

The Elapsed Time Between Acquisitions

by

Nihat Aktas, Eric de Bodt, and Richard Roll

This draft: March 21, 2008

Abstract

Acquirer cumulative abnormal returns (CARs) have been investigated intensively for more than three decades. CARs measure shareholders' wealth changes conditional upon a deal announcement. The unconditional acquirer shareholders' expected profit is, however, the product of the acquirer's CAR and the probability of making the acquisition. This probability element has been mostly overlooked in the M&A literature. Since the probability cannot be observed directly, we use the time between successive acquisitions as a proxy and provide a systematic empirical analysis of its determinants.

JEL classification: G32; G34

Keywords: serial acquisition, acquirer expected profit, time between deals, CAR

	Aktas	de Bodt	Roll
Address	Université catholique de Louvain CORE & IAG-LSM 1 place des Doyens 1348 Louvain-la-Neuve Belgium Academic Fellow Europlace Institute of Finance	Université de Lille 2 Lille School of Management 1 place Déliot - BP381 59020 Lille Cédex France	The Anderson School UCLA Los Angeles, CA 90095-1481 USA
Voice	+32-10-478-439	+33-3-2090-7477	+1-310-825-6118
Fax	+32-10-478-324	+33-3-2090-7629	+1-310-206-8404
E-mail	nihat.aktas@uclouvain.be	eric.debodt@univ-lille2.fr	rroll@anderson.ucla.edu

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1. Introduction

Acquirer cumulative abnormal returns (CARs) around merger and acquisition (M&A) announcements have been extensively investigated for more than thirty years. Jensen and Ruback (1983) provide a review of up to the beginning of the eighties. Since then, many features of M&A decisions have been uncovered and analyzed: acquirer size, acquirer valuation, acquirer listing status, acquirer growth prospects, target listing status, difficulty of valuating the target, toeholds, mode of payments, mode of financing, the deal anticipation effect, CEO compensation, CEO overconfidence, CEO learning, CEO versus shareholders agency conflicts, collusion and market power, acquisition programs, anti-takeover provisions, sources of synergies, the role of corporate governance mechanisms, geographic diversification and cross-border acquisitions, industry diversification, and effects on suppliers and customers. Appendix A.1 presents some references and is certainly far from being exhaustive! The quest for a better understanding of acquirer CARs has definitively been an intensive area of research and still continues to attract the attention of the academic community. Betton et al. (2008) provide a recent survey of the literature.

CARs are *ex post* measures of shareholders' wealth changes. They represent investors' consensus valuation of the deal (an unbiased estimate under the efficient market hypothesis) conditional on the deal announcement. The acquirer shareholders' expected (or *ex-ante*) profit is the product of this wealth change conditional on the deal announcement and the probability of doing the deal. This second element of the wealth effect has not been investigated in the literature up to now to the best of our knowledge. Overlooking it could lead to misleading interpretations.

Some observed acquirer behaviors are indeed puzzling if analyzed only from the CAR perspective. Two typical examples are the effects of bid premiums and toeholds on acquirer profits. If one measures acquirer profit by the CAR alone, paying a high premium for the target is strange (or could even be interpreted as a sign of deviant behaviors by decision makers); the higher the premium (for a given level of synergies¹), the higher the wealth transfer from acquirer to target shareholders, the lower the CAR. But once the probability of

¹ Antoniou et al. (2007) provide some evidence that premiums and synergies are positively correlated.

the doing the deal is taken into account, the trade-off becomes apparent: increasing the premium deters competition (see Fishman (1988) on preemptive bidding) and renders target shareholders and the target board more agreeable. To maximize expected profit, acquirers trade CAR against the probability of doing the deal, which is a rational.

A similar argument can be made with respect to toeholds. Toeholds are profitable for acquirers: they represent target shares bought at a lower price than the price paid once the deal is announced. But, surprisingly, Betton et al. (2007), analyzing the period 1980-2002, report that “for the entire sample of approximately ten thousand initial control bids for publicly traded targets, only thirteen percent bid with a toehold, and only three percent acquire toehold shares in the six-months prior to the initial offer.” Why do acquirers not systematically acquire large toeholds before announcing a prospective acquisition? The authors argue that toeholds are perceived unfavorably by target shareholders, leading to difficult negotiations. Again, the probability of a successful deal is at play. Acquirers trade profits associated with toeholds against the probability of reaching an agreement with the target.

As the examples of bid premiums and toeholds show, omitting the probability of deal completion may lead to incomplete analyses and interpretations. In light of the literature on the CAR side of the M&A decision problem, it seems important to gain a better understanding of the determinants of the probability of doing the deal. This is the goal of our paper.

Analyzing the deal probability faces particular challenges. In contrast with CARs, deal probabilities are not directly observable so we are obliged to use a proxy, the time between successive M&A deals (TBD for short.) The intuition supporting this proxy is as follows: in a universe characterized by a constant arrival rate of investment opportunities and constant competition, a higher deal probability should be associated with less time between successive acquisitions (and vice-versa).

However, the investment opportunity set seems to be time-varying, (see M&A waves documented by Andrade et al. (2001) among others), and competition in the market for corporate control could depend on many factors (see Boone and Mulherin (2007)). So, one must control for variation in investment opportunities and in competition. Thus, we introduce the notion of the abnormal time between deals (ATBD), which is defined as the difference between a particular acquirer’s TBD and the average TBD in the acquirer’s industry. Since

investment opportunities and competition are industry specific, their variation should be controlled to a large extent by using the ATBD.

Our empirical sample includes M&As extracted from the Thomson Financial SDC database, more than 30,000 acquisitions by U.S. firms over 1985-2006 inclusive. Since we use several other information sources to investigate potential determinants of the ATBD (CRSP, Compustat, Compustat ExecuComp, RiskMetrics Corporate Governance database, Thomson Financial Insider Filings database), the effective sample size and period vary from analysis to analysis. The combination of data sources allows us to explore alternative determinants of the ATBD: relative deal size, valuation, growth prospects, target's listing status, toeholds, mode of payment, CEO compensation, overconfidence and learning, agency conflicts, anti-takeover measures, synergies, geographic and industry diversification. In fact, we explore the potential impact of most CAR determinants in previous research (see Appendix A.1). CAR determinants are indeed natural candidates to also be determinants of the ATBD.

We uncover a number of univariate and multivariate results. Some of the more striking are:

- On a univariate basis, the ATBD is associated with (1) the relative deal size (deal size as a fraction of acquirer size), (2) the percentage of target shares acquired, (3) the toehold, (4) the number of deals already done by the firm, (5) competition in the industry, (6) the age of the CEO, (7) the CEO's compensation contract, (8) the CEO's degree of hubris (or overconfidence), (9) the acquirer's corporate governance structure, (10) the acquirer's valuation, growth prospects and financial constraints, and (11) geographic and industry diversification. Many of these associations agree with *a priori* intuition (e.g., the relative deal size increases the ATBD, ...), while other results are a bit unusual (CEO age increases the ATBD and seems therefore to capture risk-aversion rather than experience, positive private information held by insiders increases the ATBD, indicating a reluctance to acquire targets when their own shares are undervalued), while still other results are unexpected (local acquisitions are associated with a higher ATBD than foreign acquisitions).
- The univariate associations above need confirmation (or refutation) in a multivariate setting because many of these variables are highly collinear. Among the most robust factors are: (1) the number of acquisitions already made by the firm, (2) the acquirer's valuation (highly valued firms seem to rush into deals, and (3) hubris. Hubris-infected CEOs seem to acquire at a faster rate.

- There is indeed a trade-off between the probability of an acquisition (captured by our ATBD proxy) and the value creation conditional on succeeding in an acquisition (captured by acquirer's CARs). We use a two-stage approach to control for the endogenous relation between the ATBD and the CAR and larger CARs are associated with a longer ATBD. We also confirm that the results are robust to the omission of the CAR in most of the multivariate analyses.

The paper proceeds as follows. The next section (2) provides a theoretical framework. Section 3 describes the data in detail, explains how certain variables are constructed, and provides some descriptive statistics. Sections 4 and 5 are dedicated, respectively to univariate and multivariate results. Section 6 explores the trade-off between the probability of an acquisition and its associated value. Section 7 summarizes the main findings and concludes.

2. Theoretical framework

In this section, we adopt a standard auction framework to organize potential ATBD determinants into broad categories. Existing literature provides a guide to how the ATBD depends on these determinants.

2.1. Motivation

The market for corporate control (Manne (1965)) is a fruitful area for the application of auction theory in corporate finance (see Dasgupta and Hansen (2007)). M&As are modeled as auctions of firms (the targets) where the sellers (target shareholders) sell their property to buyers (the acquirers). As stressed recently by Boone and Mulherin (2007), this auction-based representation depicts particularly well the case of private sales, when the sales process is organized by financial intermediaries and involves multiple bidders. It is also a natural framework to model public takeover battles reported in the financial press (see a.o. Betton et al. (2007)). In a first price auction setup, the expected profit of the winning bidder is given by the following equation:

$$E(\pi_{Bidder}) = \Pr(\text{Winning}|\beta_i(\hat{v}_i)) \times E(\tilde{v}_i - \beta_i(\hat{v}_i)), \quad (1)$$

where, \tilde{v}_i is the true value of the target for the bidding shareholders (this includes synergies and information revelation about the acquirer's strategy), \hat{v}_i is the perceived value of the target for the bidding CEO² ($\hat{v}_i - \tilde{v}_i$ captures the effects of hubris, risk-aversion and any other source of deviation between the target's value in the eyes of the bidding shareholders and the CEO), $\beta_i(\cdot)$ is the equilibrium bidding function (in the standard independent private value setup, it is the expected value of the maximum rival valuation conditional on being inferior to \hat{v}_i (see a.o. Krishna (2002)), and $\Pr(\text{Winning}|\beta_i(\hat{v}_i))$ is the probability of a successful acquisition, a function of the proposed bid.

Up to now, the literature has focused on acquirer CARs (see Appendix A.1), which are, in efficient markets, an ex-post measure of $E(\tilde{v}_i - \beta_i(\hat{v}_i))$. The second component of $E(\pi_{Bidder})$ is $\Pr(\text{Winning}|\beta_i(\hat{v}_i))$, the probability of doing the deal. To the best of our knowledge, this

² For convenience, we refer to the decision maker as the CEO; it could actually be the CEO (for large deals), or the CFO (for intermediate deals) or some lower ranking executive (for small deals).

second dimension of the bidder expected profit has not been studied.³ In the standard independent and symmetric private value auction framework, the probability of winning is given by the following equation:

$$F(\beta_i(\hat{v}_i))^{N-1}, \quad (2)$$

where, $F(\cdot)$ is the cumulative density function characterizing the bidders' distribution of valuations; and N is the number of bidders participating to the auction.

The behavior of value maximizing bidders depends on both components of expected profits: $E(\tilde{v}_i - \beta_i(\hat{v}_i))$ and $\Pr(\text{Winning}|\beta_i(\hat{v}_i))$. This is crucial to recognize because, in many cases, there is a trade-off between these two elements. $\Pr(\text{Winning}|\beta_i(\hat{v}_i))$ is a function of the number of rivals (the intensity of the competition in the market for corporate control), the valuation of target in the eyes of the rivals (which captures the state of the investment opportunity set) and the valuation of target as perceived by the bidder (a function of the standalone value of the target, the synergies and all other factors affecting the valuation of the target by the CEO).

