Negotiations under incomplete information and idiosyncratic stock return volatility[*]

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Abstract

We trace the impact of the acquiring firm's information environment, measured by its idiosyncratic stock return volatility (sigma), on the choice of deferred payments (earnouts) in mergers and acquisitions (M&As) and, consequently, on acquirers' announcement period abnormal returns. We offer direct evidence on the superiority of earnouts under low acquirer sigma (20% of all earnout-settled M&As) and illustrate that the greater abnormal returns observed in earnout-settled M&As, relative to M&As settled in single up-front payments, are driven by deals announced by low-sigma acquirers. In contrast, high-sigma acquirers employing earnouts (40% of all earnout-settled M&As) break even or suffer significant losses. These findings are further verified under a quasi-experimental design through which we attempt to isolate the earnout effect. We argue that in deals announced by high-sigma acquirers the perceived earnout effect is elusive due to an acquirer-specific information dissemination effect, resulting from the heightened extent of information asymmetry between acquirers' managers and outside investors. Conversely, the use of earnouts in deals announced by low-sigma acquirers sends a strong signal of value creation that also prevents market participants from inducing a size-related discount.

Keywords: Acquirer idiosyncratic stock return volatility (sigma); Information asymmetry; Earnouts; Abnormal returns; Propensity Score Matching (PSM).

JEL classifications: G12, G13, G14, G30, G34.

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1. INTRODUCTION

The choice of payment method in Mergers and Acquisitions (M&As) is often guided by the aim of mitigating merger valuation-risk originating from asymmetric information over the target firm (Hansen, 1987; Fuller et al., 2002; Barbopoulos and Sudarsanam, 2012). Such adverse selection considerations are particularly prominent in M&As of unlisted target firms and can be further aggravated in case the target fails to perform as originally envisaged, or to comply to the terms of the deal in the integration period (i.e. moral hazard). Confronted with the implications of ex-ante adverse selection and ex-post moral hazard considerations in M&As, earnouts constitute a multi-stage contingent payment mechanism that can address information asymmetry over the target firm and, hence, offer a solution to the implied valuation disagreement between the merging firms (Kohers and Ang, 2000).[1] It is therefore not surprising that the use of earnouts has increased significantly over the recent decades, exceeding 14% of all M&As in 2011 from just below 3% in 1985.[2] Similarly, in their seminal paper on the effects of earnouts on acquirers' short- and long-run abnormal returns, Kohers and Ang (2000) show that earnout-settled deals yield significantly higher gains, relative to deals settled in single up-front payments (i.e. the earnout effect).

Nevertheless, while earnout activity keeps growing and scholars continue to highlight the positive earnout effect (Barbopoulos et al., 2017), a separate array of studies suggests that acquirers' short-run abnormal returns are highly sensitive to proxies for information asymmetry over the acquiring firm and, more precisely, its idiosyncratic stock return volatility (Moeller et al., 2007). A direct implication arising from this empirical observation is therefore whether the earnout effect persists across deals announced by acquirers exhibiting different degrees of idiosyncratic volatility. In this paper, we aim to fill this void in the literature.

More specifically, the main motivation for examining the potential interaction between earnout choice (and hence the earnout effect) and the acquiring firm's information environment relates to the fact that earnouts are particularly prominent in deals involving

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[1] In an earnout-settled deal, the target receives only part of the payment during the deal's announcement, whereas the receipt of the deferred payment(s) is conditional upon the satisfaction of pre-specified performance-related goals (i.e. the earnout terms) within a pre-determined period(s) (i.e. the earnout period).
[2] Earnout-settled M&As mainly involve unlisted (i.e. private or subsidiary) targets operating in intangible-rich sectors, such as the high-tech and other services-based industries (Kohers and Ang, 2000; Cain et al., 2011).

small (often listed) acquirers. As small (listed) firms are likely to be characterized by increased idiosyncratic risk (i.e. stock return volatility), their heightened sensitivity to non-systematic factors renders firm-specific information particularly valuable (Campbell et al., 2001).[3] Such information is primarily possessed by acquirers' managers and is eventually reflected in equity prices either through the passage of time, or through an information-releasing event (Dierkens, 1991). As in the case of other major corporate events, M&A announcements attract media attention and place the acquiring firm under investors' and analysts' attention who, in turn, react to the announcement. In this respect, if the capital market's assessment of the deal is unbiased, the acquiring firm's abnormal returns should reflect the impact of the expected economic benefits of the deal (conditional on merging firms- and deal- specific features) *in addition* to any new non-M&A related information over the acquiring firm that is transferred to the market via the announcement of the merger itself (Moeller et al., 2004).

Thus, an acquirer's wealth gains may fully, or only partly, reflect a deal's expected synergies, while the extent to which the deal's expected synergies are indeed reflected would depend on the extent of information asymmetry between acquirers' managers and outside investors. In other words, M&A announcements, particularly when made by small public acquirers for which information is limited (Banz, 1981), can result in a substantial re-appraisal of the acquiring firm's value, while such re-appraisal need not be exclusively based on the economic benefits of the deal but on non-M&A-related acquirer-specific information as well (Moeller et al., 2004; Draper and Paudyal, 2008). It is therefore in principle a possibility that the perceived earnout effect is in fact elusive due to an acquirer-specific information dissemination effect, the magnitude of which depends on the extent of asymmetric information over the acquiring firm. Thus, considering the popularity of earnouts among deals involving small acquirers, who are generally characterized by heightened idiosyncratic volatility, a thorough examination of whether (and, if so, to what extent) the dissemination of acquirer-specific information during the announcement period interacts with the earnout effect in shaping acquirers' abnormal returns is an important exercise to be carried out.

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[3] Banz (1981) points to the limited information available to investors over small publicly listed firms.

Another important aspect that further motivates our analysis is the fact that the majority of targets in earnout-settled M&As are privately held firms (Kokers and Ang, 2000; Barbopoulos and Sudarsanam, 2012). As the market for private firms is typically illiquid (Draper and Paudyal, 2006), the target's managers are likely to prefer cash as the medium of financing. However, cash is likely to be a 'sub-optimal' equilibrium currency for acquirers, particularly if it pays for difficult-to-value targets the integration of which in the core business of the acquirer sets up a challenging task (as argued by Fishman, 1989). Stock-financing on the other hand, which is the closest contingent payment alternative to implementing earnouts,[4] could offer a direct solution to acquirers. Yet, stock may not be the preferred financing method as (a) under increased volatility, it may not serve the appropriate incentive mechanism posited by Hansen (1987) and put forward by Chang (1998)[5] and, therefore, may not be 'optimal' in accommodating the high valuation-risk embedded in the target firm and, (b) stock may dilute the acquiring firm's ownership structure (and even more so in case the acquirer is a small firm).[6] Stock-financing may also not represent the preferred payment method for the target firm's managers as, among other reasons, (a) under increased volatility, it may raise misevaluation concerns over the acquiring firm's shares and, hence, result in the target firm's management rejecting[7] this medium of exchange (Chang, 1998) and, (b) the shares of small acquirers are regularly locked-up or cannot be sold or traded (to offer liquidity or cash to the target firm) for a sufficient period following the announcement of the deal.

The above suggest that earnouts potentially constitute an acceptable payment mechanism for both acquirers and private targets who disagree over their valuations and

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[4] Depending on the earnout composition, or its structure (e.g. whether both initial and contingent payments are in cash or stock), its similarity to stock-financing can vary significantly (see Barbopoulos et al., 2017).

[5] Hansen (1987) has theoretically shown that when a target firm knows its value better than a potential acquirer, the acquirer will prefer to offer stock, which has desirable contingent-pricing characteristics, relative to cash. This implies that under stock-financing the target will be incentivised to share valuable information with the acquirer and hence eliminate valuation errors ex-post that could potentially lead to substantial acquirer value corrections and significant target losses given that the target holds part of the acquirer's equity.

[6] See Amihud et al. (1990) for a discussion on issues related to the choice of payment method in M&As and the firm's ownership structure.

[7] The pecking order theory postulated by Myers and Majluf (1984) suggests that managers would be inclined to use equity when they believe that their firm is overvalued. Taking advantage of this overvaluation would allow the acquirer to buy a target at a discount. However, in the case of private target M&As, the target's managers are likely to reject such payment alternative (Chang, 1998).

yet, given their mutual (or even one-sided) dis-preference for stock, agree to settle in an earnout and progress with the deal. In this respect, as increased information asymmetry over the acquiring firm (reflected in its idiosyncratic volatility) could trigger the use of earnouts (i.e. by contributing towards a dis-preference for stock) it is worth investigating the interaction (if any) between the earnout effect and the acquirer's information environment.

Lastly, another motivation for our study beyond the firm- and deal-specific features that were discussed earlier in the paper, is the observation that, besides the outstanding rise in earnout-settled M&As, earnouts are becoming increasingly popular even in mega-deals, representing a sizeable investment.[8] Such newly emerged features of earnout-settled M&As are in discordance to their conventional features, i.e. the small size of both acquirers and targets. In this respect, the suitability and wealth effects of earnouts in large deals involving large acquirers (who generally exhibit significantly lower asymmetric information than small acquirers as illustrated by Campbell et al., 2001) and therefore for which the elusiveness of the earnout effect is expected to be trivial, remains to be studied.

In light of the above, the option to use earnouts is likely to: (a) 'bridge the gap' in the inherent disaccord over the deal's intrinsic value, (b) provide cash immediately (by means of the first-stage payment) to the shareholders of the (likely private) target firm and, (c) signal the unwillingness of the involved parties to finance valuation-complex deals with stock. Both (a) and (b) are likely to accommodate potential valuation concerns and liquidity shortages for the target firm, irrespective of the acquirer's information environment. Conversely, (c) is highly sensitive to the extent of information asymmetry over the acquiring firm and, therefore, the acquirer dissemination effect is likely to distort the perceived impact of earnouts on acquirers' abnormal returns. Nevertheless, the magnitude of such distortion remains indistinct to this date.

A simplified example can further depict how the stock market's reaction to two earnout-settled acquisitions of private targets, that are announced by two firms at opposite sides of the information asymmetry spectrum, depends on the extent of information dissemination that each of the acquiring firms creates when announcing a deal. Take the case of two firms

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[8] For instance, in the 2015 acquisition of Visa Europe Ltd. by Visa Inc amounted to roughly $17 billion in deal value, nearly $4 billion of which constituted the deferred payment.

i and j acquiring two identical private targets, with the exception that firm i is characterized by considerably more asymmetric information (or idiosyncratic volatility) than firm j. Even if the managers of both firms are short-term oriented and expect the same short-term aggregate payoffs from these deals, the heightened extent of information asymmetry may alter the market's perception of firm i during the announcement period. That is, even if the use of earnouts as a payment delivery mechanism addresses adverse selection and moral hazard considerations over the target firm, the announcement of the M&A may in fact lead to considerably different gains accrued to the shareholders of acquirers i and j. This could be due, for instance, to doubts being raised by investors as they observe the announcement over firm i's true value, its fundamentals, or to concerns over agency problems related to key personnel. Evidently, in this setup, acquirers' announcement period abnormal returns would not be solely driven by the deal's synergy potential. On the other hand, due to the decreased scope for information dissemination during its M&A announcement, firm j's decision to engage in an earnout-settled deal is likely to be the main driver of acquirers' gains (or losses).

In this paper we utilize a large sample of US M&As covering the period from January 1980 to December 2016 (inclusive) to examine whether information asymmetry over the acquiring firm, proxied by its idiosyncratic stock return volatility (sigma), is helpful in further understanding the statistical properties of acquirers' abnormal returns during the announcement of earnout- vs. non-earnout settled deals. In the empirical part, we begin by performing standard univariate and multivariate analyses of acquirers' abnormal returns, while controlling for (a) the payment mechanism (earnout or deferred payments vs. single up-front payments) and payment method used (cash, stock, or mixed methods of payment), (b) the acquiring firm's sigma and, (c) other factors known to affect the valuation effects of M&As (e.g. target listing status, merging-firms' industry relatedness). To accommodate self-selection concerns, we rely on a quasi-experimental analysis, based on the Propensity Score Matching (PSM) method, which allows us to isolate the earnout effect from the acquirer-specific information dissemination effect. In this respect, the inclusion of sigma in all propensity score estimators allows for more effective matching between treated and control deals whereas, to overcome potential issues over our identification strategy in the propensity score estimator, we use the Rosenbaum-bounds method (Rosenbaum, 2009).

The main findings of our analysis illustrate that high-sigma (low-sigma) acquirers announce nearly 40% (20%) of all earnout-settled deals. However, we find that it is those earnout-settled deals announced by low-sigma acquirers that generate superior abnormal returns during the announcement period, relative to their non-earnout counterparts. In contrast, high-sigma acquirers in earnout-settled deals simply break even, or even experience significant losses, relative to their non-earnout counterparts. Our results from the PSM analysis further confirm the above findings by showing that it is solely earnout-settled M&As that are announced by low-sigma acquirers (as opposed to earnout-settled M&As announced by high-sigma acquirers) that significantly outperform their counterfactual, or control deals (identified via the PSM method). Moreover, for deals involving private targets, our results suggest that it is solely earnout-settled M&As announced by low-sigma acquirers that result in significantly greater abnormal returns, relative to deals involving single up-front payments.

We argue that, consistent with information asymmetry models (Moeller et al., 2007), this is due to the prevalence of the information dissemination effect which, under high acquirer sigma, can be perceived as the main driver of the aggregate announcement period wealth effects of acquirers, irrespective of whether an earnout or non-earnout payment mechanism is included in the deal. Conversely, as acquirer-specific information release is trivial for low-sigma (or large) acquirers (Draper and Paudyal, 2008), we argue that the higher abnormal returns are due to the prevalence of the earnout effect (as opposed to the information dissemination effect). Hence, the deal's increased synergy potential, which is heightened due to the properties of earnouts, is effectively captured in acquirers' abnormal returns. Confronted with this observation, we also examine the extent to which low-sigma acquirers, being predominantly large firms, are exposed to the well-established gains-decreasing size effect at the announcement of earnout-settled M&As. Our results suggest that the synergy effect of earnouts prevails. Thus, the use of earnouts, especially in deals announced by low-sigma (or large) acquirers, may be perceived as sending a strong signal for value creation that also prevents investors from inducing a size-related discount.

This paper makes several contributions to the literature. Among others, it uncovers a strong interaction between acquirers' sigma and earnout activity, as well as between acquirers' sigma and the statistical properties of acquirers' abnormal returns around the

announcement of earnout-settled M&As. As sigma represents a well-perceived proxy for information asymmetry over a listed firm (Dierkens, 1991; Moeller et al., 2007), we draw the attention to the characteristics of publicly traded acquirers and illustrate the elusiveness of the earnout effect under high-sigma due to the considerable presence of an acquirer-specific information dissemination effect.[9] Notwithstanding that identifying the content of the acquirer-specific information that is released in the market is beyond the scope of this paper, this is the first earnout paper that focuses explicitly on the acquiring side of the deal in examining whether variables suggested by information asymmetry models are helpful in understanding the perceived valuation effects of earnouts in M&As, while accounting for selection bias and size effect considerations.

The remainder of the paper is organized as follows. Section 2 formulates and presents our testable hypotheses. Section 3 outlines both the methods and main variables that we employ to conduct our empirical analysis. Section 4 refers to the data and the sample statistics. Section 5 presents the main findings. Section 6 concludes this paper with an overarching discussion of the results along with suggestions for future research.

