low excess return and low Tobin's Q dummies with firm-specific fundamental variables:

$$h(t|d_x,y,d_xy,z) = h_0(t)\exp(\beta\prime d_x + \gamma\prime y + \delta\prime d_x y + \epsilon\prime z) \tag{2}$$

where in addition to the variables included in Equation 1, d_x is a dummy variable indicating cases of either excess return or Tobin's Q in the bottom decile of the firm's industry-year group. δ is the vector of coefficients for the interaction terms between d_x and y.

considered to have been established in that year. Only about 9% of all companies are established in 1964 and of these, 53% are successfully taken over. In contrast, of the companies established after 1964, only 34% are acquired.

4.3. Accelerated Failure Time (AFT) Model

As a robustness test, we compare the Cox PH results to those of an Accelerated Failure Time model with an assumed Weibull distribution. In log-linear form, such a model can be written as:

$$\ln T = \mu - (\beta\prime d_x + \gamma\prime y + \delta\prime d_x y + \epsilon\prime z) + \sigma W \tag{3}$$

where $\ln T$ is the log of failure time, μ is the mean failure time and $\beta\prime d_x + \gamma\prime y + \delta\prime d_x y + \epsilon\prime z$ is the acceleration factor. σW is the error term and W describes the error term distribution. We assume a Weibull distribution. The coefficients are logs of survival time ratios. As a result, coefficients take the opposite sign to that of a Cox PH model, i.e. a positive sign indicates a longer survival time.

4.4. Descriptive Statistics

Table 4 shows the descriptive statistics for the independent variables used in this study. We use the average of the beginning-of-year and end-of-year financial data for the denominator for all flow variables such as Return on Assets (*roa*). To control for outlying observations, we winsorize unbound continuous variables at 0.25%, unless stated otherwise (see Table 2). Note that volatility is not included in the interaction models due to its association with market-value-based variables. The sample size is set at the maximum number of observations from all later models.[6] In addition, Table 5 provides the correlation matrix for all the variables.

INSERT Table 4 Here
INSERT Table 5 Here

5. Results and Discussion

In this section, we present the results of the Cox PH analysis. First, we describe baseline models and then introduce the controls. We begin by assessing the impact of stock performance and Tobin's Q on takeover likelihood in Table 6. We then interact the lowest decile variables, indicating disciplinary takeover risk, with our independent variables which indicate the potential presence of agency costs (Table 7). Tables 8 and 9 include details of further analyses and robustness checks using the Accelerated Failure Time (AFT) model and examining different specifications of the disciplinary set.

[6]A particularly notable value is the mean of 17% for *d_excess_r_decile*, which is due to the dummies being created as early as possible in the data set development (i.e., at step *Initial* in Table 2) to include the maximum amount of information. A robustness test with the excess r dummy is calculated as a final step, and therefore, a mean of 10%, is added in Table A1.

5.1. Excess Return, Tobin's Q and Takeover Likelihood

One key part of our argument is to establish whether markets react to sharp price falls, in the form of changes in excess return, and whether that leads to lower takeover likelihood. This is important conceptually because this helps us to establish that the correct way to measure discipline is to employ a measure of value which incorporates both the market value (given the current information set available to the market) and its relationship to the value of the underlying assets. If the stock price fall relates to an adjustment to a previously 'fair' price, then excess return can be used for measurement of takeover likelihood. By establishing this is not the case, we are then able to focus the argument on Tobin's Q as the basis of our measure of market discipline. The inclusion of excess return in subsequent tables is then to confirm this continues to be the case as we develop our analysis. The excess return model results in Table 6 (and subsequent tables) strongly suggest that discipline is not related to excess return.

Table 6 models 1 and 2 display the results of the Cox PH models using firm-specific external (market-value) indicators as predictors. The first column presents the model, including excess return and controls. In the second column, we replace excess return with Tobin's Q. Results for market value-related variables are largely consistent with the hypothesized effects on takeover likelihood; excess returns and valuation multiples are negatively related to takeover likelihood, i.e., takeover likelihood increases with lower performance and company valuation. These findings hold when explanatory variables are combined with firm-level fundamental variables and controls in model 5.

Volatility, which can be interpreted as higher price uncertainty, had a positive effect on takeover likelihood in our models. It might reasonably be expected that risk-averse bidders would prefer lower volatility. One explanation for this finding is that volatility presents potential acquirers with an opportunity to launch their bid. Such opportunities may be related to agency costs, especially considering we control for industry-year fixed effects.

INSERT Table 6 Here

It is interesting to note that firm size similarity had a positive effect on takeover likelihood in our sample. Also notable are the large coefficients for takeover intensity and real GDP growth. The need to control for survivorship bias is confirmed by significant positive coefficients for the start dummy in all models. Overall, the results for models 1 and 2 listed in Table 6 are consistent with the market for corporate control explanation and indicate that takeover likelihood is related to falling stock prices and company valuations.

5.2. Takeover Likelihood and Firm Fundamentals

Firm-specific fundamental variables have little effect on takeover likelihood in the Cox PH models in Table 6. Models 3 and 4 examine the relationship between firm fundamental variables and takeover likelihood. Model 3 presents the baseline model and firm-specific, industry and market level controls are added in model 4. Model 5 combines the fourth model (4) with the explanatory variables from models 1 and 2. The only internal variable with a significant, and in this case, negative coefficient is return on assets (*roa*). However, the significance disappears when industry and macro-wide controls are included. All other internal variables are insignificant across all models.

The results are consistent with several other studies of takeover likelihood. The insignificant effect of leverage on takeover risk is consistent with Dickerson et al. (2002), Powell and Yawson (2007) and Loderer and Waelchli (2015) but contrary to positive impacts found in Bruner (1988) and Nuttall (1999). Dickerson et al. (2002) also reported a negative relationship between takeover likelihood and capital expenditure, which we cannot confirm. However, our results are consistent for return on assets (positive) and dividends (insignificant). The Powell and Yawson (2007) finding that sales growth is not related to takeover likelihood is also confirmed.

The lack of significant effects of firm fundamentals on takeover likelihood is slightly surprising and, therefore, lead to the next step of the analysis. Theoretical arguments for the superior predictive power of market-based variables are present in the bankruptcy forecasting literature (Agarwal and Taffler, 2008). Under the assumption of market efficiency, asset prices should contain all information that can be extracted from financial statements, including any identifiable risk of takeover or bankruptcy. The lack of significance in our sample may simply indicate that firm fundamentals contain little new information of relevance. This seems unlikely. Instead, we propose another view. We argue that most takeovers are not disciplinary, and the effect of firm fundamentals is expected to be different for disciplinary and non-disciplinary takeovers. These effects may be offset in general models. Hence, our next step is to distinguish between disciplinary and non-disciplinary takeovers. Most studies use hostile takeovers as the indicator of market discipline. However, many such acquisitions may be undertaken for other reasons (see for example Walsh and Kosnik 1993; Sinha 2004). Schwert (2000) argues that friendly and hostile takeovers are impossible to distinguish and in this study, we purposefully classify on the objective measure of Tobin's Q rather than on motives or strategy. Given our finding that decreases in stock price and company valuation increase takeover likelihood, we next consider whether firm fundamentals, and in particular agency costs indicators, drive takeover likelihood.

