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ANTI-TAKEOVER PROVISIONS AS A SOURCE OF INNOVATION AND VALUE CREATION

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Anti-takeover provisions as a source of innovation and value creation

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Abstract

Managers are risk averse. Excessive risk-aversion can destroy shareholder wealth. A key source of risk is the threat of an opportunistic takeover designed to take advantage of depressed market prices. This is especially the case in innovative or hard-to-value ('HtV') companies whose price may be depressed due to valuation difficulties rather than managerial under-performance. For these HtV firms, the threat of an opportunistic takeover can destroy value by inducing agency conflicts of managerial risk aversion. managers and regulators argue that ATPs can ameliorate this problem. This article presents a theoretical model and empirical results that show that for HtV firms, ATPs encourage managers to make value-creating takeovers and increase innovation and do not induce agency conflicts of managerial entrenchment. This implies that for innovative or hard-to-value firms, ATPs can ameliorate managerial risk aversion and encourage value-creation.

Keywords: Takeovers, Acquisitions, Valuation, Governance, Managerial Risk Aversion, Innovation
JEL Classification: G34, O31, O32

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1 Introduction

This article examines the use of anti-takeover provisions to reduce agency conflicts of managerial risk aversion. Legislatures have allowed ATPs. One reason might be that there is a 'race to the bottom' to provide the most manager-friendly laws (Bebchuk, 1992; Bebchuk and Ferrell, 1999). However, the race-to-the bottom theory lacks universal support (for example Kahan and Kamar, 2002). Instead, some legal commentators argue that a public-minded legislature has allowed ATPs so that hard to value and innovative targets can resist opportunistic takeovers and focus on long term strategic objectives (following Ribstein, 1989; Henry, 1999; Hamermesh, 2006). This article tests whether ATPs achieve this public-minded policy goal by testing whether ATPs encourage takeovers that create value and increase innovation. To my knowledge, it is the first paper to do so. This result is robust to endogeneity concerns inherent in governance studies.

One source of agency conflict between shareholders and managers is excess risk aversion (Amihud and Lev, 1981; May, 1995; Wiseman and Gomez-Mejia, 1998). The market for corporate control is one source of risk for managers. However, ATPs can insulate managers from the market for corporate control (Daines and Klausner, 2001; Casares and Karpoff, 2002). Gompers, Ishii, and Metrick (2003) and Bebchuk, Cohen, and Ferrell (2008) suggest that this may enable managers to act on agency conflicts and make unprofitable investments. However, other evidence indicates that this entrenchment effect may concentrate in specific industries (Johnson, Moorman, and Sorescu, 2009), or in firms that have high latent agency conflicts (Harford, Humphery-Jenner, and Powell, 2010). The 'risk-aversion-reduction' hypothesis, is that for HtV firms, whose stock price might be depressed by valuation risk, some insulation from market-forces may enable managers to take a long-term outlook; and thus, may encourage long-term value creation (following Gibbons and Murphy, 1992). This paper examines this hypothesis and finds evidence that ATPs can help to align shareholder and manager incentives in HtV firms by ameliorating managerial risk-aversion.

Some literature indicates that firms with more ATPs have lower firm-value or may make worse takeover decisions. Gompers, Ishii, and Metrick (2003) examine an index of 24 entrenchment and anti-takeover provisions. They find that this index is negatively correlated with firm value, as proxied by Tobin's Q. Bebchuk and Cohen (2005) argue that the presence of a classified board is the most important entrenchment mechanism. Subsequently Bebchuk, Cohen, and Ferrell (2008) examine an index of six key ATPs.[1] They find that these six key-provisions drive the finding in Gompers, Ishii, and Metrick (2003). Further, Masulis, Wang, and Xie (2007) find that the market reacts negatively to acquisitions by firms with more ATPs.

Recent evidence suggests that ATPs may not destroy value, and suggests several alternative hypotheses. First, Lehn, Patro, and

[1] These are the presence of classified boards, poison pills, golden parachutes, limits on amendments to by-laws, limits on amendments to the firm's charter, and super-majority requirements for approval of a takeover bid.

Zhao (2007) find that ATPs do not cause lower market values. Second, Johnson, Moorman, and Sorescu (2009) suggest any negative relation between firm value and ATPs is merely an industry-effect. That is, it merely reflects the fact that industries that have more ATPs have lower firm value on average. Third, some evidence suggests that ATPs may improve firm-value for some firms. Frakes (2007) uses quantile regressions to examine the relation between ATPs and firm-value, as proxied by Tobin's Q. Frakes (2007) finds ATPs reduce firm-value only if the firm is an ex-ante high-value firm. If the firm is ex-ante low-value, then ATPs increase firm value. This suggests that ATPs may actually encourage low value firms to improve their performance. Frakes (2007) suggests that this may be because ATPs enable managers to take a long-term approach to investment-decisions. Frakes (2007) does not test this hypothesis. Kadyrzhanova and Rhodes-Kropf (2008) find similar evidence, but indicate that the level of industry concentration determines the valuation-effect of ATPs, and that ATPs influence firm value only for firms in concentrated industries.

One reason for the inconsistent results may be that ATPs increase value by ameliorating agency conflicts of managerial risk aversion. Prior literature suggests that risky cash-flows may induce managerial short-termism, particularly in hard to value companies.

The rationale proceeds in five steps. First, if cash flows are risky, then assets are harder to value; and thus, (a) prices will be lower on average (Park and Park, 2004), (b) investors will be less willing to take large investment-positions (Summers, 1986), and (c) prices will be more volatile (Irvine and Pontiff, 2009; Campbell, Polk, and Vuolteenaho, 2010). Second, if prices are lower, then then the firm is exposed to 'opportunistic' takeovers, which occur when a bidder believes that the target is 'low-priced' (see for example Hasbrouk, 1985; Palepu, 1986; Powell, 1997). Third, managers typically lose their jobs after such hostile takeovers (Martin and McConnell, 1991; Franks and Mayer, 1996). Thus, fourth, managers could take steps to reduce risky cash flows by focusing on short-term, 'safe', projects, which might not maximize firm value (Stein, 1988). Therefore, fifth, ATPs, which managers believe will insulate them from takeovers (consistent with Daines and Klausner, 2001; Casares and Karpoff, 2002), should reduce managerial risk aversion. Fortunately for the firm's shareholders, this only requires managers to be insulated from opportunistic takeovers, not from disciplinary takeovers following agency-motivated investments. Further, it only requires managers to 'believe' that ATPs protect them from takeovers; ATPs need not do so in reality.

There is some evidence that ATPs may spur innovation and increase value. Atanassov (2009) suggests that state-based anti-takeover laws may encourage greater innovation, as proxied by the adoption of R&D patents. Sapra, Subramanian, and Subramanian (2009) find a U-shaped relation between external and internal governance measures, and the level of innovation. However, these papers do not indicate if patents increase value. Chemmanur and Tian (2010) show that ATPs may increase the use of patents and that this may increase firm value, as proxied by Tobin's Q. However, Tobin's Q is a messy proxy for firm value for two reasons. First, there is endogeneity between ATPs and Tobin's Q. Thus, Core, Guay, and Rusticus (2006) and Core, Holthausen, and Larcker (1999) show that it may be that poor management may drives adoption of ATPs rather than adoption of ATPs drives poor management. Second, there is evidence that Tobin's Q can deviate for long-periods from accounting-measures of firm-value (see Frankel and Lee, 1998; Lee, Myers, and Swaminathan, 1999; Curtis and Fargher, 2003). Third, many firms have had ATPs since inception (Daines and Klausner, 2001); and thus, the presence of ATPs conveys no 'new' news to the market without a new event. Therefore, in an efficient market, poor governance in general, and ATPs in specific, should not influence long-term performance. Further, the focus on patents, means that it is difficult to generalize the results to firms that use few patents, but are nevertheless hard to value.

The prior literature motivates re-examination of the use of ATPs to generate value. The analysis starts with a theoretical model that. It shows that ATPs can generate value by reducing agency conflicts of managerial risk aversion. This simple model provides an intuitive relation between valuation risk and ATPs, and motivates the empirical analysis.

The empirical analysis examines whether ATPs do create value in HtV firms. Unlike prior literature that has examined ATPs and innovation, which has focused on measures of long-term value, this paper focuses on a single 'event' - a corporate acquisition. Focusing on an event is important since an event involves the release of new news about which ATPs may convey information. The study examines five types of hard to value (HtV) firms.[2]

The study posits that ATPs create value in HtV firms only if five conditions hold: (1) The market reacts more positively to investments (takeovers) made by HtV firms that have more ATPs. (2) These acquisitions generate long term value. (3) The acquisitions are more likely to induce value-creating innovation. (4) ATPs must insulate managers from opportunistic takeovers without shielding them from disciplinary ones. (5) ATPs must still not induce complacency and overpayment. The empirical results support all five conditions, implying that ATPs do encourage value-creation in HtV firms. These results are robust to endogeneity and econometric issues.

The paper contributes to the literature in several ways. First, it contributes to the literature on managerial incentives and innovation. Prior literature shows that risk-aversion is a source of agency conflicts between shareholders and managers and this might induce value-destroying decisions (Amihud and Lev, 1981; May, 1995; Wiseman and Gomez-Mejia, 1998; Carpenter, 2000). This paper suggests that firms might use ATPs to resolve this conflict.

Second, it contributes to the literature on anti-takeover provisions. Some literature indicates that ATPs may reduce value (Gompers, Ishii, and Metrick, 2003). But, Johnson, Moorman, and

[2]These are: (1) high-tech software firms, which are typically difficult to value (Park and Park, 2004); (2) medical companies, which typically rely on hard to value research and development; (3) firms with a high average per-period analyst forecast dispersion, (4) firms with a high yearly standard deviation of analyst earnings forecasts, and (5) firms that have a high analyst forecast error.

Sorescu (2009) indicate that this is industry-specific, and Harford, Humphery-Jenner, and Powell (2010) indicate that it is highest for firms that have agency conflicts of over-valued equity. Thus, ATPs may not reduce value for all types of firms. Chemmanur and Tian (2010) suggest that hard to value firms are one type of firm for which ATPs may generate value. However, due to the focus on proxies for long-term value and on the use of patents, the conclusion is unclear. Thus, this paper shows ATPs can help hard to value firms to create value. The finding that ATPs may benefit some types of firm suggests that future literature could examine the types of firm for which ATPs destroy value.

Third, a collateral finding is to show that the relation between ATPs and value-creation/destruction is robust to endogeneity. The results, and robustness tests, indicate that (1) ATPs do entrench some firms (but do not effectively entrench HtV firms), and (2) the relation between ATPs and takeover returns is robust to endogeneity concerns.

The balance of the paper proceeds as follows. Section 2 contains a theoretical model that demonstrates how ATPs can increase shareholder wealth. Section 3 presents the empirical framework in order to structure the empirical analysis. Section 4 describes the data. Section 5 contains the empirical results, and Section 6 concludes that ATPs do create value in HtV firms.

2 Theoretical Model

2.1 Set Up

There are three relevant players: (a) the manager or CEO, (b) the 'firm', and (c) a 'shark'. The manager wishes to maximize his or her utility by altering the firm's asset mix. The shark wishes to acquire a low priced firm and replace incumbent management. The firm wishes to maximize its risk adjusted profit.

The situation proceeds as follows. First, the firm sets the level of anti-takeover provisions, A and hires a manager. Assume that the level of anti-takeover protection is a continuous variable. That is, it represents the overall 'strength' of protection. Further, the set of ATPs does not include becoming a 'dual class' company since this might create a disconnect between voting rights and cash flow rights, which might encourage managerial rent extraction (Masulis, Wang, and Xie, 2008). This paper is not a contract-theory paper and does not consider the optimal contract between the firm and the manager. The compensation contract contains a fixed component, k, and an incentive component that is a monotonically increasing function, $g(\cdot)$, of the end-of-period value.

Second, the manager invests in a set of 'divisions' or 'assets'. The manager sets the amount of money invested. This is not an either-or decision. The intuition is that firms routinely determine the amount of resources to allocate to a division (as opposed to whether to allocate money at all). The manager invests across n assets. The vector of investments is $\mathbf{x} = (x_1, \ldots, x_n)$. Each investment has a random return, contained in the random return vector $\mathbf{r} = (r_1, \ldots, r_n)$. However, the manager knows that there may be some estimation error in the random return vector. Thus, due to the estimation error, the random returns lie between the lower bound $\underline{\mathbf{r}}$ and the upper bound $\bar{\mathbf{r}}$. Thus, $\underline{\mathbf{r}} \leq \mathbf{r} \leq \bar{\mathbf{r}}$. The expected return vector is is $\mathbf{y} = \mathbb{E}(\mathbf{r})$, which similarly lies between $\underline{\mathbf{y}}$ and $\bar{\mathbf{y}}$.

The returns are joint-normally distributed with variance-covariance matrix $\mathbf{\Sigma}$ and probability density function denoted $p(\mathbf{r})$. Thus, the total variance is $\mathbf{x}^T\mathbf{\Sigma}\mathbf{x}$. However, as with the random returns, there is measurement error in the estimation of $\mathbf{\Sigma}$. Thus, $\mathbf{\Sigma}$ lies between the lower bound $\underline{\mathbf{\Sigma}}$ and the upper bound $\bar{\mathbf{\Sigma}}$. This induces the uncertainty sets:

$$\mathcal{R} = \{\underline{\mathbf{r}} \leq \mathbf{r} \leq \bar{\mathbf{r}}\}$$
$$\mathcal{Y} = \left\{\underline{\mathbf{y}} \leq \mathbf{y} \leq \bar{\mathbf{y}}\right\}$$
$$\mathcal{E} = \left\{\underline{\mathbf{\Sigma}} \leq \mathbf{\Sigma} \leq \bar{\mathbf{\Sigma}}\right\}$$

Third, the market perceives the returns on these investments and interprets the return as a signal of the manager's quality. Note that this is an imperfect signal and returns can be low because either (a) the manager is low quality, or (b) the firm is hard to value or in an innovative industry (such as technology). The market cannot distinguish between these possibilities.

Fourth, the shark decides if it will acquire the firm. It does this only if the final value, $\mathbf{x}^T\mathbf{y}$, is below a threshold level. The threshold level is a decreasing function of the level of ATPs. This reflects the fact that ATPs make an acquisition more expensive. If the acquisition is more expensive, then the firm must be cheaper for the acquisition to be worthwhile. It is denoted $\eta(A)$, with derivative $\eta'(A) < 0$.