2. DEFERRED PAYMENT MECHANISMS AND ACQUIRERS' ABNORMAL RETURNS

Information asymmetry between the merging firms in M&As may (miss-) lead an acquirer to buy a 'lemon' (Akerlof, 1970), but it can also (miss-) lead a target to be purchased at a discount. As discussed by Officer et al. (2009), this problem is further exacerbated in M&As in which the target firm is characterized by high degrees of opacity, which is particularly the case for unlisted firms (i.e. private or subsidiary). Acquirers, as a result, are motivated to employ numerous merger valuation-risk mitigation channels, which are often closely related (a) to the choice of payment method used to finance the deal and, (b) to the delivery mechanism of the consideration.

Along these lines, previous studies (see for example, Hansen (1987), Fishman (1989) and Eckbo et al. (1990)) have investigated the role of asymmetric information in the choice of the payment method in M&As (i.e. cash, stock or hybrid of cash and stock). By assuming

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[9] Moeller et al. (2007) illustrate the superiority of sigma as a proxy for information asymmetry, relative to alternative information asymmetry proxies (standard deviation of the earnings announcement abnormal returns) or relative to diversity of opinion proxies (dispersion of analyst forecasts and breadth of ownership).

two-sided information asymmetry, these studies show that the division of the merger surplus between the merging parties becomes a function of the size (i.e. dollar value) of the bid and of the medium of exchange. Moreover, Fishman (1989) shows that, in the presence of large disagreements over the value of the target, the use of a single up-front payments of, for example cash, may be the outcome of a sub-optimally designed contract.

More recently, Kohers and Ang (2000) and Barbopoulos et al. (2017) for the US, and Barbopoulos and Sudarsanam (2012) for the UK, studied both the suitability and merger valuation-risk mitigation properties of earnouts. They illustrate the suitability of the earnout payment delivery mechanism in M&As involving relatively small acquirers of targets that are characterized by increased valuation complexity or opacity. Reuer et al. (2004) also show that the likelihood of earnout-choice in the deal's payment process increases with the uncertainty faced by the acquiring firm over the value of the target. In addition to their obscure nature that is regularly defined by their listing status (i.e. private or subsidiary), targets in earnout-settled M&As often operate in intangible-rich sectors (e.g. the high-tech or the pharmaceuticals sectors). The expected synergies of these deals are difficult to be estimated due to the target's business idiosyncrasy, high level of intangible assets, and information asymmetry, as well as due to the sensitivity of the estimation to the flair, creativity and skill of key personnel. The above give rise to valuation-risk and, eventually, more scope for negotiation (and perhaps re-negotiation) as substantial disagreement may emerge even during the deal's integration process.

Confronted with the intuitive suitability of earnouts in valuation-complex deals, previous studies indicate that acquirers enjoy, on average, significant gains during the announcement of earnout-settled M&As (i.e. positive earnout effect), which are also superior to those generated in deals settled in single up-front payments of cash, or stock. Barbopoulos and Sudarsanam (2012) further show that 'correctly' classified earnout-choice, based on logit models predicting 'optimal' earnout-choice, leads to even higher announcement period and long-run abnormal returns for acquirers.[10]

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[10] Limited evidence is also provided considering the announcement period wealth effects of earnouts in cross-border M&As. Mantecon (2009) examines alternative methods of valuation uncertainty avoidance and indicates that the use of earnouts benefits predominantly domestic bidders, leading to positive announcement period abnormal returns. However, Barbopoulos et al. (2018) show that the earnout payment delivery

Nevertheless, a dimension within the earnout literature that has received limited or no attention to this date is that asymmetric information between acquirers' managers and outside investors may distort the perceived impact of earnouts on acquirers' short-run abnormal returns. As acquirers' managers and market participants may possess dissimilar information sets over the true value of the acquiring firm (i.e. its growth prospects and perhaps investment plans), with the former group being exposed to significantly more information than the latter, information dissemination events (e.g. M&A announcements) should be expected to shape acquirers' prices considerably. Arguably, the extent of information asymmetry over an acquiring firm is expected to be more severe when acquirers are small firms, for which the available information in the market is limited (Banz, 1981) and hence, their perceived risk much larger (Draper and Paudyal, 2008). Campbell et al. (2001) also illustrate the increased idiosyncratic risk characterizing small firms. Therefore, assuming that the acquiring firms' managers and outside investors are equally informed about non-firm-specific factors (i.e. they both bear the same market-wide risk), any firm-specific information (i.e. that is initially only available to managers) is what remains to be factored in acquirers' share prices. Such an outcome would be expected to occur either through the passage of time, or through an information-releasing event (Dierkens, 1991). Until that equilibrium condition is reached, the market bears some firm-specific uncertainty.[11]

Due to their considerable transaction size that often guarantees significant media coverage, M&A announcements result in the release of a substantial load of non-M&A related information, which attracts the attention of investors and analysts. The latter may in turn factor this information and adjust their assessments over the acquiring firm's true value. Therefore, the statistical properties of acquirers' short-run abnormal returns should reflect, in addition to the expected economic benefits of the deal, the release of non-M&A related information regarding the acquiring firm (Moeller et al., 2004). In this respect, Draper and Paudyal (2008) document that undervalued firms with greater information asymmetry

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mechanism benefits cross-border or foreign target acquirers with no, or limited, cross-border acquisition or international business experience.

[11] Information asymmetry corresponds to only a subset of the total uncertainty about the firm, as the managers of the firm and the market are likely to be equally well-informed about market-wide variables influencing its value (Dierkens, 1991).

enjoy greater abnormal returns as a result of information dissemination regarding their true value, revelation of expected synergies, or both. Similarly, Moeller et al. (2007) test information asymmetry models inspired by Myers and Majluf (1984) and put forward by Travlos (1987). The authors illustrate the superiority of sigma as a proxy for information asymmetry that significantly interacts with the method of payment and the listing status of the target firm in shaping acquirers' abnormal returns.[12]

Accordingly, if acquirers' abnormal returns in earnout vs. non-earnout-settled M&As that are announced by either high- or low- sigma acquirers accommodate the impact of the release of non-M&A-related information over the acquiring firm, then the comparative performance of earnout- vs. non-earnout-settled deals should also accommodate an information dissemination effect.[13] In this setup, high-sigma would be indicative of increased information asymmetry over the acquiring firm (arguably due its small size, Campbell et al., 2001), thereby suggesting a substantial information dissemination effect which could potentially distort the earnout effect. Evidently, as this new information being disseminated is reflective of, but not solely limited to, the M&A deal, such an outcome would cast doubts over the superior comparative performance of earnouts over single up-front payments. In fact, acquirers' gains during the announcement of earnout-settled deals could be identical, or even inferior, to those from non-earnout-settled deals once controlling for the acquiring firm's sigma, thereby confirming the elusiveness of the earnout effect.[14] In contrast, the earnout effect in low-sigma acquirers' short-run abnormal returns is expected to be unbiased (or materially less biased) due to the absence (or considerably reduced presence) of the acquirer information dissemination effect.

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[12] Pastor and Veronesi (2006) illustrate the positive relation between a firm's sigma and uncertainty about average profitability, as well as the idiosyncratic volatility of profitability. Irvine and Pontiff (2009), attribute the recent rise in sigma to increased economy-wide competition resulting in firms enjoying lower market power. Jiang et al. (2008) illustrate that high-sigma firms tend to have poor information disclosure leading to more heterogeneous beliefs among investors.

[13] High asymmetric information between high-sigma acquirers' managers and outside investors is also likely to imply relative mispricing or perhaps undervaluation (Draper and Paudyal, 2008; Moeller et al., 2007), whereas the selection of earnouts by high-sigma acquirers may also serve the unwillingness of acquirers' managers to mitigate the inherent valuation-risk with relatively undervalued shares.

[14] It needs to be mentioned, nevertheless, that such an outcome would not suggest that there is no synergy potential in earnout-settled deals involving high-sigma (or small) acquirers. But rather, that it would be a fallacy to infer an earnout-settled deal's synergy potential from acquirers' short-run abnormal returns without controlling for the influence of the release of non-M&A related information over the acquiring firm.

Our main hypothesis is therefore set as follows: *Low- (High-) sigma acquirers enjoy significantly greater short-run abnormal returns (break even) in deals settled in earnouts, relative to deals settled in non-earnout payments, due to the elusive (distinct) impact of the acquirer information dissemination effect.*

3. METHODS

We first present the methods we employ to estimate acquirers' abnormal returns. Subsequently, we present the tests that we use to address self-selection concerns with regards to the endogeneity inherent in employing earnouts (or not) as a payment delivery mechanism. To this end, we rely on the Propensity Score Matching (PSM) and Rosenbaum-bounds (RB) methods in our attempt to isolate the earnout effect.

3.1. Estimation of acquirers' abnormal returns

The estimation of acquirers' abnormal returns is conducted as follows:

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \tag{1}$$

Where: $AR_{i,t}$, is the abnormal return to acquirer i at day t, $R_{i,t}$ is the stock return of acquirer i at day t, $E(R_{i,t})$ is the expected return of the acquiring firm i at day t, estimated based on the Fama and French (1996) 3 factor model (3FF) as in Equation (2) below:

$$E(R_{i,t}) = (1 - \hat{\beta}_i)R_{f,t} + \hat{\beta}_i E(R_{m,t}) + \hat{\beta}_i^{smb} E(SMB_t) + \hat{\beta}_i^{hml} E(HML_t) \tag{2}$$

The parameters $\hat{\beta}_i$, $\hat{\beta}_i^{smb}$, and $\hat{\beta}_i^{hml}$ are estimated over days $t - 250$ to $t - 40$, where t is the announcement day of the M&A, as in Equation (3) below:

$$(R_i - R_f)_t = \alpha + \beta_i(R_m - R_f)_t + \beta_i^{smb} SMB_t + \beta_i^{hml} HML_t + \varepsilon_{i,t} \tag{3}$$

The announcement period cumulative abnormal return (CAR) for acquirer i is estimated as the sum of the abnormal returns in the 5-day window ($t - 2$ to $t + 2$) surrounding the M&A's announcement day ($t = 0$), as outlined in Equation (4) below:

$$CAR_i = \sum_{t-2}^{t+2} AR_{i,t} \tag{4}$$

For robustness, in line with numerous studies with similar sample characteristics (Fuller et al., 2002; Faccio et al., 2006), the announcement period abnormal returns for an acquiring firm i are estimated using the market-adjusted model (MAM). We also estimate acquirers'

abnormal returns using the Carhart 4-factor model (4-FM), the capital asset pricing model (CAPM), and the market model (MM). In unreported results (available from the authors upon request) we find that the correlations between the CAR_i obtained from (a) the 3FF, (b) the 4-FM, (c) the CAPM, (d) the MM, and (e) the MAM, are in excess of 0.92. All results using CAR_i obtained from (b), (c), (d) and (e) are qualitatively similar to those obtained from (a), and our conclusions hold regardless of which event study model is applied.

In our empirical analysis, at first, the announcement period abnormal returns of acquirers are analyzed by the method of payment and the target firm's listing status, which is extended across portfolios formed by M&As announced by acquirers exhibiting low-, medium- and high- sigma. Next, the analysis considers differentials between earnout and non-earnout payment delivery mechanisms (including 'all non-earnout' and single up-front payments in 'cash', 'stock' or 'mixed' separately), as well as between M&As announced by acquirers exhibiting low- and high- sigma.

3.2. Propensity Score Matching (PSM) and Rosenbaum-bounds (RB) methods

Observational studies differ from experimental ones in that randomization is not used to assign a treatment. Within the context of M&As, extant literature is concerned with understanding the motives and consequences of several mechanisms involved during the deal process (treatment), by examining the statistical properties of acquirers' abnormal returns as the response random variable (outcome). Nevertheless, earnouts are used in a small proportion of our sampled deals (=7.51%). This raises concerns as to whether a form of sample-selection bias reduces the reliability of our derived results, or their causal interpretation, from both our univariate and multiple regression analyses. To accommodate such concerns in our analysis, we rely on the PSM method, through which the earnout effect is measured in isolation.[15]

More specifically, implementing the PSM method allows for an (more) unbiased causal inference by pairing treated (earnout-settled) and control (non-earnout settled) sampled

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[15] Although PSM has become a popular method in estimating casual effects in policy impact research, it has been only recently used in the finance literature (Saunders and Steffen, 2011; Casu et al., 2013). Behr and Heid (2011) provide a thorough analysis of the PSM methodology along with its application in evaluating the success of German bank mergers in the period 1995-2000. An analytic representation of the PSM method can also be found in Rosenbaum (2009), Chapters 3 and 7 to 13.

M&As based on observable pre-treatment characteristics and assessing differences between the two groups in a response random variable (i.e. the CAR_i) (Dehejia and Wahba, 2002; Rosenbaum, 2009). In particular, PSM involves matching treated M&As that exhibit a certain attribute (i.e. the treatment or earnout), to counterfactual deals that do not exhibit the treatment but illustrate the same propensity score (i.e. probability) to do so as the treated deals.

We apply PSM in three Exercises. In Exercise-1 we match earnout- to non-earnout settled M&As within the full sample. This enables us to address potential self-selection concerns and estimate the overall earnout effect on acquirers' abnormal returns. Exercise-2 and Exercise-3 involve matching earnout-settled M&As to non-earnout settled counterparts within a group of deals announced by acquirers exhibiting only low-sigma (Exercise-2) and high-sigma (Exercise-3). As our propensity score estimators include sigma, performing these matching sequences enables us to match earnout-settled M&As to counterfactual ones involving acquiring firms with the most similar expected release of information (i.e. a similar sigma or information dissemination effect). Therefore, performing Exercises-2 and -3 allows us to capture the earnout effect, as well as how it varies between low and high sigma, separately.

We employ 1-to-1, 5-to-1 and 10-to-1 nearest neighbor matching with replacement within 1% of Absolute Probability Difference (APD). We also examine the sensitivity of our conclusions, which are derived from matching, to the effect of an unobserved covariate (i.e. unobserved variable bias) from our propensity score estimator (i.e. the logit model). We employ the Rosenbaum-bounds method (Rosenbaum, 2009), which enables us to measure how influential a confounding (unobserved) covariate needs to be in order to invalidate the effect of the treatment on the response random variable.

Lastly, in response to the growing popularity of matching analysis in empirical finance, Ho et al. (2007) argue that matching in itself is not an estimation method: once a matched sample (containing the treated and counterfactual M&As) is established, an estimation procedure needs to be adopted to determine the factors influencing the treatment's outcome. The authors recommend that the researchers benefit from 'their decades of experience with parametric models to adjust the matched sample' (p. 213). Particularly, matching on propensity scores is primarily used to balance the main covariates by simple *t*-tests on the

matched sample (Rosenbaum and Rubin, 1983; 1985).[16] Then, parametric methods can be applied on the matched sample.

3.3. Determinants of earnout choice

The propensity scores used to perform the matching sequences are computed using the logistic regression method. The logit model estimates the probability of a sampled deal being settled with an earnout conditional upon merging firm- and deal- specific characteristics and may be regarded as 'predicting' the use of earnouts. In the logit models, the dependent variables assume the value of 1 if a deal is earnout-settled, and 0 otherwise.