2.2. Some potential determinants

Potential determinants of deal probability fall into three broad categories: competition, investment opportunity set and target valuation. Moreover, Equation (1) highlights the existence of a trade-off between the deal probability and the value effects conditional on deal realization: $\Pr(\text{Winning}|\beta_i(\hat{v}_i))$ is increasing in $\beta_i(\hat{v}_i)$ while $E(\tilde{v}_i - \beta_i(\hat{v}_i))$ is decreasing in $\beta_i(\hat{v}_i)$. Hence, CAR determinants are natural candidates to be also ATBD determinants (see Appendix A.1). The CAR literature also provides interesting theoretical arguments that offer insights into the potential impact of various determinants on the deal probability.

Competition. Everything else equal, competition certainly should decrease the deal probability. From Equation (2),

$$\frac{\partial(F(b_i^*(\hat{v}_i))^{N-1})}{\partial N} = F(b_i^*(\hat{v}_i))^{N-1} \times \ln(F(b_i^*(\hat{v}_i))). \quad (3)$$

³However, Aktas et al. (2007a, 2007b) deliver predictions about the effects of learning and hubris on the time between successive deals, which will be used hereafter as a proxy for $\Pr(\text{Winning}|\beta_i(\hat{v}_i))$.

Since $F(b_i^*(\hat{v}_i))$ is bounded by 0 and 1, $\ln(F(b_i^*(\hat{v}_i)))$ is negative: more intensive competition leads to a smaller deal probability.⁴

Investment opportunity set. The impact of the investment opportunity set on the deal probability is ambiguous. As more acquisitions take place (e.g., during M&A waves), the number of remaining potential targets must decrease.⁵ This could reduce the deal probability except for two factors: (1) there might also be fewer remaining acquirers, and (2) the value of remaining targets could be lower. Which effect dominates is an empirical issue.

Target valuation. From the literature on CAR determinants, numerous factors potentially affect the target's valuation. They range from expected synergies to learning, hubris, risk-aversion and corporate governance mechanisms (see Appendix A.1). Again, auction theory delivers a base prediction. For independent private auctions, it is well-known that the equilibrium bidding function is given by Equation (4) (see a.o. Krishna (2002)):

$$\beta_i(\hat{v}_i) = \int_0^{\hat{v}_i} \frac{yg(y)dy}{G(\hat{v}_i)} \quad (4)$$

where $G(\cdot)$ is the distribution of the highest rival valuation, $g(\cdot)$ is the corresponding probability density function and y denotes the highest valuation of the rival bidders. By the definition of the conditional expectation, Equation (4) can be written in the following way:

$$\beta_i(\hat{v}_i) = E[\tilde{y} | \tilde{y} < \hat{v}_i] \quad (5)$$

$\beta_i(\hat{v}_i)$ is clearly increasing in \hat{v}_i and leads to an unambiguous prediction: any factor increasing valuation in the eyes of the bidder CEO increases the deal probability (and vice-versa). This prediction must however be taken with some caution because the independent private value setup is highly restrictive for (at least) three reasons:

- The private value assumption is violated for economic goods, for which a secondary market exists. In the market for corporate control, Bulow et al. (1999) argue that the private value assumption might be more justified for strategic acquisitions (where synergies are directly related to the bidder identity) than for financial acquisitions

⁴ Note that Equation (3) is a partial derivative and rests therefore on the 'everything else equal' assumption. An acquirer anticipating stronger competition might (and most probably would) adapt his/her bidding behavior. Jump-bidding is a typical maneuver to deter competition (see Fishman (1988)).

⁵ To completely characterize the long run dynamics of the investment opportunity set, one should account for the arrival rate of new firms, which is a function of many factors and is certainly beyond the scope of the present work.

(where the sources of value creation is common to all bidders). But, in both cases, the option to sell back the target creates interdependence between bidders' valuations: current rivals' valuations say something about the target resale price. In such a (partial) common value setup, the effect of an increase in valuation is potentially more complicated. A higher valuation may be associated with a more aggressive bidding behavior by rivals. The same arguments apply to correlations between bidders' valuations. If a higher valuation is statistically associated with a higher valuation by rivals (e.g., because synergies are similar for bidders in a given industry), a higher valuation will also lead to a more aggressive bidding by rivals. Thus, the net effect of an increase in valuation may be more limited than what it is expected to be in a private value framework.

- Standard auction theory assumes the seller's reservation price (the minimum price the seller will accept) is either zero or a constant. But if target shareholders become aware of potential synergies (as they probably do), they are free to revise the reservation price: the higher the anticipated synergies, the higher the requirements of the target shareholders.
- Financially constrained bidders will be limited in their scope of action. If the financial constraints are asymmetric (as they are in the reality), rivals might be encouraged. Hence, the financial profile of bidders influences the deal probability.

Among factors directly influencing the target valuation in the eyes of the acquiring CEO, overconfidence, risk aversion and learning have been recently emphasized:

- Goel and Thakor (forthcoming), in the wake of Roll (1986) and Malmendier and Tate (forthcoming), study the interaction between CEO overconfidence and risk aversion. They argue that overconfidence represents a counterweight to CEO risk aversion (due to incomplete diversification). Although risk aversion would inhibit bidding by CEOs, overconfidence compensates by causing risk underestimation. So, both risk aversion and overconfidence should be determinants of deal probability. Risk aversion should reduce deal probability while overconfidence should increase it.
- Aktas et al. (2007a, 2007b) emphasize the role of learning. They argue that learning increases the precision in estimated value assigned by the acquirer to the target and should therefore lead (at least for rational CEO) to an increase in deal probability. The authors also stress that CEO bidding behavior is influenced by the possibility of being penalized after overbidding, which depends on existing corporate governance mechanisms.

Some other recent contributions in the literature deliver complementary interesting ideas about potential determinants of the deal probability⁶:

- Acquirer valuation: since stocks are frequently used as a medium of payment in M&A transactions, the acquirer valuation matters. According to Shleifer and Vishny (2003), this may even be one of the factors explaining M&A waves. In such a case, highly valued firms may rush to do deals and, therefore, the deal probability should be increasing in the level of the acquirer's valuation;
- Betton et al. (2007) focus on toeholds. A priori, toeholds should ease deal completion (because they reduce the fraction of shares to be acquired). The authors stress, however, that toeholds could be perceived as a form of aggressive behavior by target shareholders and/or board. In such a case, negotiations could be more difficult. The impact of toeholds on the deal probability is therefore a priori ambiguous;
- The effect of agency conflicts between bidder CEOs and their shareholders is also ambiguous. As with the overconfidence hypothesis, the free cash-flow (Jensen (1986)) and the CEO entrenchment/empire building (Shleifer and Vishny (1988)) arguments should lead to a positive correlation between the intensity of the CEO and shareholders agency conflicts and the deal probability. However, under the "enjoy the quiet life hypothesis" developed by Bertrand and Mullainathan (2003), the reverse should be true. Hence, predictions emanating from agency conflicts are ambiguous.
- Incentive-based compensation contracts are designed to combat CEO risk aversion (see Datta et al. (2001)). The existence of such contracts should therefore increase the deal probability. Pukthuanthong et al. (2007) show however that this depends on the nature of the incentives. In particular, equity grants, by reinforcing the share of the CEO wealth invested within the firm, may in fact increase the risk aversion of the CEO.

3. Method

As stressed in Bhojraj et al. (2003), all industry classification schemes have shortcomings and there is an obvious trade-off between the number of SIC code digits used to group firms and the sample size per industry. For want of any compelling reason to do otherwise, we adopt a

⁶ These factors are in fact related to the target valuation as perceived by the bidder CEO but it seems to us that the predictions delivered by these recent contributions are such specific that it is worthwhile to mention them here.

scheme that has been widely used in previous work, the Fama/French 49-industry classification, which seems to strike an adequate balance between the number of industries and the number of firms per industry. We assign each firm to an industry using the industry conversation table provided by K. French.⁷

3.1. M&A sample

To investigate the determinants of the deal probability, we have extracted from the Thomson SDC database all M&A deals complying with the following criteria:

- Deal announced between 1/1/1985 and 12/31/2006;
- Deal size above 1 million US\$;
- U.S. listed acquirer;
- Completed transaction;
- Acquirer CUSIP code different from the target CUSIP code;
- Financial industries excluded (Fama/French industry codes 44 to 48).⁸

This results in a sample of 38,221 M&A deals. Table 1 describes the sample by announcement year. The end of the nineties M&A wave reported in Andrade et al. (2001) is clearly apparent and it is also a period of sharp increase in the average deal size. However, this latter pattern is driven by a few very large deals as shown by comparing the mean and median deal sizes. The largest merger, \$164,747 million, was Time Warner/AOL in 2000. The percentage of cash deals in our sample is significantly higher than reported by Andrade et al. (2001), 35.4% for the period 1973-1998. Their sample, however, is smaller (4,256 deals) because they consider only large transactions. Moeller et al. (2004) analyze 12,023 transactions during the period 1980-2001, a sample close to ours and they report 40.44% pure cash deals.

The percentage of hostile deals in our sample is very low (below 1% since the 1988) and appears to be decreasing. This accords with other literature (see, a.o., Moeller et al. (2004) or Betton et al. (2007)).

⁷ http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

⁸ We exclude financial sectors to avoid our results being dependent on the behavior of financial holdings for which the (partial) acquisitions of firms is part of portfolio management logic.

Finally, note that the percentage of related deals (for which industry code is the same acquirer and target) is well in excess of 50% except in the first year, (1985), and is relatively constant through time.

The last column of Table 1 gives the percentage of deals with a total size above \$50 million. Our sample includes 12,051 of them. In Sections 4 to 6, we provide results for the whole sample and for the big deal sub-sample to check whether the results are sensitive to smaller transactions.

3.2. Variables

This section first provides a justification for our deal probability proxy, which is our dependent variable. Then, following up on the discussion of Section 2, the explanatory variables are described in detail. These are grouped into three categories: deal features, acquirer firm characteristics, and acquirer CEO profile.

3.2.1. Dependent variable

The deal probability, being an ex-ante concept, is not directly observable. Our proxy is based on the following simple intuition: given a constant arrival rate of investment opportunities and constant competition, the time between two successive transactions should be closely related to the deal probability. Indeed, a higher ex-ante probability of doing deals implies a higher number of consummated deals during a given period and thus a shorter time between them. The proxy for the deal probability that we propose is therefore simply the time between deals (TBD), which is ex-post observable and negatively correlated with the deal probability. We measure the TBD as the number of days elapsed between the announcement dates of two successive deals.

