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Technological-induced information asymmetry, M&As and earnouts: stock market evidence from Germany

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To date, a few empirical studies exist that investigate the use of earnout contracts in mergers and acquisitions (M&As). However, two limitations can be attested. First, the studies predominantly investigate earnouts in Anglo-American economies and it is questionable whether we can generalize on these findings for other economies. Second, while earnouts have become an increasingly popular way of coping with information asymmetries and reducing the risk of overpayment in takeovers, less is known about what really drives the design of such contracts. To answer these questions, we conduct an event study that examines abnormal returns for different M&A contracts for a cross-industry sample of German acquirers. The novel aspect of this article is that we explicitly present a theoretical model to discuss the effect of technological-induced information asymmetries on the design of earnout contracts. While we find support for the fact that capital markets favour the use of earnouts when uncertainty and the buyer's ability to reduce technological-induced information asymmetry is high, a too-long earnout period specified in the contract appears to be detrimental.

Keywords: M&As; earnouts; abnormal returns; information asymmetry

JEL Classification: G14; G34; D8

I. Introduction

In a volatile economic environment, reducing information asymmetries that pertain to financial performance is of major concern in international mergers and acquisitions (M&As). Some recent literature suggests that earnouts may be a promising way to achieve this goal. An earnout agreement is a purchase price technique that attempts to reconcile the differing expectations of sellers and buyers in an acquisition (Reum and Steele, 1970; Reuer *et al.*, 2004; Lukas *et al.*, 2012). It consists of a fixed price and a performance-related component, the so-called earnout payment. The acquirer pays the fixed price part directly after the closing and the variable part after a specified

period (earnout period). Acquisitions of high-technology, service-intensive or smaller private companies are especially prone to information asymmetries and thus for these types of acquisitions, earnout agreements may be an effective way to overcome this problem and close the contract (Kohers and Ang, 2000; Datar *et al.*, 2001).

However, to date, there are only a few empirical performance studies on M&As with earnout agreements. For example, using logistic/probit regressions, Cain *et al.* (2011), Datar *et al.* (2001) and Reuer *et al.* (2004) examine factor influences on earnouts. Surprisingly, only two articles focus on earnouts and stock market reactions (Kohers and Ang, 2000; Mantecon, 2009). The findings reveal that the benefits of earnouts outweigh the complexity and

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higher transaction costs of such agreements. Aside from these event studies, which are dominated by Anglo-American companies, however, there is no evidence that verifies these findings for the German market. This article provides theoretical as well as empirical analysis of earnouts by German acquirers. We use an adapted classical principal-agent model to investigate information asymmetry between bidder and seller. The model provides four empirically testable implications. First, bidders profit more from an earnout clause than from a classical lump sum payment in an M&A. Second, the bidder profits more from an earnout, the higher the uncertainty. Third, the bidder profits more from high cash flow volatility. Fourth, the bidder profits from a shorter earnout period. The empirical part examines all acquisitions related to such a purchase price adjustment announced by German corporations between January 2000 and September 2013. In particular, we investigate capital market reactions to these announcements by means of abnormal returns. The analysis shows that the German stock market reacts positively and significantly to the announcement of earnouts. The abnormal returns for German earnouts are greater than for comparable acquisitions using only lump sum payments and for earnouts of US acquirers. Furthermore, acquirers' characteristics can reduce information asymmetries and transactions costs, making an earnout more valuable. Vice versa, lower target volatility and a longer earnout period decrease the value of an earnout.

The article is organized as follows. Section II contains a summary of the relevant literature. Section III presents the theoretical model and deduces several implications. Section IV sets out our main hypotheses. Section V provides an overview of the methodology used and the characteristics of the sample. Section VI presents the empirical results and robustness tests. Section VII discusses certain limitations of the study and makes suggestions for future research.

II. Literature

Determination of the purchase price as well as the contract design are pivotal pieces of M&As (Agrawal and Jaffe, 2000; Strickland *et al.*, 2010). The risk of overpayment in a takeover is strongly related to information asymmetries between acquirer and target (Datar *et al.*, 2001). Compared to the seller, the acquirer is usually not well informed about the target's value or quality. The target company's intangible assets (e.g. current research and development projects, personal factors) are especially likely to be characterized by information asymmetries (DePamphilis, 2010). Furthermore, these asymmetries can lead to adverse selection, that is, to a systematic selection of poor acquisition candidates (Akerlof, 1970). In this case, the buyer offers a too low price because of

information risks. Thus, good-quality sellers exit the M&A market while poor-quality companies of questionable value remain. However, most of the M&A risks arise during the integration phase following the closing. Notably, most of the overpayment risk arises from insufficient integration of human resources from the purchased company (Caselli *et al.*, 2006). This can happen if the acquirer loses key human capital (e.g. professionals and managers and their knowledge) either during or after the acquisition. This type of loss can be serious enough to jeopardize the future success of the company with the eventual result that the acquirer will have paid a too high price for the target.

Earnout performance

To reach an agreement on the purchase price, purchase price adjustment clauses (*earnouts*) are often employed (Kohers and Ang, 2000; Frankel, 2005). Reuer *et al.* (2004, p. 20) define an 'earnout' as *deferred variable payments tied to the target's ability to meet prespecified performance goals within a certain time frame after the deal has been consummated*. In other words, the earnout consists of a variable purchase price payment that may be based on several periodic rates. These rates are tied to the target's value whereby the underlying is usually EBITDA, EBIT, revenues or cash flows. The payments will be made only if the target company reaches the underlying's threshold within a pre-specified time after closing. This period, also called the 'earnout period', is typically from 2 to 5 years. The earnout is in addition to the fixed part of purchase price. The fixed part represents the value of the target to which both parties agreed. The difference between the asking price of the seller and the offering bid of the buyer can be described as the earnout value. The earnout value might be due to overly optimistic performance forecasts on the seller's part or because each party used a different method of valuating the target.