5.3. Disciplinary Takeovers and Agency Costs

Manne (1965) states that if a company's market value falls relative to the value that could be achieved under a more efficient management team, the company is likely to become a takeover target. This mechanism does not require any change in fundamentals, only a change in value. The next logical step is to ask what drives acquisition likelihood within those companies that experience the steepest price changes and are thus the strongest candidates for disciplinary takeovers. To investigate this issue, we interact company fundamentals with a binary variable that indicates firm-year observations in the bottom decile of excess return and Tobin's Q for firm's industry-year group. Table 7 shows the results for models of takeover likelihood which incorporate the disciplinary dummy and internal firm fundamentals.

INSERT Table 7 Here

In Table 7, our initial interest is in the interaction between firm fundamentals and the disciplinary dummy variable (*d excess_r decile*). The lowest decile dummy is significant in all models for the excess return specification of disciplinary takeover but not when disciplinary takeovers are identified using the lowest decile for Tobin's Q. In models 1 to 3, the effect of the disciplinary dummy is to increase takeover likelihood by 25% in model 1 to 47% in model 3. Firm fundamentals appear to have only a weak relation to takeover likelihood in models 1 to 3 however, with the exception of the expense ratio, which has the correct sign for agency costs but only indicates weak significance and only in model 3. In models 5 and 6, the Tobin's Q interaction term is insignificant while agency cost indicators interacted with the disciplinary dummy are significant. Several specific interactions are identified as significant from our agency costs indicators and consistent with the market for corporate control hypothesis.

We prefer Tobin's Q to excess return to identify disciplinary takeovers for our formal test of hypothesis 2, while all other model specifications remained unchanged. Hence, the disciplinary dummy represents companies in the lowest decile of Tobin's Q. Contrary to results in models 1 to 3, the disciplinary dummy itself is insignificant in all three models (4 to 6). However, the interaction terms between the disciplinary dummy and firm fundamentals exhibit significance for several variables.

Specifically, a notably strong effect, which is consistent across all models, is identified on *roa*, as detailed in Table 7 Panel B. Takeover hazard decreases as the company's return on assets increases for companies in the lowest decile of TQ. The finding for *roa* is consistent with the view that these companies may have minimal leeway for performance improvement if the market accurately values the current efforts of management, i.e. the agency costs. Also, weaker performance regarding return on assets attracts disciplinary takeovers.

When compared to Panel A of Table 7, we find a significant effect of sales growth on takeover likelihood. When disciplinary takeovers are classified using the lowest decile

of TQ rather than excess return, the sales growth (*d_q_decile:sales_growth*) becomes positive. Specifically, as sales growth increases takeover risk also increases. Similar effects on takeover likelihood are associated with asset utilization, and for dividend payments when controls are excluded. Asset utilization (*d_q_decile:asset utilization*) increases takeover likelihood in both models with slightly greater significance in model 5. In order to interpret the coefficients in Table 7, the hazard ratio (the exponent of the Cox coefficient) can be used. The hazard ratio indicates that a unit change in the indicator variable leads to a given percentage change in the takeover likelihood. For asset utilization in Table 7 model 5, for each unit increase there is a 39% increase in takeover likelihood. In the same model, for sales growth, a unit change in the indicator leads to an 81% change in takeover likelihood. However, it should borne in mind that the agency cost indicators have been transformed as described in the earlier discussion of the modelling strategy and in the notes to the tables. Similarly, dividends (*d_q_decile:div on assets*) are associated with increased takeover risk in model 5 only (indicating a 30% increase in takeover likelihood for a unit increase in the dividend variable). Consistent with our hypothesis, higher asset utilization is associated with higher takeover risk for companies in the lowest decile for Tobin's Q.

Within the market for corporate control framework, the results in Table 7 can be summarized as follows: sales growth, asset utilization and, to a lesser degree, dividends, raise the likelihood of becoming a target for disciplinary takeover. Return on assets also has a negative effect on the risk of a disciplinary takeover. These results are more intuitive when we consider that previous studies have examined takeover likelihood rather than disciplinary takeover likelihood. Concerning low TQ firms, i.e. underperforming firms, potential bidders appear to be selective with regards to asset utilization, sales growth and profitability. In this case, low TQ indicates the presence of agency costs. On the other hand, a one-year price fall may be a correction to the stock price rather than an indicator of agency costs.

The negative coefficient for return on assets for the low TQ firms provides further support for our hypothesis. This finding is consistent with expectations in the literature for takeover likelihood summarized in Table 1. For the low TQ set, higher profit might be expected to attract bidders because these candidates may be undervalued. Low TQ firms with high return on assets indicate an opportunity for more efficient management to improve performance, as proposed by Manne (1965). In this case, both low TQ and low profitability indicate agency costs and increase disciplinary takeover likelihood. Similarly, when profit is low but other indicators such as sales growth or asset utilization are high, agency costs may be constraining performance and such companies would be expected to become candidates for a disciplinary takeover in a market for corporate control framework.

If our definition of disciplinary takeovers is accepted, our results provide support to Manne's (1965) market for corporate control argument. Notably, a declining stock

price does not imply that a company is cheap. The discounted stock price may move the company valuation towards the true value and if the efficient market hypothesis holds, there is no reason for these companies to become disciplinary takeover targets. However, if the company is subject to agency costs and, as Manne (1965) explains, a more efficient management team could enhance the stock price, it is expected that beyond a given threshold, the company is likely to become a takeover target. One of the strongest indications of agency costs is that company value has deviated from the potential value. In our study, Tobin's Q appears to be a strong indicator of the presence of agency costs and takeover likelihood.

5.4. Robustness Tests

We perform two robustness checks to confirm our findings. First, we repeat the Cox PH model using an Accelerated Failure Time (AFT) model. This test confirms the preceding results. As a second robustness test, we check the appropriateness of our choice to use the lowest decile of Tobin's Q. Extending our specification reduces the significance of the agency cost indicators but by broadening the analysis to larger quantiles for the low Tobin's Q set, we are able observe the reduction in sensitivity of takeover likelihood to the interaction terms between firm fundamentals and the disciplinary dummy. In our main tests, we use the lowest decile of Tobin's Q in industry-year clusters. In our robustness tests, we examine Cox PH models where we extend the definition of candidates for disciplinary takeover from the lowest 10% of Tobin's Q to the lowest 15%, 20%, 30% and 40%.