Extant literature on the earnout effect on acquirers' abnormal returns illustrates that earnouts are regularly observed in acquisitions of private or subsidiary target firms, operating in intangible-rich sectors, or unrelated industries and characterized by substantial valuation-risk, mainly sourced from adverse selection and moral hazard considerations (Kohers and Ang, 2000). Mantecon (2009) also demonstrates that the probability of observing an earnout-settled deal is significantly lower when the deal involves a foreign target firm, while Datar et al. (2001) illustrate that Common-Law countries facilitate, to a great extent, contractual agreements, thus increasing the likelihood of earnout-choice. In addition, we control for the acquirer's growth opportunities as measured by its market-to-book ratio (Sudarsanam and Mahate, 2003), the relative size of the deal (Fuller et al., 2002), and the acquirer's debt-to-equity (total debt to common equity) and cash (cash and cash equivalents to its total assets) ratios (as in Barbopoulos et al., 2018).

To accommodate these effects in our analysis, we include the following variables in the modelling process of earnout choice: (a) dummy variables that account for the listing status of the target (private dummy = 1, and = 0 otherwise), the intangibility of the target firm's assets (Target in Int. sector = 1, and = 0 otherwise), the industrial diversification aspect of the deal (Diversifying deal = 1, and = 0 otherwise), the geographical diversification aspect of the deal (Foreign deal = 1, and = 0 otherwise), the legal system of the target firm's origin

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[16] As PSM is based on matching relative to each deal's propensity score to exhibit the treatment, and not on each deal's separate covariate's effect on the probability of its occurrence, we test for covariate balance between treated and control deals once matching is completed. Rosenbaum and Rubin (1983) illustrate that a two-sample *t*-test among the distribution of covariates between the treated and control groups constitutes a sufficient diagnostic to determine covariate balance.

(Common Law = 1, and = 0 otherwise), and (b) continuous variables that account for the relative size of the deal, the acquirer's MTBV, debt-to-equity ratio, cash ratio, and sigma.

3.4. Acquirer idiosyncratic stock return volatility (sigma)

Moeller et al. (2007) illustrate the significance of acquiring firm's sigma in shaping the statistical properties of the abnormal returns accrued to its shareholders during the announcement period of M&As. As in Moeller et al. (2007), we estimate sigma as the standard deviation of the residuals from the Fama and French (1996) 3 factor model that is estimated from $t - 205$ days before the M&A announcement to $t - 6$, where t is the M&A announcement day. The market model, market adjusted model, CAPM, and the Carhart (1997) four-factor model are also used as robustness checks.

3.5. Determinants of acquirers' abnormal returns: A multivariate analysis

The impact of acquirers' sigma on acquirers' abnormal returns engaged in earnout- vs. non-earnout- settled deals is further examined within a multivariate framework where the effects of several other factors known to shape acquirers' abnormal returns are simultaneously controlled. Equation (5) is therefore estimated in a nested regression form:

$$
\begin{aligned}
CAR_i = \beta_1 &+ \beta_2 \times \text{Earnout dummy}_i + \beta_3 \times \text{Unlisted Target dummy}_i \\
&+ \beta_4 \times \text{Target in Intangible-rich Sector dummy}_i \\
&+ \beta_5 \times \text{Diversifying M\&A dummy}_i \\
&+ \beta_6 \times \text{Foreign target dummy}_i + \beta_7 \times \text{Acquirer sigma}_i \\
&+ \sum_{j=8}^{k} \beta_j X_{ij} + \varepsilon_i \qquad i = 1 \dots N
\end{aligned}
\tag{5}
$$

where the intercept, β_1, accounts for the average abnormal returns accrued to acquirers' shareholders after accounting for the effects of all the explanatory variables that enter the matrix X_{ij}. The dependent variable, CAR_i, is the five-day announcement period cumulative abnormal return of acquirers calculated as in Equation (4). The impact of each of the explanatory variables entering the X_{ij} matrix is recorded in the vector β_j. The parameters in this vector reflect the impact of factors that have been proposed by previous studies, as well as those proposed by this study. These are outlined below.

Earnout dummy: Previous research indicates that earnout-settled deals yield greater abnormal returns to acquirers (Kohers and Ang, 2000; Barbopoulos and Sudarsanam, 2012; Barbopoulos et al., 2017). Therefore, to account for the potential implications of earnout-choice on acquirers' wealth gains, a variable assigned the value of 1 when an earnout is employed in the deal's payment delivery process, and 0 otherwise, is included in Equation (5), the impact of which is captured by the parameter β_2.

Unlisted target dummy: Extant literature has illustrated the influence of the target firm's listing status on the statistical properties of acquirers' abnormal returns (Chang, 1998; Fuller et al., 2002). To accommodate this effect in our analysis a dummy variable taking the value of 1 for unlisted targets, and 0 otherwise, is included in Equation (5), the impact of which is captured by the parameter β_3.

Target in intangible-rich sector dummy: The valuation-risk confronting the acquirer in an M&A deal, and hence the potential benefit of implementing earnouts, increases with the extent of intangibility inherent in the target firm's assets. To account for this effect in our analysis, a dummy variable taking the value of 1 if the target firm operates within the Consumer Products and Services, Financials, Healthcare, High-Tech, Media and Entertainment, and Telecommunications sectors, and 0 otherwise, is included in Equation (5), the impact of which is captured by the parameter β_4.

Diversifying M&A dummy: If both target and acquirer belong to the same sector, the integration of the merging firms may be easier and the synergy gains higher. However, firms acquiring targets that operate in an unrelated business may gain from diversification, thereby resulting in a reduction in the volatility of the combined firm's cash flows and the cost of capital. Therefore, to control for the potential effect of corporate diversification in our analysis, a dummy variable that is assigned the value of 1 for diversifying deals (i.e. target and acquirer do not share the same 2-digit Standard Industrial Classification (SIC) code), and 0 for focused deals, is included in Equation (5), the impact of which is captured by the parameter β_5.

Foreign target dummy: Domestic and foreign deals have been illustrated to be affecting acquirers' gains differently (Moeller and Schlingemann, 2005; Barbopoulos et al., 2012). Domestic acquisitions can be perceived as less risky than foreign target acquisitions as there is less information asymmetry regarding the target firm, especially in those cases where the

latter is a listed firm. Therefore, to control for the effect of foreign target acquisitions in our analysis, a dummy variable that is assigned the value of 1 when acquirer and target reside in different countries, and 0 otherwise, is included in Equation (5), the impact of which is captured by the parameter β_6.

Acquirer sigma (Sigma): Moeller et al. (2007) examine the link between the theoretical predictions of diversity of opinion and information asymmetry models in explaining acquirers' abnormal returns. The authors illustrate the superiority of sigma as a proxy for information asymmetry over a publicly traded firm and its significance in shaping the distribution of acquirers' abnormal returns. Therefore, to proxy for the extent of the acquiring firm's information asymmetry in our analysis, the acquirer sigma is included in Equation (5), the impact of which is captures by the parameter β_7.

Relative deal size: Extant literature (Fuller et al., 2002) depicts that acquirers' gains are positively related to the relative size of the deal (measured as the deal value over the market value of the acquirer 20 days prior to the announcement day). Therefore, to account for this effect in our analysis, the relative size of the deal is included in Equation (5).

Acquirer's age: Information asymmetry between acquirers' managers and investors influences heavily the acquirers' abnormal returns. Zhang (2006) suggests that investors tend to have more information on firms with longer trading history, which results in lower information asymmetry. Therefore, as an alternative (to sigma) proxy for information asymmetry over a publicly traded firm, the age of the acquirer (measured by the log of number of days between the announcement day and the first record of the company in Datastream) is included in Equation (5).

Additional indicator and continuous variables: In Equation (5) we include two additional dummy variables, the low-sigma and the high-sigma: Low-sigma (High-sigma) = 1 for the bottom (top) one third of all deals based on their ranking by sigma, and 0 otherwise. Lastly, key financial ratios of the acquiring firm such as the acquirer's market-to-book ratio (Acquirer's market-to-book), the acquirer's ratio of 'total cash and cash equivalents' to its total assets (Acq. Cash Ratio) and the ratio of total debt-to-common equity (Acq. Debt/Equity Ratio) signal information about the acquirer's growth prospects, liquidity and leverage position, respectively, are included in Equation (5).

Year and target industry fixed effects: To account for potential unobserved time-variant characteristics that are related to a given year in which an M&A deal is announced, as well as unobserved time-invariant characteristics specific to the acquirer's primary sector of business operations, we include in Equation (5) 'time fixed effects' and 'target industry fixed effects'.

4. DATA AND SAMPLE STATISTICS

4.1. Data

The sample consists of M&As announced by US public firms between 01/01/1980 and 31/12/2016 and recorded by the Security Data Corporation (SDC). In order for a deal to remain in the sample, it must meet the following criteria: first, the acquirer is a US public (i.e. listed) firm and has a market value of at least $1m, measured 20 trading days prior to the announcement of the deal. To avoid the insignificant effects of very small deals, the transaction value is restricted to at least $1m. Targets of listings public, private and subsidiary, and all domiciles (US or non-US) are included in the sample. To avoid the confounding effects of multiple deals, deals announced within 5-days surrounding another deal by the same acquirer are excluded. Furthermore, the daily stock price and market value of the acquirer need to be available from Datastream. Spin-offs, recapitalizations, self-tenders, exchange offers, and repurchases are excluded from the sample. Deals where either acquirer or target firms belong to the sector 'Government and Agencies' are excluded from the sample. Finally, considering the method of financing the acquisition, the percentage of unknown, provided by SDC, must be less than 100% so that the sum of cash, stock and other payments equals 100%. The above criteria are satisfied by 35,121 deals, 2,638 of which (=7.51%) are earnout-settled ones.

4.2. Sample statistics

Table 1 presents the annual distribution of our sampled M&As for the full sample (Panel A), the earnout sample (Panel B), and the sample of private target M&As (Panel C), by several deal- and merging firms- specific features. Among other noticeable patterns, the statistics indicate that from 1999 to 2003 (inclusive) the majority of all M&As (Panel A), as well as the majority of earnout-settled M&As (Panel B), were announced by acquirers exhibiting high-

sigma. Interestingly, Panel C shows that during the 1986-1998 period (with the exception of the year 1996) the majority of deals involving private targets were settled in earnouts, as opposed to stock. Consistent with Table 1, Figure 1 illustrates that the relative earnout activity (i.e. earnout activity over all M&A activity) is steadily increasing over the period between 1996 and 2011 (inclusive). Figure 1 also highlights that since 1996, the relative earnout value (i.e. earnout value to value of all M&As) is also increasing.

(Insert Table 1 and Figure 1 about here)

Table 2 provides statistics on acquirer-, target- and deal- specific features. Consistent with previous studies on the US market for corporate control (Moeller et al., 2004), Panel A demonstrates that the majority of M&As are composed of deals involving unlisted targets (private and subsidiary targets account for 48.83% and 26.90%, respectively). Considering the acquisition financing currencies, cash payments dominate stock ones (35.27% vs. 22.81%). Lastly, 7.51% of our sampled deals are earnout-settled and 92.49% of them are settled via a single up-front payment delivery mechanism.

Consistent with previous literature on the impact of earnouts on acquirers' abnormal returns (Kohers and Ang, 2000), we show in Panel A that almost 98% of earnout-settled acquisitions involve private and subsidiary target firms, accounting for 73.81% and 24.03%, respectively. Moreover, earnout-settled deals appear to involve relatively more targets operating in intangible-rich sectors (77.52% in earnout deals compared to 68.63% in non-earnout ones). Earnout-settled deals appear to be much smaller in transaction value than non-earnout deals ($133m in earnout-deals compared to $424m in non-earnout deals) and also involve smaller acquirers ($4,174m in earnout-deals compared to $5,782m in non-earnout deals). However, the relative size of earnout-settled deals is invariably (across Panels A to D) greater than that of deals settled in cash, thereby indicating the increased risk faced by acquirers. The above findings are in line with the extant earnout literature (Kohers and Ang, 2000; Mantecon, 2009; Barbopoulos and Sudarsanam, 2012) indicating the suitability of the earnout payment mechanism in risky deals involving mainly domestic unlisted target firms, operating in intangible-rich sectors.

(Insert Table 2 about here)

Panel A also verifies the (marginally) increased sigma characterizing earnout acquirers, relative to acquirers utilizing non-earnout payments (0.039 in earnout deals, compared to

0.036 in non-earnout deals). In Panels B, C, D the above statistics are replicated for deals involving low-, medium- and high- sigma acquirers, respectively. It can be observed in Panel D that nearly 40% (1,058 out of 2,638) of all earnout-settled deals involve high-sigma acquirers.

A firm's sigma has been portrayed as an accurate indicator of the extent of information asymmetry between a firm's management and outside investors (Dierkens, 1991). Nevertheless, when leverage increases, shareholders bear a greater share of the total risk of the firm and the volatility of the stock return increases. Myers (1977) illustrates that firm leverage affects investment decisions due to debt overhang considerations. As it can be observed in panels A to C, earnout acquirers exhibit the lowest debt-to-equity ratio and the highest cash ratio, compared to acquirers utilizing non-earnouts. In panel D earnout acquirers' leverage and liquidity performance comes second, following that of acquirers using stock. We perceive these features as providing evidence that concerns over the acquirer's leverage and liquidity status are not likely to be substantial within earnout-settled deals.

Table 3 records the correlations between the variables in our analysis. In general, the correlation coefficients do not raise any concerns regarding multicollinearity that may impede our assessment of the effect of the independent variables in multiple regressions.

(Insert Table 3 about here)

5. THE RESULTS

This section commences with a discussion of the results obtained from our univariate analysis, followed by a discussion of the results obtained from our cross-sectional regression analysis. We then proceed with the discussion of the results obtained from the following robustness checks: (a) addressing self-selection concerns with regards to the endogeneity inherent in employing earnouts (or not) as a payment delivery mechanism and, (b) accounting for size effect considerations.

5.1. Univariate analysis of acquirers' abnormal returns

The results of our univariate analysis are presented in Table 4, which is organized according to the method of payment and the target firm's listing status for the entire sample of deals (Panel A), deals announced by acquirers exhibiting low-sigma (Panel B), deals announced by acquirers exhibiting medium-sigma (Panel C), and deals announced by acquirers exhibiting high-sigma (Panel D). Differentials between acquirers' abnormal returns from deals settled in earnout vs. non-earnout payments are recorded within panels A to D (rightmost columns), while Panel E records differentials between acquirers' abnormal returns from deals announced by high- vs. low- sigma acquirers (i.e. Panel D vs. Panel B).

Consistent with earlier studies (Kohers and Ang, 2000; Barbopoulos and Sudarsanam, 2012), our analysis conveys that, relative to non-earnout settled M&As, acquirers in earnout-settled deals enjoy 0.45% higher abnormal returns (Panel A). Panel A also reveals that earnout-settled deals outperform deals settled in cash (stock) by 0.69% (0.42%). Therefore, M&As in which the delivery of the deal's consideration carries contingent properties significantly outperform those lacking any contingent property. As a result, acquirers' shareholders in earnout-settled M&As enjoy (a) much higher abnormal returns, relative to those settled in cash (with no contingent properties), and, (b) marginally higher abnormal returns, relative to those settled in stock (with some contingent properties, as discussed in Hansen, 1987). Similarly, earnout-settled deals involving private targets outperform their cash-financed counterparts by 0.42%, perhaps due to the adequacy (inadequacy) of earnouts (cash) in deals exhibiting high merger valuation-risk. Moreover, in line with information asymmetry models (Moeller et al., 2007), Panel D shows that stock-financed public target deals announced by high-sigma acquirers are associated with significant losses (-2.32%). Lastly, high-sigma acquirers of (a) private or subsidiary targets, irrespective of the deal's payment delivery mechanism or payment method, and (b) public targets financed with cash, enjoy significant abnormal returns.