The firm's situation is as follows. The firm decides on a level of anti-takeover provisions, A. Further, it offers the manager a contract. The fixed compensation is k. The incentive compensation increases in the final asset value but does so at a decreasing rate. That is $g'(\mathbf{x}^T\mathbf{r}) > 0$ and $g''(\mathbf{x}^T\mathbf{r}) < 0$, where $\mathbf{x}^T\mathbf{r}$ is the final return, g' is the first-derivative, and g'' is the second derivative. Thus, total wage is $w = k + g(\mathbf{x}^T\mathbf{r})$. The firm is risk-neutral. This reflects the fact that shareholders can reduce their risk exposure by dividing their wealth between the risk free asset and the risky firm. Thus, the firm's goal is to chose the level of ATPs in order to maximize the end of period value. Following Tütüncü and Koenig (2004), this induces the objective function over the uncertainty set $\mathcal{R}$:

$$\max_{A} \quad \left\{ \min_{\mathcal{R}} \int \mathbf{x}^T \mathbf{r} p(\mathbf{r}) d\mathbf{r} \right\} \tag{1}$$

$$\tag{2}$$

The shark's situation is as follows. The shark wishes to acquire low-priced firms and to replace (supposedly) inefficient managers. This correlates with the idea of acquiring firms that have a low Tobin's Q (see Hasbrouk, 1985; Palepu, 1986; Powell, 1997). The shark acquires the firm if its value, $\mathbf{x}^T\mathbf{r}$, is below the threshold $\eta(A)$. However, ATPs make the takeover expensive. Thus, η decreases with the level of ATPs (i.e. if there are more ATPs, then the firm's price must be lower).

The manager's situation is as follows. The manager wishes to maximize his/her utility. The manager is risk averse with utility function U_m such that $U'_m > 0$ and $U''_m < 0$. The utility increases monotonically in the wage. The wage is $k + g\left(\mathbf{x}^T\mathbf{y}\right)$ with associated utility $U_m\left[k + g\left(\mathbf{x}^T\mathbf{y}\right)\right]$. Since k is a constant, the manager maximizes his/her utility by altering the firm's asset mix. Thus, the manager optimizes over $U_m\left[g\left(\mathbf{x}^T\mathbf{y}\right)\right]$.

Two points are notable. First, the manager's utility does not explicitly increase with firm size (cf Nikolov and Whited, 2010). Modeling firm size does not qualitatively change the solution since with firm-size, the manager's utility is $U_m\left[k + g\left(\mathbf{x}^T\mathbf{y}\right) + \mathbf{1}^T\mathbf{x}\right]$, and here both $\mathbf{1}^T\mathbf{x}$ and $g\left(\mathbf{x}^T\mathbf{y}\right)$ monotonically increase with $\mathbf{x}$. Second, the model does not explicitly model managerial expropriation since (a) expropriating assets (which increases managerial utility) reduces returns by a commensurate amount (which reduces utility), (b) Nikolov and Whited (2010) find that that the extent of managerial expropriation is relatively small compared with the size of the firm, (c) the wage function captures the use of perquisites for compensation purposes,[3] (as opposed to illegal theft purposes) and (d) the model does not delve into strictly illegal 'theft' type behavior.

The manager also wishes to avoid losing his/her job. Thus, the

[3]Perquisites are often incorporated into wage contracts as 'fringe benefits' (see for example Mitchell, 1983; Woodbury, 1983; Cheng, 2004).

manager wants to ensure that with probability $1-\alpha$, the final return, $\mathbf{x}^T\mathbf{y}$, exceeds the shark's takeover threshold $\eta(A)$. That is there is only a $\alpha\%$ chance that $\mathbf{x}^T\mathbf{y} < \eta$. Assume that the manager must invest all cash available for investment, such that $\mathbf{1}^T\mathbf{x} = \mathbf{x}^T\mathbf{1} = 1$.[4] Thus, the manager's optimization problem, consistent with Tütüncü and Koenig (2004), is:

$$\max_{\mathbf{x}} \quad \left\{ \min_{\mathcal{R},\mathcal{Y},\mathcal{E}} \int U_m \left[g(\mathbf{x}^T\mathbf{r}) \right] p(\mathbf{r}) d\mathbf{r} \right\} \tag{3}$$

$$s.t. \quad \left\{ \min_{\mathcal{R},\mathcal{Y},\mathcal{E}} \quad \mathbf{x}^T\mathbf{y} - \int_0^{\eta(A)} \mathbf{x}^T\mathbf{r} p(\mathbf{r}) d\mathbf{r} \geq \eta(A) \right\} \tag{4}$$

$$\mathbf{x}^T\mathbf{1} = 1 \tag{5}$$

The goal is then to (a) solve the manager's optimization problem to obtain an optimal portfolio, $\mathbf{x}^*$, as a function of the level of ATPs, A, and the standard deviation of returns, $\mathbf{\Sigma}$; and thus, (b) to examine the relation between firm-risk ($\mathbf{\Sigma}$), ATPs (A), and the firm's return.

2.2 Solution

The solution proceeds as follows. There are two issues (a) what is the manager's optimal portfolio vector, $\mathbf{x}$, and (b) given this optimal portfolio, how does the interaction of variance and ATPs influence the portfolio return. It is convenient to break this into several substeps.

[4]Nikolov and Whited (2010) show that the manager need not invest all cash. However, relaxing this constraint does not qualitatively change the solution obtained in Proposition 2.1 or in Proposition 2.2.

Proposition 2.1 (Optimal Portfolio) *If (a) the vector of returns is normally distributed, with mean return* $\mathbf{y}$*, and variance* $\mathbf{\Sigma}$*, (b) the takeover threshold is* $\eta(A)$*, and (c) the z-statistic associated with* $\eta(A)$ *is* z_A*, then the manager chooses the portfolio:*

$$\mathbf{x}^* = \left(2\mathbf{y}\mathbf{y}^T - 2z_A^2\mathbf{\Sigma}\right)^{-1}\left(2\eta(A)\mathbf{y} - \mathbf{y}\lambda_1^{-1} - (\lambda_2/\lambda_1)\mathbf{1}\right)$$

Here, $\mathbf{y}$ *is the vector of returns,* $\eta(A)$ *is the takeover threshold at which the shark acquires the firm,* z_A *is the z-statistic associated with* $\eta(A)$*,* Σ *is the variance-covariance matrix, and* λ_1, λ_2 *are Lagrange multipliers.*

Proof 1 *The Proof is in the Appendix*

The Second key issue is how the firm's returns change based upon interaction of (a) return variance, and (b) ATPs. Proposition 2.2 summarizes the result.

Proposition 2.2 *The firm's total returns increase with the interaction of ATPs and return-variance. That is, if the asset returns are more risky, then returns increase with ATPs.*

Proof 2 *The Proof is in the appendix*

To summarize findings thus far, risky firms (interchangeably called difficult-to-value or hard to value firms) benefit by giving managers more ATPs. Conversely, stable firms, as proxied by low cash flow volatility, do not benefit by giving managers more ATPs. The issue is then whether the empirical evidence supports this prediction.

3 Empirical Framework

This section details the empirical setting. The over-arching theory is that ATPs enable managers of HtV firms to generate value by ameliorating agency conflicts of managerial risk aversion. This implies that ATPs enable HtV acquirers to make innovative investments that increase shareholder wealth.

The theory that ATPs faciliate value-creation and innovation in HtV firms holds only if the following conditions obtain: (1) the market reacts more positively to investments (takeovers) made by HtV firms that have more ATPs. (2) these acquisitions generate long term value. (3) the acquisitions induce value-creating innovation. (4) ATPs must insulate managers from opportunistic takeovers without shielding them from disciplinary ones. (5) ATPs must still not induce complacency and overpayment. All must hold after controlling for relevant control variables. This section details the predictions. Section 4 defines the relevant variables.

First, the market must react positively to the investments (as proxied by takeovers) made by HtV acquirers. The prediction is a positive coefficient on HtV $\times$ ATPs in Equation (6).

$$\text{Reaction} = f(\text{HtV}, \text{ATPs}, \text{HTV} \times \text{ATPs}, \text{Controls}) \tag{6}$$

Second, these acquisitions must improve long-term value. The market's reaction to an event is a good proxy for whether it will create value. However, if valuation-difficulties arise, then the market might mis value investments over short time-horizons (Wooldridge, 1988; Porter, 1992; Hall, 1993). Thus, Powell and Stark (2003) suggest that it is important to examine long-term value-creation. This implies a positive coefficient on HTV × ATPs in Equation (7).

$$\text{Value}_{t+i} = f(\text{Value}_{t-1}, \text{HtV}, \text{ATPs}, \text{HTV} \times \text{ATPs}, \text{Controls}) \quad (7)$$

Third, ATPs should encourage HtV firms to make takeovers that both (a) increase innovation and (b) create value, as proxied by a positive market-reaction to the takeover announcement. This implies a positive coefficient on HTV × ATPs in Equation (8).

$$\begin{pmatrix} \text{Higher Innovation} \\ \times\text{Reaction} > 0 \end{pmatrix} = f(\text{HtV}, \text{ATPs}, \text{HTV} \times \text{ATPs}, \text{Controls}) \quad (8)$$

Fourth, the hypothesis is that ATPs shield managers of HtV companies from opportunistic takeovers but do not prevent disciplinary takeovers. This is important because disciplinary takeovers are a key mechanism to remove managers who make value-destroying investments (Scharfstein, 1988; Mitchell and Lehn, 1990; Kini, Kracaw, and Mian, 2004; Offenberg, 2009). To assess this, the dependent variable is 'Acquired', an indicator that equals one if the firm is taken over within 4 years of the initial acquisition (following Offenberg, 2009). The key independent variables are 'HtV', 'HtV ×

ATPs', 'HtV $\times$ Reaction<0', and 'HtV $\times$ ATPs $\times$ Reaction<0'. This induces Equation (9).

$$\begin{aligned}\text{Acquired} = f\,(&\text{HtV}, \text{HtV} \times \text{ATPs}, \text{HtV} \times \text{Reaction}< 0,\\ &\text{HtV} \times \text{ATPs} \times \text{Reaction}< 0, \text{Controls})\end{aligned} \tag{9}$$

The predictions are (1) ATPs do not insulate HtV firms from disciplinary takeovers following a value destroying acquisition. This holds if there is a positive coefficient on 'HtV $\times$ ATPs $\times$ Reaction$<$ 0'. (2) ATPs do protect HtV firms from opportunistic takeovers unrelated to making a value-destroying acquisition. This holds if there is a negative coefficient on 'ATPs $\times$ HtV'.

Fifth, the ATPs must not make the HtV firm's managers complacent and must not induce overpayment. Higher takeover premiums can indicate overpayment. However, they can also indicate the need to pay a high price for a high-synergy target. Overpayment reduces shareholder wealth; synergies increase it. Thus, a negative market-reaction to the takeover premium implies overpayment whereas a positive market-reaction to the takeover premium is consistent with synergies. Thus, if ATPs create value in HtV firms then there should be a positive coefficient on HtV $\times$ Proxy Premium $\times$ ATPs in Equation (10).

$$
\begin{aligned}
\text{Reaction} = f(&\text{HtV}, \text{ATPs}, \text{Proxy Premium}, \\
&\text{HtV} \times \text{Proxy Premium}, \text{ATPs} \times \text{Proxy Premium}, \\
&\text{HtV} \times \text{Proxy Premium} \times \text{ATPs}, \text{Controls})
\end{aligned} \tag{10}
$$

4 Sample and Variables

This sample comprises 3935 acquisitions by companies listed in the US and made between 1990-2005. The takeover must be announced before 2005 so that it is possible to examine whether an acquirer is targeted for a takeover within four years of the initial acquisition. Acquisition data comes from SDC platinum. Stock price data is from CRSP. Firm-level data is from Compustat. IBES analyst forecasts are from the IBES database on WRDS. Governance data is from RiskMetrics (formerly, IRRC).[5] Consistent with Masulis, Wang, and Xie (2007), the sample only comprises completed acquisitions where the acquirer controls 100% of the target after the acquisition, and for which the bidder and target have the necessary data. The sample excludes companies with dual class shares (consistent with Gompers, Ishii, and Metrick, 2003; Masulis, Wang, and Xie, 2007). The sample yields the following variables, which Table 1 defines.

[5]IRRC only reports data for every second or third year during the sample-period. For years with missing data, the article backfills data from the previously available year. The results are robust to forward filling with data from the next available year.

4.1 Proxies for Hard to Value Companies

The study uses five proxies for HtV firms are (a) Software, a dummy that equals one if the firm is in the software industry,[6] (b) Medical, a dummy that equals one if the firm is in the medical industry,[7] (c) HighDispersion, a dummy that equals one if the firm's yearly average analyst forecast dispersion is in the top 25% of the IBES population, (d) HighVariability, a dummy that equals one if the standard deviation of analyst forecast errors is in the top 25% of the IBES population for that year, and (e) HighError, a dummy that equals one if the firm's analyst forecast error is in the top 25% of the IBES population for that year, implying some difficulty valuing the company.

4.2 The ATP variables

The paper examines several measures of the level of anti-takeover provisions. The main measure, and the one that features in the reported multivariate tests, is 'GIM$\geq$ 10', a dummy variable that equals 1 if the firm has a Gompers, Ishii, and Metrick (2003) index above 10 (following Harford, Humphery-Jenner, and Powell, 2010).[8]

[6] Following Loughran and Ritter (2002), these have the 4-digit SIC codes: 7371, 7372, 7373, 7374, 7375, 7378, 7379.

[7] Loughran and Ritter (2004) define these as firms with 4-digit SIC code of 3841 or 3845. The paper extends this to include firms as being classified as as optical (SIC code 3827), surgical (SIC code 3841), orthopedic (SIC code 3842), dental (SIC code 3843), electromedical (SIC code 3845), opthalmic (SIC code 3851), or pharmaceutical (SIC code 2834).

[8] The results hold using other measures of anti-takeover provisions, including the Gompers, Ishii, and Metrick (2003) index, the Bebchuk, Cohen, and Ferrell (2008) six-provision entrenchment index, and a dummy that equals one if the firm has a classified board.

