# Corporate investment under uncertainty: An empirical investigation of the embedded divestment (real) options in takeover premia paid by U.S. acquirers*

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**Abstract**

Acquirers often buy other companies and subsequently sell some of their assets. We assume that the acquirer has the option to sell activities outside its core business to an outside firm, which can make more efficient use of these resources. Thus, the takeover makes it possible to exploit synergy gains and it also incorporates the embedded option represented by the potential divestment gains. We examine whether the acquisition premium is affected by this option. All merger and acquisition announcements, and divestitures of acquired assets carried out subsequently, during the period from January 1999 to December 2009 for US based firms are considered. We estimate a model using the bid premium as the dependent variable and several factors identified in the literature as determinants of the premium as independent variables. Our results indicate that the premium is positively related to the runup on the target's stock and the percentage of the value of the first divestiture. On the contrary, the premium is negatively related to the size of the target and the market-to-book ratio of the target. Finally, we find evidence that the premium is positively related to the value of the divestitures and negatively related to the time interval between the acquisitions and the subsequent divestitures.

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# 1 Introduction

Acquirers often buy other companies and subsequently sell some of their activities or assets. Two alternative explanations for these occurrences have been offered. The first explanation is that a divestiture is a correction of a previous acquisition that was mistake, while the second explanation is that the divestiture was the original intent prior to the acquisition and that the acquiring firm extracts value from the acquisition-divestiture combination.

Following Alvarez and Stenbacka [2], we assume that the activities outside the firm's core business can potentially be sold to an outside firm, which can make more efficient use of these resources. Thus, the acquirer has the option to divest activities outside its core business and the outside firm can transform these assets into a profit flow. Consequently, the acquisition makes it possible to exploit synergy gains, and in addition to this primary benefit, it also incorporates the embedded option represented by the potential divestment gains.

We consider the combination of the two transactions as two parts of a more elaborate transaction. Our objective is to examine whether the acquisition premium is affected by the option the acquirer owns to divest a part of the target firm it has acquired. In particular, we will examine whether the firms that divested assets of the target firm they had previously acquired, had paid a higher premium compared to a control group of firms which made acquisitions that were not followed by divestitures.

The empirical investigation of the occurrence of acquisitions and subsequent divestitures is quite limited and the few empirical studies find no consistent evidence that the acquisition-divestiture combinations either benefit acquiring shareholders or destroy wealth. Common sense would imply that when an acquirer buys a target firm, it also buys an option to divest the assets of the target firm. To the best of our knowledge, there has not been any empirical work attempting to examine whether the firms that make acquisitions and subsequent divestitures pay higher premiums than non-divesting firms, which would mean that this embedded option is taken into account by the acquiring firms.

The rest of the paper is organized as follows: Section 2 provides a review of related work. Section 3 describes the methodology used in the empirical investigation, while the next section presents the acquisitions data set and the sample descriptive statistics. Section 5 presents and discusses the empirical results and Section 6 concludes the paper.

# 2 Literature Review

## 2.1 Wealth effects of acquisitions and divestitures

Several studies that investigate the wealth effects of acquisitions and divestitures have been made. Mitchell and Lehn [20] investigate firms that make acquisitions and they focus on firms that make acquisitions that reduce their equity value. They propose that there are "good" takeovers and "bad" takeovers and they conclude that firms that make "bad" takeovers are more likely to become takeover targets themselves, and are also more likely to divest. Their results show that firms that eventually divest have a significant drop in stock price upon the announcement of the takeover. They conclude that these divestitures are ameliorations of "bad" takeovers.

Kaplan and Weisbach [17] study divestitures by firms that had previously made acquisitions. They categorize divestitures as "successful" or "unsuccessful" based on the reasons stated by the firm and by the business press at the time of the divestiture, accounting data on the gain or loss on sale of the asset and the divestiture sale price. They find that acquirer abnormal returns are lower for acquisitions that result in "unsuccessful" divestitures than those that result in "successful" divestitures. Furthermore, they find a greater abnormal price increase on the divestiture announcement for "successful" divestitures than for "unsuccessful" ones.