To date, there are only two studies that examine stock market reactions to earnouts. Kohers and Ang (2000) analyse 938 M&As with earnout provisions from 1 January 1984 to 30 June 1996. In this article, all the target companies and the majority of buyers are Anglo-American; only in 168 cases (17.9%) the buyer was from abroad. In the total sample, the authors find a positive average abnormal return of 1.356% for the bidder on the date of announcing the earnout transaction. The authors thus conclude that earnouts can be used to overcome information asymmetries in acquisitions. The other study, Mantecon (2009), specifically examines the risks in cross-border acquisitions from 1985 to 2005. The author considers a sample of 30 783 domestic and 268 cross-border transactions with earnout arrangements. Roughly, 66% of the cross-border transactions involve Anglo-American buyers. The overall findings show an average cumulative abnormal return of 1.01% for

a 3-day window. However, this announcement effect is only weakly positive for domestic transactions and insignificant for cross-border ones. Consequently, it is as yet unclear whether earnouts actually do mitigate information asymmetries.¹

III. Theoretical Model and Implications

In the following, we will assume that two firms are involved in the M&A deal denoted T (target) and B (buyer). For the sake of simplicity, we will assume that the value of the target firm is characterized by the cash flow CF_t the target generates in the future. Of course, this cash flow is uncertain and consists of two sources. The first source results out of the current operation which is denoted by $x(\tilde{\varepsilon})$. This uncertainty affects both the target and the buyer and we will assume that $x(\tilde{\varepsilon})$ is normally distributed with $N(\mu_x; \sigma_x)$. Furthermore, the target plans to launch a new product in the future that will additionally generate an income stream y . While the target firm knows the amount generated with certainty, the buyer has limited information about the new product's profitability. However, the buyer knows the distribution of the new product's possible cash flow \tilde{y} . Without loss of generality, we rely on a uniform distribution to model the technological-induced information asymmetry between buyer and the target, i.e. $\tilde{y} \in [\bar{y}, \underline{y}]$ and assume that the two sources of risk are uncorrelated. Both firms are risk-averse expected utility maximizer with $\lambda_B(\lambda_T)$ as the degree of the buyer's (seller's) risk-aversion and we use the mean-variance framework to model the individuals' risk-return relationship.² Moreover, time is valuable, i.e., future cash flows are discounted with $\delta = e^{-r\tau}$ where r denotes the risk-free interest rate and τ represents the earnout period. Finally, we will assume that the buyer has to bear specific costs, TC , which take costly monitoring and enforcement activities into account.

Earnout versus lump sum payment

The earnout-induced M&A deal is structured as follows: In t_0 the buyer will pay an initial payment of size I to the target in order to take over the target and to internalize its generated future cash flows. At τ the buyer, however, will pay a fraction κCF , i.e. the earnout payment, with $\kappa \in [0, 1]$ in order to further compensate the seller should the target firm be more profitable than expected. Consequently, the buyer's utility at t_0 equals:

$$U_B = (1 - \kappa)\delta(\mu_x + E(\tilde{y})) - 0.5\lambda_B\delta^2(1 - \kappa)^2(\sigma_x^2 + \text{var}(\tilde{y})) - I - TC \quad (1)$$

where $E(\tilde{y}) = 0.5(\bar{y} + \underline{y})$ and $\text{var}(\tilde{y}) = 1/12(\bar{y} - \underline{y})^2$ denote the expected value and variance of the uniform distribution, respectively. For the target we get:

$$U_T = (\kappa - 1)\delta(\mu_x + y) - 0.5\lambda_T\delta^2(\kappa^2 - 1)\sigma_x^2 + I \quad (2)$$

Given that only the buyer is uninformed about the new product's future success, he has to choose a contract such that it maximizes his utility given that the target still accepts the deal. Consequently, the bidder's optimization problem results to:

$$\begin{aligned} \max_{\kappa, I} & \left\{ (1 - \kappa)\delta(\mu_x + E(\tilde{y})) - 0.5\lambda_B\delta^2(1 - \kappa)^2(\sigma_x^2 + \text{var}(\tilde{y})) - I - TC \right\} \int_{\underline{y}}^{y^*} \phi(s) ds \\ & = \max_{\kappa, I} \left\{ (1 - \kappa)\delta(\mu_x + E(\tilde{y})) - 0.5\lambda_B\delta^2(1 - \kappa)^2(\sigma_x^2 + \text{var}(\tilde{y})) - I - TC \right\} \frac{y^* - \underline{y}}{\bar{y} - \underline{y}} \end{aligned} \quad (3)$$

where $\phi(s)$ denotes the probability density of the uniform distribution and y^* equals:

$$y^* = \frac{1}{(\kappa - 1)\delta} (0.5\lambda_T(\kappa^2 - 1)\delta^2\sigma_x^2 - (\kappa - 1)\delta\mu_x - I) \quad (4)$$

Here, y^* denotes the optimal new product cash flow below it is optimal to accept the earnout contract. Above y^* the target will always prefer to grow organically and reject the acquirer's bid. Consequently, the optimal contract $(\kappa^*; I^*)$ offered to the target in t_1 maximizes:

$$\begin{aligned} & \left\{ (1 - \kappa)\delta(\mu_x + E(\tilde{y})) - 0.5\lambda_B\delta^2(1 - \kappa)^2(\sigma_x^2 + \text{var}(\tilde{y})) - I - TC \right\} \\ & \times \left[\frac{1}{(\kappa - 1)\delta} (0.5\lambda_T(\kappa^2 - 1)\delta^2\sigma_x^2 - (\kappa - 1)\delta\mu_x - I) - \underline{y} \right] (\bar{y} - \underline{y})^{-1} \end{aligned} \quad (5)$$

Implications of the model

Figure 1 depicts the effect of an increase in the degree of technological-induced information asymmetry as proxied by $\text{var}(\tilde{y})$ on the buyer's utility. In particular, the findings reveal that for no information asymmetry at all, the earnout

¹ Next to earnouts, collars or contingent value rights (CVRs) are frequently used contingent payment forms in acquisitions (Eckbo, 2009). Exemplary, Chatterjee and Yan (2008) show that CVRs have a higher abnormal stock return than stock offers and bidders facing high asymmetric information are more likely to offer CVRs. Moreover, Officer (2004) investigates collars and stock payments. His findings show that collars are more likely to be used the greater the bidder's volatility compared to the target's volatility.