5.4.1. Accelerated Failure Time Model with Weibull Distribution

Table 8 repeats selected models from Tables 6 and 7. As discussed above, a positive coefficient indicates longer survival and vice versa. Importantly, the results are consistent with previous findings. Increases in both excess return and Q lead to longer survival time in models 1 and 2. TQ is not significant in model 4 where all controls are included. Firm-level fundamentals are not significant, with the exception of leverage when excluding market-value-based variables in model 3 and the TQ interaction model (6). In model 5, consistent with Table 7, the dummy for the lowest excess return decile is significant but the interaction terms are insignificant, with the exception of expense ratio. When using the indicator of the lowest decile for Q, the disciplinary dummy is weakly significant, which contrasts with the results in Table 7. Consistent with previous findings, sales growth and asset utilization indicate shorter survival (higher takeover likelihood) for the disciplinary set. The interaction term between the disciplinary dummy and *roa* is associated with longer survival.

INSERT Table 8 Here

5.4.2. Sensitivity to Redefining Quantiles for Disciplinary Takeovers

The results listed in Table 9 provide support for the use of Tobin's Q as an indicator of disciplinary takeover likelihood, the choice of threshold used in our primary tests (Table 7) and the association between takeover likelihood and agency cost indicators. Our findings are largely consistent with the 20% threshold and begin to moderate beyond it. Our results also indicate that using the median as the threshold, as in Dickerson et al. (2002), does not capture the desired effects. The general trend observed in Table 9 compared to Table 7 is that the significance of explanatory interaction terms dissipates as we relax the thresholds for disciplinary takeover candidates. The significance of profitability, asset utilization and sales growth declines as the disciplinary takeover set is extended. The only irregularity is the weak significance on interaction terms for dividend payments and investment at the 20% threshold. Consistent with a free cash flow perspective (Jensen, 1986), the interaction term for investment is positive, indicating the possibility for a bidder to decrease or redirect the capital expenditure of a target that seems to be investing at below its cost of capital. The positive interaction term for dividends is difficult to explain from an agency cost perspective and might simply represent the purchase of strong dividend payers at low valuations.

INSERT Table 9 Here

5.4.3. Endogeneity

An important concern for our models is that endogeneity may have a confounding effect on our generation of coefficients and significance tests i.e. there may be a correlation between the error term and the explanatory variables. The main sources of endogeneity include self-selection bias, omitted variables and reverse causality. Self-selection bias should not be an issue for this data since the population of observations of M&A is collected although we recognise that some exclusions result from the data cleaning process. To allay concerns about the impact of omitted variables, we include a panel of suitable control variables, identified from the large academic literature, in addition to the agency proxies and the interaction terms in our study. We do not exclude any important determinant of takeover likelihood from our study. Reverse causality, i.e. the explanatory variables are determined by takeover likelihood, is perhaps also a concern. Takeover likelihood may of course determine whether certain firm fundamentals are adjusted by management. This would be a clear case of endogeneity. However, given that the actual specification of the dependent variable is 1 if a takeover has occurred and zero otherwise, endogeneity of this type is irrelevant. A classification of zero, indicating no takeover, is not part of our disciplinary set whilst a classification of 1 results in inclusion in the disciplinary set but also the company is taken over. There is no data on listed companies which are subsequently taken over and no possibility for the takeover to lead to the inclusion in the disciplinary set.

We further attempt to alleviate concerns about endogeneity in our results by performing some 2SLS tests on our data. Whilst there is no convention regarding the most effective way to incorporate endogeneity tests into a Cox PH framework, we employ instrumental variable (IV) Poisson and Probit specifications. The logic is to build an IV model between the dependent and independent variable in an alternative framework and then to compare those results with the Cox PH results. We use lags of the explanatory variable as our instruments as it is difficult to identify external variables that are both uncorrelated to market value or firm-level fundamental variables and correlated with Tobin's Q. We then employ two-stage models based on equation 1 (Table 6) in our paper. According to the Wald test of the exogeneity of the instrumented variables, our test statistics are insignificant i.e. the p-value is greater than 0.1. Hence, there is insufficient information in our sample to reject the null hypothesis of no endogeneity.

5.5. Discussion and Implications

Our initial interest is to establish whether stock price and/or market valuation effects drive takeover likelihood. We then examine whether takeover likelihood is related to more specific indicators of agency costs. As such, we contribute to the literature by identifying which companies are likely to be candidates for a disciplinary takeover and then by examining how the takeover likelihood for these firms is related to a panel of indicators of agency costs.

A functional market for corporate control guides efficient allocation of resources and is desirable for shareholders and society as a whole. For shareholders and corporate management, a well-functioning market for corporate control is a key mechanism for protecting investors from agency costs. Without such a mechanism, the cost of capital increases, producing serious implications for hurdle rates, the level of corporate investment and financial market development. In this study, we set out to answer two questions regarding the market for corporate control and takeover likelihood: (1) Does underperformance result in increased takeover hazard for the disciplinary set? and (2) Within the disciplinary set, which agency cost indicators are associated with market discipline?

Previous studies using US data have demonstrated that well-performing companies are more likely to be subject to a takeover (Agrawal and Jaffe, 2003; Rhodes-Kropf et al., 2005; Powell and Yawson, 2007; Loderer and Waelchli, 2015). Our approach allows us to infer a different story. We observe higher takeover likelihood when a company's stock price falls and market valuation is low relative to its assets. In particular, we find that companies in the lowest decile for excess return are more likely to be subject to a takeover bid, irrespective of firm fundamentals, whereas companies in the lowest decile for Tobin's Q are more likely to be takeover targets conditional on certain agency cost indicators. We interpret these results as consistent

with the market for corporate control hypothesis.

From our initial review of the literature (see Table 1), we expected the opposite sign from several of our tests of agency variables, namely that indicators of agency costs provide bidders with the opportunity to correct poor management and improve these indicators. However, the results suggest an alternative interpretation. Tobin's Q and profitability indicate the presence of agency costs while our firm fundamentals provide evidence of underlying strength of companies most likely to be taken over. Discipline occurs when Tobin's Q is too low and other indicators are stronger. In this study, asset utilization and sales growth are the indicators of that strength. In our results, profitability is a key indicator that agency costs are present, rather than low TQ companies simply being undervalued. Consistent with our view, the lower the profit, the higher the takeover likelihood of companies in the low TQ set. Companies with lower asset utilization or sales growth had a lower probability of takeover. Companies with higher profit and, by extension, lower agency costs are also less likely to be taken over.