(Insert Table 4 about here)

Our findings further show that acquirers' higher abnormal returns accrued from earnout- than non-earnout settled deals (=0.45%) (Panel A) are shaped by deals announced by acquirers exhibiting low-sigma (=1.02%) (Panel B) rather than high-sigma (=-0.33%) (Panel D). At first, this feature is surprising considering that nearly 40% (only 20%) of all

earnout-settled M&As are announced by acquirers exhibiting high-sigma (low-sigma). This is therefore the first credible piece of evidence suggesting that earnouts should not be perceived as superior in terms of wealth-creation in most of deals they are observed in. Consistent with our main hypothesis, our results convey that the earnout effect in deals announced by acquirers exhibiting high-sigma is potentially elusive due to the presence of an acquirer information dissemination effect.[17]

In contrast, under low-sigma, acquirers in earnout-settled M&As significantly outperform their non-earnout counterparts by 1.02% (Panel B).[18] Consistent with our theoretical predictions, we argue that this due to the earnout effect not being elusive (or being materially less so) due to the absence (or considerably limited presence) of an acquirer information dissemination effect. Our results therefore suggest that the extent of elusiveness of the earnout effect on acquirers' abnormal returns (recorded in the rightmost columns on Panels A to D in Table 4) varies with sigma, or the extent of asymmetric information between acquirers' managers and outside investors.

Lastly, Panel E records differentials between acquirers' abnormal returns in M&As announced by firms exhibiting high- vs. low- sigma. On average, high-sigma acquirers enjoy significantly higher abnormal returns than low-sigma acquirers (consistent with Moeller et al., 2007). This finding may also be regarded as in line with evidence suggesting that firms' gains during the announcement of M&As are affected by their size (Moeller et al., 2004), given the considerable disparities in the market values of high- and low- sigma acquirers (see also Table 2). Nevertheless, comparing the impact of earnouts across deals involving private targets and announced by low- and high- sigma acquirers reveals an insignificant difference of 0.42%, in contrast to what would be expected under the presence of a size effect. It could thus be argued that, whereas under high acquirer sigma the earnout effect is elusive, under low acquirer sigma the earnout effect is not only apparent but also considerable, ultimately rendering the performance of the two portfolios of deals (i.e. deals

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[17] As high-sigma acquirers are subject to high information asymmetry, the dissemination of non-M&A related acquirer-specific information through the announcement ultimately leads to a substantial re-appraisal of their value which need not be exclusively reflective of the economic benefits of the deal (Moeller et al., 2004; Draper and Paudyal, 2008).

[18] Panel B also shows that low-sigma acquirers in earnout-settled deals significantly outperform their cash and stock counterparts by 0.84% and 1.55%, respectively, which is mainly due to deals involving unlisted targets.

involving high-sigma acquirers and private targets, and deals involving low-sigma acquirers and private targets) indistinguishable.[19] In contrast, low-sigma acquirers of private targets using single up-front payments significantly underperform their high-sigma counterparts.

Put together, these results suggest the presence of a strong interaction between the earnout effect and the acquirer information dissemination effect in shaping the statistical properties of acquirers' abnormal returns in the short-run. In particular, these findings are consistent with the predictions of our main hypothesis, which is in turn based on information asymmetry models put forward by Moeller et al. (2007). While self-selection issues may distort the strength and direction of our results, later in the paper we attempt to isolate the earnout effect from the acquirer information dissemination effect.

5.2. Cross-sectional analysis of acquirers' abnormal returns

Table 5 records the estimates of the multivariate analysis, which account for the impact of several factors that are likely to affect acquirers' abnormal returns simultaneously (estimated by Equation 5). As reflected in the intercepts of all models, once controlling for the effects of several deal- and merging firms- specific factors the average acquirer breaks even (depending on the model specification the intercept terms are either positive or negative, yet statistically insignificant). This is partially consistent with previous evidence reported by Asquith et al. (1983), Eckbo and Thorburn (2000), Moeller et al. (2004). Consistent with earlier literature, unlisted target M&As yield significant gains to acquirers' shareholders of about 3% (across all Models) (see for example Fuller et al. (2002), Faccio et al. (2006) and Barbopoulos et al. (2017)). Moreover, as suggested by previous empirical findings (Asquith et al. (1983) and Fuller et al. (2002)), our estimates indicate that relatively large deals add value to acquires (across all Models), as do deals involving mature acquirers (Models 4, 6, 8, 10 and 12). Moreover, as in Sudarsanam and Mahate (2003), 'glamour' acquirers destroy value (across all Models).[20] Estimates also suggest that while liquidity considerations over the acquiring firm do appear to impose a significant effect on acquirers'

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[19] In Section 5.3. we aim to address this issue by relying on a quasi-experimental design through which the earnout effect is measured in isolation.

[20] Sudarsanam and Mahate (2003) illustrate that glamour acquirers, i.e. high market-to-book ratio firms or $MTBV > 1$, destroy value for their shareholders during acquisition announcements.

abnormal returns, the acquirer's leverage position does not. In addition, our results (Model 1) confirm the superiority of sigma, compared to the acquirer's age (see Zhang, 2006), a proxy for information asymmetry over a publicly traded firm. Lastly, consistent with Denis et al. (2002) and Moeller and Schlingemann (2005), engaging in foreign target deals, as well as industrially diversifying deals add value to acquirers.

The estimates of Models 1 and 2 indicate that acquirers in earnout-settled deals break even, as captured by the coefficient of the 'Earnout' dummy in each model. Consistent with Moeller et al. (2007) estimates reported in Model 2 convey that high- (low-) sigma acquirers are associated with positive (negative) abnormal returns. Further results show that the earnout dummy (our main variable of our interest), in conjunction with either low- or high-sigma, is associated with significant valuation effects for acquirers' shareholders.[21] Specifically, earnout-settled M&As announced by acquirers exhibiting low-sigma (Model 3) are associated with strictly positive gains, whereas Model 4 suggests the opposite outcome for earnout-settled M&As announced by high-sigma acquirers (coefficients of 0.751 and – 0.951, respectively). These results corroborate our findings from the univariate analysis, i.e. that the level of acquirer sigma is an important factor in determining the elusiveness of the earnout effect in acquirers' short-run abnormal returns.

(Insert Table 5 about here)

Further evidence shows that low-sigma acquirers of unlisted targets enjoy significant gains (Model 5) whereas their high-sigma counterparts experience significant losses (Model 6). In addition, low-sigma acquirers of intangible-rich targets break even (Model 7) whereas their high-sigma counterparts experience significant losses (Model 8). Lastly, low-sigma acquirers in diversifying deals also break even (Model 9), whereas their high-sigma counterparts experience significant losses (Model 10). These findings shed further light on the valuation effects of the interaction between the earnout-choice and acquirers' sigma in M&As that involve targets that are unlisted and are based in different (than the acquirer), or difficult-to-value, sectors.

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[21] We sort all deals by acquirer sigma and create two dummy variables (high-sigma and low-sigma). Our high-sigma (low-sigma) dummy variable is assigned the value of 1 for the top (bottom) one third of deals, exhibiting the highest (lowest) values of acquirer sigma, and 0 otherwise.

Overall, our findings suggest that the superior performance of earnout-settled deals that is uncovered by earlier studies (i.e. Kohers and Ang, 2000) appears to be represented by deals announced by acquirers exhibiting low-sigma, wherein the acquirer-specific information dissemination effect is negligible.[22] In contrast, under high-sigma, consistent with the predictions of our main hypothesis and with information asymmetry models (Moeller et al., 2007), it appears that it is the prevalence of the information dissemination effect that induces a positive wealth gain, irrespective of whether an earnout was used or not. Evidently, the extent to which acquirers' short-run abnormal returns reflect the ability of earnouts to reduce adverse selection and moral hazard concerns in M&As depends on the acquiring firm's degree of idiosyncratic stock return volatility.

5.3. Addressing selection bias

The impact of earnouts on acquirers' abnormal returns (i.e. earnout effect that discussed in Sections 5.1. and 5.2.) may be due to the pre-treatment characteristics of the treated group rather than due to the impact of the treatment per-se. In experimental studies, where the two samples (the treated and control) are randomly assigned, the assessment of their comparative performance is free from such bias. However, in observational studies such as ours, the assignment is non-random, and this may affect the estimation of the treatment effect. To accommodate this concern in our analysis (i.e. to reduce the vulnerability of our results to the problem of causal interpretation), we rely on the Propensity Score Matching (PSM) method through which the earnout effect is measured in isolation.

PSM allows for an unbiased causal inference by pairing treated deals (earnout) with control deals (non-earnout), based on a propensity score that is estimated at the deal level via a logit model based on observable pre-treatment features (discussed in Section 3.3). We estimate the propensity scores of acquirers that have used earnouts and non-earnout payments for the full sample, as well as within groups of M&As announced by acquirers exhibiting low- and high- sigma, separately. Following the matching exercise (see Dehejia and Wahba, 2002 and Rosenbaum, 2009 for an application of the method) we compare the

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[22] In this paper, we argue that the earnout effect is potentially stronger in deals announced by high-sigma (small) acquirers, yet it is indistinguishable from that of non-earnout payment mechanisms as it is concealed by the acquirer information dissemination effect.

cumulative excess returns of deals in the treated and control samples. We select the deals from the non-earnout group based on the alternative Matching Ratio (MR) of 1-to-1, 5-to-1 and 10-to-1 within 1% Absolute Probability Difference (APD). To ensure accuracy in the matching process, we test whether the distributions of the covariates between the earnout and non-earnout (control) groups are similar. The output of our PSM analysis is recorded in Table 6 (Univariate analysis) and Table 7 (Multivariate analysis).[23]

The treatment evaluation is initially executed within all deals (Model 1, defined as Exercise-1), as well as within deals announced by acquirers exhibiting low- (Model 2, defined as Exercise-2) and high- (Model 3, defined as Exercise-3) sigma, separately. Including sigma in its continuous form as a covariate term across all models, and particularly in Model 1, enables us to select counterfactual or control M&As (non-earnout settled deals) that are highly likely to exhibit consubstantial information dissemination at the time of the announcement as their treated earnout-settled M&As. Consequently, examining differences in the outcome variable between treated and control deals allows us to control for the information dissemination effect and, thus, capture the earnout effect, as well as observe how it varies across deals announced by acquirers exhibiting low- or high- sigma, separately.

5.3.1. Addressing selection bias – Univariate analysis of acquirers' abnormal returns
Consistent with Kohers and Ang (2000) and Barbopoulos and Sudarsanam (2012), Models 1 to 3 illustrate that earnouts are more likely to occur in relatively larger deals involving private targets that operate in intangible-rich sectors. Such deals are likely to exhibit high valuation-risk that may result in post-merger integration challenges, ultimately leading to substantial disagreements and, thus, triggering the choice of earnouts. Across all three models, the statistical properties of the covariates employed are similar (Panel B), which confirms successful matching.

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[23] The implementation of the PSM method allows for an unbiased causal inference by pairing treated (earnout-settled deals) and comparable or control sampled units deals (non-earnout settled deals) based on observable pre-treatment characteristics and examining differences in acquirers' abnormal returns as the response random variable (Dehejia and Wahba, 2002; Rosenbaum, 2009). We use 1-to-1, 5-to-1 and 10-to-1 nearest neighbor matching with replacement within 1% Absolute Probability Difference (APD) in the robustness section. To conserve space, we do not report these results, which are alike to the ones reported. To avoid the effects of potential hidden variable bias in our propensity score estimators (logit models) we also implement the Rosenbaum-bounds (RB) method, resulting in the selection of the least exposed to hidden variable bias model.

The treatment, or earnout effect (defined as the difference in acquirers' abnormal returns between treated and control groups) is presented in Panel C. Model 1 confirms that, once controlling for sigma, acquirers employing earnouts break even, relative to their control counterfactuals (difference of 0.38%). Therefore, it appears that once addressing selection-bias concerns, the impact of implementing earnouts in the payment process of the deal on acquirers' gains (0.45% as reported in Table 3, Panel A) becomes negligible.

Models 2 and 3 offer direct evidence on the superiority of earnouts in deals announced by acquirers exhibiting low, rather than high, sigma. Interestingly, the earnout effect is positive and highly significant in deals announced by low-sigma acquirers where treated deals significantly outperform their untreated counterparts by 0.85% (Model 2). While this finding corroborates our earlier reported findings in both our univariate and multivariate analyses, it offers strong support to our main hypothesis. Lastly, Model 3 conveys that, under high-sigma, earnout-settled deals are indistinguishable from their non-earnout counterparts in terms of the announcement period abnormal returns accrued to acquirers. Therefore, upon addressing self-selection concerns, the insignificant effect of earnouts on high-sigma acquirers' gains is confirmed.

Lastly, across all models our estimates suggest that the impact of the treatment on acquirers' abnormal returns would be rendered negligible, or even flip sign, if an unobserved covariate caused the odds of treatment assignment to change by at least 5% (Model 1), 14% (Model 2) and 4% (Model 3), respectively.[24]

(Insert Table 6 about here)

5.3.2. Addressing selection bias – Cross-sectional analysis of acquirers' abnormal returns
Table 7 records the results from our attempt to address self-selection concerns by means of multiple regression analysis on the matched sample obtained from the PSM method (as discussed in Sections 3.2. and 5.3.).

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[24] The RB critical value of Γ at p=0.10 is usually compared to the proportion of treatment frequencies within each model, which consists the a-priori probability of an observation belonging to the treated group. In this respect, the lower RB values, relative to the corresponding treatment frequencies, in Model 1 (2,094/28,371=7.38%) and in Model 3 (726/7,964=9.12%) can be perceived as suggesting the tendency of the earnout effect to revert from statistically insignificant to significantly negative. On the contrary, the high RB value (=14%) in Model 2 exceeds the corresponding treatment frequencies (523/10,526=4.97%) suggesting the relatively limited exposure of the estimation, and hence, matching outcome, to hidden or unobserved bias.

We restrict our sample to only deals announced by low-sigma acquirers (Models 1 to 3) and high-sigma acquirers (Models 4 to 6) and include control dummies based on the output of the PSM method (from Models 2 and 3, respectively, of Table 6) as additional covariates. More specifically, we add two dummy variables (Control Dummy: Low-sigma and Control Dummy: High-sigma) which are assigned the value of 1 if a deal constitutes a control counterfactual from our matching exercise within each sigma group, and 0 otherwise, respectively. A control deal constitutes a sampled unit j that does not receive the treatment (earnout) but, nevertheless, exhibits the same probability, estimated through the PSM, to receive the treatment as a treated sampled unit i.