² We assume that the target firm only consists of one person. Thus, there is no additional separation between management and ownership, and no separation between management and workforce.

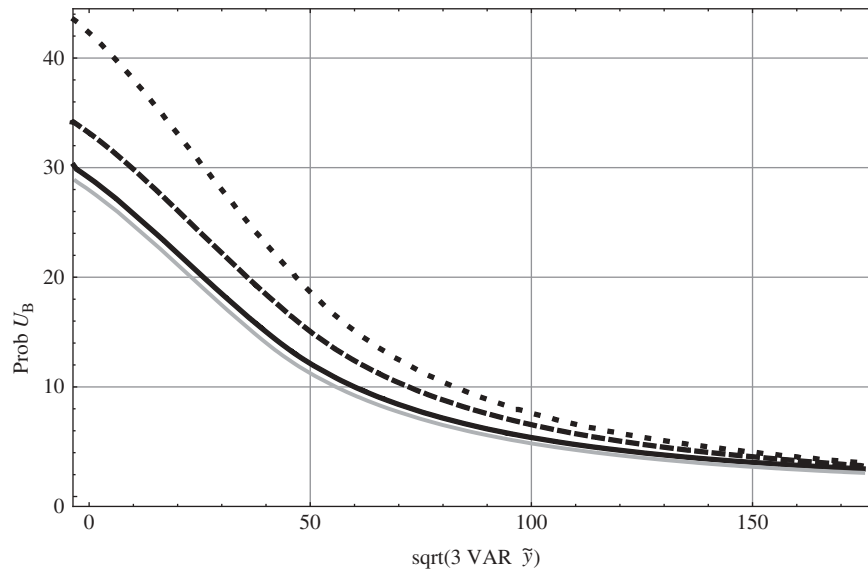


Fig. 1. Impact of degree of information asymmetry on the buyer's utility

Notes: Impact of degree of information asymmetry on the buyer's utility subject to the probability that the target accepts the deal. The solid line depicts the base case, i.e., $y = 100$; $\bar{y} = 250$; $r = 1$; $\lambda_B = .45$; $\lambda_T = .25$; $\mu_x = 100$; $\sigma_x = 35$, $\tau = 3$ and $TC = 0$. The grey line presents the solution for increased transaction costs $TC = 1$ while the dashed and dotted curve present the solution for increased uncertainty and shorter earnout period $\tau = 1$, respectively.

generates utility for the buyer and the target is willing to accept the deal. This first result is quite intuitive. The earnout allows the buyer to shift some risk to the target. Consequently, his risk is reduced and this increases his utility. Moreover, we also see that an increase in the transaction cost will have a negative impact on the buyer's utility. Consequently, in the absence of information asymmetry only for very high transaction costs, the earnout will not be the proper instrument.

In our model, the buyer is facing an information deficit with respect to the future performance of new innovations. Thus, should the degree of technology-induced information asymmetry increase we see that the buyer's utility is decreasing. This is mainly driven by the fact that the buyer has limited information about the profitability of the new product. However, he has to offer a contract $(\kappa^*; I^*)$ to the target such that the target management is willing to accept the deal. Consequently, with increased information asymmetry the probability that the target is willing to accept is decreasing, lowering the expected utility conditional on a successful bid of the buyer, respectively (see Equation 3). For very high levels of technological-induced information asymmetry, the utility approaches zero indicating very low probabilities that the target management will accept the deal under such conditions (Fig. 1).

The comparative-static analysis also reveals that the buyer's utility is positively affected by cash flow uncertainty σ_x . Consequently, an increase in the variance of the target's cash flow generally increases the attractiveness to shift portions of the risk to the target by means

of an earnout contract (see Fig. 1). Figure 1 also reveals that a negative relationship between the earnout period τ and the buyer's utility exist, i.e. a shorter earnout period increases the buyer's utility. As was alluded earlier the buyer does not know the quality of the new project and can thus only jointly optimize his utility and the probability of a successful bid. Hence, a shorter earnout period increases both the buyer's unconditional utility and the probability that the target will accept the contract. In particular, a shorter earnout period corresponds to a higher discount factor δ putting more weight on the risk. Consequently, the buyer is willing to offer a higher earnout in order to shift some risk to the target thereby increasing his unconditional utility. Moreover, because we have assumed that the seller is less risk-averse this also increases the probability that the target will accept the contract. To summarize the implications, the model suggests that in the absence of technological-induced information asymmetry, the earnout allows the buyer to improve its utility and this payment form should be preferred over a classical lump sum-induced M&A deal. Moreover, the higher the buyer's transaction costs associated with completing, monitoring or enforcing an earnout, the less valuable the earnout becomes. While higher uncertainty of the target's cash flow results in raising the buyer's utility, we see that higher degrees of technological-induced information asymmetry have an opposing effect on the buyer's utility. Finally, shorter earnout periods impact the buyer's utility positively.

As the M&A literature and the literature on earnouts in particular suggest multiple ways to measure the exogenous variables in our model, we will operationalize our model in the following section by discussing several suitable measures. Subject to the proxies chosen for *uncertainty*, *transaction cost*, *information asymmetry*, we furthermore deduce the relevant hypotheses for the subsequent empirical study.