The exact correlation between deal probability and the TBD does, however, depend on the arrival rate of investment opportunities and the degree of competition. For example, if the number of potential targets in a given industry is shrinking, then *ceteris paribus*, the TBD will increase mechanically. Consequently, since our focus is the acquirer-specific determinants of the deal probability, it is essential to control for the change in both the investment opportunity set and in the intensity of the competition. A key to effective control is that these two influences affect all potential acquirers similarly within a given industry. So, by examining a

firm's TBD relative to the industry-wide TBD, we should be able to capture acquirer-specific TBD behavior. Based on this notion, we define our basic dependent variable as:

$$ATBD_t^i = \log \left(\frac{(1 + TBD_{t,t-1}^i)}{\frac{1}{N-1} \sum_{\substack{j=1 \\ j \neq i}}^N (1 + TBD^j)} \right), \quad (6)$$

where $ATBD_t^i$ is the “abnormal” time between deals for deal t of acquirer i , $TBD_{t,t-1}^i$ is the number of days between the announcement dates of deal $t-1$ and deal t (two successive deals by acquirer i), N is the number of firm in the Fama/French industry of acquirer i and TBD^j is the TBD of a given firm j belonging to the same Fama/French industry as acquirer i and having announced a deal the same year as the announcement year of deal t .⁹ The log transformation is implemented to remove significant right skewness. The $ATBD_t^i$ is computed using the entire sample and for larger deals, above \$50 million.

3.2.2. Independent variables

As potential determinants of the ATBD, section 2.2 discussed an important factor, the valuation of the target by the acquirer. It depends upon, *inter alia*, expected synergies, the CEO's learning ability and experience, the CEO's hubris, risk-aversion and his/her compensation contract, and corporate governance. Other variables that could have an influence on the ATBD include: the acquirer's financial constraints, the acquirer's own value, toeholds, and agency conflicts between CEO and shareholders. We group all such variables into three broad categories: deal features, acquirer firm characteristics and acquirer CEO profile. A brief presentation follows and precise definitions are given in Appendix A.2.

- *Deal features*

The Thomson SDC database provides extensive information about each transaction, from which we have selected the following:

- (1) status of the target (public versus private), which could indicate something about the difficulty in valuing the target. (Private firms are known to be more difficult to value; see, Fuller et al. (2002); Faccio et al. (2006), Officer et al. (2006), Officer (2007)).

⁹ If firm j has realized more than one deal the same year, we take the corresponding average time between deals as TBD^j .

- (2) domicile country of the target (U.S. versus non U.S. target); this could be related to synergies (see Eckbo and Thorburn (2000)) and to the target's valuation (foreign targets may be less valued because they do not necessarily benefit from an active and liquid financial markets or from a legal system that provides substantial shareholders rights protection (see Moeller and Schlingemann (2005))).
- (3) industry of the target (to identify related versus unrelated deals). Indeed, related deals are more driven by synergies (Bradley et al. (1988)) and are therefore more linked to target valuation.
- (4) deal size and the relative deal size, because they should be related to the degree of complexity of the deal (the larger the deal, the larger the commitment of resources) and to acquirer financial constraints (the larger the deal with respect to the acquirer size, the more binding should be the financial constraint).¹⁰
- (5) percentage of the target shares to be acquired at the deal announcement, which could indicate that control has value to the acquirer. Moreover, partial acquisitions may signal future full acquisitions (see Aigbe et al. (2007)).
- (6) the percentage of shares owned by the acquirer prior to the acquisition, because, according to Betton et al. (2007) a toehold should be positively correlated with ATBD (see Section 2.2).
- (7) mode of payment, because it reveals information about the acquirer's own valuation (overvalued acquirers tend to use stock as an exchange medium (see, a.o., Travlos (1987))). This is also related to the acquirer's financial constraints (highly valued firms have an easier access to external financing, facilitates deal making). The mode of payment could also be related to target valuation because it indicates the degree of opacity of the target firm as perceived by the bidder. Indeed, Hansen (1987) shows that using contingent payment claims is a way to share risks in case of asymmetric information between the acquirer and the target.
- (8) the degree of hostility and
- (9) the number of rival bidders.

These last two variables are deal specific so they are only partially controlled by the ATBD computation relative to the industry average TBD.

¹⁰ Target size is not included in the tests to follow. Most targets in the sample are private companies, so neither target market value nor target total asset are available.

▪ *Acquirer firm characteristics*

Several sources of information provide relevant characteristics of acquirers. These variables are as follows:

- (1) the market to book ratio,¹¹ which is a direct measure of growth opportunities anticipated by market participants;
- (2) the Kaplan/Zingales (1997) financial constraint index (KZ index).
- (3) the CAR around the acquirer's previous acquisition, because it represents a signal sent to the CEO by investors about the CEO's ability to do undertake profitable deals. Luo (2005) confirms that CEOs learn from investor reactions to M&A decisions, so the previous CAR can be a source of learning.
- (4) the run-up and the industry adjusted return on assets (ROA) prior to the acquisition, which are two measures of acquirer past performance. Past performance may be important due to its effect on acquirer valuation and on the acquirer's financial constraints.
- (5) the Gompers et al. (2003) global corporate governance index and its components (see Appendix A.2).¹² Splitting the Gompers index into sub-categories allows a more in-depth exploration of the nature of the corporate governance mechanisms that possibly impact the ATBD. Of particular interest is the variable GProtection (the sum of compensation plans, contracts, golden parachutes, indemnification and liability dummies), which relates to the CEO's protection from the risk of dismissal. This should mitigate his/her risk aversion and have an impact on his/her bidding behavior.
- (6) Free cash flow, to test whether firms with large amounts of cash are tempted to do deals rather than making payouts to shareholders (Jensen (1986)).
- (7) The research and development, used here as a proxy for internal growth opportunities of the acquirer. According to McCardle and Viswanathan (1994) and Jovanovic and Braguinsky (2004) firms are more prone to make acquisitions when they have exhausted their internal growth opportunities.
- (8) The number of deals already consummated by the acquirer (as indicated by the deal order number.) If firms and/or CEOs learn, the number of transactions already done should influence acquirers' behavior (Aktas et al. (2007a,b)).

¹¹ Financial ratio distributions are often affected by outliers. To avoid to produce results contaminated by a few observations, we winsorized them at the first and the ninety-ninth percentiles.

¹² These corporate governance variables are from the Riskmetrics database, available for the years 1990, 1993, 1995, 1998, 2000, 2002, 2004 and 2006. For missing years, we use the last available information.

▪ *Acquirer CEO profile*

ExecuComp and Thomson Financial Insider Filings provide information about the individual acquiring CEO, including:

- (1) Percentage Incentive-based salary (total salary minus base salary divided by total salary);
- (2) variation in total salary from one year to the next. Both salary variables are measured at the end of the year prior to the acquisition announcement date. They permit us to explore the roles of risk aversion and the compensation contract. For example, total salary gives an indication of the importance to the CEO of wealth originating from the firm while incentive salary measures the sensitivity of CEO compensation to results;
- (3) Equity ownership by the CEO (in dollar value and in the percentage of the firm's total equity) and options ownership (both in dollar value and the percentage of firm equity that the unexercised options represents). These allow us to test arguments developed in Pukthuanthong et al. (2007) (see Section 2.2);
- (4) CEO age (as a proxy for risk aversion and/or learning);
- (5) Two CEO specific variables to gauge the experience: (a) whether the CEO comes from inside the company and (b) the deal order number of the CEO, which measures whether the CEO has personal experience in deal making;
- (6) To proxy for CEO hubris/overconfidence, CEO legal insider trading activities.¹³ CEO insider transactions are obtained from Thomson Financial.¹⁴ Hubris is a dummy variable taking the value one if the following conditions are fulfilled: (a) over the 2-year period before the acquisition announcement date, the CEO increases net purchases (net purchases are the total number of shares bought minus the total number

¹³ As mentioned earlier, by "CEO" we mean whomever is the decision maker. Insider trading activities are thus any done by the Chief Executive Officer, Chief Financial Officer, Chief Investment Officer, Chief Operating Officer, Chief Technology Officer, Chairman of the Board, Assistant Vice President, Executive Vice President, Officer, Officer and Beneficial Owner of more than 10% of a Class of Security, Officer of Parent Company, Officer of Subsidiary Company, Officer and Treasurer, Divisional Officer, President, Senior Vice President and Vice President.

¹⁴ The Insider Filing Database compiled by Thomson Financial is designed to capture all insider activities as reported on SEC forms 3, 4, and 5. Following prior studies, we focus on open market purchases and sales as reported in Table 1 of Form 4 (e.g., Lakonishok and Lee, 2001; Ke et al., 2003). We discard transactions following option exercises. Moreover, to guarantee data quality, we remove all insider trading records that are assigned codes "A" or "S" by Thomson Financial. Thomson Financial estimates the accuracy of insider transactions by checking external sources. Code "S" indicates no cleansing attempted and the security does not meet Thomson Financial's collection requirements; code "A" indicates that numerous data elements are missing or invalid and that reasonable assumptions can not be made.

of shares sold by the CEO during a given time period) and (b) over the 2-year period following the acquisition announcement date, the acquirer's CAR is in the bottom quartile of all acquirers' 2-year CARs.¹⁵ The intuition is simple: CEOs who increase net buying of their own stock before a long period of disappointing results are more likely to have been overconfident. Overconfident CEOs, being more aggressive in bidding, they are more likely make acquisitions. Therefore, one should observe a lower ATBD for hubris-infected/overconfident CEOs.

- (7) CEO private information. This variable takes the value one if (a) over the 2-year period before the acquisition announcement date, the CEO increases net purchases and (b) over the 2-year period following the acquisition announcement date, the acquirer's CAR is in top quartile of all acquirers' 2-year CARs. The intuition is again straightforward: a CEO increasing net buying activities before a long period of favorable results probably has positive private information about the company. If the CEO knows the company is undervalued by the market, she/he will be more reluctant to use stock as a mean of payment, which has a negative impact on the deal probability.

We also consider variables related to competition and to the investment opportunity set:

- (1) The number of deals in the industry during year of the announcement date (presumably, the number of deals is positively related to the strength of competition in making acquisitions.)
- (2) The industry average acquirer CAR, a measure of potential synergies within the industry. Higher acquirer CARs signify larger potential synergies (as perceived by investors); i.e., a more attractive investment opportunity set. It would have been more appropriate to use the average industry deal CAR to measure synergy, but since many targets are unlisted, we are unable to compute their announcement abnormal returns. However, according to Berkovitch and Narayan (1993) if takeovers are motivated by synergy, target CAR, acquirer CAR and deal CAR are all positively correlated.

3.3. Descriptive statistics

Table 2 presents some descriptive statistics. The first column reports the number of available observations. The sample size depends on the data source. For the Thomson SDC database,

¹⁵ CARs are computed as in Fuller et al. (2002) and Moeller et al. (2004, 2005) using the Beta-one model, which subtracts the daily market portfolio return from the daily return of each company.

sample sizes are very large. Using either the CRSP database (market information) or the Compustat database (financial statement information) reduces the size substantially. Information from Compustat ExecuComp (CEO information) and the Gompers et al. (2003) corporate governance index are available for fewer than 5,000 deals. Insider trading information is available for fewer than 3,000 observations.