Allen et al. [1] investigate the "correction-of-a-mistake" hypothesis for spinoffs after acquisitions. They find that at the time of the original acquisition, the announcement period excess return to the bidding firm and the combined announcement period excess return to the bidder and the target are negative and significant for acquisitions that later became spinoffs. They also find that the spinoff announcement period excess returns for spinoffs that began with an acquisition are negatively correlated with the original acquisition announcement period excess returns. However, they find no significant difference in spinoff announcement period excess return to spinoffs of prior acquisitions and spinoffs that did not begin as acquisitions.

Fluck and Lynch [12] develop a theory wherein the motivation for mergers stems from the inability of firms to finance marginally profitable projects as stand-alone entities. A conglomerate merger with a larger firm allows these projects, which would otherwise be rejected, to obtain financing. According to their theory, once the subsidiary has capitalized on these growth opportunities, there arises "coordination costs" due to the lack of synergy in the conglomerate and it is then beneficial for the larger firm to divest the newly funded firm. Thus, the acquirer enjoys the wealth created and the divestiture is interpreted by the market as good news.

Hanson and Song [14] investigate the long-term performance of firms that divest assets to assess whether resolving agency problems explains some of the gains. They find that divesting firms underperform control sample firms during the two years preceding the divestiture and outperform control sample firms in the three years following the divestiture. These results support the argument that divestitures improve the firm's operations by removing negative synergies. They also find that managerial ownership is unrelated to the poor performance preceding the divestiture, but it provides strong incentives to improve operations following the divestiture.

Finally, Marquette and Williams [19] analyse the effect of takeover and subsequent divestiture on the value of the firm that initiates the takeover. They find that there is a negative wealth effect for the acquiring firm upon the announcement of the takeover and a positive wealth effect for the spinoff, but the combined wealth effect is not significant. However, they find a significant positive relationship between the market value change for the combinations of the two transactions, that they call "flips", and R&D expenditures in the target firm. These results are consistent with the theory of Fluck and Lynch [12], which suggests that takeover-divestiture combinations can increase shareholder wealth when target firms have growth opportunities that can be appropriated.

## 2.2 Determinants of acquisition premiums

The main determinants of the premium identified in the literature are the runup on the target's stock, the market-to-book ratio of the target, the past performance of the target, the size of the target, the target's and the buyer's leverage, the buyer's free cash flows, the hostility of the transaction, the mode of the bid (negotiation with the target's managers or public takeover offer), the payment method, the presence of more than one potential acquirers, the presence of termination fees and the presence of information asymmetry between bidders.

According to the markup price effect identified by Schwert [24], there is little substitution between the post-announcement increase in the target's stock price (the markup) and the pre-bid runup. He estimates the runup as the cumulative abnormal return on the target's stock over a two-month period before the announcement and his results indicate that a higher runup is associated with a higher premium paid to acquire the target, since at least two-thirds of the runup is added to the total premium paid. Betton et al. [7] estimate the runup as the logarithm of the ratio of the share price of the target on the day before the announcement to the share price 42 days before the announcement and they also find that runup is positively related to the premium paid, while Dionne et al. [9] estimate the runup in the same way and their results are consistent with those of previous studies.

The market-to-book ratio is used in the literature to represent new growth opportunities. Therefore, it is expected that acquirers pay a higher premium for a target with a high market-to-book ratio, because it offers new investment opportunities. Betton et al. [6] imply that if the market-to-book ratio of the target is higher than the median ratio of the industry, the target is a growth company and should command a higher premium. They find that a market-to-book ratio higher than the median ratio of the industry is associated with a 3% increase in the premium. However, some acquirers are attracted by firms that are undervalued in the market. Thus, Comment and Schwert [8] obtain a lower premium when the market-to-book ratio is high.

The past performance of the target may have two opposite effects on the premium. Acquirers may be interested in targets that perform poorly because of the gains that could be realized if the current managers were replaced. Thus, the relation between the performance of the target and the premium paid is negative. On the other hand, poor performance is often associated with fragile financial health, which is likely to hinder the target's ability to negotiate and to lead to a positive relation between performance and premium. Schwert [25] examines the impact of past performance on the premium and obtains a negative but nonsignificant coefficient. Dionne et al. [9] measure the target's performance by sales growth and find that the premium is higher when there is a decrease in the growth of target's sales.