The market for corporate control does not simply act as a disciplinary mechanism but also puts pressure on managers to act in the best interests of shareholders (Wang and Wu, 2020). Our indicators provide direct evidence of this pressure. Specifically, Tobin's Q is a strong indicator of the presence of agency costs in the market for corporate control. Sales growth, asset utilization and return on assets are also found to be associated with agency costs in our framework. Managers of potential targets wishing to understand the risk of a disciplinary takeover can take heed of the indicators we identify and use them as a guide for reducing disciplinary takeover risk. Such indicators also provide avenues for future research.

We argue that a functioning market for corporate control and an open merger policy are desirable for society. Allocative efficiency and economic performance are enhanced when the pricing of stocks reflects the value placed on assets by market participants. Resources are most effectively allocated and exit is facilitated when markets are liquid and price stocks accurately. An ineffective market for corporate control and anti-takeover provisions result in inefficient allocation of society's scarce resources. In such a market, value-destroying firms and projects are allowed to continue unabated. Given that anti-takeover provisions are disallowed in the UK, our results can be interpreted as support for the effectiveness of an open merger policy. In any market where corporate governance by boards is in question, or where other internal mechanisms lack robustness, our results suggest that an open merger policy is effective, at least to an extent. In other markets which allow takeover defenses (such as the US for example), company managers could decide to deactivate anti-takeover provisions, as a form of bonding, to signal corporate control of agency costs. Shareholders may be willing to pay a premium for such companies in markets where takeover provisions are allowed. Removing anti-takeover defenses has been previously

proposed in the literature as a means to enhance takeover likelihood (Bebchuk et al., 2002). Where takeover defenses are in place, shareholders forgo potential returns that accrue if potential bidders are not deterred by defense mechanisms (See, for example, Masulis et al. 2007 and Bebchuk et al. 2009). Yet, other studies have found anti-takeover provisions effective in improving bargaining power during M&A negotiations (conditional on the takeover going ahead) when target boards are outsider dominated (Brickley et al., 1994). While our results do not directly imply that shareholders should seek the abolition of anti-takeover provisions, the findings do suggest that further investigation is warranted. Such work might include examination of the valuation implications of voluntarily rejecting anti-takeover provisions.

6. Conclusion

We examine the effectiveness of the market for corporate control in the UK and draw implications for shareholders, managers, regulators and researchers. The aim of the study is to answer two broad questions: (1) Does underperformance result in increased takeover hazard in the disciplinary set? and (2) Within the disciplinary set, which agency cost indicators are associated with market discipline?

For the first question, we establish that Tobin's Q is effective at distinguishing disciplinary takeover candidates. As the efficient markets hypothesis would imply, simply looking at companies whose price has fallen substantially in the year prior to the takeover is not sufficient as an indicator of market discipline. For the second research question, we find various agency cost indicators are significant within the disciplinary set. For companies in the lowest decile of Tobin's Q, the market favors disciplinary targets with potential for improved valuations. For example, we find significantly higher takeover risk for companies with higher sales growth and asset utilization ratios within the low TQ sample. These companies appear undervalued and, therefore, improved managerial efficiency is likely to enhance company value. Importantly, we also observe lower takeover risk for firms with higher profitability. This finding is important as it confirms that lower profit combined with positive information on other firm fundamentals increases disciplinary takeover risk.

Comparing our results to US takeover likelihood studies leads us to conclude that an open merger policy in which the market for corporate control is not inhibited by anti-takeover defenses provides strong protection for shareholders (Bebchuk et al., 2002; Masulis et al., 2007; Bebchuk et al., 2009). Consistent with Manne's (1965) definition of the market for corporate control, when market values decrease to low levels relative to the underlying assets, the market for corporate control protects shareholders. However, we caution that takeover risk is lower for companies within the low TQ set and which exhibit higher agency cost indicators.

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Table 1: Previous literature

Panel A: Market value		
	Study (Year)	Effect on takeover likelihood
Excess return	Powell and Yawson (2007); Loderer and Waelchli (2015)	Positive
	Agrawal and Jaffe (2003)	Non-significant
	Dickerson et al. (2002)	Negative
Tobin's Q	Rhodes-Kropf et al. (2005)	Positive
	Palepu (1986); Ambrose and Megginson (1992)	Non-significant
	Bates et al. (2008); Cremers et al. (2008)	Negative
Stock price volatility	Loderer and Waelchli (2015)	Positive
Panel B: Firm level fundamentals		
Asset utilization	Ang et al. (2000); Singh and Davidson III (2003)	Negative
Expense ratio	Ang et al. (2000); Singh and Davidson III (2003)	Positive
Dividend payments	Palepu (1986); Barnes (2000); Dickerson et al. (2002)	Non-significant
Investments	Dickerson et al. (2002)	Negative
Leverage	Bruner (1988); Nuttall (1999)	Positive
	Dickerson et al. (2002); Powell and Yawson (2007); Loderer and Waelchli (2015)	Non-significant
Profitability	Dickerson et al. (2002)	Negative
	Loderer and Waelchli (2015)	Positive
Sales growth	Powell and Yawson (2007)	Non-significant
	Loderer and Waelchli (2015)	Negative
Tangible assets	Dickerson et al. (2002)	Negative
	Powell and Yawson (2007); Loderer and Waelchli (2015)	Non-significant

Notes: The table summarizes variables used in previous literature together with their references, grouped by their findings for each variable's effect on takeover likelihood. Ang et al. (2000) and Singh and Davidson III (2003) are not studies of takeover likelihood, but examine the effects of ownership structure on asset utilization and expense ratio (agency cost proxies).

Table 2: Sample construction

Panel A: Sample development			
		N firms	N takeovers
Initial		4403	1630
Exclude negative sales or total assets		3659	1630
Exclude firm-year observations after a 100% takeover		3653	1557
Exclude firm-year observation with negative duration		3570	1530
Exclude companies younger than five years		2077	751
Exclude missing data		1929	704
Panel B: Final Sample			
	Count	% of firm-year obs.	% of distinct firms
N Firm-years	23893		
N Distinct firms	1929		
N Takeovers of 100%	704	2.95	36.50

Notes: The table details the development of number of firm-year observations and number of takeovers in relation to inclusion criteria in Panel A. Panel B shows number of firm-year observations, number of firms, number of 100% and their ratios for the final sample. Note that some models will use a smaller sample due to further missing observations. The final sample for Panel B corresponds to model 2 from Table 1.