The average time between deals for the entire sample is more than one year but, as the median reveals, there is a right skew: the median delay between two deals is 226 days (324 days for deals over \$50 million). 43% of the targets are private, 83% are U.S. firms and 57% are in the same industry as the acquirer. The average deal size is \$198 million but the median deal size is only \$22 million. The median ratio of deal size to acquirer size is below 10%. As previously reported (Betton et al. (2000, 2007)), toeholds are small. Roughly 55% are acquisitions paid in cash (a high proportion but the sample includes many small deals), less than 1% are hostile (consistent with previous evidence in Moeller et al. (2004) or Betton et al. (2007)), with few competing bidders reported by the Thomson SDC database.

Acquirers have an average market to book ratio of 4.3 and an average leverage of 22.5%. The KZ index reveals that they are more equity dependent than the average U.S. firm. Baker et al. (2003), using a sample of 52,101 firms, report an average KZ index of -0.12 for the 1980-1989 period and of 0.03 for the 1990-1999 period). They undergo a positive run-up and outperform their industry prior to the acquisition. The average Gompers et al. index is 9.13, which is close to that reported by Gompers et al. (2003). The firm deal order number and the corresponding CEO deal order number confirm that serial acquisitions are common; (Similar evidence is reported a.o. in Fuller et al. (2002)). Note, however, that the sample sizes for firm deal order number and CEO deal order number are very different, the latter being much smaller. The average total salary of the CEO is above \$6 million (with a median above \$2 million.) The incentive proportion of the salary is above 60%. On average CEOs hold 2.3% of their firm's shares but the distribution is heavily right skewed (the median is well below 1%). They average 61 years in age; more than 2 out of 3 come from inside the firm. In a sub-sample of 2,922 CEOs, we categorize 13.4% as hubris infected and 22.4% as privately informed before the deal. There are on average more than 62 deals in acquirer's industry during deal announcement year. The average acquirer CAR is positive and significant, as in Moeller et al. (2004), who report a significant average bidder CAR of 1.1% during the [-1,+1] window for a sample of 12,023 transactions during the period 1980-2001.

4. Univariate analyses

Table 3 presents regressions in which the dependent variable is either TBD or ATBD and there is only one independent variable per regression. The various explanatory variables are listed in Appendix A.2 and discussed in Section 3.2.2. Panel A uses the number of deals in the industry and the average acquirer CAR in the industry. The coefficients of these two variables are significant for the whole sample and for the big deal sub-sample. These results indicate that the time between successive deals seems to be influenced by the intensity of competition among bidders in the industry (proxied by the number of deals in the industry) and by the attractiveness of the investment opportunity set (proxied by the average acquirer CAR in the industry). This supports the insights provided by the auction theory framework introduced in Section 2.1 and motivates the use of an industry-adjusted time between deal variable (see the variable ATBD defined in Equation (6)).

Table 3 – Panel B presents univariate regressions ATBD against each potential determinant identified in Section 3.2 one at a time. Many of these variables are individually significant. For the whole sample, out of the 40 variables explored, 29 have significant coefficients at the 1% or the 5% levels. For the big deal sub-sample, 30 variables have significant coefficients at the same levels, despite the sample size reduction.

With respect to various deal features, ATBD is more significant for U.S. targets. This is a somewhat surprising in the light of the arguments of Section 3.2 (geographical diversification and lower valuation). Potential explanations could be a less stringent regulatory environment abroad and a more vigorous competitive environment in the U.S. M&A market. But an international empirical investigation would be required to settle this issue.

Related deals take longer time to be accomplished. This is also a surprising result, since related deals seem likely to produce more synergies. A possible explanation is that related deals attract more competition within the industry because they could increase the competitive power of the acquirer. So, the related variable could be picking up some of the potential competition or preemptive bidding effects. Other potential explanations are again the regulatory environment (horizontal M&A are subject to more regulatory scrutiny from the Federal Trade Commission and the Department of Justice) and the lower information

asymmetry between the acquirer and the target, perhaps giving the target shareholders a stronger bargaining position.

Private target has a negative coefficient. This is consistent with private targets being on average smaller than public targets (see Fuller et al. (2002)) and also attracting less competition (see Officer (2007)).

The positive coefficient of relative deal size reveals swallowing a relatively big fish takes more time. The phenomenon probably explains the positive coefficient of percentage acquired.

The negative coefficient of toehold is worth mentioning with respect to the debate in Betton et al. (2007). A toehold seems to ease the acquisition more than it generates target resistance; (note that the toehold effect in Table 3 is ex-post. Ex-ante, the Betton et al. target resistance argument could still explain the chosen toehold level).

For the whole sample, on average cash transactions are completed more rapidly. But for the big deal sub-sample, cash deals seem to take more time. This difference between smaller and larger deal intimates the importance of the financial resources required to complete the transaction. For large deals, paying fully in cash could be straining for the acquirer. For small transactions, paying fully in cash finesses lengthy valuation procedures required to set the exchange ratio between acquirer and target shares.

The regression coefficient associated to the “hostile” variable is only significant for the big deal sub-sample. Large hostile transactions take more time to complete as might have been expected; (This effect is significant even though there are few hostile transactions in our sample (less than 1%)).

Many acquirer characteristics play significant roles. The market to book ratio indicates that highly valued acquirers have strong incentives to do deals, confirming the stock market misvaluation based arguments of Shleifer and Vishny (2003). Financial constraints slow down acquisitions (as indicated by KZ index and leverage, the latter variable playing a role only for larger transactions). Consistent with the valuation and financial constraints effects, past-performers do deals more quickly (negative coefficients of run-up and industry adjusted

ROA). The Gompers et al. index has a significant positive coefficient, which appears to be driven mainly by the variable GProtection: the higher the degree of CEO protection, the slower the speed at which deals are undertaken. This is consistent with the enjoying the quiet life hypothesis of Bertrand and Mullainathan (2003) and supports the recent findings of John et al. (forthcoming), who emphasize the positive relation between investor protection and risk taking by CEOs. The free cash flow variable displays a significant positive coefficient for the big deal sub-sample. If free cash flow proxies CEO managerial latitude, this result is more supportive of the Bertrand and Mullainathan's argument than the free cash flow hypothesis of Jensen (1986). R&D displays opposite results for the whole sample and the big deal sub-sample: in the former case, more internal research is associated with less acquisitiveness (as expected under the trade-off between internal and external growth argument) while in the latter case, more internal growth is associated with a more aggressive behavior in the market for corporate control market. The negative coefficients associated with firm deal order number (highly significant for both the whole and big deal samples) and previous deal CAR support the learning hypothesis introduced by Aktas et al. (2007a).

Turning now to CEO related variables, all the wage contract related variables except one (percentage of options) have negative and significant (with one exception) coefficients. For total salary, base salary, value of stock and value of options, one could argue they are linked to the acquirer's size (bigger acquirers doing deals at a faster rate), but the negative coefficients associated with incentive salary and total salary variation show that incentives do seem to have an impact on M&A decisions. The significant but opposite coefficients of percentage of stock and percentage of options validate the argument developed in Pukthuanthong et al. (2007) according to which stock and options based contracts have opposing incentive effects with respect to risk taking. The positive coefficient for age gives credence to the idea that more elderly CEOs are more risk averse. The coefficient of insider is negative. CEOs coming from inside the firm and therefore having more internal knowledge do deals at faster pace, but this is only significant when the sample includes the small deals. Both for the whole and the big deal samples, CEO deal order number confirms the learning effect captured by the same variables at the firm level. CEOs with experience in deal making do deals at faster pace.

Hubris and private information are particularly pertinent with respect to several recent papers about CEO overconfidence. Hubris-infected (or overconfident) CEOs adopt a more aggressive

behavior in the market for corporate control. This supports Goel and Thakor (forthcoming), who argue overconfidence offsets the normal risk aversion from underdiversification. It also supports Malmendier and Tate (forthcoming), who find that overconfident managers are more likely to do deals. On the other hand, CEOs with positive private information about their stock are less inclined to do deals rapidly. For transactions financed by an exchange of stock, a CEO convinced that his own shares are undervalued, should be less prone to proceed. Cash acquisitions might still be attractive but it is more difficult to finance large cash deals. Moreover, as pointed out by Hansen (1987), information asymmetry between acquirer and target reduces the likelihood of coming to an agreement; (stock-financed transaction allow sharing of the valuation risks.)

5. Multivariate results

Multivariate results are presented in Tables 4 to 8. Before commenting on these results, we must first mention some potential econometric issues that can plague inferences:

- Section 3.2 introduced nearly 40 potential determinants of ATBD. Many of them are collinear. To assess the stability of the results, we estimate the condition number of the variance-covariance matrix of the independent variables (see Greene (2008), p. 971). Any specification with a condition number above 40 is eliminated (with a few exceptions having condition numbers reaching 60);¹⁶
- the number of observations in our sample is a function of the data source. It ranges from a maximum of 21,840 to a minimum of 1,240. Needless to say, this has a big impact on statistical power. There is conundrum trading off the number of independent variables and the possibility of detecting statistical significance. For this reason, we first introduce basic specifications in Table 4 ((1) and (3)) and then explore peripheral topics in Tables 5 to 8;

5.1. Base specifications

Table 4 presents base specifications. To maximize the number of available observations, specifications (1) and (2) consider only determinants constructed using the Thomson SDC database. Specification (3) introduces determinants based on the CRSP-Compustat merged

¹⁶ Greene (2008) considers 20 a high a condition number. However, there is no statistical theory beyond the use of the condition number itself to assess collinearity. Our experience is that 20 is rather restrictive and excessively eliminates interesting specifications.

database. The number of observations is significantly reduced (by more than 2,000 for the whole sample and 991 for the large deal sample) but sample sizes remain sufficient.

In specification (1), private target has a significant negative coefficient while U.S. target, related, relative deal size and hostile have positive coefficients. A negative coefficient of toehold is found for the whole sample it turns positive (with a p-value of 0.13) for the large deal sub-sample. The latter result is more consistent with the Betton et al. (2007) argument according to which toeholds are perceived by target shareholders as too aggressive.

A positive coefficient for cash is observed in the large deal sub-sample but it changes sign and is not significant in the entire sample. Hostile is positive (but significant only for the big deal sample): large hostile acquisitions take more time. For the full sample, the number of bidders is negative and highly significant. Evidently, more competition speeds up acquisitions.

Specification (2), explore the role of deal size. As deal size is highly correlated with many other determinants, only related, toehold and hostile are retained as control variables. Deal size does not appear to play a significant role. This suggests only deal size relative to acquirer size matters and this is confirmed by specification (3), which also reinforces the influence of competition since the number of bidders is highly significant for the entire sample and marginally significant for the big deal sample.

The univariate results concerning market to book, KZ index (for the whole sample), run-up and industry adjusted ROA (for the whole sample) are reconfirmed: highly valued acquirers and good past performers take less time do deals. Leverage seems more affected by the introduction of control variables: in a univariate setting, leverage (used as proxy for acquirer financial constraints) increases the time between deals, its coefficient here is negative (and significant for the whole sample). This might have been precipitated by introducing the KZ index, which also control for financial constraint. The multivariate leverage coefficient thus reveals something about the acquisition behavior of the firm: more frequent acquirers have higher leverage (Aktas et al. 2007b).