Models 1 to 3 reveal that low-sigma acquirers not implementing earnouts, despite exhibiting a consubstantial probability to do so as low-sigma acquirers that implement earnouts, experience marginally significant losses (Control Dummy: Low-sigma = -0.006, -0.005 and -0.004, for Models 1 to 3, respectively). On the other hand, Models 4 to 6 reveal that high-sigma acquirers not implementing earnouts, despite exhibiting a consubstantial probability to do so as high-sigma acquirers that implement earnouts, enjoy significant gains (Control Dummy: High-sigma = 0.011, 0.013 and 0.013, for Models 4 to 6, respectively).

Overall, this analysis allows us to elicit more robust estimates regarding the valuation effects of earnouts within matched deals announced by acquirers exhibiting similar sigma. Evidently, once the acquirer information dissemination effect is held constant between earnout and non-earnout settled deals, it is acquirers exhibiting low- rather high- sigma that are observed to enjoy higher abnormal returns, relative to their non-earnout counterparts.

5.4. Size effect considerations

Overall, our results suggest that under increased information asymmetry over the acquiring firm (high-sigma), the earnout effect appears to be elusive due to an acquirer-specific information dissemination effect, resulting from the heightened extent of information asymmetry between acquirers' managers and outside investors. More specifically, our analysis so far shows that low-sigma acquirers benefit more from the use of earnouts, relative to single up-front payments, than high-sigma acquirers, and that low-sigma (large) earnout acquirers match the performance of high-sigma (small) earnout acquirers in private

target M&As. We are thus prompted to examine the exposure of our portfolio of earnout-settled deals to size effect considerations. Specifically, Moeller et al. (2004) identify the presence of a size effect in acquirers' abnormal returns resulting in small firms earning more from M&A announcements than large firms. The size effect is often illustrated to be associated with managerial inefficiencies that tend to be present within larger firms.

Nevertheless, large firms are characterized by lower information asymmetry between their managers and outside investors as there is more information available in the market and significant analyst coverage over them (Banz, 1981; Moeller et al., 2004; Draper and Paudyal, 2008). Similarly, Campbell et al. (2001) illustrate that firms exhibiting high levels of sigma are more likely to be small firms. Consequently, we proceed to investigate the extent of size effect considerations within the portfolios of both earnout- and non-earnout- settled deals. In particular, the presence of a size effect would be suggested in case we observed opposite signs between average abnormal returns (CAR_i) and weighted-by-market-value average abnormal returns ($WCAR_i$). Such an outcome would indicate that large and small acquiring firms reap different abnormal returns.

Consistent with Moeller et al. (2004), Table 8 reports that for all acquirers the average CAR_i reaches 1.26%, while the $WCAR_i$ is –0.63%, thereby suggesting the presence of a size effect within our sample. Earnout-settled deals, in their total, are also exposed to a size effect as Panel A demonstrates the opposite signs between CAR_i and $WCAR_i$ (1.68% and -0.16%).

(Insert Table 8 about here)

Nevertheless, within earnout-settled deals (i.e. Earnout), and in contrast to all remaining payment methods (i.e. non-earnout), it can be observed that the CAR_i is of the same sign as the $WCAR_i$ for deals announced by acquirers exhibiting low- and medium-sigma (Panels B and C, respectively). The above suggest that the exposure of earnout-settled deals announced by non-high-sigma acquirers to size effect considerations is very limited, despite their considerably larger size ($13,718m and $2,336m under low- and medium-sigma, respectively, compared to $617m under high-sigma). Thus, our results suggest that the selection of earnouts by large acquirers with low information asymmetry sends a strong signal for value creation that also prevents the occurrence of a size-related discount. On the contrary, it can be observed that CAR_i and $WCAR_i$ differ in sign for deals announced by acquirers exhibiting high-sigma (Panels D) (2.49% to -4.52%), thereby suggesting the

substantial exposure of earnout-settled deals announced by high-sigma acquirers to size effect issues.

6. CONCLUSIONS AND FURTHER DISCUSSION

In this paper, we trace the interaction between the acquiring firm's information environment (measured by its idiosyncratic stock return volatility, or sigma), the choice of earnouts as the payment delivery mechanism in M&As and the statistical properties of acquirers' short-run abnormal returns. We are motivated by several interesting peculiarities of earnout-settled M&As, such as the small size of acquirers, their heightened levels of sigma and the prevalence of unlisted (mainly private) targets. Confronted with recent evidence suggesting that information asymmetry over the acquiring firm influences acquirers' abnormal returns in the short-run (Moeller et al., 2007), these features raise concerns as to whether the earnout effect could in fact be elusive due to the release of non-M&A related acquirer-specific information during the announcement period. We therefore set out to examine the potential interaction between the earnout effect and the acquirer information dissemination effect using both univariate and multivariate analyses, as well as a quasi-experimental design through which the earnout effect is isolated from the acquirer information dissemination effect.

We find that the well-documented superior acquirer gains in earnout- than non-earnout-settled M&As are mainly driven from deals involving low-sigma acquirers. In contrast, despite being observed in roughly 40% of all earnout-settled deals, high-sigma acquirers break even or experience losses when using earnouts, relative to non-earnout payments. Our PSM based results further confirm these findings as it is solely under low acquirer sigma that earnout-settled deals are observed to significantly outperform their counterfactual deals. Similarly, for deals involving private targets, our results suggest that earnout-settled M&As announced by low-sigma (high-sigma) acquirers result in strictly greater (lower) abnormal returns, relative to deals involving single up-front payments. Lastly, as low-sigma acquirers are likely to be much larger firms than high-sigma acquirers, we proceed to examine the likely presence of size effect considerations within our portfolios of deals announced by acquirers exhibiting deferent degrees of sigma (i.e. low-, medium- and high- sigma). In

contrast to deals settled in single up-front payments, our results do not support the presence of a size effect within the portfolio of low-sigma acquirers using earnouts.

We believe that the most realistic explanation of these results is the presence (absence) of an acquirer information dissemination effect in deals announced by acquirers exhibiting high-sigma (low-sigma). Put simply, in M&As announced by high-sigma acquirers, the earnout effect appears to be overwhelmed by the acquirer information dissemination effect, which is present across all deals announced by high-sigma acquirers ultimately rendering the comparative performance of earnout and non-earnout settled deals indistinguishable. In this respect, our findings indicate that in nearly 40% of the M&As they are observed in, earnouts should not be perceived as strictly more wealth-creating, than single up-front payments.

On the other hand, the selection of earnouts by large acquirers with low information asymmetry sends a strong signal for value creation to market participants, preventing the occurrence of a size-related discount. This superior performance of earnouts, relative to non-deferred payments when involving such acquirers can also be linked to recent legal evidence suggesting that the success of an earnout is highly dependent on the support provided to the target by the acquirer during the earnout period. Specifically, the achievement of the earnout thresholds often relies on the implied duty of 'good faith', 'fair dealing', as well as the new doctrine of the acquiring firm's 'implied obligation to use reasonable efforts' in order to support the target firm achieve the deferred payment's conditions.[25] Such support can include guaranteed levels of working capital, marketing assistance, and/or sales force. The above increase in significance in case the target is partially integrated and does not operate as a fully stand-alone firm post-merger, or in case changes need to be made in its processes and operations,[26] as part of its integration with the buyer. To this end, it is not rare for courts to impose liability on acquirers for failing to support acquired businesses, noting that 'earnouts all too often transform current disagreements over price into future litigation over outcome'.[27] In this respect, large acquirers should be expected to be better prepared to

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[25] See O'Tool v. Genmar Holdings, Inc, 387 F.3d 1188 (10th Cir. 2004) and Hodges v. Medassets Net Revenues, LLC, 2008 WL 476140 (N.D. Ga. 2008).
[26] Such changes can include potential bundling of the target firm's products to those of the acquirer.
[27] See Airborne Health, Inc. v. Squid Soap, LP, 984 A.2d 126 (Del. Ch. 2009).

accommodate the target's need for assistance during the earnout period, thus ultimately enhancing the probability of realization of the expected synergies.

It needs to be mentioned at this stage that we do not regard our findings as suggesting that there is no synergy potential in earnout-settled deals involving high-sigma acquirers. However, our results do suggest that, under high sigma, the earnout effect is likely to be elusive as a result of the presence of an acquirer information dissemination effect. It would therefore be highly unwarranted to infer an earnout-settled deal's likelihood of success from acquirers' short-run abnormal returns without controlling for acquirers' information environment or sigma.

Controlling for the acquirers' information environment, nevertheless, would naturally be best achieved provided a thorough understanding of what this information being disseminated relates to. Accordingly, there are several possible explanations for the acquirer information effect and its content, the most intuitive being misevaluation. In this respect, information asymmetry models inspired by Myers and Majluf (1984) and put forward by Hansen (1987) and Travlos (1987) suggest that in acquisitions of private firms (which dominate earnout-settled M&As), the use of stock by acquirers with high information asymmetry induces a positive wealth effect as it indicates the willingness of the seller to receive equity and, thus, certifies that the acquiring firm is not overvalued (Chang, 1998). Similarly, in resulting to the realisation that differences in abnormal returns between acquisition types (i.e. stock-, or cash- financed acquisitions of private, or public firms) can be explained by acquirers' idiosyncratic volatility, Moeller et al. (2007) indicate the positive wealth effect of sigma in stock-financed acquisitions of private targets.

Considering the above, the use of earnouts in deals involving private targets that are announced by high-sigma acquirers could indicate (a) the unwillingness of sellers to offer a certification that the acquirer's stock is not overvalued (either because it is not, or because of the sellers' illiquidity-induced preference for cash), or, conversely, (b) the unwillingness of acquirers' managers to mitigate the inherent valuation-risk with undervalued (or relatively less overvalued) shares. However, as also mentioned earlier in the paper, identifying the content of the acquirer information dissemination effect, and forming a view as to the presence (or absence) of any misevaluation considerations, particularly in earnout-settled M&AS, is beyond the scope of this paper and is up to future research.

Appendix A. Variable definitions

Name	Description	Source
All	Refers to the entire sample analysed in this paper.	SDC
Earnout	Dummy = 1 when payment includes earnout in addition to cash, stock, or mixed, and = 0 otherwise (= Non-Earnout) (NEA).	SDC
NEA	Dummy = 1 when payment does not include earnouts, and = 0 otherwise (=Earnout).	SDC
Cash	Dummy = 1 when payment is 100% cash.	SDC
Stock	Dummy = 1 when payment is 100% stock.	SDC
Mixed	Dummy = 1 when payment is combination of cash, stock and other payments (excluding earnouts)	SDC
Foreign	Dummy = 1 with a US acquirer and non-US target, and = 0 when both acquirer and target are US institutions (= Domestic).	SDC
Domestic	Dummy = 1 when both acquirer and target are US institutions, and = 0 otherwise (= Foreign).	
Target under Common Law	Dummy = 1 when the acquisition is cross-border and the target's nation follows the English Common Law legal system, and = 0 otherwise.	SDC
Focused	Dummy = 1 when acquirer and target share the same two-digit SIC code and = 0 otherwise.	
Diversifying	Dummy = 1 when acquirer and target do not share the same two-digit SIC code and = 0 otherwise.	SDC
Deal Value	Bid's transaction value, in millions dollars.	SDC
Earnout Value	The bid's value, in million dollars, of the deferred payment in an earnout-settled M&A	SDC
Rel. Earnout Value	The bid's relative earnout size (=earnout value/deal value)	SDC
Private target	Dummy = 1 if target is a private firm, and = 0 otherwise.	SDC
Subsidiary target	Dummy = 1 if target is a subsidiary firm, and = 0 otherwise.	SDC
Unlisted target	Dummy = 1 if target is not a listed firm, and = 0 otherwise.	SDC
Public target	Dummy = 1 if target is a listed firm, and = 0 otherwise.	SDC
Target in Int. Sector	Dummy = 1 when target belongs to a high intangible assets industry (Consumer Products and Services, Financials, Healthcare, High-Tech, Media and Entertainment, and Telecommunications) and = 0 otherwise.	SDC
Target in High Tech	Dummy = 1 if target is belongs to the High Technology industry, and = 0 otherwise.	SDC
Target in Cons. & Serv.	Dummy = 1 if target is belongs to the Consumer Products and Services industry, and = 0 otherwise.	SDC
Target in Med. & Ent.	Dummy = 1 if target is belongs to the Media and Entertainment industry, and = 0 otherwise.	SDC
Target in Telecoms	Dummy = 1 if target is belongs to the Telecommunications industry, and = 0 otherwise.	SDC
Target in Financial	Dummy = 1 if target is belongs to the Financial industry, and = 0 otherwise.	SDC
Target in Retail	Dummy = 1 if target is belongs to the Retail industry, and = 0 otherwise.	SDC
Relative Deal Size	Ratio of Deal Value to Acq. MV (Deal Value/ Acq. MV).	SDC & Datastream
Acq. Age	Number of years between day the acquirer is first recorded on Datastream and bid's announcement day.	Datastream

Continued (Appendix A)

Acq. Debt/Equity Ratio	Acquirer's total debt to common equity measured at the end of the last quarter prior to the deal's announcement.	Datastream
Acq. Cash Ratio	Acquirer's total cash and cash equivalents to its total assets measured at the end of the last quarter prior to the deal's announcement	Datastream
Sigma	Acquirer's idiosyncratic stock return volatility (Measured as in Moeller et al., 2007)	Datastream
High-sigma	Dummy = 1 if a sample deal belongs to the top one third of deals based on their distribution of *sigma*.	Datastream
Low-sigma	Dummy = 1 if a sample deal belongs to the bottom one third of deals based on their distribution of *sigma*.	Datastream
Acq. MV	Acquirer's market value of equity at four weeks prior to bid's announcement, in millions dollars.	Datastream
Acq. MTBV	Acquirer's market-to-book value estimated four weeks prior to the deal announcement.	Datastream
Control Dummy: Low-sigma	Dummy = 1 for deals that were control counterfactuals in PSM Exercise 2 (see Sections 3.2. and 5.3. for information on the formulation of the matching sequence), =0 otherwise.	Own calculations
Control Dummy: High-sigma	Dummy =1 for deals that were control counterfactuals in PSM Exercise 3 (see Sections 3.2. and 5.3. for information on the formulation of the matching sequence), =0 otherwise.	Own calculations

The table defines the variables used in the empirical analysis and indicates the data source used. SDC denotes Thomson-Reuters SDC M&A database. With a dummy variable, a sample observation without the value of 1 has the value of 0. Age, MTBV, RS and Debt are log transformed in subsequent regressions.