IV. Hypotheses

Overall hypothesis

In the following, we will measure the value creation of earnout-induced and nonearnout-induced M&As by means of abnormal returns. According to the present literature, the capital markets see earnout-induced M&As as more valuable as comparable M&A deals without such an instrument. Alike, we expect that this result also holds for the German sample. This leads to the first hypothesis:

Hypothesis 1a: *The abnormal return of German acquirer using an earnout is positive and greater than the return on comparable acquisitions without an earnout.*

Transaction costs

As our model has indicated, transaction costs have a significant impact on the attractiveness of an earnout clause. Transaction costs may, however, arise from different sources. With respect to the economic environment the buyer operates in, Boehmer (2000) stresses the question whether the Anglo-American capital markets or highly concentrated ownership and universal banks in Germany are better suited to monitor the acquirer's management or not. In this context, the additional external monitoring can reduce agency costs associated with earnouts. These agency costs arise from the principal-agent relationship between the bidder and the seller who – in most cases – remain as manager in the target (Sherman and Janatka, 1992; Kohers and Ang, 2000; Cain *et al.*, 2011). According to this, German acquirer can profit more from an earnout than a US acquirer. Thus, the following hypotheses can be stated:

Hypothesis 1b: *The abnormal return of German acquirers using an earnout is positive and greater than the abnormal return of US acquirers using an earnout.*

Of course, transaction costs may also arise more directly between the parties involved. Following Ragozzino and Reuer (2009), two main deal characteristics affect the transaction costs at the deal level. First, cross-border acquisitions usually involve the need for information regarding the risks of the foreign markets and foreign accounting, disclosure and legal requirements, respectively (Mantecon, 2009). Hence, most empirical studies

find a negative cross-border effect for the acquirer (Moeller *et al.*, 2004; Eckbo, 2009). However, the earnout's incentive and selection mechanisms can facilitate business valuation and purchase price decisions in cross-border transactions (Sherman, 2004). In particular, the earnout payment creates an incentive for the seller to resolve valuation uncertainties caused by lack of information about the target's home country and its legal system. Furthermore, by accepting an earnout, the foreign seller signals confidence in the target's future performance. However, Mantecon (2009) shows that stock markets place an insignificant value on earnout agreements in international transactions. Also, Datar *et al.* (2001) find that earnouts are less likely to be used in cross-border acquisitions possibly due to the increased costs of using them, including having to negotiate, monitor and enforce the agreement in a different language and within a different culture and legal system. In this situation, it is not too surprising that the stock market would view the use of an earnout as of negligible value. Thus, we state:

Hypothesis 2a: *Market reactions to announcements of M&As that include earnouts will be weaker for cross-border than for domestic transactions.*

Apart from the cross-border dimension, the characteristic of the legal system affects the size of the transaction costs incurred by the parties. Reuer *et al.* (2004) attest that buyers use significantly fewer earnouts in cross-border acquisitions in which the target companies are from countries that operate under the continental European legal system. According to La Porta *et al.* (1997), this legal system (e.g. in France and Germany) provides investors with less protection and poorer enforcement options. These options can play a tremendous role in M&A deals, because earnout agreements are more exposed to litigations (Del Roccili and Fuhr, 2001; Frankel, 2005). However, it is not only the type of legal system in the target country that is crucial for earnout contracts, but also the degree of jurisdictional similarity between the acquirer and target countries (Kohers and Ang, 2000). Thus, in the case of German acquirers, we expect lower transaction costs for M&As that occur across identical legal systems. Vice versa, in the case of cross-jurisdictional transactions we expect a negative stock market reaction. Hence, the following hypothesis can be deduced:

Hypothesis 2b: *Market reaction to announcements of M&As that include earnouts will be stronger in cases where there is a high level of jurisdictional similarity between the host countries than in cases of low jurisdictional similarity.*

Technological-induced information asymmetry

In the current literature, several indicators for information asymmetries between the buyer and seller can be

identified (Datar *et al.*, 2001; Mantecon, 2009; Cain *et al.*, 2011). Datar *et al.* (2001) point out that earnout agreements are particularly likely in transactions involving target companies with high research and development expenditures (R&D) to revenue ratios. Mantecon (2009) notes, however, that not earnouts *per se* are an effective means of reducing R&D-induced information asymmetries in the target company. Rather, it is the absorption capacity of acquirers that is more significant in overcoming information asymmetries and supports the earnout. The absorption capacity is the ability to identify, process and interpret encoded knowledge (Cohen and Levinthal, 1989; Gilroy *et al.*, 2008). Consequently, an acquirer with a large stock of knowledge-intensive resource can more accurately assess the future risk and growth potential (e.g. cash flows) of the target and will be able to do so cost effectively, thus reducing transaction costs of the earnout. Our model gives a similar prediction. The implication is that we expect a higher abnormal return for acquirer with high absorption capacity and further relying on earnout agreements. Thus, the following hypothesis can be stated:

Hypothesis 3a: *Market reactions to announcements of M&As that include earnouts will be stronger for R&D-intensive acquirers than for less R&D-intensive acquirers.*

Likewise, larger corporations can more effectively reduce information asymmetries with an earnout. According to Nooteboom (1999), large corporations usually have better access to information (e.g. by employing consulting firms and businesses) and financing (e.g. a better credit rating) and can rely on their own know-how in structuring a transaction (e.g. more acquisition experience). Consequently, they have better abilities to assess the target and its cash flows. Furthermore, the larger the corporation, the more closely it will be linked with the banking system (e.g. in Germany via ownership of share, providing loans, represented on supervisory board) and the more likely it is that the corporation can use this relationship to its advantage and obtain useful information about the target to improve the net present value of such a transaction (Boehmer, 2000). Indeed, it will be in the bank's best interest not to extend credit to the corporation to buy a poor risk. Thus, we state the following hypothesis:

Hypothesis 3b: *Market reactions to announcements of M&As that include earnouts will be stronger for larger acquirers than for smaller acquirers.*

Contract parameters

Cain *et al.* (2011) investigate the earnout period and the target's industry volatility in a tobit regression. Their findings reveal that the target's industry volatility, measured by the SD of daily returns has a strong negative and significant impact on the length of the earnout period. Our model predicts that an increase in uncertainty and shorter

earnout periods, respectively, increase the attractiveness of an earnout. This is mainly driven by the fact that in both cases the risk associated with the future cash flow development is more pronounced, lowering the buyer's unconditional utility. As a reaction, he will offer a higher earnout payment to the seller, thereby improving his unconditional utility and the probability of a successful bid alike. Consequently, we state the following hypothesis:

Hypothesis 4a: *Market reaction to announcements of M&As that include earnouts will be stronger the shorter the length of the earnout period.*

Hypothesis 4b: *Market reaction to announcements of M&As that include earnouts will be stronger the higher the target's volatility.*

V. Methods

Event study methodology

We conduct an event study to evaluate the success of earnouts (see, e.g. Ball and Brown (1968), Beaver (1968), Fama *et al.* (1969), Campbell *et al.* (1997), MacKinlay (1997) and Corrado (2011)). The abnormal return (or excess return) $AR_{i,t}$ is obtained by the difference between the observed return $R_{i,t}$ and the expected return as determined by means of the market model:

$$AR_{i,t} \equiv \varepsilon_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t}) \quad (6)$$

where α_i and β_i are regression coefficients and $\varepsilon_{i,t}$ is the error term. The return of a diversified market portfolio equals $R_{m,t}$. Both coefficients are estimated by ordinary least squares (OLS) regression in the period $T = [-205; -6]$. Cross-sectional average abnormal return at date t , AAR_t , is estimated by:

$$AAR_t = \frac{1}{N} \sum_{i=1}^N AR_{i,t} \quad (7)$$

To analyse the abnormal returns within a certain event window, cumulative average abnormal returns ($CAAR_{[e_1, e_2]}$) are calculated as follows:

$$CAAR_{[e_1, e_2]} = \sum_{t=e_1}^{e_2} AAR_t \quad (8)$$

Furthermore, we calculate the average cumulative abnormal euro returns (ACAER) for the earnout sample. Therefore, we multiply the firm-specific cumulative abnormal return $\left(CAR_{i,[e_1, e_2]} = \sum_{t=e_1}^{e_2} AR_{i,t} \right)$ for the symmetric 3-day event window $[-1; +1]$ around the deal

announcement date with its market capitalization ($Mcap_i$) taken from the previous fiscal year (Peterson, 1989). Thus, we get:

$$ACAER_{[-1;+1]} = \frac{1}{N} \sum_{i=1}^N CAR_{i,[-1;+1]} \times Mcap_i \quad (9)$$

Cross-sectional analysis

In the second step, we investigate the previously discussed factors that are expected to influence the abnormal returns of the sample companies. Using the standardized event announcement day return ($SAR_{i,[t=0]}$) as the dependent variable, we arrive at the following multiple regression model:

$$SAR_{i,[t=0]} = \delta_0 + \sum_{j=1}^J \delta_j X_{i,j} + \eta_{i,0} \quad (10)$$

where $X_{i,j}$ are independent variables and $\eta_{i,0}$ is the error term. When the sample is of adequate size, the regression coefficients δ_j can be efficient and the OLS estimators unbiased. To cope with violations in statistical assumptions of the classical linear regression model, robust SEs are calculated to cope with heteroscedasticity and autocorrelation. Furthermore, we test for the normality of the disturbance term, the linearity assumptions and for multicollinearity. Descriptions and statistics for the independent variables are given in the Appendix (see Table A1). Next to the hypothesis variables, we control variables for information asymmetries between bidder and seller (e.g. target is private, is partially acquired or from the high-tech-industry) which are frequently used in earnout regression models (Kohers and Ang, 2000; Datar *et al.*, 2001; Reuer *et al.*, 2004; Mantecon, 2009; Ragozzino and Reuer, 2009).

Data

The earnout sample was generated from M&A databases from the *Bureau van Dijk* (BvD, ZEPHYR Database) and *Thomson Reuters* (SDC Platinum accessed via Thomson.One) and other freely available information services such as, for example, *euro adhoc*. Signal words were used to identify deals that involved earnouts (see the Appendix, Table A2). During the period under investigation, 1 January 2000 until 30 September 2013, 236 earnout transactions involving German buyers were identified. Transactions involving nonlisted (delisted) corporate buyers (42 cases) and those where less than 50% of the target shares were acquired (16 cases) were excluded from the sample. Furthermore, four transactions were excluded because of their overlapping

event windows. Another five cases were removed from analysis since the earnout definition was not satisfied. The final sample is comprised of 169 transactions. The closing prices paid by the German acquirers and the market index are from the *Thomson Reuters*. These prices are adjusted by dividend payments, capital changes and stock splits. As a market-weighted index, the *CDAX* performance index by *Deutsche Börse Group* was used. The data for the metric and dummy variables are from *ZEPHYR*, the *DAFNE* database of *BvD* and *Thomson Reuters*.

VI. Results

Overall results

The stock market reaction to the selected 169 German earnouts is significant and is on an average 1.439% at the announcement day (see Table 1). This influence is not statistically significant the day before and less significant the day after the announcement. The cumulative announcement effect in time window $CAAR_{[-3;+3]}$ is still statistically highly significant and positive at 2.036%. These findings are confirmed to be valid based on robust test statistics according to Brown and Warner (1980, 1985), Boehmer *et al.* (1991), Cowan and Sergeant (1996a) and Corrado (1989, 2011). Thus, Hypothesis 1a about the favourable use of earnouts in M&A deal cannot be rejected.