Table 3: Variable definitions

Panel A: Market value	
Variable	Definition
excess_r	Difference between stock return and market return for the 12 months ending at financial year end. Returns are calculated on basis of DataStream's return index.
q	(Market value of equity plus total debt) divided by total assets.
volatility	Standard deviation of monthly stock returns for the last 12 months ending at latest full month before or on financial year end.
d_excess_r_decile	1 if firm-year observation is in bottom decile of its industry-year group for excess_r.
d_q_decile	1 if firm-year observation is in bottom decile of its industry-year group for q.
Panel B: Firm specific fundamentals	
Variable	Definition
duration	Difference between financial year end and BDATE in full years.
asset_utilization	Net sales divided by average of beginning- and end-of-year book values of Total Assets.
expense_ratio	Operating expense divided by Net sales. Winsorisation is increased to 2.75% on the right side for the removal of extreme values.
div_on_assets	Cash dividends paid divided by average of beginning- and end-of-year book values of Total Assets.
investment	Capital Expenditure (CAPEX) divided by average of beginning- and end-of-year book values of Total Assets.
leverage	End-of-year book value Total Debt divided by end-of-year book value of Total Assets. Winsorisation is increased to 0.50% on the right side to remove outliers.
roa	Earnings before Interest and Taxes (EBIT) divided by average of beginning- and end-of-year book values of assets
sales_growth	Net sales divided by previous year's net sales minus one. Winsorisation is increased to 0.30% on the right side to remove extreme values.
tangible	End of year Property, Plant and Equipment (PPE) divided by end-of-year book value of assets.
Panel C: Control variables	
Variable	Definition
ln_mva	Natural logarithm of (Market value of equity plus book value Total Debt)
mtb_similarity	Number of companies with similar market to book ratio from the same industry-year group divided by total number of companies in the group. Similarity is assumed for all peers with market to book ratios within 0.25 standard deviations of the company in question.
size_similarity	Number of similar sized companies from the same industry-year group, divided by total number of companies in the industry-year group. Similar size is assumed for companies with a market value of equity within 0.15 standard deviations of the company in question.
intensity	Number of other companies from the same industry-year group that get taken over, divided by total number of other companies in the industry-year group
herfindahl	Sum of squared Net sales figures for all companies of the industry-year group. The top 2.5% percentile is excluded from the group to prevent misclassification (Giroud and Mueller, 2010; Loderer and Waelchli, 2015).
gdp_growth	Year on year real GDP growth
start	A binary variable that is 1 for all companies that are present in the first year of the panel and 0 otherwise.

Notes: The table details the calculation of all variables. Firm-level variables are standardized by industry-year group. All unbound continuous variables are winsorized at 0.25% on each side to remove outliers unless a different degree is indicated.

Table 4: Descriptive statistics

	N	Mean	STD	Min	Median	Max
div_on_assets	20255	0.03	0.03	0.00	0.02	0.34
investment	23149	0.06	0.07	0.00	0.04	0.65
leverage	23893	0.19	0.20	0.00	0.15	1.52
excess_r	22404	-0.11	0.54	-2.79	-0.05	1.75
volatility	23893	0.12	0.08	0.00	0.10	0.61
asset_utilization	23291	1.28	0.93	0.00	1.15	6.81
expense_ratio	22789	1.11	0.89	0.35	0.94	7.02
roa	23155	0.02	0.28	-2.95	0.08	0.69
sales_growth	22766	0.31	2.03	-1.00	0.08	33.83
tangible	23742	0.30	0.24	0.00	0.26	0.96
mva	23893	931.83	4651.24	0.58	58.19	60233.82
mtb_similarity	23893	0.20	0.11	0.00	0.21	0.50
size_similarity	23893	0.44	0.29	0.00	0.48	0.94
intensity	23893	0.01	0.01	0.00	0.01	0.06
herfindahl	23893	0.05	0.08	0.01	0.02	0.72
gdp_growth	23893	0.02	0.02	-0.06	0.03	0.07
d_excess_r_decile	23893	0.17	0.38	0.00	0.00	1.00
d_q_decile	23893	0.10	0.30	0.00	0.00	1.00

Table 5: Correlation coefficients

	(1) excess_r	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(2) q	0.06***								
(3) volatility	-0.23***	0.08***							
(4) div_on_assets	0.09***	0.27***	-0.21***						
(5) investment	0.06***	0.10***	-0.07***	0.08***					
(6) leverage	-0.14***	0.04***	0.12***	-0.17***	0.05***				
(7) asset_utilization	0.08***	-0.02***	-0.05***	0.13***	-0.01	-0.07***			
(8) expense_ratio	-0.14***	-0.11***	0.15***	-0.20***	-0.10***	0.08***	0.11***		
(9) roa	0.30***	-0.03***	-0.30***	0.39***	0.11***	-0.21***	0.16***	-0.44***	
(10) sales_growth	0.06***	0.07***	0.02***	-0.03***	0.08***	-0.01**	0.02***	-0.04***	0.05***
(11) tangible	0.00	-0.08***	-0.10***	-0.06***	0.44***	0.16***	-0.21***	-0.12***	0.02***
(12) ln_mva	0.16***	0.07***	-0.27***	0.22***	0.11***	0.11***	-0.05***	-0.19***	0.26***
(13) mtb_similarity	-0.01	-0.49***	-0.08***	-0.18***	-0.04***	-0.11***	-0.12***	0.02***	0.04***
(14) size_similarity	-0.13***	-0.08***	0.18***	-0.19***	-0.05***	-0.05***	0.05***	0.12***	-0.17***
(15) intensity	-0.03***	-0.01	-0.03***	0.00	-0.01	-0.00	-0.00	-0.01	0.01
(16) herfindahl	-0.00	0.01**	-0.01**	0.00	0.02***	0.00	0.00	-0.06***	0.01
(17) gdp_growth	0.06***	-0.01	-0.06***	0.00	-0.01	0.00	-0.01	0.02***	-0.00
(18) d_excess_r_decile	-0.69***	-0.02**	0.37***	-0.11***	-0.04***	0.11***	-0.03***	0.13***	-0.27***
(19) d_q_decile	-0.08***	-0.22***	0.04***	-0.16***	-0.09***	-0.10***	0.04***	0.09***	-0.07***
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(11) tangible	-0.02***								
(12) ln_mva	-0.01*	0.13***							
(13) mtb_similarity	-0.05***	0.10***	-0.05***						
(14) size_similarity	0.03***	-0.06***	-0.78***	0.07***					
(15) intensity	0.00	-0.01	0.00	-0.00	0.03***				
(16) herfindahl	0.02***	0.03***	0.00	0.00	0.01**	-0.16***			
(17) gdp_growth	-0.01*	-0.00	-0.00	0.00	-0.01	0.09***	-0.02***		
(18) d_excess_r_decile	-0.01*	-0.03***	-0.20***	-0.03***	0.15***	-0.01*	-0.01*	-0.03***	
(19) d_q_decile	-0.03***	-0.03***	-0.20***	0.05***	0.14***	0.00	0.01	0.00	0.07***

Notes: The table shows Pearson correlation coefficients between the indicated variable pairs. Variable definitions in Table 3. *p<0.1; **p<0.05; ***p<0.01. The number of observations between variable pairs are differing due to missing data. We use the highest possible number of observations for each pair.