Base specifications (1) and (3) in Table 4 are references for the further analyses. The choice between these two base specifications has been dictated by the multi-collinearity issues pointed out in the introduction of Section 5.

5.2. Risk aversion, hubris and private information

Table 5 explores how the CEO's risk aversion, hubris and private information affect the deal probability. The univariate results (Table 3) show older CEOs wait longer between deals (age perhaps acting as a proxy for risk aversion), while hubris plays in the opposite direction. Private information slows down acquisitions. In multivariate estimation, however, only hubris survives: hubris-infected CEOs do acquisitions at a faster rate. This is consistent with Malmendier and Tate (forthcoming), where the authors find that "the odds of making an acquisition are 65% higher if the CEO is classified as overconfident".

After controlling for the mode of payment, private information does not seem to play a role. This makes sense: CEOs with private information know their stocks are undervalued. They are therefore reluctant to use them as mean of payment for acquisitions.

Unreported results show that age is significantly correlated with several other independent variables (older CEOs buy fewer private targets, do more deals abroad, do fewer deals in the same industry, hold more toeholds and pay more in cash¹⁷). This explains the loss of statistical significance.

5.3. Learning

To capture the effect of learning on the ATBD, Table 6 introduces the deal order number of the acquiring firm, the previous deal CAR of the acquirer, and the deal order number of the CEO. In general, learning seems to speed up the acquisitions. However,

- Previous deal CAR is significant only in one specification out of four. But CAR is noisy, so this is not all that surprising;
- the effect of industry adjusted ROA is reversed when controlling for learning at the firm level (when controlling for learning at the CEO level, the coefficient remains positive but is not significant.) So, after controlling for learning, good performers take more time to do deals. One possible reason is a feedback from acquisition to performance: frequent acquirers could suffer from integration problems and becomes weak performers. Good performers would then be associated with a higher time

¹⁷ Interestingly, these correlations reinforce the interpretation of age as a proxy for risk aversion.

between deals. The negative coefficient of industry adjusted ROA in the univariate setting is evidently an effect of learning and not performance per se.

5.4. Corporate governance and agency conflicts

Table 7 confirms the univariate results about the role of corporate governance mechanisms: the higher the Gompers et al. (2003) index, the more time it takes for acquirers to do deal. The effect is clearly significant. Table 7 – specification (2) confirms also, mainly for the big deal sample, that the GProtection component of the corporate governance index seems to drive this result (the statistical significance is however more marginal here). These results support the “enjoy the quiet life hypothesis” of Bertrand and Mullainathan (2003). The free cash flow variable keeps its significant positive coefficient for the big deal sample as in the univariate analysis. We finally note that R&D expenses do not seem to play a role. Unreported results show that R&D is highly correlated with several other explanatory variables (including the market to book ratio, leverage, the Gompers et al. index and the free cash flow). This probably explains its loss of multivariate significance.

5.5. CEO compensation

The final multivariate analysis deals with CEO compensation. Table 8 confirms that:

- more motivated CEOs acquire at a faster rate. Wage contract incentives offset risk aversion induced by under-diversification (Hall and Murphy (2002));
- the nature of the incentives matters: the percentage of equity owned by the CEO reduces the delay between acquisitions while the percentage of options has the opposite effect. Pukthuanthong et al. (2007) provide a rationale: equity ownership, when underdiversified, induces caution while option ownership induces risk seeking because option values depend on volatility.

Another insight confirmed by Table 8 is that CEOs play a direct role in M&A timing decisions. This complements results provided by Bertrand and Schoar (2003) concerning the effects of management style on firm policies.

6. The trade-off between the deal probability and value creation

The higher the price offered by the acquirer, the higher the acquisition probability but the lower the proportion of deal value creation retained by the acquirer. This trade-off has at least two implications:

- there should be a positive correlation between the ATBD and the acquirer’s CAR.;

- in the multivariate analyses (Tables 4-8), the acquirer's CAR is a missing factor (potentially endogenous to the ATBD) and its absence could bias the results.

Table 9 – Panel A focuses on the first issue (the deal probability versus value creation trade-off). Specification (1) simply regresses the ATBD on the observed acquirer CAR.¹⁸ The slope coefficient is positive but not significant. However, ATBD and CAR are endogenous: the proposed price and many other deal features deriving from the acquirer's target choice such as the target's status, nationality, degree of relatedness, etc., influence simultaneously both variables. Consequently, the lack of significance in Table 9 – Panel A might be caused by the endogeneity problem.

To resolve this issue, we adopt a classical instrumental variable approach, using the two-stage least squares. In the first stage regression, an instrument for the acquirer's CAR is constructed from six variables already used in Table 4 (private target, U.S. target, related, relative deal size, toehold and cash) as well as a new variable called 'matched acquirer CAR' that helps solve identification conditions. This variable is the average CAR of a portfolio of acquirers having done deals in the same industry, the same year, buying targets with the same status (private or public) and using the same mode of payment (cash versus other).

Table 9 – Panel A – Specification (2) presents the first stage regression, where the dependent variable is the acquirer's CAR. The regression is highly significant (with a Fisher statistic of 120.6). The R^2 is only of 3.8%, but low R^2 's are typically obtained for CAR regressions (see, e.g., Moeller et al. (2004), Bouwman et al. (forthcoming)). The matched CAR variable coefficient is positive and highly significant (with a student statistic of 5.87). Specification (3) in Table 9 – Panel A reports the results of the second stage estimation, where ATBD is regressed on the acquirer CAR instrument, which corresponds to the fit of specification (2) in Table 9. The coefficient is this time positive and highly significant (with a student statistic of 5.5). The trade-off assumption is clearly confirmed once we control for the endogenous relation between the ATBD and the acquirer's CAR.

Table 9 – Panel B investigates whether the regression results presented in Section 5 are robust to the omission of the acquirer's CAR. Specification (1) reproduces the results presented in

¹⁸ Note that we just test the sign of the correlation between the two variables but do not assume any direction in terms of causality.

Table 4 – Specification (1) for the whole sample of deals. Specification (2) reproduces the result presented in Table 4 – Specification (3), again for the whole sample. In both cases, the acquirer’s CAR instrument (from 2SLS) is included. All the results in Table 4 are confirmed qualitatively. Most coefficient estimates are very close to those presented in Table 4. Hence the basic results appear to be robust to CAR’s omission.

Also, note that the acquirer CAR instrument is now negative but not significantly different from 0 at conventional levels.¹⁹ This raises a question of why the CAR instrument is positive and significant in Table 9 – Panel A – Specification (3). Apparently, various deal features capture the most important decisions taken by the CEO (the kind of target, the mode of payment,...). The inclusion of deal attributes in the multivariate regression seems to control to a large extent for the trade-off between the deal probability and the acquirer’s wealth creation.

7. Conclusion

This paper inaugurates the study of the time between successive deals as an important feature of acquisitions. We provide an auction theory-based framework to elucidate the trade-off between the conditional wealth created by an acquisition (classically estimated using a CAR) and the deal probability. We argue that the abnormal time between successive deals (ATBD) can be used as a proxy for the deal probability and then proceed to an empirical study of its determinants.

We find several significant determinants of the ATBD. Some of them are intuitively plausible (private targets are acquired faster, larger deals take more time, competition among bidders speeds up the acquisition process, financially constrained acquirers act more slowly), while others are particularly interesting in the light of recent results in the M&A literature. In particular, we find that highly valued acquirers and hubris infected (overconfident) CEOs do deals more rapidly. Learning also plays a role: more experienced CEO acquirers, those having done more deals in the past, act faster in the future. CEOs who are more insulated from

¹⁹ Despite the fact that Table 9 – Panel A- Specification (2) clearly shows that matched acquirer CAR is significantly correlated to acquirer CAR (a key condition to guarantee model identification), concerns may be raised that the lack of significance of the acquirer CAR instrument in Table 9 – Panel B specifications is due to a weak instrument issue (this might be suspected because the R^2 of the first-stage CAR regression is low). To dig deeper this issue, in unreported result, we have performed the Anderson and Rubin (1949) test procedure, and the test rejects the null hypothesis that the coefficient of the endogenous variable is equal to zero. To sum up, although some suspicion might be raised concerning weak instruments, our results are confirmed using robust testing procedure.

shareholder pressure, appear to enjoy the quiet life and do not rush into deals. CEOs wage contracts can create appropriate incentives but equity ownership (which exacerbates underdiversification) should be accompanied by options ownership, an antidote that motivates more risk taking.

Our last section confirms empirically that there exists a significant trade-off between the CAR and the ATBD. This result is important. It potentially explains why failing to account for the deal probability when analyzing the CAR determinants can lead to some puzzling results.

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Appendix A.1 – Some important references on acquirer CAR determinants

Topic	References
Acquirer listing status	Bargeron et al. (forthcoming)
Acquirer growth prospects	Moeller et al. (2007)
Acquirer size or deal size	Moeller et al. (2004)
Acquirer valuation	Shleifer and Vishny (2003), Dong et al. (2006), Ang and Cheng (2006), Bouwman et al. (forthcoming), Song (2007)
Acquisition programs	Schipper and Thompson, (1983), Malatesta and Thompson (1985), Fuller et al. (2002)
Agency conflicts	Jensen (1986), Shleifer and Vishny (1988), Morck et al. (1990)
Anti-takeover provisions	Comment and Schwert (1995)
Arbitrageurs' price pressure	Mitchell et al. (2004)
CEO compensation	Datta et al. (2001), North (2001), Cai and Vijn (2007)
CEO overconfidence/hubris	Roll (1986), Berkovitch and Narayan (1993), Hietala et al. (2004), Doukas and Petmezas (2007), Malmendier and Tate (forthcoming),
CEO learning	Aktas et al. (2007a, 2007b)
Deal anticipation	Song and Walkling (2005)
Collusion and market power hypothesis	Eckbo (1983, 1985), Fee and Thomas (2004), Sharur (2005)
Corporate governance mechanisms	Masulis et al. (2007), Khorana et al. (2007), Wang and Xie (2007)
Geographic diversification and cross-border acquisitions	Doukas and Travlos (1988), Eun et al. (1996), Cakici et al. (1996), Eckbo and Thorburn (2000), Goergen and Renneboog (2004), Moeller and Schlingemann (2005)
Mode of financing	Schlingemann (2004), Morellec and Zhdanov (forthcoming)
Mode of payment	Hansen (1987), Travlos (1987), Eckbo et al. (1990), Officer (2004), Faccio and Masulis (2005)
Sources of synergies	Bradley et al. (1988), Houston et al. (2001), Devos et al. (forthcoming)
Target listing status	Fuller et al. (2002), Faccio et al. (2006), Officer (2007)
Target valuation difficulty	Officer et al. (2006)
Toeholds	Bulow et al. (1999), Betton et al. (2000, 2007), Bris (2002), Goldman and Qian (2005)