4.3 Takeover Premiums

The takeover premium is the transaction value divided by the target's share price 3, 11, or 21 days before the acquisition. However, the premium paid for a transaction is endogenous with the market's reaction to that transaction. Thus, follwoing Officer (2007) and Harford, Humphery-Jenner, and Powell (2010), the study examines a 'Proxy Premium', defined as the average takeover premium paid for companies in the target's industry in the year of the acquisition. A collateral advantage is that this allows the sample to retain acquisitions of unlisted targets.

4.4 Dependent Variables

4.4.1 Reaction Variable

This proxy for the market's reaction is the firm's cumulative average abnormal return ('CAR') surrounding the takeover announcement. The CAR is the sum of a firm's abnormal stock returns around the announcement date. The study calculates abnormal returns using an OLS estimation of the market model estimated over the period 11-days to 210-days before the acquisition announcement. Following Masulis, Wang, and Xie (2007), the main estimation cumulates abnormal returns from day -2 to day +2 (a five-day event window).

4.4.2 Long Term Performance Variable

The proxy for the bidder's long-term value is its industry adjusted Tobin's Q ('IaTobinQ'). 'IaTobinQ' is the firm's Tobin's Q less the average Tobin's Q in the firm's 3-digit SIC industry.[9] The rationale is that Tobin's Q is a commonly used measure of value (see Lang, Stulz, and Walkling, 1989; Bharadwaj, Bharadwaj, and Konsynski, 1999; Gompers, Ishii, and Metrick, 2003). However, Tobin's Q is naturally higher for some industries; and thus, a high Tobin's Q in a high-tech firm might give the false impression of high performance (following Gilchrist, Himmelberg, and Huberman, 2005). Thus, the study subtracts the average Tobin's Q for the firm's 3-digit SIC industry from the firm's Tobin's Q (consistent with Powell and Stark, 2003; Bebchuk, Cohen, and Ferrell, 2008).[10]

4.4.3 Value Creating Innovation

The 'value creating innovation' variables equal one if the takeover increases 'innovation' and the market reacts positively to the takeover.

The study uses two proxies for innovation-increasing takeovers. First, acquisitions of targets in high-tech industries might encourage further innovation. Thus, 'TargetTech' equals one if the target is in a high-tech industry, as defined in Loughran and Ritter (2002). Second, it examines the post-takeover increase in R&D.[11] An increase in R&D signals a long-term commitment to innovation since R&D generates long-term (rather than immediate) cash flows (Hagedoorn, 1989), and correlates with an increase in patents (Hausman, Hall, and Griliches, 1984; Hitt, Hoskisson, and Kim,

[9] The results are robust to subtracting the industry medial Tobin's Q and examining SIC 2-digit and SIC 3-digit industry classifications.

[10] The results are robust to the industry-adjustment procedure, also holding when subtracting industry-medians, and when defining industry using 2-digit and 4-digit SIC codes.

[11] R&D expenditures have received substantial use as a proxy for innovation, see: Hagedoorn (2002); Desyllas and Hughes (2010); Roijakkers and Hagedoorn (2006); Cloodt, Hagedoorn, and Van Kranenburg (2006); Hagedoorn and Cloodt (2003).

1997). Thus, the study deems an acquisition to increase innovation if $\text{R\&D}_{t+i} > \text{R\&D}_{t-1}$, where $i \in \{1, 2\}$.

The study captures whether the innovation creates value by interacting the innovation variable with an indicator that equals one if the market reacts positively to the acquisition announcement. Thus, the two 'value creating innovation' variables are $\mathbb{I}(\text{R\&D}_{t+i} > \text{R\&D}_{t-1}) \times \text{CAR} > 0$ and $\text{TargetTech} \times \text{CAR} > 0$.

4.4.4 Post-takeover Disciplinary takeovers

Entrenchment arises if ATPs protect managers from disciplinary takeovers (a takeover following a value-decreasing acquisition). Offenberg (2009) suggests that a way to check for entrenchment is to assess whether a bidder receives an acquisition attempt in the 4-years after the initial acquisition. Thus, the study examines the likelihood of receiving a takeover bid within 4 years of the initial acquisition.

4.5 Control Variables

The control variables are standard in the literature.[12] The variables are in two sub-categories: bidder-based variables and deal-based variables. Table 1 describes the variables in detail. The following describes the variables in the 'Reaction' model in brief.

The bidder variables are: (1) 'LnAssets': the natural log of the bidder's book assets; (2) 'P/RIV': the price-to-residual-income-value; (3) 'FCF/MVA': the free cash flow scaled by the market value

[12] See for example: Moeller and Schlingemann (2005); Moeller, Schlingemann, and Stulz (2004, 2005); Masulis, Wang, and Xie (2007).

of assets; (4) 'Leverage': the long-term debt divided by the market value of assets; and (5) 'TobinQ': the Tobin's Q defined as the market value of assets divided by the book value of assets.

The deal-based variables are: (1) 'RunUp': the pre-announcement run-up; (2) 'Volume': the pre-announcement abnormal stock turnover; (3) 'RelSize': the transaction value divided by the bidder's market value; (4) 'BothTech': an indicator that both the bidder and target are high-tech as defined in Loughran and Ritter (2002).[13]; (6) 'BothTech' × 'RelSize'; (7) 'Diversifying': an indicator that the bidder and target are in different Fama-French 48 industries; (8) 'CrossBorder': an indicator that the bidder and target are based in different countries; (9) 'Competed': an indicator that there were multiple bidders; (10) the indicators 'Public', 'Private', 'Subsidiary' represent an acquisition of a listed target, an unlisted target, a subsidiary. The terms 'Cash' and 'Stock' equal one if the bidder paid with some cash, or with only stock, respectively. The models control for the interactions of the variables.

The models in Equations (7), (8), and (9) use slightly different sets of variables. Equation (7) discards some deal-variables that should not logically influence long-term value, and includes 'IaTobinQ_{t-1}' in place of TobinQ_{t-1}. Equation (8) omits 'BothTech' and 'Tech×RelSize' to avoid endogeneity. Equation (9) controls for the Herfindahl-Hirschman Index ('HHI') due to the relationship be-

[13]They define high tech firms as firms in the industries: computer hardware (SIC codes: 3571, 3572, 3575, 3577, 3578); communications equipment (3661, 3663, 3669); electronics (3671, 3672, 3674, 3675, 3677, 3678, 3679); navigation equipment (3812); measuring and controlling devices (3823, 3825, 3826, 3827, 3829); medical instruments (3841, 3845); telephone equipment (4812, 4813); communications services (4899); and software (7371, 7372, 7373, 7374, 7375, 7378, 7379).

tween industry concentration and takeover prediction.

5 Empirical Results

5.1 Sample Description and Univariate Analysis

The sample contains 3935 acquisitions. Table 2 contains the sample description by year. Software companies make 408 of these acquisitions and Medical companies make 164 acquisitions in the sample. The sample reveals some takeover clustering. Specifically, there are relatively few takeovers in 1990 and 1991. However, 1998 and 1999 feature a significant spike in takeover activity.

Table 3 contains summary statistics. Column 1 contains statistics for the full sample of 3935 firms. The statistics are largely in line with those reported in prior literature (see Moeller, Schlingemann, and Stulz, 2004; Masulis, Wang, and Xie, 2007). Columns 2-6 contain summary statistics for sub-samples of HtV firms. There is significant variation in the variables across the HtV sub-samples. Interesting results are: (1) HtV firms earn lower CARs on average; (2) some HtV sub-samples have a negative average industry-adjusted Tobin's Q, suggesting lower valuations; (3) HtV firms do not always increase innovation, as proxied by an increase R&D after the takeover; and, (4) HtV firms pay higher premiums on average (which is consistent with either acquiring high-synergy targets or overpaying). These results neither support nor undermine the predictions in Section 3; instead, it is necessary to examine how the key variables change with the adoption of more ATPs.

Table 4 contains univariate statistics for HtV companies sorted by whether they have a GIM index of at least 10. Panel C compares high-ATP HtV companies with low-ATP HtV companies. The key results are: First, HtV companies make acquisitions that have higher CARs. Second, the acquisitions have a less-negative impact on industry-adjusted Tobin's Q. Third, HtV companies are also more likely to make acquisitions that create value and increase R&D expenditure. While ATPs reduce the likelihood that a HighDispersion or HighVariability firm makes a value-creating acquisition of a high-tech target, the difference-result in Panel C is not significant and (in unreported analysis) reflects the lower probability of acquiring a high tech target.[14] Fourth, if the initial acquisition destroyed value (had a CAR<0), then ATPs increase the likelihood that the HtV will be acquired. Overall, these results are laregly consistent with the predictions in Section 3.

Table 5 analyzes the CARs in further detail. It examines the relation between CARs and various definitions of being a high-ATP company.[15]

Panel A contains the results for all bidders, the results suggest that bidders in general make profitable takeovers (supporting Moeller, Schlingemann, and Stulz, 2004), but that ATPs encourage takeovers that are less profitable (consistent with Masulis, Wang, and Xie, 2007).

[14]Section 5.4 controls for the possibility that some acquirers are less likely to acquire a high-tech target by examining the probability that a bid creates value conditional on it being for a high-tech target.

[15]Note that for medical companies, all companies that have a Gompers, Ishii, and Metrick (2003) index of at least 10 also have a classified board. Thus, the results in the gim columns (Columns 2-4) are the same as in the dic columns (Columns 8-10).

The univariate results in Panels B to E suggest that ATPs enable managers of hard to value companies to focus on long-term value-creation. Several results are notable: First, if the firm is HtV and has more ATPs, then the market reacts significantly positively to its acquisition announcements. Second, if a HtV firm has GIM$<$ 10, BCF$<$ 3, or DIC$=$ 0, then the market will react insignificantly negatively to its takeovers. Third, if the firm is not HtV, but has more ATPs (GIM$\geq$ 10, BCF$\geq$ 3, or DIC$=$ 1), then the market reacts significantly negatively to its takeovers.

5.2 Market-Reaction Analysis

The first key issue is whether the market reacts positively to acquisitions by HtV firms who have more ATPs. The multivariate model is in Equation (11).

$$\text{CARs} = f(\text{HtV}, \text{GIM}{\geq}10, \text{HTV} \times \text{GIM}{\geq}10, \text{Controls}) \qquad (11)$$

Here, 'CARs' is the 5-day cumulative abnormal return based on an OLS estimation of the market model over the period 11 days to 210 days before the announcement; 'HtV' is one of the five proxies for being a hard-to-value company; 'GIM$\geq$ 10' is an indicator that the firm's GIM index is at least 10; and, 'Controls' denotes the control variables. The model uses standard errors clustered by 3-digit SIC industry and includes year-dummies (consistent with Johnson, Moorman, and Sorescu, 2009; Petersen, 2009).

The results confirm that the market reacts positively to takeovers by HtV firms that have ATPs. Table 6 contains the OLS regression results. The first key result is that the market responds negatively to bidders that have more ATPs (the coefficient on 'dic' is negative and significant). This quadrates with findings in prior literature (see for example Masulis, Wang, and Xie, 2007; Harford, Humphery-Jenner, and Powell, 2010). The second key result is that the market reacts positively to the acquisitions of HtV bidders if they have more ATPs (the interaction of 'dic' and all five HtV dummies is significant and positive). This supports the hypothesis that ATPs can encourage managers of HtV firms to make value-increasing investments.

The signs on the control variables are largely consistent with expectations. The results support prior findings that the market reacts negatively to large bidders' takeovers (see Moeller, Schlingemann, and Stulz, 2004); acquisitions by bidders with high equity valuations, as proxied by P/RIV (Harford, Humphery-Jenner, and Powell, 2010); acquisitions where there are multiple bidders; and, acquisitions of listed targets paid for with stock (Chang, 1998).

The OLS results overall support the hypothesis that ATPs enable managers of hard to value companies to implement value-creating investments. The OLS findings indicate that the univariate results do not merely reflect spurious correlation. This motivates examination of whether software-dictators also have higher post-takeover performance.

5.3 Do these acquisitions increase long-term value?

The second key issue is whether these acquisitions improve long term value. Equation (12) contains the OLS regression model

$$\begin{aligned} \text{IaTobinQ}_{t+i} = f\,\big(&\text{IaTobinQ}_{t-1}, \text{HtV}, \text{GIM}\geq 10, \\ &\text{HTV} \times \text{GIM}\geq 10, \text{Controls}\big) \end{aligned} \tag{12}$$

Here, the dependent variable is the industry-adjusted Tobin's Q estimated i years after the announcement. The tables report the results for 1 year after the announcement because the immediate hurdles of acquisition integration and fees impose immediate pressure on corporate values. 'HtV' is one of five hard-to-value proxies, 'GIM$\geq$ 10' equals one if the firm has a GIM index of at least 10, and 'Controls' denotes the controls. The model uses fewer controls than in Section 5.2 because some deal-based variables should not logically influence the acquirer's long-term value.[16] The models use robust standard errors clustered by 3-digit SIC code and include year dummies.

Table 7 contains regression results where the dependent variable is the industry-adjusted Tobin's Q one year after the acquisition. HtV acquirers perform worse on average. Firms with more ATPs have lower values on average (consistent with Gompers, Ishii, and Metrick, 2003; Bebchuk, Cohen, and Ferrell, 2008). However, the interaction 'GIM$\geq$ 10$\times$HtV' is positive and significant at 1% . Thus, while hard to value companies tend to make worse acquisitions, on

[16]The results are qualitatively the same if the model includes all control variables.

average, the presence of ATPs encourages managers to make acquisitions that create more value.

The control variables are consistent with expectations. Pre-takeover industry adjusted Tobin's Q is significantly positively correlated with post-takeover Tobin's Q, reflecting auto-correlation in performance (consistent with Harford, Humphery-Jenner, and Powell, 2010). Further, post-takeover performance decreases with firm-size, and cross-border diversification (supporting Moeller, Schlingemann, and Stulz, 2004; Moeller and Schlingemann, 2005). Interestingly, post-takeover performance increases with free-cash-flow, and decreases with leverage. But this may likely reflects the presence of P/RIV, which controls for agency-conflicts due to high-valuation.