Both the size of the target directly and a ratio of the size of the target to that of the acquirer have been used in the literature to analyse the influence of firm size on the premium paid. Comment and Schwert [8] and Schwert [25] use the target size and conclude that it is negatively related to the premium because acquirers pay higher premiums for small firms, since their limited size makes them more easily integrated into the acquirer's operations, and avoid larger targets, which are associated with higher integration costs. Gondhalekar et al. [13] and Moeller [21] use a relative size variable and find that it is significantly and inversely related to the premium. Dionne et al. [9] use both the target size and the relative size and also obtain negative and significant coefficients.

The debt level of both the acquirer and the target influences the premium paid. Gondhalekar et al. [13] propose that if an acquirer has considerable debt, limitations are imposed on the acquirer's ability to pay and therefore it cannot offer an an overly high premium. They report a significant negative influence of the acquirer's debt-to-equity ratio on the premium. Moreover, they propose that a target that has considerable debt is less attractive and the premium paid to obtain it is lower. However, Bates and Lemmon [5] find weak evidence that the target's leverage is positively correlated to the premium.

The premium paid during an acquisition can also be influenced by the acquirer's hubris or agency problems. According to the hubris hypothesis, introduced by Roll [23], managers that possess exaggerated self confidence overestimate their ability to manage the target and, thus, pay high premiums to

acquire it. Hayward and Hambrick [15] investigate the influence of hubris of the CEO on the premium and find that hubris is associated with higher premiums. Agency problems occur when the acquirer's managers use the company's free cash flows to undertake projects that generate few profits for shareholders, in order to maximize their own interests (Jensen [16]). Gondhalekar et al. [13] propose that acquirers with a low-market-to-book ratio but high free cash flows are likely to over-invest and therefore pay higher premiums. They analyse the impact of free cash flows and investment opportunities on the premium, and find that high cash flows are positively related to the premium, while the acquirer's investment opportunities are negatively related to the premium.

A target that receives a takeover bid can either accept it or reject it aggressively. Schwert [25] implies that a hostile reaction is intended to decrease the probability of success of the acquisition or initiate negotiation of a better offer and increase the price the acquirer pays. Moeller [21] and Dionne et al. [9] find that hostile acquisitions are associated with higher premiums, while Bates and Lemmon [5] obtain a negative but nonsignificant coefficient.

Furthermore, the mode of the bid can influence the takeover premium, since public takeover bids do not require approval by the board of the target and are quicker than negotiations with the target's managers. Moeller [21] reports that a public purchase offer has a negative effect on the premium paid and Betton et al. [6] also report a drop in premium if potential acquirers make a public offer. On the contrary, Comment and Schwert [8], Schwert [25], Bates and Lemmon [5], Officer [22], Bange and Mazzeo [4] and Dionne et al. [9] report a positive effect for a public takeover offer.

Several studies have found that the premium can also be influenced by the payment method. Eckbo and Langohr [10], Slusky and Caves [26], Comment and Schwert [8], and Betton et al. [6] find that a wholly cash payment increases the premium significantly. However, Dionne et al. [9] find weak evidence that transactions paid entirely in cash command a lower premium.

The presence of multiple potential acquirers creates competition that could increase the premium paid to acquire the target. Flanagan and O'Shaughnessy [11] analyse the impacts of core-relatedness and multiple bidders on tender offer premiums and find that acquirers that are not core-related to the targets, tend to pay very high premiums when multiple bidders compete for the target. They also find evidence that acquirers tend to pay higher premiums for core-related acquisitions than they do for non-core related when there are no competing bidders. Furthermore, Slusky and Caves [26] and Gondhalekar et al. [13] find a significantly positive coefficient for the presence of multiple bidders, while Dionne et al. [9] find a negative but nonsignificant coefficient.

Laamanen [18] shows that acquisition premiums may be justified when target firms' resources are difficult for the market to value. His analysis demonstrates

that that R&D investment-to-market ratios and R&D growth rates of target firms are positively related to the premiums paid by the acquirers. Thus, higher premiums are paid for R&D related assets. However, the premiums do not cause negative abnormal returns. Instead of acquisition premiums, abnormal returns are found to be more affected by the target price levels in general.

According to a theory of managerial discretion, termination fees can be used by target managers in order to deter competing bids and secure deals with friendly bidders, possibly resulting in lower premiums for target shareholders. However, the efficiency theory posits that termination fees compensate bidders for the revelation of private information released during merger negotiations, thereby improving incentives for bidding. Bates and Lemmon [5] and Officer [22] examine the influence of termination fees on the premium. Their results are consistent with the efficiency theory, since they find that the premium is higher when a target termination fee is included in the merger terms.