Appendix A.2 – Variable definition

Variable	Description
Panel A. Dependent variables	
Time between deals – TBD	The elapsed time (in number of days) between the announcement dates of two successive deals by the same company.
Abnormal time between deals – ATBD	The acquirer’s TBD relative to the average TBD of companies in the same Fama-French industry announced the same year, (computed using Equation 6.)
Panel B. Independent variables	
Deal features	
Private target	Dummy variable: 1 for private targets, 0 otherwise.
U.S. target	Dummy variable: 1 for U.S. targets, 0 otherwise.
Related	Dummy variable: 1 when the bidder and the target are from the same Fama-French industry, 0 otherwise.
Deal size	Size of the deal (in US\$millions), defined by SDC as the total value of consideration paid by the acquirer, excluding fees and expenses.
Relative deal size	The ratio of the deal size to the acquirer’s market value of equity 31 days prior to the announcement date.
Percentage acquired	The percentage of target shares acquired with the announcement of the deal.
Toehold	Percentage of target held by the acquirer before the transaction.
Cash	Dummy variable: 1 for purely cash-financed deals, 0 otherwise.
Hostile	Dummy variable: 1 for hostile deals, 0 otherwise.
Number of bidders	Number of rival bidders reported by SDC.
Acquirer firm characteristics	
Market to book	Market value of equity 31 days prior to the announcement date divided by the book value of total common equity (Compustat item 60).
Leverage	Book value of debt (item 34 plus item 9) divided by total assets (item 6).
KZ index	The Kaplan and Zingales (1997) financial constraint index computed as in Baker et al. (2003).
Previous deal CAR	The acquirer 11-day cumulative abnormal returns around the previous deal announcement obtained using the Beta-One model as the return generating process (as in recent large sample M&A studies – see, e.g., Fuller et al. (2002)). The event window is centered on the announcement day, and goes from –5 to day +5.
Run-up	The bidder’s cumulative abnormal return during the estimation period (-235,-31), relative to the announcement date.
Industry adjusted ROA	The difference between the acquirer’s return on assets during the year prior the acquisition (operating income before depreciation (item 14) divided by total asset (item 6) and the corresponding Fama/French industry average.
Gompers et al. index	The Gompers et al. (2003) global corporate governance index) obtained from the Riskmetrics database. This variable is available for the years 1990, 1993, 1995, 1998, 2000, 2002, 2004 and 2006. For the missing years, the last available index was substituted.
	Components of the Gompers et al. index: <i>GDelay</i> (the sum of blank check, classified board, special meeting, written consent dummies), <i>GProtection</i> (the sum of compensation plans, contracts, golden parachutes, indemnification and liability dummies), <i>GVoting</i> (the sum of bylaws, charter, cumulative voting,

	secret ballot, supermajority and unequal voting dummies), <i>GState</i> (the sum of anti-greenmail law, business combination law, cash-out law, director's duties law, faire price law and control share acquisition law dummies) and <i>GOther</i> (the sum of anti-greenmail, directors' duties, faire price, pension parachutes, poison pill and silver parachutes dummies).
Free cash flow	Operating income before depreciation (item 13) minus interest expense (item 15) minus income taxes (item 16) minus capital expenditures (item 128), scaled by total assets (item 6).
R&D	Research and development expense (item 46) divided by total assets (item 6).
Firm deal order number	1+ the number of previous acquisitions by the firm (computed using either all M&As in the sample or M&As with deal sizes above \$50 million).
	Acquirer CEO characteristics
Total salary	Total compensation (in thousands of dollars) for the individual year comprised of the following: salary, bonus, other annual payments, total value of restricted stock granted, net value of stock options exercised, long-term incentive payouts, and all other income (item TDC2 from ExecuComp).
Base salary	The dollar base salary in thousands of dollars earned by the named executive officer during the fiscal year (item SALARY in ExecuComp)
Incentive salary	Total salary minus base salary divided by total salary.
Total salary variation	Percentage variation in total salary from one year to the next (item TDC2_PCT in ExecuComp).
Value of stocks	The log of one plus the dollar value of stock possessed by the CEO. The dollar value of stock possessed by the CEO corresponds to the product of shares owned by the executive, excluding options that are exercisable or will become exercisable within 60 days (item SHROWN_EXCL_OPTS in ExecuComp) by the closing price of the company's stock for the calendar year (item PRCC in ExecuComp), as reported in ExecuComp.
Percentage of stocks	Percentage of firm equity owned by the CEO, the ratio of the value of stock owned by the CEO to the total market value of the equity.
Value of options	The log of one plus the dollar value of stock that the unexercised options owned by the CEO allow him/her to acquire. This is the product of the number of unexercised options held by the executive at fiscal year end that were not yet vested (item OPTS_UNEX_UNEXER in ExecuComp) by the closing price of the company's stock for the calendar year (item PRCC in ExecuComp), as reported in ExecuComp.
Percentage of options	The percentage of firm equity that the unexercised options represent; obtained by dividing the value of options by the total market value of the equity.
Age	The age of the CEO
Insider	Dummy variable: 1 for CEO coming from the inside of the firm, 0 otherwise.
CEO deal order number	1+Number of previous acquisitions by the CEO (computed using either all M&As in the sample or M&As with deal sizes above \$50 million).
Hubris	The CEO's degree of hubris, a dummy variable taking the value one if the following conditions are fulfilled: (i) over the 2-year period before the acquisition announcement date, the CEO increased net purchases (the difference between shares bought and shares sold by the CEO during a given time period) and (ii) over the 2-year period following the acquisition announcement date, the acquirer's CAR is in the bottom quartile of all acquirers' 2-year CARs.
Private information	Whether the CEO possessed private information about his/her own firm's valuation, 1.0 if (i) over the 2-year period before the acquisition announcement date, the CEO increased net purchases and (ii) over the 2-year period following the acquisition announcement date, the acquirer's CAR is in the top quartile of

all acquirers' 2-year CARs.

Other key variables

Number of deals in the industry	Number of deals in the same year as the announcement date in the Fama-French industry of the acquirer
Average acquirer CAR in the industry	Average acquirer CAR for deals during the same year as the announcement date within the Fama-French industry of the acquirer.
Matched acquirer CAR	The average CAR of acquirers having done deals in the same industry, the same year, buying targets with the same status (private or public) and using the same mode of payment (cash versus stock).
Acquirer CAR	The acquirer 11-day cumulative abnormal return around the deal announcement obtained using the Beta-One model as a return generating process (as in recent large sample M&A studies – see, e.g., Fuller et al. (2002)). The event window is centered on the announcement day, and goes from –5 to day +5.
Acquirer CAR instrument	The fitted value of the first-stage cross-sectional regression where acquirer CAR is regressed on a set of determinants.

Table 1
M&A sample statistics

For each calendar year, 1985-2006, N is the number of completed deals. Deal sizes are in US\$ millions. Cash is the percentage of deals fully paid in cash. Hostile is the percentage of deals reported as hostile by the Thomson SDC database. Related is the percentage of deals for which the Fama/French industry code is the same for the acquirer and the target. Big is the percentage of deals for which the deal size is above US\$50 million.

Year	N	Deal size			Cash	Hostile	Related	Big
		Average	Median	Maximum				
1985	417	297	62	6,605	66.91%	2.88%	44.12%	56.59%
1986	641	160	47	4,755	70.05%	1.40%	56.79%	49.45%
1987	678	143	38	7,858	67.40%	1.33%	55.16%	44.25%
1988	810	168	39	13,444	69.88%	1.85%	55.93%	43.46%
1989	994	142	23	14,110	65.19%	0.70%	59.15%	33.20%
1990	970	77	14	7,893	63.61%	0.31%	56.39%	25.15%
1991	1,009	58	11	2,464	53.32%	0.20%	57.38%	21.80%
1992	1,275	59	12	3,967	49.57%	0.24%	58.35%	22.27%
1993	1,598	90	12	17,109	51.88%	0.06%	56.57%	22.53%
1994	1,861	99	12	9,561	48.36%	0.64%	58.57%	26.11%
1995	2,152	114	16	18,837	50.60%	0.65%	57.62%	26.91%
1996	2,615	143	19	21,345	49.90%	0.42%	57.86%	29.22%
1997	3,124	145	19	41,907	46.61%	0.29%	57.87%	30.76%
1998	3,220	255	24	78,946	50.71%	0.09%	57.89%	34.60%
1999	3,003	341	28	89,168	52.61%	0.33%	55.84%	38.76%
2000	2,840	361	28	164,747	47.46%	0.25%	54.05%	40.32%
2001	1,929	247	22	72,041	52.31%	0.26%	54.95%	34.47%
2002	1,733	148	21	59,515	57.41%	0.17%	56.61%	31.51%
2003	1,657	162	21	16,442	64.45%	0.36%	60.83%	33.92%
2004	1,831	205	28	41,005	60.79%	0.16%	58.44%	36.97%
2005	1,937	303	28	54,907	62.16%	0.15%	60.30%	38.46%
2006	1,927	272	31	72,671	65.13%	0.00%	59.06%	40.32%
All Years	38,221	198	22	164,747	54.87%	0.38%	57.27%	31.52%

Table 2

Descriptive statistics for dependent and independent variables

Precise definitions are given in Appendix A.2. All and Big refer to the entire sample (deal size above \$1 million) and to the sub-sample with a deal size above \$50 million, respectively. N is the number of available observations. Average or percentage reports either the sample average (for continuous variables) or the sample proportion (for dummy variables). Standard error of mean is the standard deviation of the observations divided by the square root of the number of observations. Median is the 50th percentile.

	N	Average or percentage	Standard Error of Mean	Median
<i>Panel A. Dependent variables</i>				
Time between deals – All	22,381	491	5	226
Time between deals – Big	7,106	630	10	324
Abnormal time between deals – All	22,381	-0.824	0.012	-0.506
Abnormal Time Between deals – Big	7,106	-0.643	0.019	-0.293
<i>Panel B. Independent variables</i>				
<i>Deal Features</i>				
Private target	38,221	43%		
U.S. target	38,221	84%		
Related	38,221	57%		
Deal size (in million USD)	38,221	198	9	22
Relative deal size	22,916	0.30	0.02	0.07
Percentage acquired	37,349	91%	0%	100%
Toehold	37,349	2.2%	0.1%	0.0%
Cash	38,221	55%		
Hostile	38,221	0.4%		
Number of bidders	38,221	1.01	0.00	1.00
<i>Acquirer Characteristics</i>				
Market to book	21,101	4.28	0.04	2.65
Leverage	21,720	22.5%	0.1%	19.8%
KZ index	18,934	0.11	0.01	0.14
Previous Deal CAR	17,099	2.3%	0.1%	1.3%
Run-up	20,464	18.2%	0.4%	10.9%
Industry adjusted ROA	19,497	6.4%	0.1%	6.6%
Gompers et al. index	8,608	9.13	0.03	9.00
GDelay	4,326	2.30	0.02	2.00
GProtection	4,326	2.22	0.02	2.00
GVoting	4,326	0.58	0.01	0.00
GState	4,326	1.64	0.02	1.00
GOther	4,326	0.98	0.01	1.00
Free cash flow	19,980	-0.01	0.00	0.03
R&D	21,285	0.04	0.00	0.00
Firm deal order number – All	38,221	4.12	0.03	1.00
Firm deal order number – Big	18,678	3.51	0.04	1.00
<i>CEO Profile</i>				
Total salary (in million USD)	5,306	6.73	0.26	2.04
Base salary (in million USD)	5,306	0.65	0.01	0.58
Incentive salary	5,297	63%	0%	68%
Total salary variation	5,086	0.28	0.03	0.02
Value of stocks	5,037	3.95	0.02	3.95
Percentage of stocks	5,026	2.6%	0.1%	0.3%

	N	Average or percentage	Standard Error of Mean	Median
<i>CEO Profile (cont'd)</i>				
Value of options	5,306	3.64	0.02	3.95
Percentage of options	5,295	0.70%	0.02%	0.30%
Age	6,827	61.2	0.1	62.0
Insider	3,996	68.1%		
CEO deal order number – All	6,852	4.97	0.10	1.00
CEO deal order number – Big	5,007	5.78	0.12	1.00
Hubris	2,922	13.4%		
Private information	2,922	22.4%		
<i>Industry level variables</i>				
Number of deals in the industry	38,221	62.58	0.33	38.00
Average acquirer CAR in the industry	36,963	2.50%	0.02%	2.10%

Table 3
Univariate results

Dependent variables are the time between successive deals (TBD) and the abnormal time between successive deals (ATBD), in Panel A and Panel B, respectively. The dependent and independent variables are defined in Appendix A.2. All and Big refer to the whole sample (deal size above \$1 million) and to the sub-sample with a deal size above \$50 million, respectively. R² is the coefficient of determination and it is expressed in percentage. Coef is the coefficient of the univariate regression of TBD or ATBD on the corresponding independent variable and p-val is the associated p-value computed using heteroskedastic robust standard errors. N denotes the number of observations.