Furthermore we contemplate a control group to disentangling the idiosyncratic effect of earnout clauses in M&A deals. Therefore, we ascertain acquisitions comparable to earnout deals but without agreeing such a clause (called nonearnouts). We matched for every earnout transaction two comparable transactions based on similar industries, countries, announcement dates and sizes. Data and comparables were collected with the help of

Table 1. Overall earnout results

Event day	N	Average abnormal return (in %)	Event window	N	Cumulative average abnormal return (in %)
+1	169	0.426**/++	+1;-1	169	2.036***/+++
0	169	1.439***/+	0;+1	169	1.865***/+++
-1	169	0.171	-1;0	169	1.610***/+++

Notes: Parametric test, Standardized cross-sectional test statistic according to Boehmer *et al.* (1991); Nonparametric test: Rank order test statistic according to Corrado (2011). Significance level (parametric test/nonparametric) ***/+++ $p < 0.01$; **/+ $p < 0.05$; */+ $p < 0.10$.

Table 2. Earnout versus Nonearnouts

Panel		Sample	N	CAAR[-1;+1] (in %)	Avg. Mcap in mio. EUR)	Avg. CAER[-1;+1](in th.)
Base case	(a)	Earnouts	169	2.036***	4396.21	3481.45
Comparable control groups	(b)	Nonearnouts (Total)	338	0.991	3558.48	-16 983.13
		Difference (a-b)		1.046[***]	837.73	20 464.58
	(c)	Nonearnouts (Cash)	169	0.800	4612.29	-28 923.26
		Difference (a-c)		1.237[***]	-216.08	32 404.71
	(d)	Nonearnouts (Shares)	169	1.168	2468.62	-5444.97
		Difference (a-d)		0.868[***]	1927.59	8926.42

Notes: CAAR[-1;+1], cumulative average abnormal return for the event date and the day before and after the announcement; Avg. MCap, is the average market capitalization; Avg. CAER[-1;+1], average cumulative abnormal euro returns for the event date and the day before and after the announcement. For testing differences Wilcoxon-Mann-Whitney two sample test [Significance level] is used. Control groups are formed by M&A transactions comparable to deals of the earnout sample without agreeing such a clause (called nonearnouts). (c) deals using only cash in consideration and (d) only using shares in consideration. Significance level *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

Table 3. German earnout versus US earnouts

		Base case	Control group	
	Criterion	Earnout (German acquirer)	Earnout (US acquirer)	Difference
Performance	AAR (in %)	1.439*** ($n = 169$)	0.641*** ($n = 1523$)	0.798[**]
	CAAR [-1;+1] (in %)	2.036*** ($n = 169$)	1.130*** ($n = 1523$)	0.907[***]
Comparability	Avg. MCap (in Mio. EUR)	3970 ($n = 169$)	3890 ($n = 1448$)	79.20

Notes: CAAR[-1;+1], cumulative average abnormal return for the event date and the day before and after the announcement; Avg. MCap is the average market capitalization; For testing differences Wilcoxon-Mann-Whitney two sample test [significance level] is used. Control group consists of deals with US acquirer using earnouts from 1 January 2000 to 30 September 2013. Significance level *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

Thomson Reuters. The results are shown in Table 2. We can find significant differences in the cumulative abnormal returns for the 169 earnouts and the 338 nonearnout samples. Subsequently, we distinguish between the nonearnouts using only cash or shares in consideration. The differences in the cumulative abnormal returns are significant in favour of our earnout sample, too. According to this hypothesis, 1a cannot be rejected. To show the monetary consequences of earnout deals and nonearnout deals, we calculated the average cumulative abnormal euro returns (ACAER). On average, every earnout deal generates for a 3-day event window a positive amount of 3.48 million euros. All control groups generate negative ACAER. Compared with the total nonearnouts an earnout deal shows a positive amount of about 20 million euros and demonstrates how effective earnouts are seen in Germany.

Hypothesis 1b is tested by comparing our earnout sample with earnout deals carried out by US acquirers (see Table 3).

The US acquirers ($n = 1523$) show significant and positive abnormal returns too. However, the difference test reveals a significant and positive difference in favour of German acquirers (see Table 3). According to this we cannot reject hypothesis 1b. Thus, the stronger impact of the larger German ownership and the universal banking system favour the use of earnouts by German acquirer.

Furthermore, we use the debt-equity ratio (*Debt/Equity*) as a control variable to support this view. Previous studies show that creditors closely scrutinize the management decisions of companies having high debt ratios with the usual result being that these companies have less cash flow available for financing risky M&As (Jensen, 1989; Stulz, 1990). The obligation to make periodic invariable principal payments may force the management to exercise particular caution when making strategic decisions, such as an M&A (Jensen, 1986). Furthermore, it also signals its confidence in the ability of making these payments (Ross, 1977). However, a high debt-equity ratio has a negative

influence (Table 4, regression 2). It thus appears that the use of an expensive and risky financial instrument like the earnout – in combination with a high level of indebtedness – signals that no other cheaper financing opportunities are available. Furthermore, the stock market reacts negatively when the shareholders (e.g. German banks) assume that the returns of positive net present value projects may be used to finance the future earnout payments instead of repaying debt. This result contradicts our above findings for high indebted acquirers and gives support to reject hypothesis 1b.