5.4 Value creating innovation

The third issue is whether ATPs encourage takeovers that induce value-creating innovation. Thus the study examines whether ATPs increase the likelihood that HtV firms (1) acquire a high-tech acquisition and the market responds positively to this and (2) the firm's R&D expenditure increases following the acquisition and the market responds positively. To ensure that the propensity to acquire high-tech targets (as opposed to acquiring value-creating high-tech targets) creates value, the study also examines whether ATPs increase the chances of a positive market reaction conditional on the acquisition being for a high-tech firm. The OLS regression specifications are below:

$$\begin{pmatrix} \text{TargetTech} \\ \times\text{Reaction}\geq 0 \end{pmatrix} = f(\text{HtV}, \text{ATPs}, \text{HTV} \times \text{ATPs}, \text{Controls}) \tag{13}$$

$$\begin{pmatrix} \mathbb{I}\left(\text{R\&D}_{t+i} > \text{R\&D}_{t-1}\right) \\ \times\text{Reaction}\geq 0 \end{pmatrix} = f(\text{HtV}, \text{ATPs}, \text{HTV} \times \text{ATPs}, \text{Controls}) \tag{14}$$

$$\text{CAR} \geq 0 = f(\text{HtV}, \text{ATPs}, \text{HTV} \times \text{ATPs}, \text{Controls}) \tag{15}$$

Here, R&D is the firm's expenditure on R&D; TargetTech equals one if the target is in a high tech industry as defined in Loughran and Ritter (2002); HtV is one of five hard-to-value proxies; and, GIM$\geq$ 10 is an indicator that the firm has a GIM index of at least 10. The control variables are as in Section 5.2 except that they omit 'BothTech' and 'Tech$\times$RelSize' to avoid endogeneity. Equation (15) restricts the sample to the sub-sample of 1016 acquisitions that are for high-tech targets as defined in Loughran and Ritter (2002). The models use robust standard errors clustered by 3-digit SIC code.

The results are in Table 8. The control variables are suppressed for brevity. Looking at Panels A - C. The key result is that the coefficient on 'HtV $\times$ GIM $\geq$ 10' is positive and significant across all HtV specifications in Panels B and C and across four HtV specifications in Panel A. Unsurprisingly, there is a negative coefficient on 'GIM$\geq$ 10', confirming that ATPs can reduce value in non-

HtV firms. Overall, this implies that ATPs encourage HtV firms to increase innovation and this innovation creates value. Looking at Panel D, the coefficient on 'HtV × GIM ≥ 10' is positive and significant for four HtV specifications. Thus, conditional on the acquisition being for a high-tech target, ATPs increase the probability that a HtV firm will make an acquisition that creates value. Overall, these results indicate that ATPs encourage HtV firms to make acquisitions that generate value.

5.5 Post-acquisition takeovers

The hypothesis that ATPs benefit the shareholders of HtV companies rests on the assumption that ATPs do not entrench managers so as to protect them from disciplinary takeovers and ATPs may protect them from opportunistic takeovers.

The study analyzes this using multivariate logit regressions. Estimation is by logit since the possibility of non-normality in the residuals may bias probit results (Berra, Jarque, and Lee, 1984). Equation (16)

$$\begin{aligned}\text{Acquired} = f\,(&\text{HtV}, \text{HtV} \times \text{GIM}\geq 10, \text{HtV} \times \text{Reaction}< 0,\\ &\text{HtV} \times \text{GIM}\geq 10 \times \text{Reaction}< 0, \text{Controls})\end{aligned} \tag{16}$$

Here, 'Acquired' is an indicator that equals one if the initial bidder is acquired within four years of that initial bid; 'HtV' denotes the hard-to-value proxies; 'GIM≥ 10' equals one if the firm has a GIM index of at least 10; and 'Controls' denotes the control variables. The models use robust standard errors clustered by 3-digit SIC code and include year dummies.[17]

The bidder and deal variables are largely as in Section 5.2. However, there are two key changes. First, following Offenberg (2009), the models include the Herfindahl-Hishman Index ('HHI') of the initial-bidder's industry since a high HHI indicates a crowded industry, which might reduce the probability of receiving a takeover-bid (Powell, 1997; Brar, Giamouridis, and Liodakis, 2009).[18] Second, the models exclude variables that would not theoretically influence the likelihood of receiving a bid. These include whether the initial target was publicly listed, the method of payment, stock-price run-up in the initial acquisition, abnormal volume in the initial acquisition, the tech-status of the initial target, and the industry-relatedness of the bidder and the target.[19]

Now, if ATPs protect managers from opportunistic takeovers but do not insulate them from disciplinary ones, then (1) there should be a negative coefficient on 'HtV$\times$GIM$\geq$ 10', suggesting that ATPs make an acquisition of a HtV company less likely; and (2) there should be a positive coefficient on 'HtV$\times$GIM$\geq$ 10 $\times$CAR$\leq$ 0', suggesting that HtV companies are still disciplined for value-destroying decisions, even if they have more ATPs.

The results show that ATPs do not entrench managers of HtV companies. There are two key results. First, for four HtV proxies,

[17]The results are robust to the use of the cross-derivative-method proposed in Ai and Norton (2003), which corrects coefficient-estimates and standard errors of interaction terms Norton, Wang, and Ai (2004); Ai and Norton (2003); Brambor, Roberts Clark, and Golder (2006); Powers (2005)

[18]The results are unchanged in models that replace HHI with a dummy that equals 1 if the number of firms in the industry is in the top 25% of all industries.

[19]Robustness tests include all the original variables. The results are qualitatively the same.

HtV firms that have more ATPs are less likely to be targeted (the coefficient on GIM$\geq$ 10*HtV is negative and significant for all HtV variables except HighError). Second, HtV firms that have more ATPs are more likely to be acquired if they make a value destroying takeover. That is, the coefficient on **CAR**$< 0 \times$ **GIM**$\geq 10 \times$ **HtV** is positive in all models, and is significant for the HtV variables HighVariability, HighDispersion, and HighError. Together, these results suggest that ATPs do not insulate HtV firms from disciplinary takeovers, but do protect them from opportunistic ones.

The control variables are largely as expected. Especially relevant results are that high free cash flow firms are more likely to be taken over, consistent with the theory that free cash flow induces agency conflicts and poor acquisitions (see Jensen, 1986). Further, a high Herfindahl-Hirshman index reduces the likelihood of receiving a takeover bid. This suggests that acquisitions are less likely in concentrated industries and may suggest that anti-takeover regulations can inhibit some acquisitions. One interesting result is that ATPs in general do not reduce the likelihood of a takeover bid. This appears inconsistent with evidence that ATPs reduce the likelihood of receiving a takeover bid (as in Daines and Klausner, 2001; Casares and Karpoff, 2002). However, this may be because this paper focuses on a sample of acquirers rather than the population of all firms. Nonetheless, it suggests that ATPs may not be a wholly effective entrenchment mechanism.

These results combined with the foregoing results suggest that ATPs enable HtV companies to make acquisitions that are more profitable and that ATPs do not entrench managers of HtV companies. Together, these results strongly support the theory that ATPs enable managers of HtV companies to focus on value creation.

5.6 The reaction to takeover premiums

The prediction is that the market should react positively to the takeover premiums that HtV firms pay. The regression specification is:

$$\begin{aligned}\text{CAR} = f(&\text{HtV}, \text{GIM}\geq 10, \text{ProxyPremium}^{(i)},\\ &\text{HtV} \times \text{ProxyPremium}^{(i)}, \text{GIM}\geq 10 \times \text{ProxyPremium}^{(i)},\\ &\text{HtV} \times \text{ProxyPremium}^{(i)} \times \text{GIM}\geq 10, \text{Controls})\end{aligned} \tag{17}$$

Here, CAR is the 5-day cumulative abnormal return surrounding the announcement of the takeover; GIM$\geq$ 10 indicates if the firm has a GIM index of at least 10 and HtV is one of five HtV indicators. The proxy premium (denoted 'ProxyPremium$^{(i)}$') is the average premium paid for firms in the target's SIC 2-digit industry in that year, where the takeover premium is variously the transaction value divided by the target's stock price i-days before the acquisition, where i-days is various 3-days, 11-days, or 21-days . The controls are as in Section 5.2. The models use robust standard errors clustered by 3-digit SIC industry and include industry dummies.

The results are in Table 10. The key result is that the coefficient on 'HtV $\times$ ProxyPremium$^{(i)}$ $\times$ GIM$\geq$ 10' is positive and significant for four of the five HtV variables for all proxy premium specifications. The coefficient on 'ProxyPremium' is positive. This appears surprising; however, reflects the inclusion of 'ProxyPremium' in several interaction terms, and 'ProxyPremium' has a significant negative univariate correlation with CARs. The table omits control variables for brevity, although they are largely consistent with the results reported in Section 5.2.

These results imply that for HtV firms use takeover premiums productively to acquire targets that have high value.

5.7 Robustness and endogeneity

This section ensures that the results are robust. The results are robust in several ways. First, the results are robust to other ATP-measures. Specifically, the results hold in models that use CBD and PPILL, dummies that equal 1 if the firm has a classified board or has poison pills, respectively. The results also hold in models that use the Gompers, Ishii, and Metrick (2003) index or the Bebchuk, Cohen, and Ferrell (2008) index (denoted 'BCF'). Second, the results are robust to industry, year and firm clustering. The results hold in models that replace year fixed effects, with standard errors clustered by year and industry. The results also hold in models that cluster standard errors by firm rather than by industry. The results are qualitatively the same when industry is defined using SIC 2-digit, 3-digit, and 4-digit codes.

Third, the results are robust to multi-collinearity. The VIF does not exceed two for any variable in the models. Nonetheless, the relation between the HtV variable, ATPs and the dependent variables holds in models that replace the bidder and deal control variables with principal components that reflect the bidder and deal characteristics. Table 11 contains these results the PCA-regression results. The results re-enforce the relation between ATPs and CARs, and the positive relation between CARs and the combination of ATPs and being a software-firm. Fourth, they hold in different definitions of CARs, holding in models that use the event windows (-1,1), (-2,2), and (-5,5). Fifth, the takeover-likelihood-prediction models hold in both logit and probit models. Sixth, the results are robust to definition of takeover premium, holding in models that define premium as the transaction value divided by the target's market value 11-days, 21-days, or 31-days before the acquisition announcement. Seventh, they are robust to the examination of Tobin's Q, and industry adjusted Tobin's Q, 1, 2, or 3 years after the acquisition. The industry adjusted Tobin's Q is also robust to the subtraction of either the industry mean or median, and for industry being defined as the firm's 2-digit, 3-digit, or 4-digit SIC industry.

Fourth, the results are to endogeneity. I address endogeneity by replacing the ATP index with a 'Residual ATP' index that is the residual from a first-stage regression that predicts the level of ATPs (following Pagan, 1984; Murphy and Topel, 2002; Harford, Humphery-Jenner, and Powell, 2010). The 'Residual ATP' represents that proportion of the ATP index that is not due to other firm and governance characteristics.[20] For brevity, I only report the sec-

[20]These characteristics are: a dummy that equals one if the firm was sued under a shareholder class action in the last 12 months, the proportion of inside directors, a CEO-chairman

ond stage regression that examines acquisition CARs. The results are in Table 12. The key findings are that (1) the coefficient on the 'Residual GIM' variable is negative and significant whereas (2) the coefficient on the interaction of the 'Residual GIM' variable with the 'HtV' variable is positive and significant in all models. This supports the hypothesis that ATPs can create value in HtV companies. There is similar support for the other models in the paper.

6 Conclusion

This paper examines whether ATPs can ameliorate agency conflicts of managerial risk aversion. The results suggest that ATPs enable managers of hard to value firms to make value-creating acquisitions and encourage value-creating innovation, and that ATPs do not insulate managers of HtV firms from disciplinary takeovers. Unlike prior literature, which has focused on messy proxies for long-term value, this paper focuses on the market's reaction to an event, about which ATPs may convey new news. In so doing, this addresses the inconsistent findings in the literature that ATPs may reduce value for some, but not for all, firms. These results contribute to two bodies of literature. First, they contribute the governance literature by clarifying the relation between ATPs and firm value. Second, they contribute to the managerial incentive literature by showing one way to reduce agency conflicts of managerial risk-aversion. The

duality indicator, the log of the CEO's age, the log of the CEO's tenure, the proportion of incentive pay to total pay, the level of insider ownership, a high-tech dummy, the natural log of assets, the firm's tobin's Q, the industry-adjusted operating performance over assets, and the HHI.

findings in this paper suggest that future research could focus on the precise types of firm for which ATPs might destroy value.