Bates and Lemmon [5], Officer [22] and Dionne et al. [9] test the influence of information asymmetry between potential acquirers on the premium paid for an acquisition and find that informed acquirers (acquirers that hold at least 5% of the shares of the target before the announcement of the offer) pay a significantly lower premium than buyers that do not possess privileged information.

Finally, Antoniou et al. [3] in a study concerning premiums and the performance of acquiring firms examine how the extent of merger premiums paid impacts both the long-run and announcement period stock returns of acquiring firms. In particular, they test the hypothesis that overpaying may be partly responsible for acquirers' post-merger underperformance. Their results suggest that mergers do not benefit shareholders in the long-run, but they find no evidence that acquirers paying high premiums underperform those paying low premiums in three years following mergers. Their result is robust after controlling for various firm and deal characteristics. They also find that short term cumulative abnormal returns are positively correlated to the level of the premium paid by acquirers, which suggests that merger premiums may proxy for synergies between targets and bidders.

# 3 Methodology

Following Dionne et al. [9] we estimate the influence of determinants of the premium using the ordinary least squares method. Our model is expressed as follows:

$$PREM_i = \beta_0 + \beta_1 RUNUP_i^T + \beta_2 MB_i^T + \beta_3 SIZE_i^T + \beta_4 LEV_i^T + \beta_5 MB_i^A + \beta_6 LEV_i^A + \beta_7 TO_i + \beta_8 CASH_i + \beta_9 FND_i + \beta_{10} LND_i + \beta_{11} VFD_i + \beta_{12} VFDAA_i + \beta_{13} VADAA_i + \beta_{14} IND_i + \mu_i$$

where $T$ is for target and $A$ is for the acquirer.

The dependent variable of our model is the premium ($PREM_i$) paid by the acquirer. We define the premium as the differene in percentage between the final price and the share price of the target 42 days before the announcement of the acquisition. The runup ($RUNUP_i^T$) in the share price of the target occurs mainly after the 42nd day before the announcement (Schwert [24]). Thus, we use the price on this day as the reference price to calulate the premium because it reflects the value the shareholders attribute to the firm before the rumors.

Like Schwert [24] and Dionne et al. [9] we use the cumulative abnormal return over a two-month period before the announcement to estimate the runup in the share price of the target. We estimate, for each target, a model that links the return of the target ($R_{it}$) to the return of the S&P 500 index ($R_{mt}$), for a period ranging from the 379th day before the announcement until the 64th day before the announcement: $R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$, where t = -379 to -64. Using the estimated alpha and beta coefficients, we compute the error term of the market model for each target, for each day of the two-month period before the announcement. The error term corresponds to the abnormal return: $\varepsilon_{it} = R_{it} - \widehat{\alpha}_i - \widehat{\beta}_i R_{mt}$, where t = -42 to -1 and the runup, which is the cumulative abnormal return, is computed by summing the error terms $RUNUP_i^T = \sum_{t=-42}^{-1} \varepsilon_{it}$. We predict that the premium paid increases with the runup of the target's share price.

We include the market-to-book ratio of the target ($MB_i^T$). We define the market value as the product of the share price and the number of common shares outstanding, and the book value as the book value of common equity. A positive relation between the market-to-book ratio and the premium should be anticipated if a low ratio is a sign of restricted investment opportunities, while a negative relation should be seen if a low ratio signals the undervaluation of the target.

Following Comment and Schwert [8], we measure the target size ($SIZE_i^T$) as the logarithm of the total assets. We assume that the size variable is negatively related to the premium paid. We estimate the debt level as the ratio of long-term debt to total assets and predict a negative relation between the acquirer's ($LEV_i^A$) and the target's ($LEV_i^T$) debt and the premium paid.

We also include the market-to-book ratio of the acquirer's assets ($MB_i^A$) to control for growth opportunities, since managers that possess considerable free cash flows are more likely to pay a higher premium if investment opportunities are limited. The numerator represents the market value of the assets and is calculated as the book value of the assets, from which we subtract the book value of equity and add the market value of equity. The denominator is defined as the market value of the assets. We predict that this ratio is negatively

associated with the premium. We employ the aforementioned variables at the end of the most recent fiscal year before the announcement of the acquisition.