Table 6: Cox PH models

	Market Value		Firm level fundamentals		Combined
	(1)	(2)	(3)	(4)	(5)
excess_r	-0.220***				-0.202***
	(0.034)				(0.040)
q		-0.465***			-0.340**
		(0.107)			(0.138)
volatility	0.705***	0.817***			0.874***
	(0.082)	(0.079)			(0.095)
asset_utilization			0.001	0.030	0.029
			(0.053)	(0.054)	(0.055)
expense_ratio			0.053	-0.144	-0.239
			(0.221)	(0.206)	(0.195)
div_on_assets			-0.049	0.010	-0.041
			(0.062)	(0.061)	(0.068)
investment			0.131	0.132	0.163
			(0.120)	(0.110)	(0.121)
leverage			0.114	0.230	0.095
			(0.144)	(0.139)	(0.143)
roa			-0.223***	-0.117	0.075
			(0.081)	(0.088)	(0.097)
sales_growth			-0.190	-0.052	-0.081
			(0.216)	(0.195)	(0.191)
tangible			0.020	0.019	0.025
			(0.051)	(0.051)	(0.108)
start	-1.862***	-1.862***	-2.671***	-1.936***	-1.759***
	(0.143)	(0.139)	(0.128)	(0.147)	(0.155)
ln_mva	0.228***	0.257***		0.127*	0.164**
	(0.063)	(0.062)		(0.073)	(0.075)
mtb_similarity	0.133**	0.030		0.477***	0.311
	(0.054)	(0.056)		(0.127)	(0.132)
size_similarity	0.310***	0.297***		0.234***	0.250***
	(0.053)	(0.051)		(0.055)	(0.058)
intensity	95.437***	94.012***		113.050***	90.105***
	(6.153)	(5.997)		(6.345)	(7.070)
herfindahl	6.151***	6.524***		7.222***	6.058***
	(0.923)	(0.907)		(1.067)	(1.109)
gdp_growth	38.930***	41.455***		14.352***	59.386***
	(5.046)	(4.991)		(2.657)	(6.587)
N	22 407	23 893	20 076	19 938	18 514
No. of events	658	704	586	586	548
R^2	0.056	0.056	0.027	0.049	0.060
Max. Possible R^2	0.408	0.412	0.404	0.406	0.406
Log Likelihood	-5229.550	-5660.306	-4920.394	-4699.875	-4245.276
Wald Test	1390.070***	1446.520***	413.740***	1149.490***	1191.920***
LR Test	1301.470***	1366.708***	552.772***	992.351***	1153.128***
Score (Logrank) Test	1415.186***	1446.747***	646.523***	1240.250***	1315.819***

Notes: The table shows Cox PH models for market value based variables and controls in columns 1 and 2, Cox PH models for firm-level fundamental variables in columns 3 and 4 and a Cox PH model combining all variables in column 5. Variable definitions are in Table 3. Models 1 and 2 contain interaction terms of volatility, gdp_growth, intensity and herfindahl with duration. Models 3 and 4 contain interaction terms of investment, leverage, sales_growth, tangible, intensity and gdp_growth with duration. Panel C contains interaction terms of duration with volatility, investment, sales_growth, tangible, intensity and gdp_growth. This is for the protection of Cox PH assumptions. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parentheses.

Table 7: Firm level fundamental/market value interaction

	Excess Return			Tobin's Q		
	(1)	(2)	(3)	(4)	(5)	(6)
asset_utilization	0.005	0.017	-0.004	0.008	-0.039	-0.010
	(0.053)	(0.059)	(0.059)	(0.053)	(0.060)	(0.061)
expense_ratio	0.043	-0.128	-0.239	0.053	0.054	-0.125
	(0.220)	(0.241)	(0.227)	(0.220)	(0.237)	(0.218)
div_on_assets	-0.044	-0.078	-0.013	-0.055	-0.098	-0.036
	(0.062)	(0.071)	(0.069)	(0.063)	(0.068)	(0.067)
investment	0.050	0.050	0.100	0.048	0.063	0.116
	(0.133)	(0.137)	(0.126)	(0.133)	(0.133)	(0.122)
leverage	0.064	0.038	0.090	0.066	0.077	0.140*
	(0.071)	(0.084)	(0.084)	(0.071)	(0.074)	(0.074)
roa	-0.196**	-0.240**	-0.137	-0.228***	-0.130	-0.012
	(0.084)	(0.104)	(0.107)	(0.081)	(0.092)	(0.097)
sales_growth	-0.173	-0.174	-0.065	-0.180	-0.281	-0.183
	(0.214)	(0.220)	(0.198)	(0.216)	(0.219)	(0.205)
tangible	0.168	0.213	0.116	0.170	0.155	0.056
	(0.109)	(0.113)	(0.106)	(0.108)	(0.109)	(0.104)
d_market	0.221**	0.311**	0.384***	-0.077	-0.211	-0.251
	(0.108)	(0.120)	(0.121)	(0.145)	(0.221)	(0.221)
start	-2.632***	-2.639***	-2.059***	-2.650***	-2.676***	-1.941***
	(0.129)	(0.129)	(0.146)	(0.129)	(0.129)	(0.148)
ln_mva			0.126*			0.109
			(0.072)			(0.073)
mtb_similarity			0.487**			0.433**
			(0.131)			(0.126)
size_similarity			0.240***			0.237***
			(0.054)			(0.055)
intensity			113.023***			113.091***
			(6.247)			(6.368)
herfindahl			-0.043			7.145***
			(0.775)			(1.080)
gdp_growth			14.514***			14.299***
			(2.681)			(2.658)
asset_utilization:d_market		-0.037	-0.026		0.331**	0.268*
		(0.136)	(0.137)		(0.142)	(0.142)
expense_ratio:d_market		0.698	0.802*		-0.210	-0.148
		(0.490)	(0.484)		(0.619)	(0.603)
div_on_assets:d_market		0.173	0.104		0.263*	0.248
		(0.138)	(0.146)		(0.162)	(0.169)
investment:d_market		-0.016	-0.043		-0.089	0.034
		(0.168)	(0.168)		(0.310)	(0.304)
leverage:d_market		0.102	0.112		-0.241	-0.308
		(0.154)	(0.155)		(0.339)	(0.326)
roa:d_market		0.152	0.147		-0.766***	-0.746***
		(0.181)	(0.194)		(0.208)	(0.215)
sales_growth:d_market		0.004	0.027		0.597**	0.523*
		(0.237)	(0.226)		(0.187)	(0.201)
tangible:d_market		-0.190	-0.215		-0.023	-0.065
		(0.134)	(0.135)		(0.193)	(0.194)
d_market		d_excess_r_decile			d_q_decile	
N	20 076	20 076	19 938	20 076	20 076	19 938
No. of events	586	586	586	586	586	586
d_market events	118	118	118	57	57	57
R^2	0.027	0.028	0.047	0.027	0.028	0.049
Max. Possible R^2	0.404	0.404	0.406	0.404	0.404	0.406
Log Likelihood	-4917.220	-4913.826	-4716.457	-4919.100	-4907.722	-4690.152
Wald Test	429.300***	442.440***	1178.190***	417.810***	440.340***	1167.130***
LR Test	559.121***	565.909***	959.187***	555.360***	578.117***	1011.796***
Score (Logrank) Test	655.418***	661.390***	1245.531***	649.260***	672.286***	1253.358***