	All				Big			
	R ² (%)	Coef	p-val	N	R ² (%)	Coef	p-val	N
<i>Panel A. Dependent variable: TBD</i>								
Number of deals in the industry	2.40	-4E-03	0.00	22,381	3.90	-0.01	0.00	6,874
Average acquirer CAR in the industry	0.10	-1.55	0.00	21,652	0.10	-0.88	0.06	6,592
<i>Panel B. Dependent variable: ATBD</i>								
<i>Deal Features</i>								
Private target	0.29	-0.19	0.00	22,381	0.07	-0.10	0.02	7,106
U.S. target	0.09	0.14	0.00	22,381	0.12	0.14	0.00	7,106
Related	0.02	0.05	0.05	22,381	0.13	0.12	0.00	7,106
Deal size (in million USD)	0.00	5E-06	0.40	22,381	0.01	-5E-06	0.33	7,106
Relative deal size	0.46	0.16	0.00	16,338	0.41	0.16	0.00	5,238
Percentage acquired	0.42	4E-03	0.00	21,840	0.32	4E-03	0.00	6,998
Toehold	0.17	-0.01	0.00	21,840	0.05	-3E-03	0.07	6,998
Cash	0.02	-0.05	0.03	22,381	0.07	0.08	0.03	7,106
Hostile	0.01	0.24	0.17	22,381	0.08	0.47	0.02	7,106
Number of bidders	0.01	-0.11	0.15	22,381	0.00	-0.02	0.84	7,106
<i>Acquirer Characteristics</i>								
Market to book	1.12	-0.03	0.00	15,522	2.16	-0.04	0.00	5,010
Leverage	0.00	-0.03	0.69	15,917	0.10	0.27	0.03	5,130
KZ index	0.03	0.03	0.03	14,488	0.10	0.04	0.03	4,849
Previous deal CAR	0.01	-0.12	0.22	17,099	0.08	-0.43	0.03	5,531
Run-up	0.47	-0.24	0.00	15,446	0.84	-0.36	0.00	5,124
Industry adjusted ROA	0.10	-0.36	0.00	14,901	0.09	-0.40	0.03	4,973
Gompers et al. index	0.09	0.02	0.01	7,783	0.55	0.04	0.00	3,965
GDelay	0.00	-0.01	0.78	3,906	0.09	0.04	0.19	1,972
GProtection	0.15	0.05	0.01	3,906	0.72	0.11	0.00	1,972
GVoting	0.01	0.02	0.63	3,906	0.01	0.02	0.63	1,972
GState	0.08	0.04	0.07	3,906	0.10	0.04	0.17	1,972
GOther	0.07	0.05	0.10	3,906	0.15	0.07	0.09	1,972
Free cash flow	0.01	0.14	0.17	14,667	0.27	0.78	0.00	4,864
R&D	0.07	0.73	0.00	15,639	0.23	-1.44	0.00	5,044
Firm deal order number – All	4.83	-0.05	0.00	22,381	4.15	-0.03	0.00	7,106
Firm deal order number – Big	3.46	-0.05	0.00	14,845	5.33	-0.05	0.00	7,106
<i>CEO Profile</i>								
Total salary (in million USD)	1.95	-1E-05	0.00	4,939	1.30	-9E-06	0.00	2,438
Base salary (in million USD)	0.13	-1E-04	0.01	4,939	0.00	-3E-05	0.74	2,438
Incentive salary	0.51	-0.44	0.00	4,932	0.36	-0.39	0.00	2,435
Total salary variation	0.93	-8E-04	0.00	4,735	0.74	-5E-05	0.00	2,341
Value of stocks	1.36	-0.18	0.00	4,686	0.75	-0.13	0.00	2,288
Percentage of stocks	0.11	-0.91	0.03	4,677	0.30	-1.85	0.01	2,287
Value of options	0.91	-0.12	0.00	4,939	1.01	-0.12	0.00	2,438
Percentage of options	0.23	7.48	0.00	4,930	0.34	9.99	0.00	2,437
Age	0.16	0.01	0.00	6,180	0.65	0.02	0.00	2,970
Insider	0.16	-0.15	0.02	3,659	0.05	-0.09	0.33	1,768
CEO deal order number – All	8.70	-0.06	0.00	6,201	7.63	-0.04	0.00	2,976
CEO deal order number – Big	4.31	-0.04	0.00	4,356	7.36	-0.05	0.00	2,418
Hubris	0.33	-0.29	0.00	2,664	1.60	-0.58	0.00	1,369
Private information	0.14	0.15	0.06	2,664	0.24	0.21	0.07	1,369

Table 4

Multivariate analyses using deal features and acquirer firm characteristics as determinants

The abnormal time between deals (ATBD) is regressed on deal characteristics from Thomson SDC and acquirer firm characteristics computed using CRSP Compustat merged data. The dependent and independent variables are defined in Appendix A.2. CN denotes the condition number, which corresponds to the square root of the ratio of the maximum characteristic root to the minimum characteristic root of the variance/covariance matrix of independent variables (see Greene (2008), p. 971). All and Big refer to the whole sample (deal size above \$1 million) and to the sub-sample with a deal size above \$50 million, respectively. Coef is the coefficient estimates of the multivariate regressions. Significance is based on White-adjusted standard errors. R² is the coefficient of determination. Fisher is the classical Fisher statistic. N denotes the number of observations.

<i>Dependent variable: ATBD</i>	(1)				(2)				(3)			
	All CN=9.63		Big CN=9.31		All CN=36.22		Big CN=60.43		All CN=17.58		Big CN=19.16	
	Coef	<i>p-value</i>	Coef	<i>p-value</i>	Coef	<i>p-value</i>	Coef	<i>p-value</i>	Coef	<i>p-value</i>	Coef	<i>p-value</i>
<i>Deal features</i>												
Private target	-0.20	0.00	-0.09	0.09					-0.15	0.00	6E-04	0.99
U.S. target	0.13	0.00	0.14	0.01					0.15	0.00	0.11	0.06
Related	0.05	0.07	0.13	0.00	0.04	0.10	0.11	0.01	0.10	0.00	0.14	0.00
Deal size (in million USD)					3E-06	0.51	-4E-06	0.35				
Relative deal size	0.14	0.00	0.14	0.00					0.13	0.00	0.19	0.00
Toehold	-0.01	0.00	-3E-03	0.13	-0.01	0.00	-3E-03	0.07	-0.01	0.00	-3E-03	0.11
Cash	-0.04	0.17	0.11	0.02	-0.03	0.21	0.10	0.01	-0.11	0.00	0.01	0.85
Hostile	0.25	0.17	0.47	0.01					0.29	0.11	0.56	0.00
Number of bidders	-0.26	0.00	-0.11	0.15					-0.31	0.00	-0.13	0.09
<i>Acquirer firm characteristics</i>												
Market to book									-0.03	0.00	-0.03	0.00
Leverage									-0.68	0.00	-0.07	0.71
KZ index									0.05	0.00	-0.02	0.56
Run-up									-0.19	0.00	-0.16	0.02
Industry adjusted ROA									-0.24	0.02	-0.03	0.91
R ²	1.10%		1.00%		0.20%		0.30%		2.70%		3.00%	
Fisher	22.58		6.32		10.57		4.53		30.04		11.35	
N	15,968		5,710		21,840		6,998		13,874		4,719	

Table 5

Risk aversion, hubris and private information

The abnormal time between deals (ATBD) is regressed on variables constructed from Thomson SDC (deal features), the CRSP Compustat merged database and the Thomson Insider Filings database. The variables are defined in Appendix A.2. CN denotes the condition number, which corresponds to the square root of the ratio of the maximum characteristic root to the minimum characteristic root of the variance/covariance matrix of independent variables (see Greene (2008), p. 971). All and big refer to the entire sample and to the sub-sample with a deal size above \$50 million, respectively. Coef is the coefficient estimates of the multivariate regressions. Significance is based on White-adjusted standard errors. R² is the coefficient of determination. Fisher is the classical Fisher statistic. N denotes the number of observations.

<i>Dependent variable: ATBD</i>	All CN=38.59		Big CN=38.75	
	Coef	<i>p-value</i>	Coef	<i>p-value</i>
Private target	-0.05	0.52	-0.17	0.11
U.S. target	0.26	0.00	0.32	0.00
Related	0.29	0.00	0.24	0.01
Relative deal size	0.84	0.00	0.75	0.00
Toehold	-4E-03	0.16	-4E-04	0.91
Cash	0.04	0.57	0.19	0.05
Hostile	0.23	0.48	0.76	0.00
Age	-2E-03	0.72	-2E-03	0.76
Hubris	-0.27	0.01	-0.45	0.00
Private information	9E-04	0.99	-0.05	0.67
R ²	3.40%		5.00%	
Fisher	8.18		6.46	
N	2,317		1,240	

Table 6
Learning

The abnormal time between deals (ATBD) is regressed on a set of determinants to explore the learning hypothesis. The variables are defined in Appendix A.2. CN denotes the condition number, which corresponds to the square root of the ratio of the maximum characteristic root to the minimum characteristic root of the variance/covariance matrix of independent variables (see Greene (2008), p. 971). All and big refer to the whole sample and to the sub-sample with a deal size above \$50 million, respectively. Coef is the coefficient estimates of the multivariate regressions and p-values are based on White-adjusted standard errors. R² is the coefficient of determination. Fisher is the classical Fisher statistic. N denotes the number of observations.