We use an indicator variable that equals 1 if the acquirer made a public takeover offer and 0 otherwise ($TO_i$). We control for the method of payment by creating an indicator variable that equals 1 if the transaction is fully paid in cash and 0 otherwise ($CASH_i$), and we assume that the influence of this variable to the premium paid is positive. We also include an indicator variable that equals 1 if the acquirer and the target belong to the same industry ($IND_i$), based on the two-digit SIC code, in order to examine if this factor influences the premium paid.

Additionally, we include a variable that represents the time (in days) elapsed between the first acquisition and the first divestiture ($FND_i$), and between the first acquisition and the last divestiture ($LND_i$) of each "flip". Finally, we include three variables that show the percentage of the total value of the divestitures ($VFD_i$) and the total value of the acquisitions ($VFDAA_i$) of each event that represents the value of the first divestiture, as well as the percentage of the total value of the acquisitions of each event that represents the total value of divestitures made by each firm ($VADAA_i$). We assume that the smaller the time interval and the higher the percentage in value of the first (and all) divestitures, the more in-the-money will be the option that the firm buys to divest part of the target, and, therefore, the higher will be the premium it will pay for the acquisition.

# 4 Sample Selection and Descriptive Statistics

Our data are derived from Thomson One database. All merger and acquisition announcements during the period from January 1999 to December 2009 for US based firms are considered. We also identify divestitures carried out by acquiring firms subsequent to the acquisitions from Thomson One database for the same period.

We exclude minority stake purchases, acquisitions of remaining interest, leveraged buyouts and repurchases and we require that the acquiring firm hold less than 50% of the target firm before the acquisition and owns more than 50% after the completion of the transaction. We identify the firms that made acquisitions and we match them with the subsequent divestitures made by the same firms. Using the deal synopsis provided by Thomson One and the EDGAR filings provided by the U.S. Securities and Exchange Commission, we identify which of those divestitures include the sale of assets bought during the original acquisitions. One event can be comprised of one or more acquisitions and one or more divestitures. Our initial sample comprised of 251 “flips”. However,

due to the lack of some accounting data required, mainly for target firms, the final sample was reduced to 205 “flips”, which include 290 acquisitions and 350 divestitures.

Lastly, the accounting data concerning the acquirers and the targets, which were required to test several hypotheses concerning the determinants of the premium, were obtained from Compustat and the share prices used to calculate the premium and the runup of the target were obtained from CRSP database. In cases where there was lack of data, both accounting data and share prices were complemented with data from Datastream.

The premium, which is the dependent variable of our model, varies considerably. The average premium is 30.3%. The maximum premium paid by an acquirer is 748%, whereas the minimum is -99.7%, which signifies that in some cases the acquirer paid a price below the share price to acquire the target. The average premium peaked in 2001, at 54.8%.

Table 1 contains a statistical description of the explanatory variables of the model. Our first finding is that rumors preceding the announcement of an acquisition create an average runup of 6.2%. This is lower than that identified by Schwert [24] (which was 13.3% for the period of 1975 to 1991) and by Dionne et al. [9] (which was 8.4% for the period 1990 to 2007), but it still indicates a strong positive reaction by the market. Further, the market value of the target is on average 3.5 times higher than the book value. However, the presence of extreme values is probably responsible for this result. By comparison, the median market-to-book ratio is only 1.89. The mean market-book-ratio of the acquirer is 2.05, while the median market-to-book ratio is 1.36. The leverage of the acquirers and the targets is similar, since the debt represents 25.5% and 26.1% of their assets respectively.

Acquisitions paid entirely in cash represent 55.2% and tender offers represent 12.1% of the acquisitions included in the sample. In 77.2% of the acquisitions the acquirer and the target belong to the same industry, based on the two digit SIC code. The average number of days between the first acquisition and the first divestiture of each “flip” is 999 and the average number of days between the first acquisition and the last divestiture of each “flip” is 1284. The first divestiture of each "flip" represents on average 78% of the total value of the assets sold. However, our sample contains 136 "flips" which include only 1 divestiture and, thus, in these "flips" the total value of the first divestiture equals 100%. There are only 69 "flips" which include 2 or more divestitures. In this subsample, the first divestiture of each "flip" represents on average 34% of the total value of the assets sold. Lastly, the first divestiture represents 20.2% of the total value of the acquisitions, while the total value of the divestitures represents on average 27.4% of the total value of the acquisitions of each "flip".