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Table 1 Annual distribution of M&A activities by several deal- and merging firms- features

	Panel A: All M&As										Panel B: All Earnout-Settled M&As							Panel C: Private Target M&As					
	All	Foreign	Diversifying	Low sigma	High sigma	Private Target	Public Target	Cash	Stock	NEA	All	Foreign	Diversifying	Low sigma	High sigma	Private Target	Public Target	Earnout	Earnout HS	%	Stock	Stock HS	%
1980	36	0	24	18	2	19	10	6	2	36	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	256	0	160	150	18	140	73	2	2	256	0	0	0	0	0	0	0	0	0	0	1	0	0%
1982	359	0	215	211	22	190	90	0	0	359	0	0	0	0	0	0	0	0	0	0	0	0	0%
1983	508	4	304	193	69	240	116	6	0	508	0	0	0	0	0	0	0	0	0	0	0	0	0%
1984	599	4	299	311	55	237	184	21	11	599	0	0	0	0	0	0	0	0	0	0	0	0	0%
1985	292	10	166	199	22	55	165	159	69	283	9	0	4	5	3	5	2	5	3	60%	20	3	15%
1986	296	11	131	159	23	94	146	123	97	288	8	0	3	3	0	5	1	5	0	0%	52	7	13%
1987	357	18	162	165	46	102	191	153	108	348	9	1	3	2	1	7	0	7	1	14%	52	5	10%
1988	345	24	173	60	113	76	198	161	83	335	10	4	8	3	4	7	0	7	2	29%	24	10	42%
1989	522	43	234	263	85	158	198	214	162	495	27	2	16	8	9	14	2	14	5	36%	67	8	12%
1990	414	31	184	165	96	141	134	160	115	392	22	5	12	4	7	15	2	15	6	40%	51	10	20%
1991	510	61	210	119	217	221	138	143	167	470	40	12	22	3	20	29	1	29	17	59%	82	44	54%
1992	744	78	296	207	259	366	163	192	260	699	45	6	21	13	21	30	1	30	15	50%	150	51	34%
1993	987	77	409	299	397	488	211	276	360	917	70	7	38	7	38	46	1	46	29	63%	213	91	43%
1994	1,259	111	507	396	437	636	315	378	417	1,201	58	1	37	9	30	45	0	45	24	53%	218	86	39%
1995	1,337	144	506	432	409	630	381	403	486	1,281	56	6	24	7	25	40	1	40	18	45%	245	98	40%
1996	1,570	158	653	439	596	825	369	427	581	1,509	61	10	30	9	27	41	2	41	20	49%	360	190	53%
1997	2,048	201	896	578	779	1,061	468	567	687	1,946	102	14	52	10	56	82	1	82	45	55%	377	199	53%
1998	2,139	284	916	482	802	1,119	549	632	696	2,008	131	21	63	16	63	95	3	95	49	52%	375	174	46%
1999	1,811	223	766	191	1,024	884	542	544	673	1,717	94	8	57	3	66	67	3	67	49	73%	378	286	76%
2000	1,812	247	772	82	1,243	969	478	483	735	1,701	111	15	46	0	84	80	3	80	64	80%	464	401	86%
2001	1,225	184	528	68	771	532	353	404	355	1,131	94	17	52	3	68	68	2	68	50	74%	168	141	84%
2002	1,118	160	485	211	561	505	249	450	206	1,010	108	11	50	5	65	80	1	80	47	59%	107	87	81%
2003	992	123	395	248	393	464	242	420	185	881	111	13	46	16	57	80	2	80	44	55%	81	59	73%
2004	1,246	199	483	476	402	668	247	558	177	1,116	130	29	49	31	52	101	2	101	44	44%	84	63	75%
2005	1,384	228	585	586	358	764	230	635	181	1,261	123	22	48	35	34	92	3	92	27	29%	97	74	76%
2006	1,385	226	614	589	296	745	265	703	151	1,243	142	22	52	43	35	108	3	108	27	25%	76	52	68%
2007	1,356	247	579	604	303	738	268	650	162	1,193	163	20	70	55	36	124	2	124	29	23%	82	55	67%
2008	967	192	401	255	317	504	193	460	117	828	139	33	59	25	47	109	6	109	40	37%	51	42	82%
2009	700	139	281	52	403	315	165	301	123	613	87	15	37	3	52	66	3	66	37	56%	46	34	74%
2010	819	180	341	329	209	399	168	415	103	718	101	25	32	33	26	69	2	69	18	26%	47	42	89%
2011	866	198	386	390	220	450	140	426	101	746	120	27	44	35	35	94	0	94	26	28%	57	46	81%
2012	882	194	391	444	154	415	155	483	73	777	105	21	43	43	17	78	2	78	12	15%	29	21	72%
2013	794	143	334	492	112	384	157	423	88	706	88	17	30	46	15	61	2	61	12	20%	43	28	65%
2014	1,029	189	421	601	175	545	188	511	130	919	110	19	50	45	27	85	1	85	21	25%	62	38	61%
2015	1,201	226	568	723	161	605	216	316	87	1,109	92	23	37	40	18	70	2	70	13	19%	36	16	44%
2016	956	161	471	520	158	464	169	182	61	884	72	11	44	26	20	54	1	54	14	26%	19	10	53%
Total	35,121	4,718	15,246	11,707	11,707	17,148	8,524	12,387	8,011	32,483	2,638	437	1,179	586	1,058	1,947	57	1,947	808	-	4,214	2,471	-
%	-	13.43%	43.41%	33.33%	33.33%	48.83%	24.27%	35.27%	22.81%	92.49%	-	16.57%	44.69%	22.21%	40.11%	73.81%	2.16%	-	41.50%	-	-	58.64%	-

All refers to all M&As within each Panel; Panel A refers to all M&As included in the analysis; Panel B refers to only earnout-settled M&As; Panel C refers to solely private target M&As settled in earnout or stock. All refers to the entire M&A activity (within Panel); Foreign (within Panel) refers to foreign target acquisitions in which the acquirer and target are based in different countries; Diversifying (within Panel) refers to diversifying deals in which acquirer and target operate in different industries i.e. they do not share the same two-digit SIC code; Low-sigma (within Panel) corresponds to the bottom one third of deals exhibiting the lowest acquirer-sigma; High-sigma (within Panel) corresponds to the top one third of deals exhibiting the highest acquirer-sigma; Cash refers to deals fully financed with cash; Stock refers to deals fully financed with stock; Private Target (within Panel) refers to M&A deals in which the target is a private firm; Public Target (within Panel) refers to M&A deals in which the target firm is publicly listed; NEA (Panel A) refers to all deals that are not earnout-settled; Earnout (Panel C) refers to deals that are earnout-settled; Earnout HS refers to earnout-settled deals announced by high-sigma acquirers; Stock HS refers to stock-financed deals announced by high-sigma acquirers. Further information on the definition of each variable can be found in the Appendix A.

Table 2 Summary statistics

	Panel A: All Deals					Panel B: Low-sigma Acquirers					Panel C: Medium-sigma Acquirers					Panel D: High-sigma Acquirers				
	All	Earnout	NEA	Cash	Stock	All	Earnout	NEA	Cash	Stock	All	Earnout	NEA	Cash	Stock	All	Earnout	NEA	Cash	Stock
All Deals	35,121	2,638	32,483	12,387	8,011	11,707	586	11,121	5,278	1,899	11,707	994	10,713	4,579	2,216	11,707	1,058	10,649	2,530	3,896
Private Target	17,148	1,947	15,201	4,786	4,214	4,488	400	4,088	1,765	681	5,600	739	4,861	1,880	1,062	7,060	808	6,252	1,141	2,471
Public Target	8,524	57	8,467	2,888	2,973	3,824	18	3,806	1,515	1,093	2,888	17	2,871	967	958	1,812	22	1,790	406	922
Subsidiary Target	9,449	634	8,815	4,713	824	3,395	168	3,227	1,998	125	3,219	238	2,981	1,732	196	2,835	228	2,607	983	503
Domestic	30,403	2,201	28,202	10,096	7,296	10,088	460	9,628	4,224	1,827	10,209	835	9,374	3,748	2,069	10,106	906	9,200	2,124	3,400
Foreign	4,718	437	4,281	2,291	715	1,619	126	1,493	1,054	72	1,498	159	1,339	831	147	1,601	152	1,449	406	496
Focused	19,875	1,459	18,416	6,806	4,955	6,361	314	6,047	2,622	1,372	6,942	562	6,380	2,690	1,439	6,572	583	5,989	1,494	2,144
Diversifying	15,246	1,179	14,067	5,581	3,056	5,346	272	5,074	2,656	527	4,765	432	4,333	1,889	777	5,135	475	4,660	1,036	1,752
Target in Int. Sector	24,339	2,045	22,294	8,146	6,524	7,531	447	7,084	3,214	1,525	8,014	747	7,267	3,090	1,832	8,794	851	7,943	1,842	3,167
Sigma	0.036	0.039	0.036	0.027	0.050	0.014	0.014	0.014	0.014	0.014	0.025	0.026	0.025	0.025	0.026	0.070	0.066	0.071	0.058	0.081
Deal Value ($m)	402.6	133.3	424.4	254.5	508.6	784.5	313.5	809.3	435.0	1,202.1	310.1	124.2	327.4	157.6	501.2	113.1	42.1	120.1	53.5	174.9
Acq. MV ($m)	5,611.5	4,174.7	5,728.2	8,999.2	4,655.2	11,273.8	1,3717.7	11,145.1	15,848.6	7,005.5	4,487.6	2,335.9	4,687.2	5,134.8	8,405.9	1,073.1	616.7	1,118.4	1,704.5	1,376.1
Relative Deal Size	0.392	0.290	0.400	0.213	0.590	0.270	0.253	0.271	0.156	0.365	0.288	0.188	0.298	0.182	0.345	0.617	0.407	0.638	0.387	0.840
Acq. MTBV	2.865	2.877	2.864	2.867	3.278	2.565	2.947	2.544	2.868	2.093	2.836	2.838	2.836	2.874	3.278	3.229	2.875	3.265	2.852	3.927
Acq. Age (in years)	11.5	11.0	11.6	13.8	9.5	16.4	17.0	16.4	17.8	16.0	11.1	10.8	11.1	12.4	9.8	7.0	7.7	6.9	8.1	6.1
Acq. Cash Ratio	0.180	0.257	0.174	0.162	0.210	0.099	0.176	0.095	0.111	0.070	0.166	0.242	0.159	0.175	0.148	0.292	0.326	0.288	0.254	0.333
Acq. Debt/Equity Ratio	0.833	0.478	0.863	0.898	0.765	1.137	0.585	1.168	1.062	1.438	0.866	0.522	0.899	0.873	0.853	0.440	0.363	0.448	0.565	0.316
Earnout Value ($m)	37.62	37.62	-	-	-	88.45	88.45	-	-	-	32.30	32.30	-	-	-	14.47	14.47	-	-	-
Rel. Earnout Value	0.34	0.34	-	-	-	0.30	0.30	-	-	-	0.31	0.31	-	-	-	0.38	0.38	-	-	-

Panel A refers to all M&As included in the analysis; Panel B refers to only M&As announced by Low-sigma acquirers; Panel C refers to only M&As announced by Medium-sigma acquirers; Panel D refers to only M&As announced by High-sigma acquirers. Each panel is organized as follows: it vertically presents the number of all deals, number of deals that are earnout-settled (Earnout), number of deals that are not earnout-settled (NEA), number of deals fully financed with cash (Cash) and number of deals fully financed with stock (Stock), which is further (horizontally) categorized by the target firm's listing status (i.e. private, public and subsidiary), by the target firm's domicile (i.e. domestic and foreign), by the merging firms' industry relatedness (i.e. focused and diversifying), as well as by the extent of intangible richness of the target firm's assets (i.e. target in int. sector), followed by the mean of acquirer- and deal-specific characteristics (i.e. sigma, deal value, acquirer market value, relative deal size, acquirer MTBV, acquirer age, acquirer cash ratio, acquirer debt to equity ratio). All refers to all M&As within Panel; Private Target corresponds to deals involving private targets; Public Target corresponds to deals involving public targets; Subsidiary Target corresponds to deals involving subsidiary targets; Domestic refers to deals where the acquirer's and target's domiciles coincide; Foreign refers to cross-border acquisitions in which the acquirer and target are based in different countries; Focused refers to deals in which acquirer and target operate in the same industries i.e. they share the same two-digit SIC code; Diversifying refers to diversifying deals in which acquirer and target operate in different industries i.e. they do not share the same two-digit SIC code; Target in Int. Sector corresponds to deals involving targets operating in intangible-rich sectors (Consumer Products and Services, Financials, Healthcare, High-Tech, Media and Entertainment, and Telecommunications); Sigma corresponds to the acquiring firm's idiosyncratic stock return volatility (measured as in Moeller et al., 2007); Deal value reflects the deal's transaction value (in $mil.); Acq. MV corresponds to the acquiring firm's market capitalization (measured 20 days prior to the deal's announcement); Relative Deal Size corresponds to the relative size of the deal (=deal value/acquirer's market value 20 days prior to the deal's announcement); Acq. MTBV corresponds to the acquiring firm's market-to-book ratio (measured 20 days prior to the deal's announcement); Acq. Age corresponds to the number of years between the acquirer's first recorded day on Datastream and the deal's announcement day; Acq. Cash Ratio corresponds to the acquirer's ratio of cash and cash equivalents to total assets at the end of the last quarter prior to the deal's announcement; Acq. Debt/Equity Ratio corresponds to the acquirer's ratio of total debt to common equity at the end of the last quarter prior to the deal's announcement; Earnout Value refers to the value (in $m) of the deferred payment in an earnout-settled M&A; Rel. Earnout Value corresponds to the relative earnout size of the deal (=earnout value/deal value). Further information on the definition of each variable can be found in the Appendix A.

Table 3 Correlation matrix of main variables

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
Sigma	(1)																									
Deal Value	(2)	-0.06																								
Acq. MV	(3)	-0.11	0.25																							
Relative Deal Size	(4)	0.27	0.07	-0.07																						
Acq. MTBV	(5)	0.02	0.03	0.12	-0.11																					
Acq. Cash Ratio	(6)	0.26	-0.04	-0.01	0.03	0.14																				
Acq. Debt/Equity Ratio	(7)	-0.13	0.04	0.03	0.00	0.09	-0.20																			
Acq. Age	(8)	-0.26	0.12	0.23	-0.09	-0.03	-0.22	0.04																		
Earnout Value	(9)	-0.11	0.76	0.48	0.02	0.09	-0.03	0.09	0.15																	
Earnout	(10)	0.02	-0.03	-0.02	-0.03	0.00	0.10	-0.05	-0.02	-																
Cash	(11)	-0.18	-0.04	0.10	-0.14	0.00	-0.06	0.03	0.17	-	-0.21															
Stock	(12)	0.18	0.02	-0.02	0.11	0.04	0.07	-0.02	-0.11	-	-0.15	-0.40														
Mixed	(13)	0.01	0.04	-0.07	0.06	-0.04	-0.05	0.02	-0.07	-	-0.21	-0.53	-0.39													
Private Target	(14)	0.16	-0.11	-0.08	-0.04	0.03	0.16	-0.09	-0.17	-0.04	0.14	-0.15	0.04	0.04												
Public Target	(15)	-0.14	0.16	0.10	0.06	-0.01	-0.11	0.09	0.15	0.04	-0.15	-0.02	0.16	-0.05	-0.55											
Subsidiary Target	(16)	-0.05	-0.03	-0.01	-0.01	-0.03	-0.07	0.02	0.05	0.02	-0.02	0.19	-0.20	0.00	-0.59	-0.34										
Foreign	(17)	0.01	-0.01	0.08	-0.02	0.03	0.06	-0.02	0.08	0.03	0.03	0.11	-0.07	-0.06	-0.02	-0.04	0.07									
Diversifying	(18)	0.05	-0.03	0.04	0.04	-0.01	-0.04	0.01	0.02	-0.07	0.01	0.02	-0.06	0.02	0.05	-0.07	0.02	0.01								
Target in Int. Sector	(19)	0.04	-0.01	0.05	-0.05	0.06	0.22	-0.04	-0.11	0.04	0.05	-0.06	0.14	0.09	0.04	-0.14	-0.06	-0.09								
Target in Med. & Ent.	(20)	0.01	0.04	-0.01	0.04	0.00	-0.03	0.02	-0.05	-0.02	-0.01	0.02	-0.04	0.02	-0.02	-0.03	0.06	-0.02	0.03	0.16						
Target in Retail	(21)	0.01	-0.01	-0.01	0.02	-0.01	-0.03	-0.01	-0.02	-0.03	-0.02	0.00	-0.01	0.02	0.00	0.00	0.00	-0.03	0.03	0.13	-0.05					
Target in Financial	(22)	-0.13	-0.01	-0.02	-0.03	-0.09	-0.21	0.17	0.04	0.05	-0.07	-0.09	0.17	-0.03	-0.05	0.18	-0.12	-0.11	-0.11	0.28	-0.10	-0.08				
Target in High Tech	(23)	0.10	-0.03	0.06	-0.06	0.10	0.33	-0.13	-0.08	-0.07	0.05	0.01	0.06	-0.09	0.11	-0.06	-0.07	0.05	-0.06	0.34	-0.13	-0.10	-0.22			
Target in Healthcare	(24)	0.00	0.03	0.04	-0.01	0.03	0.10	-0.05	0.02	0.17	0.08	0.00	-0.02	-0.02	0.00	0.00	-0.01	0.00	-0.08	0.23	-0.09	-0.07	-0.15	-0.18		
Target in Cons. & Serv.	(25)	0.03	-0.03	-0.03	-0.01	0.02	0.03	-0.03	-0.05	-0.07	0.04	-0.01	-0.02	0.00	0.07	-0.06	-0.02	0.01	0.12	0.21	-0.08	-0.06	-0.13	-0.16	-0.11	