7 Proofs

Proof 3 (Proof of Proposition 2.1) *For clarity of exposition, solution proceeds in several steps.*

First, recall that the manager's optimization problem is:

$$
\begin{aligned}
\max_{\mathbf{x}} \quad & \left\{ \min_{\mathcal{R},\mathcal{Y},\mathcal{E}} \int U_m \left[g(\mathbf{x}^T\mathbf{r}) \right] p(\mathbf{r}) d\mathbf{r} \right\} \\
s.t. \quad & \min_{\mathcal{R},\mathcal{Y},\mathcal{E}} \left(\mathbf{x}^T\mathbf{y} - \int_0^{\eta(A)} \mathbf{x}^T\mathbf{r} p(\mathbf{r}) d\mathbf{r} \right) \geq \eta(A) \\
& \mathbf{x}^T\mathbf{1} = 1
\end{aligned}
$$

Second, recall that the incentive compensation increases monotonically with returns, but does so at a decreasing rate; that is, $g' > 0$, and $g'' < 0$. Thus, maximizing over $g(\mathbf{x}^T\mathbf{r})$ is equivalent to maximizing over $\mathbf{x}^T\mathbf{r}$. Therefore, the optimization problem becomes:

$$
\max_{\mathbf{x}} \quad \left\{ \min_{\mathcal{R},\mathcal{Y},\mathcal{E}} \int U_m \left[\mathbf{x}^T\mathbf{r} \right] p(\mathbf{r}) d\mathbf{r} \right\} \tag{18}
$$

$$
s.t. \quad \min_{\mathcal{R},\mathcal{Y},\mathcal{E}} \left(\mathbf{x}^T\mathbf{y} - \int_0^{\eta(A)} \mathbf{x}^T\mathbf{r} p(\mathbf{r}) d\mathbf{r} \right) \geq \eta(A) \tag{19}
$$

$$
\mathbf{x}^T\mathbf{1} = 1 \tag{20}
$$

Third, note that (a) the returns are Gaussian, and (b) the manager is risk averse with $U'_m > 0$ and $U''_m < 0$. Following well-established result in portfolio optimization under a Gaussian distribution (see for example Pulley, 1981; Simaan, 1997; Rockafellar and Uryasev, 2000; Cornuejols and Tütüncü, 2007), Equation (18) *becomes:*

$$
\begin{aligned}
\max_{\mathbf{x}} \quad & \min_{\mathcal{R},\mathcal{Y},\mathcal{E}} \left(\mathbf{x}^T\mathbf{y} \right) \\
s.t. \quad & \max_{\mathcal{R},\mathcal{Y},\mathcal{E}} \left(\mathbf{x}^T\boldsymbol{\Sigma}\mathbf{x} \right) = \sigma
\end{aligned}
$$

Fourth, note that the returns are Gaussian. Further, recall that the manager chooses $\mathbf{x}$ such that $\mathbb{P}\left[\mathbf{x}^T\mathbf{y} \leq \eta_A\right] = \alpha$. Thus, consistent with Gourieroux, Laurent, and Scaillet (2000), El Ghaoui, Oks, and Oustry (2003), Scaillet (2004), and Bertsimas, Lauprete, and Samarov (2004):

$$
\mathbb{P}\left(\mathbf{x}^T\mathbf{y} \leq \eta_A\right) = \alpha = \int_{-\infty}^{z_\alpha} p(\mathbf{r}) d\mathbf{r}
$$

Thus,

$$
\frac{\left[\mathbf{x}^T\mathbf{y} - \eta(A)\right]}{\sqrt{\mathbf{x}^T\boldsymbol{\Sigma}\mathbf{x}}} = z_\alpha
$$

Thus, letting $z_A = z_\alpha$

$$
\eta(A) = \mathbf{x}^T\mathbf{y} - z_A\sqrt{\mathbf{x}^T\boldsymbol{\Sigma}\mathbf{x}}
$$

Therefore, the constraint in Equation (19) *induces the following relation,*

$$\min_{\mathcal{R},\mathcal{Y},\mathcal{E}} \left(\mathbf{x}^T\mathbf{y} - \int_0^{\eta(A)} \mathbf{x}^T\mathbf{r}p(\mathbf{r})d\mathbf{r}\right) \geq \eta(A)$$
$$\Leftrightarrow \min_{\mathcal{R},\mathcal{Y},\mathcal{E}} \left(\mathbf{x}^T\mathbf{y} - z_A\sqrt{\mathbf{x}^T\mathbf{\Sigma}\mathbf{x}}\right) \geq \eta(A) \quad (21)$$

Here, $\eta(A)$ *is the takeover threshold, and* z_A *is the z-statistic associated with the takeover threshold. Note that* $\eta(A)$ *decreases with the level of ATPs, and conversely, the absolute value of* z_A *increases with the level of ATPs.*

Fifth, now note that the firm will set the level of ATPs such that Equation (19) *binds in the optimum. Combine these relations together to obtain the new optimization problem:*

$$\max_{\mathbf{x}} \quad \min_{\mathcal{R},\mathcal{Y},\mathcal{E}} \quad \left(\mathbf{x}^T\mathbf{y}\right) \quad (22)$$
$$s.t. \quad \max_{\mathcal{R},\mathcal{Y},\mathcal{E}} \left(\mathbf{x}^T\mathbf{\Sigma}\mathbf{x}\right) = \sigma \quad (23)$$
$$\min_{\mathcal{R},\mathcal{Y},\mathcal{E}} \left(\mathbf{x}^T\mathbf{y} - z_A\sqrt{\mathbf{x}^T\mathbf{\Sigma}\mathbf{x}}\right) = \eta(A) \quad (24)$$
$$\mathbf{x}^T\mathbf{1} = 1 \quad (25)$$

Sixth, transform the problem into an ordinary optimization problem by eliminating the uncertainty sets. The approach follows that in Tütüncü and Koenig (2004), Calafiore (2007), and Cornuejols and Tütüncü (2007). This induces the modified optimization problem:

$$\max_{\mathbf{x}} \quad \mathbf{x}^T\underline{\mathbf{y}} \quad (26)$$
$$s.t. \quad \mathbf{x}^T\bar{\mathbf{\Sigma}}\mathbf{x} = \sigma \quad (27)$$
$$\mathbf{x}^T\underline{\mathbf{y}} - z_A\sqrt{\mathbf{x}^T\bar{\mathbf{\Sigma}}\mathbf{x}} = \eta(A) \quad (28)$$
$$\mathbf{x}^T\mathbf{1} = 1 \quad (29)$$

Seventh, perform a change of variables in Equation (28). *Here,* $\left[\mathbf{x}^T\underline{\mathbf{y}} - \eta(A)\right] = z_A\sqrt{\mathbf{x}^T\bar{\mathbf{\Sigma}}\mathbf{x}}$. *Thus,*

$$\left[\mathbf{x}^T\underline{\mathbf{y}} - \eta(A)\right] = z_A\sqrt{\mathbf{x}^T\bar{\mathbf{\Sigma}}\mathbf{x}}$$
$$(\mathbf{x}^T\underline{\mathbf{y}})^2 - 2\eta(A)\mathbf{x}^T\underline{\mathbf{y}} + \eta^2 = z_A^2\mathbf{x}^T\bar{\mathbf{\Sigma}}\mathbf{x}$$
$$0 = \eta(A)^2 - 2\eta(A)\mathbf{x}^T\underline{\mathbf{y}} + \mathbf{x}^T\mathbf{\Omega}\mathbf{x}$$

Where,

$$\mathbf{\Omega} = \underline{\mathbf{y}}\mathbf{y}^T - z_A^2\bar{\mathbf{\Sigma}}$$

Note that $\mathbf{\Omega} = \underline{\mathbf{y}}\mathbf{y}^T - z_A^2\bar{\mathbf{\Sigma}}$ *is symmetric. To see this,*

$$\begin{aligned}\Omega^T &= \left[\underline{\mathbf{y}}\mathbf{y}^T - z_A^2\bar{\mathbf{\Sigma}}\right]^T \\ &= \left(\underline{\mathbf{y}}\mathbf{y}^T\right)^T - z_A^2\bar{\mathbf{\Sigma}}^T \\ &= \mathbf{y}\underline{\mathbf{y}}^T - z_A^2\bar{\mathbf{\Sigma}} \\ &= \mathbf{\Omega}\end{aligned}$$

Eigth, re-write the optimization problem using the foregoing results:

$$\max_{\mathbf{x}} \quad \mathbf{x}^T\underline{\mathbf{y}} \tag{30}$$

$$s.t. \quad \eta(A)^2 - 2\eta(A)\mathbf{x}^T\underline{\mathbf{y}} + \mathbf{x}^T\mathbf{\Omega}\mathbf{x} = 0 \tag{31}$$

$$\mathbf{x}^T\mathbf{1} = 1 \tag{32}$$

Ninth, differentiate with respect to $\mathbf{x}$ *and set to zero to obtain an optimum. This induces the system of equations:*

$$\underline{\mathbf{y}} - 2\eta(A)\underline{\mathbf{y}}\lambda_1 + 2\lambda_1\mathbf{\Omega}\mathbf{x} + \lambda 2\mathbf{1} = 0 \qquad \textit{Derivative} \tag{33}$$

$$\eta(A)^2 - 2\eta(A)\mathbf{x}^T\underline{\mathbf{y}} + \mathbf{x}^T\mathbf{\Omega}\mathbf{x} = 0 \qquad \textit{Constraint 1} \tag{34}$$

$$\mathbf{1}^T\mathbf{x} = 0 \qquad \textit{Constraint 2} \tag{35}$$

Tenth, solve Equation (33) *with respect to* $\mathbf{x}$ *to obtain the optimal investment vector. Here, this is*

$$\begin{aligned}\mathbf{x}^* &= (2\Omega)^{-1}\left(2\eta(A)\underline{\mathbf{y}} - \underline{\mathbf{y}}\lambda_1^{-1} - (\lambda_2/\lambda_1)\mathbf{1}\right) \\ &= \left(2\underline{\mathbf{y}}\underline{\mathbf{y}}^T - 2z_A^2\bar{\mathbf{\Sigma}}\right)^{-1}\left(2\eta(A)\underline{\mathbf{y}} - \underline{\mathbf{y}}\lambda_1^{-1} - (\lambda_2/\lambda_1)\mathbf{1}\right)\end{aligned} \tag{36}$$

Proof 4 (Proof of Proposition 2.2) *To see this, recall that the manager chooses the investment portfolio* $\mathbf{x}^* = \left(2\underline{\mathbf{y}}\underline{\mathbf{y}}^T - 2z_A^2\bar{\mathbf{\Sigma}}\right)^{-1}\left(2\eta(A)\underline{\mathbf{y}} - \underline{\mathbf{y}}\lambda_1^{-1} - (\lambda_2/\lambda_1)\mathbf{1}\right)$. *Thus, the firm's total return is:*

$$\underline{\mathbf{y}}^T\mathbf{x}^* = \underline{\mathbf{y}}^T\left(2\underline{\mathbf{y}}\underline{\mathbf{y}}^T - 2z_A^2\bar{\mathbf{\Sigma}}\right)^{-1}\left(2\eta(A)\underline{\mathbf{y}} - \underline{\mathbf{y}}\lambda_1^{-1} - (\lambda_2/\lambda_1)\mathbf{1}\right)$$

Now note that the Lagrange multipliers are positive. Further, recall that (a) $\eta(A)$ *decreases with ATPs and (b)* z_A *increases with the level of ATPs. Now, the term* $z_A^2\bar{\mathbf{\Sigma}}$ *represents the combined impact of ATPs and return-variance. Thus, increasing ATPs and return-variance increases the term* $z_A^2\bar{\mathbf{\Sigma}}$. *Noting the negative sign and inverse power, this means that increasing the term* $z_A^2\bar{\mathbf{\Sigma}}$ *increases* $\underline{\mathbf{y}}^T\mathbf{x}^*$. *Thus, if the firm's assets are more risky, then increasing ATPs increases the firm's total returns.*

8 Tables

Table 1: Variable definitions

Variable	*Definition*
Dependent Variables	
CAR	The cumulative abnormal returns accruing to the bidder for the five days surrounding the announcement (from days -2, to +2). Abnormal returns are the difference between actual returns and predicted returns. The predicted return is based on an OLS estimation of the market model with parameters computed over the pariod 11 days to 210 days before the announcement.
IaTobinQ_{t+i}	The bidder's industry adjusted Tobin's Q i years after the acquisition. The paper reports the results for $i = 1$. The bidder's Tobin's Q is its market value of assets over its book value of assets. The market value of assets is the firm's market capitalization plus book assets less its book equity. In compustat terms this is (at - ceq+csho×price)/(at). The firm's industry adjusted Tobin's Q is its Tobin's Q less the average Tobin's Q in the firm's SIC 4-digit industry.
CAR$\geq 0 \times \mathbb{I}(\text{R\&D}_{t+i} > \text{R\&D}_{t-1})$	The interaction of (a) an indicator that equals one if the CAR is positive, and (b) an indicator that equals one if the R&D expenditure in year $t+i$ exceeds that in year $t-i$, where year t is the acquisition year.
CAR$\geq 0 \times$ TgtTech	The interaction of (a) an indicator that equals one if the CAR is positive and (b) an indicator that equals one if the target is in a high-tech industry as defined in Loughran and Ritter (2002).
Acquired	An indicator that equals one if the initial acquirer receives a takeover bid within 4 years of the acquisition
Valuation Difficulty Variables	
Software	A dummy variable that equals 1 if the acquirer is in the computer software industry. These have the 4-digit SIC codes: 7371, 7372, 7373, 7374, 7375, 7378, 7379.
Medical	A dummy variable that equals 1 if the acquirer is in the medical industry. Loughran and Ritter (2004) define these as firms with 4-digit SIC code of 3841 or 3845. However, the results also hold in an extended definition of medical firms as being classified as as optical (SIC code 3827), surgical (SIC code 3841), orthopedic (SIC code 3842), dental (SIC code 3843), electromedical (SIC code 3845), opthalmic (SIC code 3851), or pharmaceutical (SIC code 2834). The reported models use the Loughran and Ritter (2004) specification.
HighDispersion	A dummy variable that equals one if the average of the standard deviation of analyst forecasts is in the top 25% of the IBES population. The calculation is as follows. For each forecast period IBES reports the standard deviation of the analyst forecasts. Compute the average of the standard deviations over the course of the year. The variable HighAveOfSd equals one if the average of the standard deviations is in the top 25% of the IBES population.

HighVariability	This is based upon the 1-period ahead analyst forecasts made over the 12 months before the acquisition announcement. Here, each forecast period, IBES reports the mean one-period-ahead analyst forecast. Compute the standard deviation of the mean analyst forecasts over the course of the year. The variable HighSdOfAve equals one if the standard deviation of the mean analyst forecasts is in the top 25% of the IBES population.
HighError	A dummy variable that equals one if the firm's average absolute forecast error is in the top 25% of the IBES population. For each forecast period, the absolute forecast error is the absolute value of the difference between the earnings forecast and the actual earnings. An acquirer is a HighError firm if the average absolute forecast error over the year before the acquisition is in the top 25% of the IBES population.
Governance Variables	
GIM	The index of 24 ATPs used in Gompers, Ishii, and Metrick (2003). A firm's gim score is the number of these 24 ATPs that the firm has.
GIM$\geq$ 10	An indicator that equals 1 if the firm has a gim score of at least 10 and has a classified board, and equals 0 otherwise. The reported models use this as the key governance variable.
BCF	The index of 6 ATPs used in Bebchuk, Cohen, and Ferrell (2008). A firm's bcf score is the number of these 6 ATPs the firm has.
CBD	An indicator that equals 1 if the firm has a classified board.
PPILL	An indicator that equals 1 if the firm has a classified board.
Firm level variables	
LnAssets	The natural log of the acquirer's total assets (Compustat code: at).
P/RIV	The firm's stock price ('P') to a measure of its true value (Residual Income Value, 'RIV'). The computation of RIV is as in Harford, Humphery-Jenner, and Powell (2010).
FCF/MVA	The firm's free cash flow scaled by the market value of assets. In Compustat codes, the free cash flow is (oibdp-xint - txt-capx)/(at - ceq+csho×price), and the market value of assets is (at - ceq+csho×price), where 'price' is the firm's share price 35 days before the announcement.
Leverage	The long-term debt (Compustat: dltt) scaled by the market value of assets (Compustat: at - ceq+csho×price, where 'price' is the firm's share price 35 days before the announcement soruced from CRSP).
TobinQ	Tobin's Q is the market value of assets (at - ceq+csho×price, where 'price' is the firm's share price 35 days before the announcement) scaled by the book value of assets (Compustat: at).
Deal level variables	
RunUp	The RunUp variable is the firm's buy-and-hold-abnormal-return (BHAR) earned over the period 210 days to 11 days before the takeover. The abnormal returns are based on an OLS estimation of the market model computed over 200 days before this period.
Volume	The measure of abnormal volume on day t is the turnover on day t less that predicted by an OLS estimation of a turnover-based market-model (computed over a prior 200 day period). The 'Volume' variable is the cumulative abnormal volume over the window from 10-days to 30-days before the announcement.