Notes: The table shows Cox PH models including a dummy that indicates the bottom decile for excess_r in Panel A and a dummy that indicates the bottom decile for TQ in Panel B. Variable definitions in Table 3. Panel A contains interaction terms of investment, tangible, sales_growth, mtb_similarity and intensity with duration. Panel B contains interaction terms of investment, tangible, sales_growth, intensity and Herfindahl with duration. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parentheses.

Table 8: Accelerated failure time models with Weibull distribution

	(1)	(2)	(3)	(4)	(5)	(6)
excess_r	0.083***			0.077***		
	(0.012)			(0.013)		
q		0.104***		0.065		
		(0.037)		(0.045)		
volatility	0.023	-0.006		0.019		
	(0.019)	(0.020)		(0.022)		
asset_utilization			-0.002	-0.005	-0.008	0.014
			(0.023)	(0.022)	(0.024)	(0.025)
expense_ratio			0.002	0.027	0.083	0.004
			(0.088)	(0.089)	(0.088)	(0.093)
div_on_assets			-0.006	0.003	-0.0002	0.008
			(0.020)	(0.022)	(0.022)	(0.022)
investment			-0.010	-0.020	-0.011	-0.009
			(0.023)	(0.023)	(0.025)	(0.023)
leverage			-0.046*	-0.025	-0.038	-0.049*
			(0.028)	(0.030)	(0.031)	(0.028)
roa			0.039	-0.005	0.036	0.001
			(0.031)	(0.034)	(0.038)	(0.034)
sales_growth			0.034	0.047	0.029	0.066
			(0.051)	(0.045)	(0.062)	(0.051)
tangible			-0.006	0.002	-0.019	-0.006
			(0.021)	(0.022)	(0.023)	(0.022)
d_market					-0.098**	0.127*
					(0.042)	(0.077)
start	0.998***	1.022***	0.987***	0.975***	0.986***	0.982***
	(0.036)	(0.036)	(0.038)	(0.039)	(0.038)	(0.038)
ln_mva	-0.048**	-0.053**	-0.022	-0.026	-0.023	-0.016
	(0.024)	(0.025)	(0.027)	(0.028)	(0.027)	(0.028)
mtb_similarity	-0.026	-0.003	-0.035	-0.016	-0.035	-0.029
	(0.023)	(0.024)	(0.026)	(0.029)	(0.026)	(0.025)
size_similarity	-0.097***	-0.097***	-0.079***	-0.077***	-0.077***	-0.080***
	(0.020)	(0.020)	(0.021)	(0.021)	(0.021)	(0.021)
intensity	-13.097***	-14.018***	-13.007***	-12.121***	-13.197***	-12.826***
	(0.997)	(0.978)	(1.037)	(1.072)	(1.045)	(1.035)
herfindahl	-0.228	-0.167	-0.182	-0.134	-0.164	-0.186
	(0.281)	(0.292)	(0.322)	(0.330)	(0.322)	(0.319)
gdp_growth	-4.201***	-4.074***	-5.417***	-5.612***	-5.468***	-5.399***
	(0.827)	(0.841)	(0.931)	(0.931)	(0.936)	(0.930)
asset_utilization:d_market					0.019	-0.112**
					(0.045)	(0.046)
expense_ratio:d_market					-0.355**	0.066
					(0.169)	(0.199)
div_on_assets:d_market					-0.026	-0.061
					(0.042)	(0.048)
investment:d_market					0.009	0.030
					(0.054)	(0.107)
leverage:d_market					-0.020	0.110
					(0.056)	(0.126)
roa:d_market					-0.036	0.301***
					(0.061)	(0.070)
sales_growth:d_market					0.002	-0.185*
					(0.091)	(0.095)
tangible:d_market					0.071	0.010
					(0.052)	(0.073)
Constant	3.901***	3.956***	3.961***	3.948***	3.990***	3.955***
	(0.052)	(0.054)	(0.053)	(0.058)	(0.056)	(0.053)
d_market					d_excess_r_decile	d_q_decile
N	22 407	23 893	19 938	18 514	19 938	19 938
No. of events	658	704	586	548	586	586
d_market events					118	57
Scale	0.347	0.355	0.344	0.338	0.344	0.342
Log(Scale)	-1.059***	-1.034***	-1.068***	-1.083***	-1.068***	-1.072***
Log Likelihood	-4190.077	-4507.121	-3800.436	-3535.863	-3794.876	-3789.165
χ^2	1010.133***	1033.487***	844.991***	828.414***	856.111***	867.532***

Notes: The table shows AFT models repeating the final specifications from Table 6 and Table 7 Panels A and B. d_market is a place holder for the variables d excess_r decile and d_q_decile in the last two models. *p<0.1; **p<0.05; ***p<0.01. Standard errors in parentheses.