Information asymmetries

We control for several variables indicating the parties' information asymmetry using the *Private*, the *Stake* and the *Hitec* variable (see Table A1; Kohers and Ang (2000), Datar *et al.* (2001), Reuer *et al.* (2004), Mantecon (2009) and Ragozzino and Reuer (2009)). The variable *Private* is significant and shows the expected positive impact on the success of announcing earnouts by German acquirers (see Table 4, regression 1). Thus, investors view this contingent payment instrument as an appropriate way of reducing the information asymmetries that characterize transactions involving private targets (e.g. because these companies are not legally required to publicly disclose business reports). Furthermore, in many deals earnouts and partial ownership are combined. Partial acquisitions can have similar functions like an earnout when coping with information asymmetries. Because in partial ownership we assume a higher number of shareholders this can increase the agency cost associated with the earnout as in the case of public targets mentioned above (Ragozzino and Reuer, 2009). According to this, we control in all regressions for the acquired stake in the target firm. For this control variable *Stake*, we find a significant positive impact on the abnormal return (see Table 4, regression 1). This result supports the view of Ragozzino and Reuer (2009) that the value of using an earnout will be greater in full than partial acquisitions. Next to this, we control for targets from the high-tech-industry. Empirical studies show that earnout arrangements are especially common in technology- and service-intensive sectors (Datar *et al.*, 2001; Reuer *et al.*, 2004). The earnout creates an incentive for the seller to retain valuable employees in the target company ensuring that business continues as usual. Thus, the earnout ensures that critical human capital is not leaving and future competitiveness is not compromised. Our empirical results show that the *Hitec* variable is not statistically significant, but its sign is as predicted (see Table 4, regression 1). A possible explanation for this is that these industries tend to experience rapid technological change, which could make an earnout agreement with an average duration period of 2.50 years inappropriate. Their rapidly changing environment means that high-tech service

businesses find it difficult to establish a reliable business plan (e.g. market analysis, marketing and financial plan), which has implications for the earnout base and its threshold. This entire situation increases the risk of judicial intervention becoming necessary. Hence, transaction costs increase with the consequence that an earnout becomes less useful.

Transaction costs

We test hypothesis 2a and 2b with the *CivilLaw* and the *CrossBord* variable. While the *CivilLaw* variable indicates that the German bidder and the target firm come from identical legal systems, the *CrossBord* variable indicates international acquisitions. The *CivilLaw* variable has a significant and positive impact on the success of earnouts (see Table 4, regression 3). Thus, Hypothesis 2b cannot be rejected. Furthermore, the simple distinction between domestic and foreign target companies shows an insignificant and negative effect. Thus, Hypothesis 2a can be rejected. The results show that the stock market views only domestic deals and cross-border transactions in which the acquirer and target country operate under the same legal system as 'appropriate.' In this situation, the acquirer can profit from the positive earnout functions and incurs only low earnout-induced transaction costs (e.g. legal enforcement of property rights). The special protection and better enforcement of property rights in countries with a code law tradition (Anglo-American countries) seems not to affect the abnormal returns of the German acquirers. According to Reuer *et al.* (2004), these conflicting results clarify that no one system is better or worse when it comes to earnout acquisitions; it is the similarity (or lack thereof) of the legal systems under which the parties operate that is important. Transaction costs will be lower the higher the similarity. This result is in line with our model implication.

Technological-induced information asymmetries

Hypothesis 3a is tested with the absorption capacity variable *RnD/Rev*. This measure shows the predicted positive effect on the success of earnouts (see Table 4, regression 4) and is significant at the 10% level. According to this, hypothesis H3a cannot be rejected. Thus, the findings indicate that the absorption capacity of the acquirer helps to reduce earnout-induced transaction costs and makes the deal more favourable. The *DealVal/MCap* variable has the expected negative effect on announcing earnouts (see Table 4, regression 5). Its impact is significant. Hence, Hypothesis 3b cannot be rejected. It seems that larger corporate acquirers in Germany have better internal and/or external access to information about the target (e.g. through their relationship with German banks) and this information acts as a cheaper substitute to the earnout agreement. Both variables confirm our model predictions,

Table 4. Multiple regression, variables regressed on $SAR_{i,t=0}$

	Basic model		Extended models				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Constant</i>	-0.440* (.250)	0.757** (.382)	-0.041 (.273)	-0.561** (.257)	-0.688** (.271)	-0.588* (.33)	0.225 (.55)
<i>CivilLaw</i>	0.399** (.191)	0.405** (.203)		0.476** (.202)	0.310 (.262)	0.450** (.23)	0.804*** (.25)
<i>Private</i>	0.490** (.247)	0.439* (.234)	0.497** (.253)	0.496** (.240)	0.841*** (.281)	0.528* (.30)	0.361 (.34)
<i>Stake</i>	0.315* (.172)	0.302* (.159)	0.301* (.172)	0.337** (.167)	0.164 (.226)	0.368* (.22)	0.081 (.22)
<i>Hitec</i>	0.096 (.205)	-0.095 (.270)	0.099 (.204)	0.041 (.286)	0.267 (.323)	0.190 (.22)	0.301 (.36)
<i>Debt/Equity</i>		-0.264*** (.078)					
<i>CrossBord</i>			-0.202 (.206)				
<i>RnD/Rev</i>				1.729** (.776)			
<i>DealVal/Mcap</i>					0.674** (0.314)		
<i>Vola</i>						0.015*** (0.00)	
<i>EOPeri</i>							-0.382*** (.13)
<i>N</i>	169	167	169	169	94	156	86
<i>R²</i>	0.06	0.10	0.05	0.08	0.14	0.07	0.18
Adjusted <i>R²</i>	0.04	.06	0.02	0.05	0.09	0.04	0.13
<i>F</i> -Statistic	2.66**	3.40***	2.04*	2.74**	2.85**	2.172*	3.549***

Notes: OLS regression coefficients with robust (Newey–West) SEs in brackets. Target/acquirer country variables: *CivilLaw* (civil law = 1, code law = 0), *CrossBord* (Germany = 1, other countries = 0). Target variables: *HitecMan* (high-tech manufacturing = 1, other industries = 0), *Private* (nonlisted target = 1, listed target = 0). Acquirer variables: *Debt/Equity* (leverage ratio), *DealVal/MCap* (deal value to market capitalization ratio), *RnD/Rev* (R&D expenditure to revenue ratio). Contract variables: *Stake* (full ownership = 1, partial ownership = 0); *EOPeri* (earnout period); *Vola* (SD of daily returns from comparable target companies).