<i>Dependent variable: ATBD</i>	(1)				(2)			
	All CN=23.76		Big CN=26.84		All CN=26.09		Big CN=26.85	
	Coef	<i>p-value</i>	Coef	<i>p-value</i>	Coef	<i>p-value</i>	Coef	<i>p-value</i>
Private target	-0.16	<i>0.00</i>	0.06	<i>0.24</i>	-0.01	<i>0.88</i>	0.11	<i>0.09</i>
U.S. target	0.09	<i>0.01</i>	0.05	<i>0.34</i>	0.12	<i>0.02</i>	0.12	<i>0.09</i>
Related	0.05	<i>0.07</i>	0.07	<i>0.14</i>	0.09	<i>0.04</i>	0.03	<i>0.65</i>
Relative deal size	0.09	<i>0.00</i>	0.15	<i>0.00</i>	0.51	<i>0.00</i>	0.47	<i>0.00</i>
Toehold	-0.01	<i>0.00</i>	0.00	<i>0.18</i>	-0.01	<i>0.00</i>	0.00	<i>0.51</i>
Cash	-0.07	<i>0.02</i>	0.02	<i>0.68</i>	-0.08	<i>0.06</i>	0.05	<i>0.45</i>
Hostile	0.33	<i>0.07</i>	0.53	<i>0.00</i>	-0.03	<i>0.91</i>	0.44	<i>0.04</i>
Number of bidders	-0.27	<i>0.00</i>	-0.13	<i>0.09</i>	-0.05	<i>0.66</i>	-0.02	<i>0.84</i>
Market to book	-0.01	<i>0.00</i>	-0.02	<i>0.00</i>	-0.02	<i>0.00</i>	-0.03	<i>0.00</i>
Leverage	-0.69	<i>0.00</i>	-0.36	<i>0.05</i>	-0.49	<i>0.01</i>	-0.18	<i>0.49</i>
KZ index	0.08	<i>0.00</i>	0.04	<i>0.19</i>	0.06	<i>0.02</i>	-0.02	<i>0.58</i>
Run-up	-0.23	<i>0.00</i>	-0.23	<i>0.00</i>	-0.13	<i>0.02</i>	-0.06	<i>0.46</i>
Industry adjusted ROA	0.23	<i>0.02</i>	0.53	<i>0.02</i>	0.02	<i>0.90</i>	0.25	<i>0.38</i>
Firm deal order number – All	-0.06	<i>0.00</i>	-0.04	<i>0.00</i>				
Previous deal CAR	-0.17	<i>0.19</i>	-0.30	<i>0.24</i>	-0.02	<i>0.91</i>	-0.72	<i>0.03</i>
CEO deal order number – All					-0.05	<i>0.00</i>	-0.04	<i>0.00</i>
R ²	9.50%		8.20%		11.00%		10.40%	
Fisher	96.74		27.91		47.23		21.74	
N	13,829		4,706		5,746		2,829	

Table 7

Corporate governance and agency conflicts

The abnormal time between deals (ATBD) is regressed on a set of determinants to explore the role of corporate governance. The variables are defined in Appendix A.2. CN denotes the condition number, which corresponds to the square root of the ratio of the maximum characteristic root to the minimum characteristic root of the variance/covariance matrix of independent variables (see Greene (2008), p. 971). All and big refer to the whole sample and to the sub-sample with a deal size above \$50 million, respectively. Coef is the coefficient estimates of the multivariate regressions and p-values are based on White-adjusted standard errors. R² is the coefficient of determination. Fisher is the classical Fisher statistic. N denotes the number of observations.

<i>Dependent variable: ATBD</i>	(1)				(2)			
	All CN=38.22		Big CN=39.47		All CN=33.16		Big CN=35.01	
	Coef	<i>p-value</i>	Coef	<i>p-value</i>	Coef	<i>p-value</i>	Coef	<i>p-value</i>
Private target	-0.03	<i>0.56</i>	0.03	<i>0.66</i>	3E-03	<i>0.97</i>	0.10	<i>0.32</i>
U.S. target	0.16	<i>0.00</i>	0.13	<i>0.06</i>	0.04	<i>0.57</i>	0.10	<i>0.33</i>
Related	0.22	<i>0.00</i>	0.20	<i>0.00</i>	0.24	<i>0.00</i>	0.23	<i>0.01</i>
Relative deal size	0.50	<i>0.00</i>	0.42	<i>0.00</i>	0.50	<i>0.00</i>	0.37	<i>0.01</i>
Toehold	-0.01	<i>0.00</i>	-2E-03	<i>0.27</i>	-0.01	<i>0.00</i>	-4E-03	<i>0.20</i>
Cash	-0.03	<i>0.51</i>	0.05	<i>0.44</i>	-1E-03	<i>0.99</i>	0.08	<i>0.35</i>
Hostile	0.13	<i>0.58</i>	0.54	<i>0.00</i>	-0.09	<i>0.80</i>	0.30	<i>0.34</i>
Number of bidders	-0.04	<i>0.58</i>	-0.06	<i>0.43</i>	-0.18	<i>0.02</i>	-0.24	<i>0.03</i>
Market to book	-0.04	<i>0.00</i>	-0.04	<i>0.00</i>	-0.04	<i>0.00</i>	-0.04	<i>0.00</i>
Leverage	0.40	<i>0.04</i>	0.50	<i>0.07</i>	0.48	<i>0.10</i>	0.67	<i>0.11</i>
KZ index	-0.06	<i>0.03</i>	-0.09	<i>0.02</i>	-0.05	<i>0.25</i>	-0.14	<i>0.01</i>
Run-up	-0.08	<i>0.23</i>	-0.03	<i>0.78</i>	-0.02	<i>0.87</i>	0.28	<i>0.02</i>
Industry adjusted ROA	-0.40	<i>0.07</i>	-0.16	<i>0.63</i>	-0.01	<i>0.97</i>	-0.39	<i>0.40</i>
Gompers et al. index	0.02	<i>0.04</i>	0.03	<i>0.00</i>				
Gdelay					-0.02	<i>0.52</i>	0.03	<i>0.43</i>
Gprotection					0.03	<i>0.18</i>	0.06	<i>0.09</i>
Gvoting					0.07	<i>0.10</i>	0.04	<i>0.47</i>
Gstate					7E-04	<i>0.98</i>	0.01	<i>0.72</i>
Gother					0.07	<i>0.06</i>	0.05	<i>0.31</i>
Free cash flow	0.13	<i>0.67</i>	0.89	<i>0.06</i>	-0.17	<i>0.71</i>	1.76	<i>0.03</i>
R&D	-0.52	<i>0.25</i>	-0.24	<i>0.73</i>	0.09	<i>0.89</i>	-0.35	<i>0.73</i>
R ²	4.50%		4.40%		4.90%		4.90%	
Fisher	18.16		9.43		7.37		3.77	
N	6,212		3,268		2,865		1,470	

Table 8
The CEO compensation contract

The abnormal time between deals (ATBD) is regressed on a set of determinants to explore the role of the CEO's compensation contract. The variables are defined in Appendix A.2. CN denotes the condition number, which corresponds to the square root of the ratio of the maximum characteristic root to the minimum characteristic root of the variance/covariance matrix of independent variables (see Greene (2008), p. 971). All and big refer to the whole sample and to the sub-sample with a deal size above \$50 million, respectively. Coef is the coefficient estimates of the multivariate regressions and p-values are based on White-adjusted standard errors. R² is the coefficient of determination. Fisher is the classical Fisher statistic. N denotes the number of observations.

<i>Dependent variable: ATBD</i>	All CN=23.74		Big CN=23.73	
	Coef	<i>p-value</i>	Coef	<i>p-value</i>
Private target	-0.06	0.29	-4E-03	0.96
U.S. target	0.12	0.04	0.10	0.25
Related	0.20	0.00	0.14	0.05
Relative deal size	0.77	0.00	0.57	0.00
Toehold	-0.01	0.00	-2E-03	0.42
Cash	-0.04	0.44	0.08	0.28
Hostile	2E-03	1.00	0.55	0.00
Incentive salary	-0.41	0.00	-0.38	0.01
Percentage of stocks	-1.53	0.00	-2.03	0.03
Percentage of options	3.29	0.10	5.92	0.08
R ²	2.90%		2.30%	
Fisher	13.72		5.34	
N	4,526		2,251	

Table 9
The TBD/CAR trade-off and endogeneity issue

Regressions here check for a trade-off between the acquirer's cumulative abnormal returns (CAR) and the deal probability (Panel A), and whether the omission of the acquirer CAR instrument affects previous multivariate results (Panel B). The probability of doing deals is proxied by the abnormal time between successive deals (ATBD). The variables are defined in Appendix A.2. Matched acquirer CAR corresponds to the average CAR of a portfolio of acquirers having done deals in the same industry, the same year, buying targets with the same status (private or public) and using the same mode of payment (cash versus other). The acquirer CAR instrument is constructed from specification (2) in Panel A. Panel B presents 2SLS estimation to ascertain whether specifications (1) and (3) of Table 4 are robust to the omission of the acquirer's CAR. Coef is the coefficient estimates of the multivariate regressions and p-values are either based on White-adjusted standard errors (OLS estimator) or on 2SLS adjusted standard errors (2SLS estimator). R² is the coefficient of determination. Fisher is the classical Fisher statistic. N denotes the number of observations. Both panels include the entire sample of deals (deal sizes above \$1 million).

Panel A. Is there a tradeoff between CAR and ATBD?

	(1) – OLS		(2) – 2SLS stage 1		(3) - 2SLS stage 2	
	Dependent var. : ATBD		Dependent var. : CAR		Dependent var. : ATBD	
	Coef	<i>p-value</i>	Coef	<i>p-value</i>	Coef	<i>p-value</i>
Acquirer CAR	0.09	0.42				
Acquirer CAR instrument					2.58	0.00
Matched acquirer CAR			0.12	0.00		
Private target			0.01	0.00		
U.S. target			0.00	0.25		
Related			0.00	0.04		
Relative deal size			0.03	0.00		
Toehold			0.00	0.51		
Cash			0.01	0.71		
R ²	0.00%		3.80%		4.10%	
Fisher	0.74		120.67			
N	16,315		21,677		15,677	

Panel B. Robustness check

<i>Dependent variable: ATBD</i>	(1) – 2SLS stage 2		(2) – 2SLS stage 2	
	<i>Table 4 – (1)</i>		<i>Table 4 – (3)</i>	
	Coef	<i>p-value</i>	Coef	<i>p-value</i>
Private target	-0.11	0.03	-0.10	0.04
U.S. target	0.16	0.00	0.16	0.00
Related	0.07	0.02	0.08	0.01
Relative deal size	0.30	0.01	0.32	0.01
Toehold	-0.01	0.00	-0.01	0.00
Cash	-0.06	0.15	-0.07	0.10
Hostile	0.19	0.37	0.15	0.48
Number of bidders	-0.31	0.00	-0.33	0.00
Market to book			-0.03	0.00
Leverage			-0.78	0.00
KZ index			0.08	0.00
Run-up			-0.15	0.00
Industry adjusted ROA			-0.24	0.03
Acquirer CAR Instrument	-3.353	0.18	-4.087	0.12
R ²	5.00%		6.60%	
N	13,587		13,587	