This table reports the Pearson correlation coefficients between the following variables: Acquirer sigma corresponds to the acquiring firm's idiosyncratic stock return volatility (measured as in Moeller et al., 2007); Deal value reflects the deal's transaction value (in $mil.); Acq. MV corresponds to the acquiring firm's market capitalization (measured 20 days prior to the deal's announcement); Relative Deal Size corresponds to the relative size of the deal (=deal value/acquirer's market value 20 days prior to the deal's announcement); Acq. MTBV corresponds to the acquiring firm's market-to-book ratio (measured 20 days prior to the deal's announcement); Acq. Cash Ratio corresponds to the acquirer's ratio of cash and cash equivalents to total assets at the end of the last quarter prior to the deal's announcement; Acq. Debt/Equity Ratio corresponds to the acquirer's ratio of total debt to common equity at the end of the last quarter prior to the deal's announcement; Acq. Age corresponds to the number of years between the acquirer's first recorded day on Datastream and the deal's announcement day;Earnout Value refers to the value (in $m) of the deferred payment in an earnout-settled M&A; Earnout corresponds to earnout-settled M&As; Cash refers to M&As fully financed with cash; Stock refers to M&As fully financed with stock; Mixed refers to M&As encompassing combinations of cash, stock and other payments; Private Target corresponds to deals involving private targets; Public Target corresponds to deals involving public targets; Subsidiary Target corresponds to deals involving subsidiary targets; Foreign refers to cross-border acquisitions in which the acquirer and target are based in different countries; Diversifying refers to diversifying deals in which acquirer and target operate in different industries, i.e. they do not share the same two-digit SIC code; Target in Int, Sector corresponds to deals involving targets operating in intangible-rich sectors (Consumer Products and Services, Financials, Healthcare, High-Tech, Media and Entertainment, and Telecommunications); Target in Med. & Ent refers to deals where the target operates within the Media and Entertainment 2-digit SIC code; Target in Retail refers to deals where the target operates in the Retail 2-digit SIC code; Target in Financial refers to deals where the target operates in the Financial 2-digit SIC code; Target in High Tech refers to deals where the target operates in the High-Tech 2-digit SIC code; Target in Healthcare refers to deals where the target operates in the Healthcare 2-digit SIC code; Target in Cons. & Serv. refers to deals where the target operates in the Consumer Products and Services 2-digit SIC code. Further information on the definition of each variable can be found in the Appendix A.

Table 4 Univariate analysis of acquirer abnormal returns

		All	Earnout (1)	NEA (2)	Cash (3)	Stock (4)	Mixed (5)	(1) – (2)	(1) – (3)	(1) – (4)	(1) – (5)
					Panel A: All deals						
All	Mean	1.26***	1.68***	1.23***	0.99***	1.26***	1.45***	0.45**	0.69***	0.42*	0.23
	N	35,121	2,638	32,483	12,387	8,011	12,085				
Private target	Mean	1.85***	1.32***	1.91***	0.90***	3.01***	1.95***	-0.59**	0.42**	-1.68***	-0.63**
	N	17,148	1,947	15,201	4,786	4,214	6,201				
Public target	Mean	-0.77***	2.44	-0.79***	0.48***	-1.82***	-1.03***	3.23*	1.95**	4.26**	3.47***
	N	8,524	57	8,467	2,888	2,973	2,606				
Subsidiary target	Mean	2.03***	2.71***	1.98***	1.38***	3.41***	2.48***	0.73*	1.33***	-0.70	0.23
	N	9,449	634	8,815	4,713	824	3,278				
					Panel B: Deals announced by low-sigma Acquirers						
All	Mean	0.23***	1.20***	0.18***	0.36***	-0.35**	0.20**	1.02***	0.84***	1.55***	1.00***
	N	11,707	586	11,121	5,278	1,899	3,944				
Private target	Mean	0.64***	1.32***	0.57***	0.30***	1.18***	0.60***	0.75***	1.02***	0.14	0.72**
	N	4,488	400	4,088	1,765	681	1,642				
Public target	Mean	-0.68***	0.37	-0.68***	0.09	-1.35***	-1.04***	1.05*	0.28	1.72***	1.41**
	N	3,824	18	3,806	1,515	1,093	1,198				
Subsidiary target	Mean	0.71***	1.00**	0.70***	0.61***	0.07	0.94***	0.30	0.39	0.93	0.06
	N	3,395	168	3,227	1,998	125	1,104				
					Panel C: Deals announced by mid-sigma Acquirers						
All	Mean	0.75***	1.10***	0.72***	0.93***	0.01	0.88***	0.37	0.17	1.09***	0.22
	N	11,707	994	10,713	4,579	2,216	3,918				
Private target	Mean	1.06***	0.87***	1.09***	0.68***	1.42***	1.30***	-0.22	0.19	-0.55	-0.43
	N	5,600	739	4,861	1,880	1,062	1,919				
Public target	Mean	-0.88***	-2.80	-0.86***	0.65***	-1.87***	-1.39***	-1.94	-3.45**	-0.93	-1.41
	N	2,888	17	2,871	967	958	946				
Subsidiary target	Mean	1.69***	2.08***	1.66***	1.36***	1.57***	2.16***	0.42	0.72*	0.51	-0.08
	N	3,219	238	2,981	1,732	196	1,053				
					Panel D: Deals announced by high-sigma Acquirers						
All	Mean	2.80***	2.49***	2.83***	2.40***	2.75***	3.16***	-0.33	0.09	-0.26	-0.66
	N	11,707	1,058	10,649	2,530	3,896	4,223				
Private target	Mean	3.24***	1.74***	3.44***	2.18***	4.19***	3.27***	-1.70***	-0.44	-2.46***	-1.54***
	N	7,060	808	6,252	1,141	2,471	2,640				
Public target	Mean	-0.80**	8.18*	-0.91***	1.59***	-2.32***	-0.28	9.09***	6.59**	10.51**	8.46***
	N	1,812	22	1,790	406	922	462				
Subsidiary target	Mean	3.99***	4.63***	3.93***	3.00***	4.95***	4.29***	0.70	1.63*	-0.32	0.34
	N	2,835	228	2,607	983	503	1,121				
					Panel E: Differentials between Panel D and Panel B (high sigma – low sigma)						
All target	Mean	2.57***	1.29***	2.65***	2.05***	3.10***	2.96***				
Private target	Mean	2.61***	0.42	2.87***	1.88***	3.01***	2.67***				
Public target	Mean	-0.12	7.81*	-0.23	1.51***	-0.97**	0.77*				
Subsidiary target	Mean	3.27***	3.63***	3.23***	2.39***	4.89***	3.36***				

The table presents mean announcement period 5-day ($t-2, t+2$) cumulative abnormal returns for all acquisitions (Panel A) divided by target listing status (All, Private target, Public target and Subsidiary target) and method of payment (All, earnout, non-earnout(NEA), Cash, Stock and Mixed). The analysis is further categorized by low (Panel B), medium (Panel C) and high (Panel D) acquirer sigma deals. Panel E illustrates differences in mean abnormal returns between high and low acquirer sigma deals. sigma corresponds to the acquiring firm's idiosyncratic stock return volatility (measured as in Moeller et al., 2007); Low-sigma corresponds to the bottom one third of deals exhibiting the lowest levels of sigma; Medium-sigma corresponds to the middle one third of deals in terms of their acquirer sigma ranking; High-sigma corresponds to the top one third of deals exhibiting the highest levels of sigma. The statistical significance of differences in returns between groups of acquirers is tested using the t-test for equality of means. ***, **, and * indicate significance at 1%, 5% and 10% respectively of the mean for each covariate presented. N stands for the number of observations. Further information on the definition of each variable can be found in the Appendix A.

Table 5 Determinants of acquirer abnormal returns: Multivariate analysis

Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Earnout	-0.008	-0.279	-0.678**	-0.091	-0.644**	-0.018	-0.592**	-0.143	-0.536**	-0.154	-0.481**	-0.481**
Unlisted	1.056***	2.380***	2.996***	2.919***	2.995***	2.921***	2.998***	2.922***	3.002***	2.917***	3.002***	2.929***
Target in Int. Sector	-0.497***	-0.585***	-0.201*	-0.251**	-0.200*	-0.252**	-0.207*	-0.231**	-0.197*	-0.248**	-0.196*	-0.249**
Diversifying	0.241**	0.073	0.223**	0.194*	0.223**	0.194*	0.223**	0.194*	0.215**	0.247**	0.222**	0.195*
Foreign	0.391**	-0.072	0.383**	0.350**	0.384**	0.350**	0.385**	0.352**	0.387**	0.344**	0.396**	0.331**
Sigma	26.975***											
Low-sigma		-0.498***	-0.686***		-0.678***		-0.664***		-0.649***		-0.635***	
High-sigma		1.779***		1.478***		1.497***		1.462***		1.465***		1.380***
Earnout × Low-sigma			0.751**									
Earnout × High-sigma				-0.959**								
Earnout × Low-sigma × Unlisted					0.631*							
Earnout × High-sigma × Unlisted						-1.186**						
Earnout × Low-sigma × Target in Int. Sector							0.522					
Earnout × High-sigma × Target in Int. Sector								-1.005**				
Earnout × Low-sigma × Diversifying									0.373			
Earnout × High-sigma × Diversifying										-1.838**		
Earnout × Low-sigma × Foreign											-0.288	
Earnout × High-sigma × Foreign												0.717
Relative Deal Size	0.564***	0.009**	0.745***	0.701***	0.744***	0.701***	0.745***	0.702***	0.744***	0.702***	0.745***	0.701***
Acq. Age	0.031	0.001	0.065	0.121**	0.065	0.122**	0.065	0.121**	0.066	0.119**	0.065	0.118**
Acq. MTBV	-0.074***	-0.103***	-0.062***	-0.065***	-0.062***	-0.065***	-0.062***	-0.065***	-0.062***	-0.065***	-0.062***	-0.065***
Acq. Cash Ratio	-0.757**	-1.226***	-0.371	-0.834**	-0.372	-0.839**	-0.370	-0.826**	-0.372	-0.857**	-0.373	-0.823**
Acq. Debt/Equity Ratio	-0.040	-0.013	-0.043	-0.030	-0.043	-0.030	-0.043	-0.031	-0.043	-0.031	-0.044	-0.032
Intercept	0.731	-0.761	0.342	-0.657	0.340	-0.665	0.338	-0.663	0.319	-0.650	0.313	-0.624
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared (in %)	3.28	2.88	4.01	4.30	4.01	4.31	4.01	4.30	4.01	4.32	4.01	4.28
F-stat	76.94***	62.42***	88.13***	94.62***	88.07***	94.83***	88.01***	94.63***	87.96***	95.08***	87.94***	94.28***
Min VIF	1.02	1.00	1.03	1.02	1.03	1.02	1.03	1.02	1.04	1.05	1.03	1.03
Max VIF	1.26	1.42	1.38	1.69	1.36	1.66	1.28	1.50	1.26	1.30	1.26	1.29
Mean VIF	1.12	1.14	1.17	1.23	1.17	1.23	1.16	1.20	1.14	1.16	1.13	1.13
N	29,523	29,523	29,523	29,523	29,523	29,523	29,523	29,523	29,523	29,523	29,523	29,523

The table records results from the multivariate analysis examining the wealth effects of earnout-settled deals. The dependent variable consists of the announcement period market adjusted 5-day ($t-2, t+2$) abnormal returns of acquirers which are regressed against a set of explanatory variables. Regression outputs are estimated using ordinary least squares with the coefficients adjusted for possible heteroscedasticity using White (1980) heteroscedasticity-consistent standard errors and covariance. The intercept measures the abnormal returns to acquirers after accounting for the effects of the explanatory variables included in the specification or model. Earnout corresponds to deals financed with an earnout provision; Unlisted corresponds to deals involving unlisted (private or subsidiary) targets; Target in Int. Sector corresponds to deals involving targets operating in intangible-rich sectors (Consumer Products and Services, Financials, Healthcare, High-Tech, Media and Entertainment, and Telecommunications); Diversifying corresponds to diversifying deals (the acquiring and target firms do not share the same 2-digit SIC number); Foreign corresponds to international deals; sigma corresponds to the acquiring firm's idiosyncratic stock return volatility (measured as in Moeller et al., 2007); Low-sigma corresponds to the bottom one third of deals exhibiting the lowest levels of sigma; High-sigma corresponds to the top one third of deals exhibiting the highest levels of sigma; Relative Deal Size corresponds to the relative size of the deal (=deal value/acquirer's market value 20 days prior to the deal's announcement); Acq. Age corresponds to the number of days between the acquirer's first recorded day on Datastream and the deal's announcement day; Acq. MTBV corresponds to the acquiring firm's market-to-book ratio (measured 20 days prior to the deal's announcement); Acq. Cash Ratio corresponds to the acquirer's ratio of cash and cash equivalents to total assets at the end of the last quarter prior to the deal's announcement; Acq. Deb/Equity Ratio corresponds to the acquirer's ratio of total debt to common equity at the end of the last quarter prior to the deal's announcement. N stands for the number of observations. ***, **, and * indicate significance at 1%, 5%, and 10% respectively. VIF is the Variance Inflation Factor, which quantifies the severity of multicollinearity. Variance inflation is the reciprocal of tolerance. Further information on the definition of each variable can be found in the Appendix A.