Table 9: Low TQ dummy definition test

	(1)	(2)	(3)	(4)
asset_utilization	-0.007	-0.047	-0.075	-0.041
	(0.063)	(0.068)	(0.078)	(0.085)
expense_ratio	-0.131	-0.107	-0.145	-0.164
	(0.212)	(0.219)	(0.236)	(0.263)
div_on_assets	-0.048	-0.053	-0.025	-0.047
	(0.067)	(0.068)	(0.070)	(0.076)
investment	0.099	0.093	0.108	0.131
	(0.124)	(0.124)	(0.124)	(0.129)
leverage	0.279*	0.266*	0.285*	0.297*
	(0.138)	(0.140)	(0.143)	(0.149)
roa	0.023	0.031	0.040	0.037
	(0.099)	(0.103)	(0.115)	(0.125)
sales_growth	-0.165	-0.115	-0.100	-0.131
	(0.192)	(0.186)	(0.193)	(0.211)
tangible	-0.002	0.011	-0.006	-0.030
	(0.104)	(0.105)	(0.107)	(0.113)
d_market	-0.129	-0.007	0.152	0.214*
	(0.167)	(0.138)	(0.114)	(0.106)
start	-1.849***	-1.848***	-1.857***	-1.849***
	(0.147)	(0.147)	(0.148)	(0.148)
ln_mva	0.112	0.109	0.124	0.133*
	(0.074)	(0.074)	(0.074)	(0.074)
mtb_similarity	0.428**	0.417**	0.416**	0.417**
	(0.126)	(0.126)	(0.128)	(0.129)
size_similarity	0.225***	0.224***	0.218***	0.212***
	(0.055)	(0.056)	(0.056)	(0.056)
intensity	92.498***	92.858***	92.962***	92.798***
	(6.905)	(6.920)	(6.912)	(6.898)
herfindahl	6.099***	6.119***	6.139***	6.151***
	(1.104)	(1.103)	(1.099)	(1.100)
gdp_growth	65.781***	65.742***	66.052***	65.951***
	(6.429)	(6.421)	(6.434)	(6.439)
asset_utilization:d_market	0.220*	0.261**	0.215*	0.117
	(0.128)	(0.115)	(0.108)	(0.109)
expense_ratio:d_market	0.112	0.011	0.110	0.071
	(0.504)	(0.463)	(0.407)	(0.391)
div_on_assets:d_market	0.241	0.270*	0.153	0.210
	(0.172)	(0.157)	(0.148)	(0.129)
investment:d_market	0.252	0.252*	0.121	0.030
	(0.160)	(0.147)	(0.134)	(0.127)
leverage:d_market	-0.287	-0.047	-0.046	-0.056
	(0.250)	(0.204)	(0.159)	(0.142)
roa:d_market	-0.572***	-0.500***	-0.314*	-0.253
	(0.185)	(0.184)	(0.175)	(0.175)
sales_growth:d_market	0.389	0.281	0.167	0.156
	(0.195)	(0.197)	(0.195)	(0.191)
tangible:d_market	0.054	-0.017	0.037	0.068
	(0.153)	(0.131)	(0.107)	(0.103)
d_market	d q 15	d q 20	d q 30	d q 40
N	19 938	19 938	19 938	19 938
No. of events	586	586	586	586
d_market events	89	128	218	295
R^2	0.054	0.054	0.054	0.054
Max. Possible R^2	0.406	0.406	0.406	0.406
Log Likelihood	-4641.845	-4642.271	-4645.832	-4646.579
Wald Test	1178.340***	1152.610***	1146.790***	1150.550***
LR Test	1108.410***	1107.558***	1100.436***	1098.943***
Score (Logrank) Test	1307.919***	1307.387***	1301.414***	1300.028***

Notes: The table shows Cox PH models repeating model 6 from Table 7 while relaxing the TQ dummy definition to the lowest 15%, 20%, 30% and 40%. Variable definitions are in Table 3. The figure behind the d_market descriptor indicates the top percentile at which the indicator function operates. All models contain interactions of investment, leverage, tangible, sales_growth, mtb_similarity, intensity, Herfindahl and gdp_growth with duration in order to protect the proportional hazards assumption. *p<0.1; **p<0.05; ***p<0.01 Standard errors in parentheses.

Table A1: Robustness test with alternative excess r dummy

	(1)	(2)	(3)
asset_utilization	0.002	-0.008	0.021
	(0.053)	(0.058)	(0.059)
expense_ratio	0.033	-0.060	-0.248
	(0.219)	(0.239)	(0.219)
div_on_assets	-0.043	-0.073	-0.020
	(0.062)	(0.067)	(0.066)
investment	0.046	0.067	0.135
	(0.133)	(0.135)	(0.123)
leverage	0.052	0.021	0.077
	(0.071)	(0.080)	(0.080)
roa	-0.164**	-0.225**	-0.079
	(0.086)	(0.101)	(0.106)
sales_growth	-0.150	-0.112	-0.008
	(0.209)	(0.208)	(0.187)
tangible	0.167	0.217	0.096
	(0.108)	(0.111)	(0.105)
d_market	0.514***	0.573***	0.478***
	(0.138)	(0.167)	(0.169)
start	-2.650***	-2.660***	-1.954***
	(0.128)	(0.129)	(0.147)
ln_mva			0.128*
			(0.073)
mtb_similarity			0.478***
			(0.128)
size_similarity			0.223***
			(0.055)
intensity			114.067***
			(6.370)
herfindahl			7.009***
			(1.073)
gdp_growth			14.490***
			(2.661)
asset_utilization:d_market		0.091	0.070
		(0.155)	(0.159)
expense_ratio:d_market		0.484	0.564
		(0.532)	(0.520)
div_on_assets:d_market		0.480**	0.421**
		(0.196)	(0.198)
investment:d_market		-0.246	-0.228
		(0.257)	(0.247)
leverage:d_market		0.181	0.216
		(0.172)	(0.175)
roa:d_market		0.223	0.056
		(0.200)	(0.209)
sales_growth:d_market		-0.123	-0.111
		(0.290)	(0.279)
tangible:d_market		-0.288	-0.300
		(0.176)	(0.178)
d_market		d_excess_r_decile_alt	
N	20 076	20 076	19 938
Number of events	586	586	586
Number of events in d_market	67	67	67
R^2	0.028	0.029	0.050
Max. Possible R^2	0.404	0.404	0.406
Log Likelihood	-4913.040	-4905.396	-4688.011
Wald Test	449.970***	468.580***	1210.790***
LR Test	567.480***	582.769***	1016.077***
Score (Logrank) Test	664.873***	685.743***	1263.443***

Notes: d_excess_r_decile_alt is an alternative specification of d_excess_r_decile of Table 7 and Table 8. In this table, the dummy is created after missing observations are dropped so that its mean across the sample is 0.10. The model confirms the previous finding of higher takeover risk for the low excess r set with little relation to firm fundamental variables of that set. The exception in this case is dividends, which are significant on the interaction term. Variable definitions are in Table 3. The models contain interactions of investment, tangible, sales_growth, mtb_similarity, intensity and herfindahl with duration in order to protect the proportional hazards assumption. *p<0.1; **p<0.05; ***p<0.01 Standard errors in parentheses.