RelSize	The transaction value divided by the bidder's market value 11 days before the announcement.
BothTech	'BothTech' equals one if both the bidder and target are in high-tech industries as defined in Loughran and Ritter (2002).[21]
Diversifying	An indicator that equals one if the bidder and target are in different Fama-French 48 industries. The results are qualitatively the same when defining diversifying acquisitions as those in which the bidder and target are in different 2-digit, 3-digit, and 4-digit SIC codes.
CrossBorder	An indicator that equals one if the bidder and target are based in different countries.
Friendly	An indicator that equals one if SDC codes the deal as neither hostile nor unsolicited.
Competition	An indicator that equals one if there was more than one bidder.
Method of Payment & Target Status interactions	The indicators 'Public', 'Private', 'Subsidiary' represent an acquisition of a listed target, an unlisted target, a subsidiary. The terms 'Cash' and 'Stock' equal one if the bidder paid with some cash, or with only stock, respectively. The models control for the interactions of the variables.
IndustryM&A	The total value of the takeover transactions in the target's industry in the past year
CAR< 0	An indicator variable that equals one if the bidder's market value falls following the acquisition (i.e. the 5-day CAR is negative).
BidderComp1-3	Principal components derived from the bidder-based variables: lnta, priv, tobinq, fcf, and leverage.
AcqComp1-8	Principal components derived from acquisition based variables: bhar, indma, relsize, bothtech, tech*relsize, conglomerate, pub*cash, pub*stock, priv*cash, priv*stock, sub*cash, competed, volume, crossBorder, friendly, and serial.

[21] They define high tech firms as firms in the industries: computer hardware (SIC codes: 3571, 3572, 3575, 3577, 3578); comunications equipment (3661, 3663, 3669); electronics (3671, 3672, 3674, 3675, 3677, 3678, 3679); navigation equipment (3812); measuring and controlling devices (3823, 3825, 3826, 3827, 3829); medical instruments (3841, 3845); telephone equipment (4812, 4813); communications services (4899); and software (7371, 7372, 7373, 7374, 7375, 7378, 7379).

Table 2: Takeovers by year

The sample comprises a total of 3935 acquisitions made between 1990 and 2005. Column 1 contains the total number of acquisitions in a given year. Column 2 (Column 3) contains the number of acquisitions that are by a software (non-software) company. Column 4 (Column 5) contains the number of acquisitions that are by a medical (non-medical) company). Column 6 contains the average of the standard deviation in analyst forecasts. Column 7 contains the standard deviation of the mean analyst forecast. Column 8 containst the average forecast error.

Year	Number	Software	Mon-Software	Medical	Non-Medical	Dispersion	Variability	Forecast Error
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1990	119	11	108	2	117	0.090	0.157	0.338
1991	109	5	104	2	107	0.281	0.319	0.736
1992	121	12	109	3	118	0.064	0.101	0.159
1993	201	14	187	10	191	0.077	0.150	0.188
1994	225	11	214	10	215	0.063	0.099	0.161
1995	225	26	199	8	217	0.083	0.144	0.180
1996	232	17	215	11	221	0.069	0.121	0.156
1997	236	13	223	4	232	0.066	0.123	0.925
1998	382	40	342	15	367	0.079	0.212	0.331
1999	322	18	304	16	306	0.084	0.227	0.243
2000	279	31	248	8	271	0.125	0.330	0.430
2001	252	22	230	11	241	0.071	0.324	0.281
2002	319	55	264	12	307	0.058	0.197	0.338
2003	289	52	237	14	275	0.063	0.207	0.179
2004	336	40	296	18	318	0.058	0.169	0.173
2005	288	41	247	20	268	0.059	0.162	0.172
Overall	3935	408	3527	164	3771	0.087	0.190	0.312

Table 3: Summary Statistics

Table 3 contains summary statistics for the sample. All figures are means. Table 1 defines the variables. Column 1 examines all firms in the sample. Columns 2-6 examine sub-sample of firms that are HtV. The HtV definition is in the column title.

	All Firms (1)	Software (2)	Medical (3)	High Dispersion (4)	High Variability (5)	High Error (6)
Panel A: Dependent and Related Variables						
CAR	0.301	0.035	-0.017	0.122	-0.006	0.500
IaTobinQ_{t+3}	0.155	0.190	0.300	-0.043	-0.100	-0.099
IaTobinQ_{t+2}	0.173	0.334	0.284	-0.032	-0.060	-0.115
IaTobinQ_{t+1}	0.192	0.406	0.339	-0.060	-0.043	-0.067
TgtTech	0.258	0.806	0.421	0.216	0.309	0.277
$\mathbb{I}(\text{R\&D}_{t+2} > \text{R\&D}_{t-1})$	0.915	0.902	0.872	0.814	0.840	0.848
$\mathbb{I}(\text{R\&D}_{t+1} > \text{R\&D}_{t-1})$	0.910	0.868	0.848	0.827	0.840	0.857
Acquired	0.133	0.211	0.116	0.188	0.144	0.089
$\text{ProxyPremium}^{(3)}$	1.139	1.526	1.178	1.139	1.267	1.202
$\text{ProxyPremium}^{(11)}$	1.196	1.586	1.273	1.191	1.329	1.256
$\text{ProxyPremium}^{(21)}$	1.228	1.662	1.303	1.214	1.354	1.293
Panel B: Governance Variables						
GIM	9.418	8.137	9.220	9.288	9.164	8.946
BCF	2.270	1.730	2.018	2.161	2.146	1.929
CBD	0.629	0.458	0.640	0.583	0.588	0.473
GIM≥ 10	0.484	0.270	0.439	0.487	0.455	0.473
BCF≥ 3	0.450	0.260	0.360	0.386	0.391	0.295
Panel C: Control Variables						
Assets (USDm)	12154	2121	4643	3432	2401	2717
IaTobinQ_{t-1}	0.426	1.001	0.886	0.143	0.345	0.235
TobinQ_{t-1}	1.972	3.115	3.353	1.580	1.934	1.618

P/RIV	2.137	3.652	3.198	1.699	1.759	0.591
FCF/MVA	0.017	0.020	0.032	-0.001	0.004	-0.009
Leverage	0.166	0.057	0.110	0.205	0.183	0.221
RunUp	-0.071	-0.098	-0.086	-0.073	-0.128	-0.073
IndM&A	0.022	0.038	0.036	0.020	0.023	0.017
RelSize	0.133	0.090	0.113	0.170	0.148	0.195
Diversifying	0.369	0.328	0.372	0.363	0.407	0.438
Cash	0.552	0.525	0.579	0.565	0.572	0.580
Stock	0.448	0.475	0.421	0.435	0.428	0.420
Private	0.364	0.500	0.305	0.277	0.367	0.268
Public	0.317	0.297	0.378	0.343	0.290	0.348
Subsidiary	0.314	0.201	0.317	0.371	0.337	0.384
Competed	0.020	0.017	0.037	0.030	0.027	0.036
Volume	0.072	-0.105	0.163	0.057	0.120	0.120
CrossBorder	0.007	0.005	0.006	0.013	0.006	0.009
Friendly	0.989	0.988	0.976	0.983	0.987	0.991
Serial	0.200	0.201	0.116	0.124	0.160	0.071
HHI	0.154	0.106	0.091	0.144	0.152	0.120

Table 4: Univariate Statistics for HtV firms

Table 4 contains univariate statistics for HtV firms sorted by whether they have a GIM index of at least 10. All figures are sample means. The column title denotes the HtV measure. Panel A examines firms with GIM$\geq$ 10; Panel B examines firms with GIM$<$ 10; and, Panel C takes the difference of Panel A and Panel B. The variables under analysis are: CAR is the 5-day cumulative abnormal return. $\Delta\text{IaTobinQ}_{t-1}^{t+i}$ is the change in industry-adjusted tobin's Q between year $t+i$ and year $t-1$, where t is the acquisition year. TgtTech indicates that the target is a high-tech target as defined in Loughran and Ritter (2002). $\mathbb{I}(\text{R\&D}_{t+i} > \text{R\&D}_{t-1})$ equals one if the R&D expenditure in year $t+i$ exceeds that in year $t-1$. Bid$\times$CAR$<$ 0 equals one if the initial acquirer is acquired within 4-years of the initial acquisition and the initial acquisition had a negative CAR. Superscripts ***, **, and * denote a significant different from zero in Panel A and Panel B and denote a significant difference in means in Panel C.

	Software	Medical	High Dispersion	High Variability	High Error
Panel A: GIM$\geq$ 10					
CAR	1.146	0.679*	0.231***	0.295*	1.737***
$\Delta\text{IaTobinQ}_{t-1}^{t+1}$	-0.117	-0.541***	-0.117***	-0.230***	0.071
$\Delta\text{IaTobinQ}_{t-1}^{t+2}$	-0.290	-0.603**	-0.092***	-0.181**	0.113***
$\Delta\text{IaTobinQ}_{t-1}^{t+3}$	-0.416	-0.866**	-0.080***	-0.210*	0.130***
TgtTech $\times$ CAR$\geq$ 0	0.588***	0.208***	0.087***	0.111***	0.189***
$\mathbb{I}(\text{R\&D}_{t+1} > \text{R\&D}_{t-1}) \times \text{CAR} > 0$	0.545***	0.444***	0.428***	0.458***	0.509***
$\mathbb{I}(\text{R\&D}_{t+2} > \text{R\&D}_{t-1}) \times \text{CAR} > 0$	0.564***	0.514***	0.420***	0.461***	0.509***
Acquired$\times$CAR$<$ 0	0.164***	0.083**	0.080***	0.084***	0.038
Panel B: GIM$<$ 10					
CAR	-0.375***	-0.562***	0.018***	-0.257***	-0.611**
$\Delta\text{IaTobinQ}_{t-1}^{t+1}$	-0.765***	-0.436***	-0.310***	-0.643***	-0.601**
$\Delta\text{IaTobinQ}_{t-1}^{t+2}$	-0.975***	-0.516**	-0.306***	-0.676***	-0.648**
$\Delta\text{IaTobinQ}_{t-1}^{t+3}$	-1.149***	-0.489*	-0.295*	-0.711***	-0.615
TgtTech $\times$ CAR$\geq$ 0	0.396***	0.185***	0.108***	0.187***	0.136***
$\mathbb{I}(\text{R\&D}_{t+1} > \text{R\&D}_{t-1}) \times \text{CAR} > 0$	0.433***	0.424***	0.399***	0.399***	0.356***
$\mathbb{I}(\text{R\&D}_{t+2} > \text{R\&D}_{t-1}) \times \text{CAR} > 0$	0.453***	0.435***	0.406***	0.417***	0.373***
Acquired$\times$CAR$<$ 0	0.057***	0.065**	0.058***	0.041***	0.000

Panel C: Difference: GIM$\geq$ 10 - GIM$<$ 10

CAR	1.521	1.241**	0.213*	0.552*	2.347*
ΔIaTobinQ$_{t-1}^{t+1}$	0.648***	-0.105	0.193**	0.413***	0.672**
ΔIaTobinQ$_{t-1}^{t+2}$	0.685***	-0.087	0.215**	0.495***	0.760**
ΔIaTobinQ$_{t-1}^{t+3}$	0.732**	-0.377	0.215**	0.501***	0.745**
TgtTech $\times$ CAR≥ 0	0.193*	0.024	-0.021	-0.076	0.053*
$\mathbb{I}(\text{R\&D}_{t+1} > \text{R\&D}_{t-1}) \times \text{CAR} > 0$	0.113**	0.021**	0.029	0.060*	0.154**
$\mathbb{I}(\text{R\&D}_{t+2} > \text{R\&D}_{t-1}) \times \text{CAR} > 0$	0.111**	0.079*	0.014	0.044	0.137**
Acquired$\times$CAR< 0	0.107***	0.018	0.022**	0.043***	0.038

Table 5: Univariate statistics by governance and software classification

Table 5 contains the univariate for the 5-day market model abnormal return, sorted by the level of ATPs, for the takeover performance of high valuation difficulty versus low valuation difficulty companies. Panels A - E measure valuation difficulty based upon being in the software industry, being in the medical industry, having high forecast dispersion, having high forecast variability and having high forecast error. Numbers in normal font are mean 5-day CARs, and numbers in italics are median 5-day CARs. Table 1 defines the variables. Numbers in brackets are p-values. Superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively using ttests for means and non-parametric sign tests for medians.