Significance level *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

i.e. larger acquirer or acquirer with high R&D expenditures are better in encoding tacit knowledge of target companies (e.g. private targets, targets from the high-tech or service-industry) regarding the future profitability and thus suffer to a lesser degree from technological-induced information asymmetries.

Contract parameters

To test Hypothesis 4a, we use the *EOPeri* variable that measures the length of the earnout period. Hypothesis 4b is measured by the *Vola* variable, the SD of daily returns from comparable target companies. The findings reveal that the Hypothesis 4a cannot be rejected. Specifically, the transaction-specific variable *EOPeri* shows a significant effect on the shareholder value with the predicted sign (see Table 4, regression 7). Next to our confirmed model implication, a longer duration provides the opportunity to manipulate the earnout base and negotiated performance thresholds too (see, e.g. Eckbo, 2009). Consequently, due to an increased risk of legal action, an earnout period of longer than 3 years is regarded as less attractive. In addition, these results indicate that increased transaction costs overtake the value-enhancing effects of earnouts, that is, reduced information asymmetry. Furthermore, the *Vola* variable has a positive and significant impact on the bidder's abnormal return and confirms our model implications (see Table 4, regression 6). Thus, Hypothesis 4b cannot be rejected.

VII. Conclusion and Limitations

Reducing information asymmetries that pertain to financial performance is of major concern in M&As. Earnouts are viewed as a promising instrument to achieve this goal. With respect to the present literature, however, two limitations can be attested. First, the studies predominantly investigate earnouts in Anglo-American economies and it is questionable whether we can generalize on these findings for other economies. Second, while earnouts have become an increasingly popular way of coping with information asymmetries and reducing the risk of overpayment in takeovers, less is known about what really drives the design of such contracts. To answer these questions, we conduct an event study that examines abnormal returns for different M&A contracts for a cross-industry sample of German acquirers. The novel aspect of this article is that we explicitly present a theoretical model to discuss the effect of technological-induced information asymmetries on the design of earnout contracts. While we find support for the fact that capital markets favour the use of earnouts when uncertainty and the buyer's ability to reduce technological-induced information

asymmetry is high, a too-long earnout period specified in the contract appears to be detrimental.

The study, however, is not without some limitations. Evaluating earnout success based solely on stock market reaction is obviously too simplistic in that the advantages and disadvantages of earnouts from the perspective of the private acquirer are neglected. For example, earnouts might also be used by nonlisted buyers and their reasons for using this instrument may be significantly different from those of listed acquirers. Another issue is the under-reporting of earnouts and the possible motives behind nondisclosure of purchase conditions in the acquirer's *ad hoc* release, raising the suspicion of self-selection bias. Moreover, the contingent feature of earnouts is not fully captured making it promising to implement option pricing techniques into the model. In this context, differentiation between mature and young companies as well as between those with and without high growth prospects/options could be a promising avenue for future research.

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Appendix

Table A1. Independent variables – definitions, signs and descriptive statistic

Variable	Description	Sign (cf. earnout studies)	N	Mean	SD	
CivilLaw	Civil law target country (=1), Code law country (=0)	+	(Kohers and Ang, 2000)	169	0.69	0.46
Private	Nonlisted targets (=1), Listed targets (=0)	+	(Kohers and Ang, 2000)	169	0.77	0.42
Stake	100% stake acquired (=1), less than 100% acquired (=0)	+	(—)	169	0.76	0.43
Hitec	High-tech targets (=1), other industries (=0)	‘+’	(Kohers and Ang, 2000)	169	0.36	0.48
CrossBord	International targets (=1), German targets (=0)	+/-	(Kohers and Ang, 2000; Mantecon, 2009)	169	0.59	0.49
RnD/Rev	Acquirer’s absorption capacity; ratio between R&D expenditures and revenue*	‘+’	(—)	169	0.04	0.10
DealVal/ MCap	Acquirer’s deal value divided by its market capitalization*	‘+’	(—)	93	0.19	0.43
Debt/ Equity	Acquirer’s debt equity ratio*	‘+’	(—)	167	3.07	8.73
Vola	SD of daily returns from comparable target companies	‘+’	(—)	156	1.25	5.77
EOPeri	Period between closing and last earnout payment (in years)	‘-’	(—)	86	2.34	1.22

Notes: (—) no empirical study for this variable; ‘+/-’ predicted sign by authors; N = number of transactions; SD = standard deviation; *values are from the end of the fiscal year prior to the acquisition announcement. *Hitec* (NACIS Codes: 333314–15, 333295, 334111–13, ... 19, 334210, ... 20, ... 90, 334310, 334411–19, 334510–17, ... 19, 335921, 517110, 517211–12, 517310, ... 410, ... 510, ... 910, 518111–12, 518210, 541511–13, ... 19, 541330, ... 80, 541710, 611420).

Table A2. Signal words for earnout transactions

German signal words:	‘Earnout/Earnout/Earnout-Regelung/Earnout-Vereinbarung/Earnout-Zahlung/Earnout-Komponente’ ‘Anfangs(kaufpreis-)zahlung/fixe (Kaufpreis-)Zahlung/feste (Kaufpreis-)Zahlung/(Kaufpreis-)Zahlung/ Gesamtkaufpreis, ... zusätzliche (Kaufpreis-)Zahlung(en)/variable (Kaufpreis) Zahlung(en)/bedingte (Kaufpreis-)Zahlung(en), ... ergebnisabhängig/in Abhängigkeit der wirtschaftlichen Entwicklung der Unternehmung.’
English signal words:	‘earnout/earnout/earnout agreement/earnout payments’ ‘initial payment/fixed payment ... additional payment(s)/variable payment(s)/installment(s)/contingent payment, ... subject to future performance criteria/dependent on profit performance over the next ... months/years/payable in’