In addition to the empirical investigation of the original sample, we also test our predictions using a joint sample which includes the acquisitions of the

**Table 1.** Statistical description of independent variables - original sample

| Independent variable | Mean | Standard Deviation | Median | Minimum | Maximum |
|---|---|---|---|---|---|
| *Target* | | | | | |
| Runup ($RUNUP^T_i$) | 0.062032 | 0.278206 | 0.036642 | -1.644050 | 1.601659 |
| Market-to-book ($MB^T_i$) | 3.400539 | 10.40454 | 1.886565 | -25.08520 | 135.8025 |
| Size ($SIZE^T_i$) | 6.898110 | 2.441370 | 6.885106 | 0.634988 | 1350959 |
| Leverage ($LEV^T_i$) | 0.260909 | 0.241108 | 0.221621 | 0.000000 | 1.775167 |
| *Acquirer* | | | | | |
| Market-to-book ($MB^A_i$) | 2.047415 | 2.277734 | 1.360609 | -3.103263 | 23.38821 |
| Leverage ($LEV^A_i$) | 0.255311 | 0.200532 | 0.225494 | 0.000000 | 1.039944 |
| *Transaction* | | | | | |
| Tender offer ($TO_i$) | 0.120690 | 0.326329 | 0.000000 | 0.000000 | 1.000000 |
| Cash payment ($CASH_i$) | 0.551724 | 0.498177 | 1.000000 | 0.000000 | 1.000000 |
| Industry ($IND_i$) | 0.772414 | 0.419999 | 1.000000 | 0.000000 | 1.000000 |
| *"Flip"* | | | | | |
| Num. of days: 1st acq.-1st div. ($FND_i$) | 998.6585 | 684.9993 | 961.0000 | 12.0000 | 3513.0000 |
| Num. of days: 1st acq.-last div. ($LND_i$) | 1283.5950 | 881.3897 | 1212.0000 | 34.0000 | 3928.0000 |
| % of value of first divestiture ($VFD_i$) | 0.777826 | 0.353838 | 1.000000 | 0.001191 | 1.000000 |
| % of value of first divestiture / all acquisitions ($VFDAA_i$) | 0.202364 | 0.245505 | 0.096135 | 0.000247 | 0.945436 |
| % of value of all divestitures / all acquisitions ($VADAA_i$) | 0.274169 | 0.270993 | 0.172131 | 0.000497 | 0.945436 |

original sample and all the acquisitions that took place during the same period (1999 – 2009), but were not followed by divestitures. Thus, our control sample consists of 1984 acquisitions and our joint sample of 2274 acquisitions. The average premium for the joint sample is 52.8%, which is higher than that of the original sample.

Table 2 contains a statistical description of the explanatory variables for the joint sample. The average runup is 8.3%, which is slightly higher than the average runup in the original sample. The acquirer market-to-book ratio is also higher than the original sample, since it has an average value of 2.5, whereas the target market-to-book ratio is lower, only 2.6 on average. The average acquirer and target leverage are also lower than in the original sample, 17.1% and 16.2% respectively.

Tender offers represent 16.6% and acquisitions paid entirely in cash represent 40% of the acquisitions included in the joint sample. In 68.2% of the acquisitions the acquirer and the target belong to the same industry, based on the two digit SIC code. The average number of days between the first acquisition and the first divestiture of each "flip" is only 94 and the average number of days between the first acquisition and the last divestiture of each "flip" is only 120, compared to 999 and 1284 in the original sample. The first divestiture of each "flip" represents on average 7.3% of the total value of the assets sold. Finally, the first divestiture represents 1.9% of the total value of the acquisitions, while the total value of the divestitures represents on average 2.6% of the total value of the acquisitions of each "flip". However, when interpreting these results we should consider the fact that the variables that account for the time interval and the value of divestitures take the value of zero for the acquisitions of the control sample, which were not followed by divestitures.

# 5 Empirical Results

The empirical results for our sample of acquisitions that were followed by divestitures, are presented in Table 3. Due to high correlation observed between the variables that represent the time elapsed between acquisitions and the divestitures and the percentage of divestitures, we do not include all of them in one regression. Instead, we test different combinations of these variables.