	All	GIM≥10	GIM<10	Difference	BCF≥3	BCF<3	Difference	GIM≥10 &CBD =1	GIM≤10 & CBD =0	Difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
All	0.301***	-0.036	0.617***	-0.653***	-0.011	0.556***	-0.568***	-0.036	0.617***	-0.653***
	*0.118***	*-0.197*	*0.385****	*-0.583****	*-0.137*	*0.305****	*-0.441****	*-0.197*	*0.385****	*-0.583**
Panel A: Software										
HtV=1	0.035	1.146*	-0.375	1.521	0.459*	-0.114	0.573	1.146*	-0.375	1.521
	0.204	*1.227***	*-0.342*	*1.569**	*0.346***	*0.166*	*0.180*	*1.227***	*-0.342*	*1.569**
HtV=0	0.332	-0.108***	0.788	-0.896***	-0.041***	0.665	-0.706***	-0.108***	0.788	-0.896***
	*0.106***	*-0.237****	*0.437*	*-0.674****	*-0.174****	*0.323*	*-0.497****	*-0.237****	*0.437*	*-0.674****
Difference	-0.296	1.254**	-1.162*		0.501**	-0.778*		1.254**	-1.162***	
	0.098	*1.464***	*-0.779*		*0.520*	*-0.156*		*1.464***	*-0.779*	
Panel B: Medical										
HtV=1	-0.017	0.679***	-0.562	1.241**	0.742**	-0.443	1.185*	0.679**	-0.562	1.241*
	-0.134	*0.074***	*-0.462*	*0.537**	*0.540**	*-0.606*	*1.146*	*0.074***	*-0.462*	*0.537**
HtV=0	0.315***	-0.064	0.673***	-0.737***	-0.037	0.607***	-0.644***	-0.064	0.673***	-0.737***
	*0.128****	*-0.202*	*0.422****	*-0.625****	*-0.153*	*0.375****	*-0.528****	*-0.202*	*0.422****	*-0.625****
Difference	-0.332	0.743**	-1.235		0.779**	-1.050		0.743**	-1.235	

	-0.262	0.277*	-0.884		0.693	-0.981		0.277*	-0.884	
Panel C: Forecast Dispersion										
HtV=1	0.122	0.231*	0.018	0.213*	-0.207	0.328	-0.535	0.231*	0.018	0.213*
	-0.282	-0.202	-0.321	0.118	-0.721	-0.102	-0.619	-0.202	-0.321	0.118
HtV=0	0.330***	-0.078	0.712***	-0.790***	0.015	0.598***	-0.583***	-0.078	0.712***	-0.790***
	0.159***	-0.194	0.547***	-	-0.098	0.416***	-	-0.194	0.547***	-
				0.741***			0.513***			0.741***
Difference	-0.208	0.309**	-0.694***		-0.221	-0.270***		0.309**	-0.694***	
	-0.441	-0.009*	-		-0.624	-		-0.009	-	
			0.868***			0.518***			0.868***	
Panel D: Forecast Variability										
HtV=1	-0.006	0.295***	-0.257	0.552*	0.224**	-0.154	0.378**	0.295**	-0.257	0.552*
	-0.075	0.294**	-0.229	0.523*	0.172**	-0.167	0.339*	0.294*	-0.229	0.523*
HtV=0	0.381***	-0.115	0.862***	-0.977***	-0.063	0.767***	-0.830***	-0.115	0.862***	-0.977***
	0.147***	-0.229	0.565***	-	-0.157	0.437***	-	-0.229	0.565***	-
				0.795***			0.594***			0.795***
Difference	-0.387	0.410**	-1.119***		0.288**	-0.921***		0.410**	-1.119***	
	-0.222	0.524**	-		0.329	-		0.524**	-	
			0.794***			0.604***			0.794***	
Panel E: Forecast Error										
HtV=1	0.500	1.737*	-0.611	2.347*	0.605**	0.456	0.148*	1.737**	-0.611	2.347*
	-0.253	0.693*	-0.500	1.193*	-1.149	0.011	-1.160	0.693*	-0.500	1.193*
HtV=0	0.295***	-0.086	0.654***	-0.740***	-0.023	0.560***	-0.583***	-0.086	0.654***	-0.740***
	0.125***	-0.201	0.421***	-	-0.131	0.340***	-	-0.201	0.421***	-
				0.621***			0.471***			0.621***
Difference	0.205	1.823**	-1.264		0.628*	-0.104***		1.823**	-1.264***	
	-0.379	0.894**	-0.921		-1.018	-		0.894*	-	
						0.329***			0.921***	

Table 6: 5-day CARs Regression Results

Table 6 contains OLS estimates of Equation 11. The dependent variable is the 5-day market model cumulative abnormal return. The column title indicates the valuation difficulty dummy. Table 1 defines the variables. Numbers in brackets are p-values. Superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Software (1)	Medical (2)	HighDispersion (3)	HighVariability (4)	HighError (5)
GIM$\geq$ 10	-0.758***	-0.665**	-0.714**	-0.857***	-0.678**
	[0.005]	[0.026]	[0.026]	[0.007]	[0.022]
HtV	-0.930***	-1.464***	-0.442	-0.744**	-1.261
	[0.005]	[0.000]	[0.355]	[0.035]	[0.201]
GIM$\geq$ 10 $\times$ HtV	1.858***	1.858***	0.929*	1.316**	3.128**
	[0.000]	[0.002]	[0.095]	[0.010]	[0.013]
LnAssets$_{t-1}$	-0.373***	-0.376***	-0.373***	-0.368***	-0.372***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
TobinQ$_{t-1}$	0.304**	0.310**	0.298**	0.286**	0.299**
	[0.021]	[0.016]	[0.021]	[0.031]	[0.019]
P/RIV	-0.080***	-0.082***	-0.081***	-0.082***	-0.082***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
FCF/MVA$_{t-1}$	5.946	6.535	6.081	5.727	6.185
	[0.152]	[0.120]	[0.144]	[0.172]	[0.150]
Leverage$_{t-1}$	3.017***	3.252***	3.223***	3.099***	3.130***
	[0.009]	[0.006]	[0.006]	[0.008]	[0.007]
RunUp	0.059	0.057	0.066	0.012	0.073
	[0.874]	[0.878]	[0.860]	[0.975]	[0.846]
IndustryM&A	2.542	1.901	1.363	1.848	1.064
	[0.642]	[0.715]	[0.790]	[0.720]	[0.834]
RelSize	0.574	0.546	0.588	0.589	0.585
	[0.517]	[0.538]	[0.512]	[0.505]	[0.512]
BothTech	0.514	0.45	0.504	0.49	0.482
	[0.118]	[0.137]	[0.118]	[0.121]	[0.136]
BothTech $\times$ RelSize	-7.158***	-7.307***	-7.509***	-7.446***	-7.641***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Diversifying	0.01	-0.003	0.002	0.006	-0.003

	[0.963]	[0.988]	[0.992]	[0.977]	[0.991]
Public × Cash	0.304	0.306	0.287	0.261	0.32
	[0.447]	[0.438]	[0.469]	[0.515]	[0.414]
Public× Stock	-2.011***	-1.993***	-1.998***	-2.011***	-2.003***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Private × Cash	0.387	0.373	0.397	0.37	0.388
	[0.187]	[0.201]	[0.175]	[0.206]	[0.190]
Private × Stock	0.238	0.222	0.198	0.217	0.206
	[0.647]	[0.657]	[0.692]	[0.662]	[0.678]
Subsidiary ×	1.071***	1.073***	1.085***	1.072***	1.092***
Cash	[0.002]	[0.002]	[0.001]	[0.002]	[0.001]
Competed	-1.578**	-1.582**	-1.595**	-1.610**	-1.551**
	[0.013]	[0.013]	[0.012]	[0.011]	[0.015]
Volume	0.159	0.165	0.157	0.161	0.161
	[0.156]	[0.140]	[0.153]	[0.142]	[0.144]
CrossBorder	2.879**	2.834**	2.944**	2.863**	2.922**
	[0.023]	[0.024]	[0.023]	[0.024]	[0.020]
Friendly	-2.617***	-2.565***	-2.471***	-2.522***	-2.507***
	[0.002]	[0.002]	[0.003]	[0.002]	[0.003]
Serial	0.201	0.169	0.192	0.175	0.184
	[0.428]	[0.486]	[0.436]	[0.480]	[0.450]
Constant	4.973***	4.920***	4.784***	4.971***	4.835***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	3,935	3,935	3,935	3,935	3,935
R-squared	6.60%	6.50%	6.50%	6.60%	6.60%

Table 7: Industry Adjusted Tobin's Q

Table 7 examines the relation between governance, risk and post-takeover performance, as proxied by Industry-Adjusted Tobin's Q. It contains OLS estimates of Equation (12). The dependent variable is the industry adjusted Tobin's Q one year after the acquisition. The column title contains the valuation difficulty variable. Table 1 defines the variables. Numbers in brackets are p-values. Superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	software (1)	medical (2)	HighDispersion (3)	HighVariability (4)	HighError (5)
$IaTobinQ_{t-1}$	0.198***	0.195***	0.196***	0.196***	0.197***
	[0.003]	[0.003]	[0.003]	[0.004]	[0.003]
GIM$\geq$ 0	-0.091	-0.109***	-0.08	-0.109	-0.074
	[0.122]	[0.009]	[0.195]	[0.100]	[0.176]
HtV	-0.175**	-0.374**	-0.194**	-0.292***	-0.158
	[0.014]	[0.028]	[0.012]	[0.000]	[0.114]
GIM$\geq$ 0$\times$HtV	0.200***	0.876***	0.052*	0.168*	0.096**
	[0.008]	[0.000]	[0.062]	[0.077]	[0.046]
$LnAssets_{t-1}$	-0.019	-0.016	-0.012	-0.012	-0.015
	[0.232]	[0.314]	[0.450]	[0.447]	[0.313]
P/RIV	0.007	0.006	0.006	0.005	0.006
	[0.189]	[0.244]	[0.249]	[0.326]	[0.235]
FCF/MVA_{t-1}	0.930**	0.989**	0.668*	0.545	0.886**
	[0.033]	[0.016]	[0.076]	[0.148]	[0.034]
$Leverage_{t-1}$	-1.130***	-1.070***	-1.067***	-1.089***	-1.076***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
RelSize	-0.199***	-0.193***	-0.184***	-0.191***	-0.189***
	[0.003]	[0.002]	[0.003]	[0.004]	[0.003]
BothTech	-0.013	-0.028	-0.04	-0.038	-0.023
	[0.778]	[0.494]	[0.401]	[0.417]	[0.609]
BothTech $\times$ RelSize	-0.265	-0.333*	-0.315	-0.275	-0.361*
	[0.178]	[0.086]	[0.100]	[0.136]	[0.068]
Diversifying	-0.009	-0.008	-0.009	0	-0.007
	[0.846]	[0.854]	[0.847]	[0.994]	[0.871]
CrossBorder	-0.175	-0.207	-0.149	-0.181	-0.169
	[0.163]	[0.122]	[0.220]	[0.162]	[0.173]

Serial	0.06	0.056	0.046	0.051	0.054
	[0.304]	[0.318]	[0.408]	[0.366]	[0.336]
Constant	0.420**	0.388*	0.376*	0.425**	0.372*
	[0.048]	[0.058]	[0.066]	[0.038]	[0.065]
Observations	3,709	3,709	3,709	3,709	3,709
R-squared	21.80%	22.30%	21.90%	22.30%	21.70%

Table 8: Valuation Creating Innovation

Table 8 examines whether ATPs enable HtV firms to make takeovers that both increase innovation and firm value. The panel heading states the dependent variable in each model. The control variables are suppressed for brevity. They are as in Table 6, except the models omit 'BothTech' and 'Tech×RelSize' to avoid endogeneity. Table 1 defines the variables. Numbers in brackets are p-values. Superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Software	Medical	HighDispersion	HighVariability	HighError
Panel A: Dependent Variable: CAR$\geq 0 \times$ TgtTech					
GIM$\geq$ 10	-0.444**	-0.403**	-0.435**	-0.425***	-0.425**
	[0.037]	[0.019]	[0.016]	[0.004]	[0.012]
HtV	0.652**	-0.702	-0.122	0.254	0.098
	[0.027]	[0.107]	[0.523]	[0.198]	[0.819]
HtV $\times$ GIM$\geq$ 10	0.551**	0.476**	0.474*	0.234	1.218**
	[0.012]	[0.035]	[0.066]	[0.350]	[0.011]
Controls	Yes	Yes	Yes	Yes	Yes
Constant	-1.781	-1.132	-1.171	-1.221	-1.244
	[0.119]	[0.321]	[0.310]	[0.287]	[0.267]
Observations	3935	3935	3935	3935	3935
Pseudo-R2	20.20%	19.20%	19.00%	19.20%	19.20%
Panel B: Dependent Variable: CAR$\geq 0 \times \mathbb{I}(\text{R\&D}_{t+1} > \text{R\&D}_{t-1})$					
GIM$\geq$ 10	-0.237***	-0.191**	-0.236**	-0.287***	-0.208**
	[0.001]	[0.031]	[0.014]	[0.001]	[0.014]
HtV	-0.293***	-0.473***	-0.394**	-0.351***	-0.506*
	[0.000]	[0.000]	[0.016]	[0.008]	[0.068]
HtV $\times$ GIM$\geq$ 10	0.568***	0.248	0.380*	0.505***	0.880***
	[0.000]	[0.169]	[0.055]	[0.005]	[0.003]
Controls	Yes	Yes	Yes	Yes	Yes
Constant	0.866**	0.823**	0.818**	0.883**	0.806**
	[0.035]	[0.039]	[0.041]	[0.033]	[0.045]
Observations	3935	3935	3935	3935	3935
Pseudo-R2	3.59%	3.56%	3.62%	3.67%	3.56%

Panel C: Dependent Variable: CAR$\geq 0 \times \mathbb{I}(\text{R\&D}_{t+2} > \text{R\&D}_{t-1})$					
GIM$\geq$ 10	-0.223***	-0.192**	-0.211**	-0.257***	-0.194**
	[0.001]	[0.024]	[0.022]	[0.003]	[0.018]
HtV	-0.254***	-0.461***	-0.349**	-0.280**	-0.423*
	[0.001]	[0.000]	[0.022]	[0.026]	[0.094]
HtV $\times$ GIM$\geq$ 10	0.555***	0.502***	0.28	0.417**	0.778**
	[0.000]	[0.003]	[0.181]	[0.023]	[0.019]
Controls	Yes	Yes	Yes	Yes	Yes
Constant	1.071***	1.052***	1.039***	1.085***	1.024***
	[0.005]	[0.004]	[0.004]	[0.004]	[0.005]
Observations	3935	3935	3935	3935	3935
Pseudo-R2	3.63%	3.60%	3.64%	3.65%	3.59%
Panel D: Dependent Variable: CAR$\geq$ 0; target must be high-tech					
GIM$\geq$ 10	-0.317**	-0.159	-0.237	-0.274	-0.14
	[0.035]	[0.398]	[0.215]	[0.165]	[0.379]
HtV	-0.255***	-0.726**	-0.456*	-0.15	0.286
	[0.007]	[0.048]	[0.060]	[0.232]	[0.599]
HtV $\times$ GIM$\geq$ 10	0.678***	0.504*	0.999***	0.691**	0.12
	[0.000]	[0.051]	[0.002]	[0.030]	[0.896]
Controls	Yes	Yes	Yes	Yes	Yes
Observations	1016	1016	1016	1016	1016
Pseudo-R2	6.08%	6.04%	6.12%	6.06%	5.80%