Table 6 Addressing selection bias

Model/exercise:	(1) All M&As			(2) M&As by Low-sigma Acquirers			(3) M&As by High-sigma Acquirers		
Panel A: Logistic Regression									
Private target	1.151***			1.297***			1.948***		
Target in Int. sector	0.187***			0.172***			0.220***		
Diversifying	-0.003			-0.087			0.033		
Foreign	0.241***			0.390***			0.119		
Sigma	-0.680			82.797***			-1.192*		
Relative Deal Size	0.097***			0.079***			0.515**		
Acq. Age	0.018			0.040			0.050		
Acq. MTBV	-0.045*			0.200***			-0.075**		
Acq. Cash Ratio	0.964***								
Acq. Debt/Equity Ratio	0.001								
Target in High-Tech	0.213**								
Target in Cons. & Serv.	0.455***								
Target in Telecoms	0.049								
Target under Common Law	0.182								
Intercept	-4.751***			-6.375***			-4.646***		
Year fixed effects (YFE)	Yes			Yes			Yes		
Pseudo R-Squared (in %)	7.98			9.07			4.86		
LR chi square test	1,235.95			384.16			246.35		
Mean VIF	1.19			1.11			1.07		
N	28,371			10,256			7,964		
Panel B: Covariate Balance									
	Earnout treated	Non-Earnout control	Treated vs. control	Earnout treated	Non-Earnout control	Treated vs. control	Earnout treated	Non-Earnout control	Treated vs. control
Private target	1,519***	1,464***		353	338		549	518	
Target in Int. sector	617	570		170	160		437	410	
Diversifying	905	887		233	233		301	306	
Foreign	349	300		106	119		116	106	
Sigma	0.036***	0.034***	0.002	0.014***	0.014***	-0.000	0.063***	0.062***	0.001
Relative Deal Size	-2.530***	-2.604***	0.075	-3.037***	-3.158***	0.120	-2.069***	-2.021***	-0.047
Acq. Age	7.872***	7.914***	-0.042	8.391***	8.440***	-0.050	7.498***	7.447***	0.051
Acq. MTBV	0.865***	0.838***	0.027	0.881***	0.890***	-0.009	0.900***	0.867***	0.033
Acq. Cash Ratio	0.252***	0.241***	0.012						
Acq. Debt/Equity Ratio	0.530***	0.701***	-0.171						
Target in High-Tech	602	553							
Target in Cons. & Serv.	260	264							
Target in Telecoms	75	83							
Target under Common Law	1,951	1,881							
Panel C: Differentials Treated VS Matched M&A Deals									
Mean CAR Treated (in %)	1.31***			1.18***			1.80***		
N	2,094			523			726		
Mean CAR Control (in%)	0.93***			0.32***			2.70***		
N	2,094			523			726		
Mean (in%) Difference (Treated VS Control)	**0.38**			**0.85***			**-0.90**		
Panel D: Rosenbaum-bounds									
RB: p-value of estimated difference at Γ=1	0.015			0.006			0.047		
RB: critical value of Γ at cut-off p=0.05	1.03			1.09			1.01		
RB: critical value of Γ at cut-off p=0.10	**1.05**			**1.14**			**1.04**		

Continued

Continued (Table 6)

Panel A presents the output of the logistic regression models that were used to estimate the probability of occurrence of an earnout relative to alternative single up-front payment delivery methods. Panel B presents the balance of covariates between treated and control deals in our matching sequences. The PSM technique employs 1-to-1 nearest neighbor matching allowing for replacement. Differences in average covariates are tested using the *t*-test. Panel C reports mean 5-day announcement period cumulative abnormal returns (CAR) for treated and matched deals. The statistical significance of differences in mean returns between the two groups is tested using the *t*-test for equality of means. Panel D shows the outcome of the Rosenbaum-bounds test. ***, **, and * indicate significance at 1%, 5% and 10% respectively of the mean for each covariate presented. Private target corresponds to deals involving private targets; Target in Int. Sector corresponds to deals involving targets operating in intangible-rich sectors (Consumer Products and Services, Financials, Healthcare, High-Tech, Media and Entertainment, and Telecommunications); Diversifying corresponds to diversifying deals (the acquiring and target firms do not share the same 2-digit SIC number); Foreign corresponds to international deals; Sigma corresponds to the acquiring firm's idiosyncratic stock return volatility (measured as in Moeller et al., 2007); Relative Deal Size corresponds to the relative size of the deal (=deal value/acquirer's market value 20 days prior to the deal's announcement); Acq. age corresponds to the number of days between the acquirer's first recorded day on Datastream and the deal's announcement day; Acq. MTBV corresponds to the acquiring firm's market-to-book ratio (measured 20 days prior to the deal's announcement); Acq. Cash Ratio corresponds to the acquirer's cash ratio at the end of the last quarter prior to the deal's announcement; Acq. Debt/Equity Ratio corresponds to the acquirer's ratio of total debt to common equity at the end of the last quarter prior to the deal's announcement; Target in High Tech corresponds to deals involving targets operating in the High-Tech sector; Target in Cons. &Serv. corresponds to deals involving targets operating in the Consumer Products and Services sector; Target In Telecoms corresponds to deals involving targets operating in the Telecommunications sector; Target under Common Law corresponds to deals in which the target operates in a country under a Common Law legal framework. Low-sigma corresponds to the bottom one third of deals exhibiting the lowest levels of sigma; High-sigma corresponds to the top one third of deals exhibiting the highest levels of sigma; N stands for the number of observations. CAR corresponds to the 5-day ($t-2, t+2$) announcement period acquirer cumulative abnormal return; VIF is the Variance Inflation Factor, which quantifies the severity of multicollinearity. Variance inflation is the reciprocal of tolerance. Further information on the definition of each variable can be found in the Appendix A.

Table 7 Determinants of acquirer abnormal returns: Multivariate analysis

| Model:	(1)	(2)	(3)	(4)	(5)	(6)
Matching Ratio:	1-to-1	5-to-1	10-to-1	1-to-1	5-to-1	10-to-1
Unlisted	0.015**	0.013***	0.013***	0.029*	0.052***	0.055***
Target in Int. Sector	-0.010**	-0.004*	-0.003*	-0.012	-0.014***	-0.012***
Diversifying	-0.001	-0.001	-0.002	-0.009	0.001	0.005
Foreign	-0.007*	-0.001	0.001	0.011	0.002	0.005
Relative Deal Size	0.004***	0.004***	0.004***	0.020***	0.015***	0.014**
Acq. Age	0.002	0.002*	0.001*	0.001	0.001	0.001
Acq. MTBV	0.001	0.001	0.001	-0.001	-0.001	-0.001**
Acq. Cash Ratio	0.023*	0.016*	0.018**	-0.018	-0.020**	-0.009
Acq. Debt/Equity Ratio	-0.001	-0.001	0.001	-0.001	-0.001	-0.001
Control Dummy: Low-sigma	-0.006*	-0.005*	-0.004*			
Control Dummy: High-sigma				0.011	0.013**	0.013***
Intercept	0.004	-0.004	-0.001	0.058*	0.003	-0.009
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Target industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared (in %)	4.74	3.04	2.69	6.13	5.18	5.06
F-stat	4.22***	6.99***	9.31***	7.62***	15.6***	22.02***
Min VIF	1.04	1.06	1.06	1.01	1.01	1.01
Max VIF	1.20	1.20	1.21	1.20	1.19	1.19
Mean VIF	1.12	1.12	1.12	1.08	1.07	1.07
N	1,032	2,687	4,056	1,414	3,441	4,973

The table records results from the multivariate analysis examining the wealth effects of earnout-settled deals on the matched sample (created as discussed in Sections 3.2. and 5.3.). The dependent variable consists of the announcement period market adjusted 5-day ($t-2, t+2$) abnormal returns of acquirers which are regressed against a set of explanatory variables. Regression outputs are estimated using ordinary least squares with the coefficients adjusted for possible heteroscedasticity using White (1980) heteroscedasticity-consistent standard errors and covariance. The intercept measures the abnormal returns to acquirers after accounting for the effects of the explanatory variables included in the specification or model. Unlisted corresponds to deals involving unlisted (private or subsidiary) targets; Target in Int. Sector corresponds to deals involving targets operating in intangible-rich sectors (Consumer Products and Services, Financials, Healthcare, High-Tech, Media and Entertainment, and Telecommunications); Diversifying corresponds to diversifying deals (the acquiring and target firms do not share the same 2-digit SIC number); Foreign corresponds to international deals; Relative Deal Size corresponds to the relative size of the deal (=deal value/acquirer's market value 20 days prior to the deal's announcement); Acq. Age corresponds to the number of days between the acquirer's first recorded day on Datastream and the deal's announcement day; Acq. MTBV corresponds to the acquiring firm's market-to-book ratio (measured 20 days prior to the deal's announcement); Acq. Cash Ratio corresponds to the acquirer's ratio of cash and cash equivalents to total assets at the end of the last quarter prior to the deal's announcement; Acq. Deb/Equity Ratio corresponds to the acquirer's ratio of total debt to common equity at the end of the last quarter prior to the deal's announcement; 'Control Dummy: Low-sigma' corresponds to deals that were control counterfactuals in PSM Exercise 2 (see Sections 3.2. and 5.3. for information on the formulation of the matching sequence); 'Control Dummy: High-sigma' corresponds to deals that were control counterfactuals in PSM Exercise 3 (see Sections 3.2. and 5.3. for information on the formulation of the matching sequence); N stands for the number of observations. ***, **, and * indicate significance at 1%, 5%, and 10% respectively. VIF is the Variance Inflation Factor, which quantifies the severity of multicollinearity. Variance inflation is the reciprocal of tolerance. Further information on the definition of each variable can be found in the Appendix A.

Table 8 Acquirer size, idiosyncratic volatility and acquirer abnormal returns

	N	Acquirer MV	CAR	$WCAR$
Panel A: All M&As				
All	35,121	5,611	1.26	-0.63
Earnout	2,638	4,175	1.68	-0.16
Non-earnout	32,483	5,728	1.23	-0.66
Panel B: M&As announced by low-sigma acquirers				
All	11,707	11,274	0.23	-0.42
Earnout	586	13,718	1.20	0.14
Non-earnout	11,121	11,145	0.18	-0.46
Panel C: M&As announced by medium-sigma acquirers				
All	11,707	4,488	0.75	-0.57
Earnout	994	2,336	1.10	0.04
Non-earnout	10,713	4,687	0.72	-0.6
Panel D: M&As announced by high-sigma acquirers				
All	11,707	1,073	2.80	-3.13
Earnout	1,058	617	2.49	-4.52
Non-earnout	10,649	1,118	2.83	-3.05

The table presents U.S. M&A activity for all deals (All) (Panel A), earnout-settled deals (earnout), as well as non-earnout-settled deals (NEA) according to the acquiring firm's idiosyncratic stock return volatility (high-medium- and low- acquirer sigma in Panels B, C and D, respectively). N stands for the number of observations; sigma corresponds to the acquiring firm's idiosyncratic stock return volatility (measured as in Moeller et al., 2007); Low-sigma corresponds to the bottom one third of deals exhibiting the lowest levels of sigma; Medium-sigma corresponds to the medium one third of deals exhibiting the medium levels of sigma; High-sigma corresponds to the top one third of deals exhibiting the highest levels of sigma; MV corresponds to each group's average market capitalization of acquiring firms measured 20 days before the announcement of the deal; CAR corresponds to each group' average cumulative abnormal return for the window from $t-2$ to $t+2$ where t is the announcement day of the M&A; $WCAR$ reports the weighted by MV average CAR of each group of deals as in Moeller et al. (2004). Further information on the definition of each variable can be found in the Appendix A.

Figure 1 Relative earnout activity and relative earnout value
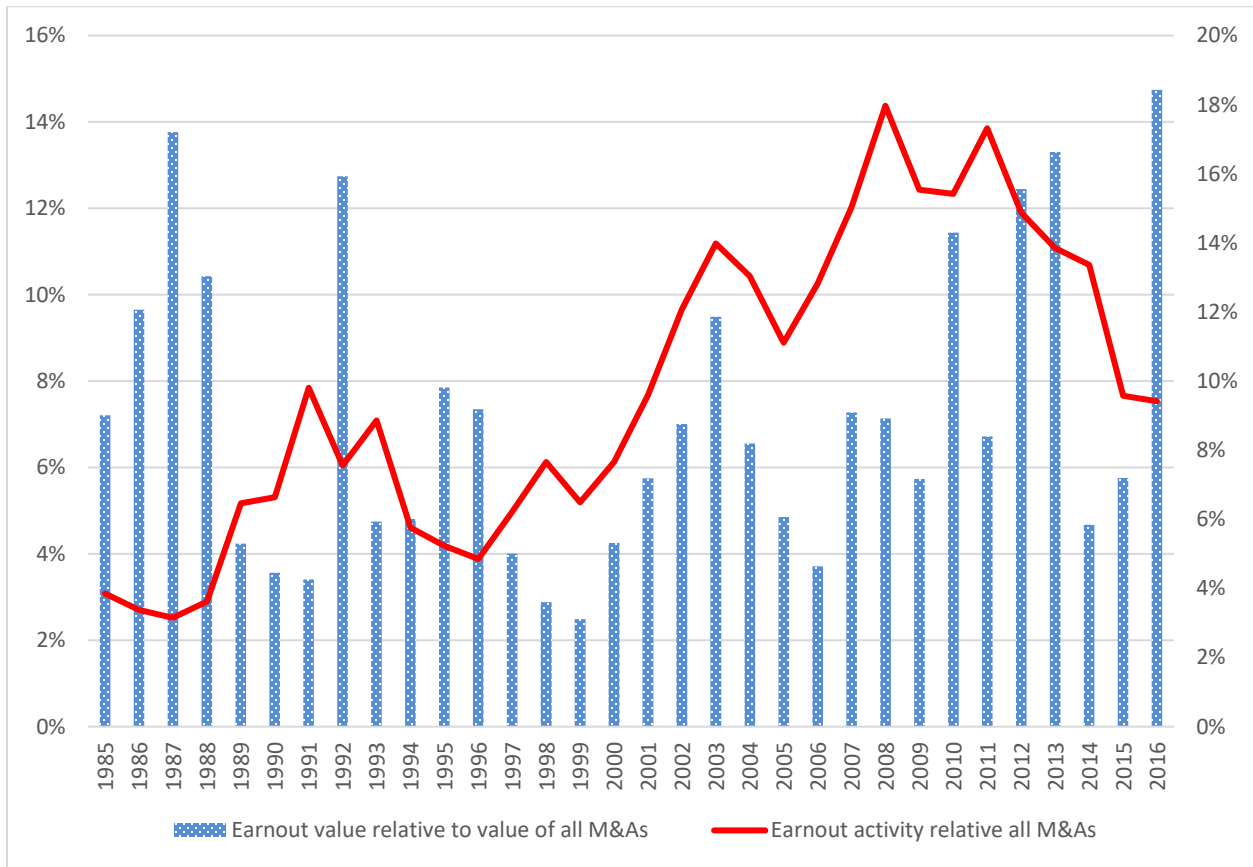
This figure reports the annual frequency of earnout activity (i.e. ratio of earnout activity to all M&A activity) as well as the annual relative earnout value (i.e. ratio of earnout value to value of all M&As). The left-hand scale (red continuous line) reports the frequency of earnout activity during 1985 to 2016 (inclusive), while the relative earnout value is reported (blue columns) on the right-hand scale. The figure is restricted to the years including earnout-settled M&As in the sample period. Data obtained from the Thomson-Reuters SDC ONE Banker and the DataStream databases.