Table 9: Takeover Likelihood Predictions

Table 9 contains logit estimates of Equation 16. The dependent variable is a dummy that equals one if the acquirer receives a takeover bid within four years of the initial acquisition. The title of each column indicates the valuation difficulty variable. Table 1 defines the variables. Numbers in brackets are p-values. Superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	software (1)	medical (2)	HighDispersion (3)	HighVariability (4)	HighError (5)
CAR< 0	-0.444**	-0.457***	-0.267	-0.179	-0.397***
	[0.013]	[0.003]	[0.113]	[0.346]	[0.010]
GIM≥ 10	0.042	0.242	0.401*	0.367*	0.263
	[0.804]	[0.236]	[0.084]	[0.063]	[0.173]
HtV	0.13	-0.402	1.270***	0.823***	0.286
	[0.454]	[0.273]	[0.000]	[0.000]	[0.594]
GIM≥ 10×CAR< 0	-0.07	-0.113	-0.337	-0.502**	-0.162
	[0.765]	[0.583]	[0.195]	[0.017]	[0.417]
GIM≥ 10 × HtV	-1.619***	-1.530*	-1.013**	-0.726**	-1.321
	[0.000]	[0.090]	[0.038]	[0.014]	[0.146]
CAR< 0 × HtV	0.033	0.367	-1.092***	-1.226***	-14.632***
	[0.846]	[0.280]	[0.004]	[0.002]	[0.000]
CAR< 0×GIM≥ 10×HtV	0.153	1.899	1.623***	1.982***	16.650***
	[0.525]	[0.198]	[0.009]	[0.000]	[0.000]
LnAssets_{t-1}	-0.067	-0.113	-0.127	-0.114	-0.111
	[0.489]	[0.259]	[0.216]	[0.277]	[0.272]
HHI	-1.663*	-2.039**	-1.997**	-2.021**	-1.960**
	[0.089]	[0.027]	[0.041]	[0.031]	[0.029]
TobinQ_{t-1}	-0.266*	-0.205	-0.19	-0.207	-0.22
	[0.079]	[0.212]	[0.223]	[0.190]	[0.180]
P/RIV	0.004	0.005	0.005	0.005	0.004
	[0.332]	[0.258]	[0.300]	[0.263]	[0.318]
FCF/MVA_{t-1}	6.800***	7.123***	8.084***	7.621***	6.886***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Leverage_{t-1}	-0.869	-1.062	-1.163	-1.105	-1.086
	[0.365]	[0.204]	[0.173]	[0.185]	[0.204]

Serial	-0.655***	-0.615***	-0.567***	-0.573***	-0.617***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Constant	-1.036	-0.622	-0.786	-0.837	-0.641
	[0.127]	[0.295]	[0.220]	[0.148]	[0.268]
Observations	3935	3935	3935	3935	3935
Pseudo R-squared	8.48%	7.12%	7.98%	7.73%	7.21%

Table 10: Takeover Premium Regressions

Table 10 examines the market's reaction to premiums paid by HtV firms that have more ATPs. The dependent variable is the 5-day CAR based on an OLS estimation of the market model. All models include the same controls as in Section 5.2 (suppressed for brevity). All models use the 'Industry Average' premium (similarly to Officer, 2007; Harford, Humphery-Jenner, and Powell, 2010).
The column title contains HtV variable. Table 1 defines the variables. Numbers in brackets are p-values. Superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Software	Medical	HighDispersion	HighVariability	HighError
Panel A: 3-Day Premium					
GIM$\geq$ 10	-0.616*	-0.581	-0.541	-0.548	-0.549
	[0.094]	[0.134]	[0.167]	[0.152]	[0.158]
ProxyPremium$^{(3)}$	0.214	0.205	0.238	0.252	0.22
	[0.224]	[0.197]	[0.157]	[0.118]	[0.174]
HtV	-1.118***	-0.205	-0.412	-0.302	0.628
	[0.002]	[0.851]	[0.257]	[0.384]	[0.510]
HtV $\times$ ProxyPremium$^{(3)}$	0.21	-0.641	-0.197	-0.309	-0.665
	[0.456]	[0.331]	[0.290]	[0.336]	[0.194]
GIM$\geq$ 10 $\times$ ProxyPremium$^{(3)}$	-0.149	-0.086	-0.215	-0.256	-0.124
	[0.513]	[0.670]	[0.322]	[0.145]	[0.537]
HtV $\times$ GIM$\geq$ 10 $\times$ ProxyPremium$^{(3)}$	0.860***	1.050***	0.840**	0.767**	1.263
	[0.000]	[0.000]	[0.021]	[0.022]	[0.157]
Controls	Yes	Yes	Yes	Yes	Yes
Observations	3,169	3,169	3,169	3,169	3,169
R-squared	6.60%	6.50%	6.60%	6.60%	6.50%
Panel B: 11-Day Premium					
GIM$\geq$ 10	-0.594	-0.551	-0.512	-0.523	-0.521
	[0.103]	[0.154]	[0.190]	[0.172]	[0.179]
ProxyPremium$^{(11)}$	0.227	0.222	0.252	0.264*	0.236
	[0.168]	[0.137]	[0.114]	[0.081]	[0.125]
HtV	-1.129***	-0.189	-0.433	-0.332	0.628
	[0.002]	[0.870]	[0.229]	[0.335]	[0.510]

HtV × ProxyPremium$^{(11)}$	0.206	-0.595	-0.189	-0.278	-0.631
	[0.432]	[0.367]	[0.295]	[0.364]	[0.182]
GIM≥ 10 × ProxyPremium$^{(11)}$	-0.161	-0.107	-0.235	-0.274	-0.142
	[0.450]	[0.577]	[0.250]	[0.100]	[0.454]
HtV × GIM≥ 10 × ProxyPremium$^{(11)}$	0.839***	0.925***	0.844**	0.772**	1.201
	[0.000]	[0.000]	[0.013]	[0.013]	[0.165]
Controls	Yes	Yes	Yes	Yes	Yes
Observations	3,169	3,169	3,169	3,169	3,169
R-squared	6.60%	6.50%	6.60%	6.60%	6.50%
Panel C: 21-Day Premium					
GIM≥ 10	-0.576	-0.534	-0.501	-0.511	-0.512
	[0.115]	[0.169]	[0.203]	[0.185]	[0.192]
ProxyPremium$^{(21)}$	0.213	0.211	0.228	0.247*	0.22
	[0.193]	[0.153]	[0.149]	[0.096]	[0.146]
HtV	-1.310***	-0.239	-0.478	-0.356	0.475
	[0.000]	[0.837]	[0.186]	[0.296]	[0.623]
HtV × ProxyPremium$^{(21)}$	0.31	-0.551	-0.141	-0.253	-0.55
	[0.256]	[0.399]	[0.421]	[0.387]	[0.233]
GIM≥ 10 × ProxyPremium$^{(21)}$	-0.184	-0.13	-0.253	-0.298*	-0.162
	[0.390]	[0.489]	[0.204]	[0.074]	[0.386]
HtV × GIM≥ 10 × ProxyPremium$^{(21)}$	0.806***	0.947***	0.868***	0.814***	1.34
	[0.000]	[0.000]	[0.009]	[0.007]	[0.110]
Controls	Yes	Yes	Yes	Yes	Yes
Observations	3,177	3,177	3,177	3,177	3,177
R-squared	6.50%	6.50%	6.50%	6.60%	6.50%

Table 11: PCA Regressions

Table 11 contains the principal components regressions. The dependent variable is the 5-day OLS market model cumulative abnormal return. The title of each column indicates the valuation difficulty variable, whose coefficient is in the row 'HtV'. Table 1 defines the variables. Numbers in brackets are p-values. Superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	software	medical	HighDispersion	HighVariability	HighError
	(1)	(2)	(3)	(4)	(5)
GIM≥ 10	-0.838***	-0.743**	-0.779**	-0.959***	-0.747**
	[0.002]	[0.014]	[0.017]	[0.003]	[0.013]
HtV	-0.818***	-1.460***	-0.758	-1.091***	-1.503
	[0.008]	[0.003]	[0.111]	[0.003]	[0.138]
GIM≥ 10*HtV	2.148***	2.194***	0.918	1.491***	3.385**
	[0.000]	[0.000]	[0.120]	[0.005]	[0.015]
BidderComp1	-0.009	-0.01	-0.033	-0.036	-0.014
	[0.936]	[0.919]	[0.763]	[0.743]	[0.897]
BidderComp2	0.055	0.065	0.043	0.039	0.061
	[0.706]	[0.657]	[0.763]	[0.782]	[0.670]
BidderComp3	-0.637***	-0.649***	-0.638***	-0.649***	-0.650***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
AcqComp1	-0.629***	-0.642***	-0.644***	-0.637***	-0.645***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
AcqComp2	-0.072	-0.078	-0.076	-0.069	-0.077
	[0.495]	[0.447]	[0.479]	[0.523]	[0.469]
AcqComp3	0.091	0.086	0.081	0.09	0.077
	[0.371]	[0.377]	[0.415]	[0.369]	[0.437]
AcqComp4	0.209*	0.205*	0.192*	0.200*	0.207**
	[0.056]	[0.052]	[0.074]	[0.066]	[0.049]
AcqComp5	0.202**	0.191**	0.187**	0.206**	0.177*
	[0.041]	[0.049]	[0.050]	[0.035]	[0.065]
AcqComp6	0.337***	0.345***	0.344***	0.342***	0.348***
	[0.002]	[0.001]	[0.002]	[0.002]	[0.002]
AcqComp7	-0.138	-0.14	-0.135	-0.148	-0.134
	[0.137]	[0.132]	[0.146]	[0.112]	[0.143]
AcqComp8	-0.221**	-0.215**	-0.230**	-0.225**	-0.230***

	[0.012]	[0.017]	[0.011]	[0.012]	[0.009]
Constant	1.035***	1.002***	1.034***	1.184***	0.993***
	[0.005]	[0.005]	[0.004]	[0.001]	[0.005]
Observations	3,935	3,935	3,935	3,935	3,935
R-squared	4.90%	4.90%	4.80%	5.00%	4.90%

Table 12:

Table 12 contains results from the two-step regression process that replaces the dictatorship dummy with the residual from a first stage regression that predicts the level of ATPs. Numbers in brackets are p-values. Superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Software (1)	Medical (2)	HighDispersion (3)	HighVariability (4)	HighError (5)
Residual GIM	-0.203***	-0.178***	-0.180***	-0.196**	-0.179***
	[0.001]	[0.006]	[0.007]	[0.011]	[0.005]
HardToVal	-0.76	-0.707	0.242	0.367	1.098
	[0.121]	[0.261]	[0.592]	[0.291]	[0.296]
Residual GIM*HardToVal	0.349***	0.243***	0.092*	0.119**	0.770**
	[0.000]	[0.005]	[0.054]	[0.032]	[0.023]
lnta	-0.409***	-0.401***	-0.402***	-0.403***	-0.391***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
tobinq	0.404***	0.424***	0.409***	0.411***	0.410***
	[0.003]	[0.001]	[0.002]	[0.002]	[0.002]
priv	-0.086***	-0.085***	-0.086***	-0.086***	-0.090***
	[0.001]	[0.000]	[0.001]	[0.001]	[0.000]
fcf	11.846**	12.600**	12.636**	12.852**	12.133**
	[0.020]	[0.015]	[0.016]	[0.017]	[0.018]
leverage	4.743***	5.176***	5.081***	5.123***	5.034***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
bhar	-0.497	-0.468	-0.45	-0.456	-0.445
	[0.309]	[0.348]	[0.365]	[0.347]	[0.368]
indMA	-3.192	-5.002	-5.689	-5.652	-5.429
	[0.668]	[0.484]	[0.420]	[0.426]	[0.443]
relsize	-2.490**	-2.465**	-2.470**	-2.455**	-2.436**
	[0.033]	[0.035]	[0.036]	[0.036]	[0.038]
bothTech	0.755	0.654	0.726	0.729	0.685
	[0.113]	[0.132]	[0.123]	[0.104]	[0.134]
bothTech*relsize	-7.320*	-7.912**	-8.057**	-8.058**	-7.967**
	[0.061]	[0.049]	[0.041]	[0.042]	[0.045]

conglomerate	0.101	0.092	0.111	0.092	0.125
	[0.731]	[0.757]	[0.709]	[0.759]	[0.677]
pub*cash	0.597	0.558	0.549	0.559	0.543
	[0.273]	[0.300]	[0.308]	[0.294]	[0.316]
pub*stock	-2.088***	-2.069***	-2.061***	-2.058***	-2.065***
	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]
priv*cash	0.118	0.109	0.122	0.115	0.133
	[0.780]	[0.797]	[0.776]	[0.786]	[0.758]
priv*stock	0.204	0.171	0.178	0.196	0.178
	[0.770]	[0.802]	[0.793]	[0.771]	[0.794]
sub*cash	1.510***	1.538***	1.537***	1.540***	1.557***
	[0.004]	[0.004]	[0.004]	[0.003]	[0.004]
competed	-1.202*	-1.147*	-1.161*	-1.223*	-1.109
	[0.092]	[0.094]	[0.090]	[0.069]	[0.106]
vol	0.125	0.134	0.127	0.127	0.128
	[0.295]	[0.269]	[0.291]	[0.291]	[0.283]
crossBorder	3.27	3.452	3.519	3.564	3.498
	[0.386]	[0.364]	[0.354]	[0.358]	[0.360]
friendly	-1.52	-1.417	-1.338	-1.427	-1.386
	[0.113]	[0.119]	[0.135]	[0.116]	[0.131]
serial	0.368	0.333	0.343	0.337	0.338
	[0.374]	[0.405]	[0.394]	[0.394]	[0.398]
Constant	3.438**	3.267**	3.120**	3.163**	3.138**
	[0.021]	[0.019]	[0.024]	[0.026]	[0.026]
Observations	2,498	2,498	2,498	2,498	2,498
R-squared	8.70%	8.50%	8.50%	8.50%	8.50%

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