Our results support the markup pricing hypothesis, formulated by Schwert [24], which states that potential acquirers adjust their offer to movements in the share price of the target triggered by rumors of an acquisition. We find that the runup of the target in the two months preceding the announcement of the acquisition is positively and significantly related to the premium paid. We also find that the size of the target influences the premium negatively. This result is

**Table 2.** Statistical description of independent variables - joint sample

| Independent variable | Mean | Standard Deviation | Median | Minimum | Maximum |
|---|---|---|---|---|---|
| *Target* | | | | | |
| Runup ($RUNUP^T_i$) | 0.082571 | 0.297417 | 0.050036 | -1.698441 | 3.688879 |
| Market-to-book ($MB^T_i$) | 2.633428 | 21.217357 | 1.744653 | -525.291845 | 698.333333 |
| Size ($SIZE^T_i$) | 5.707611 | 2.01251 | 5.617525 | 0.263133 | 13.835362 |
| Leverage ($LEV^T_i$) | 0.161926 | 0.222315 | 0.082029 | 0.000000 | 3.231728 |
| *Acquirer* | | | | | |
| Market-to-book ($MB^A_i$) | 2.468802 | 3.858853 | 1.441739 | -3.103263 | 58.040925 |
| Leverage ($LEV^A_i$) | 0.170926 | 0.175253 | 0.122761 | 0.000000 | 1.477124 |
| *Transaction* | | | | | |
| Tender offer ($TO_i$) | 0.166227 | 0.372366 | 0.000000 | 0.000000 | 1.000000 |
| Cash payment ($CASH_i$) | 0.399736 | 0.489952 | 0.000000 | 0.000000 | 1.000000 |
| Industry ($IND_i$) | 0.682498 | 0.465607 | 1.000000 | 0.000000 | 1.000000 |
| *"Flip"* | | | | | |
| Num. of days: 1st acq.-1st div. ($FND_i$) | 93.5244 | 358.3844 | 0.0000 | 0.0000 | 3513.0000 |
| Num. of days: 1st acq.-last div. ($LND_i$) | 120.2088 | 460.8071 | 0.0000 | 0.0000 | 3928.0000 |
| % of value of first divestiture ($VFD_i$) | 0.072843 | 0.251098 | 0.000000 | 0.000000 | 1.000000 |
| % of value of first divestiture / all acquisitions ($VFDAA_i$) | 0.018951 | 0.095379 | 0.000000 | 0.000000 | 0.945436 |
| % of value of all divestitures / all acquisitions ($VADAA_i$) | 0.025676 | 0.115022 | 0.000000 | 0.000000 | 0.945436 |

consistent with the theory of integration costs, which states that acquirers prefer small firms because they are associated with lower integration costs. Further, we observe that the market-to-book ratio of the target is negatively correlated to the premium, which supports the idea that some acquirers are attracted by firms that are undervalued in the market.

Contrary to our predictions, the acquirer market-to-book ratio, and the acquirer and the target leverage are not statistically significant. Moreover, the indicator variables that account for method of payment, the industry of the acquirer and the target, and the presence of a public takeover offer, as well as the time elapsed between the first acquisition and the first divestiture and between the first acquisition and the last divestiture of each "flip", do not appear to influence the premium.

Lastly, we observe that the coefficients of the variables that depict the percentage of the total value of the divestitures and the percentage of the total value of the acquisitions of each event that represents the value of the first divestiture made by each firm are positive and statistically significant, thus indicating that the higher the percentage of the first divestiture's value, the higher is the premium paid for the acquisition.

The empirical results for the joint sample are presented in Table 4. As in the original sample, the runup is positively and the target size is negatively related to the premium, while the indicator variables that account for the method of payment, the industry of the acquirer and the target, and the presence of a public takeover offer, as well as the acquirer leverage, remain nonsignificant. The results are different in the joint sample for the target and the acquirer market-to-book ratio. The target market-to-book ratio is no longer statistically significant, even though it remains negative. Contrary to our predictions, the acquirer market-to-book ratio has a positive influence on the premium.

Finally, the time elapsed between the first acquisition and the first divestiture and between the first acquisition and the last divestiture of each "flip" affects the premium negatively, indicating that a smaller time interval between the acquisitions and the subsequent divestitures is associated with a higher premium. However, the variables that depict the value of divestitures made by each firm are no longer statistically significant.

# 6 Concluding Remarks

Several studies have established that paying a high acquisition premium can be value-destroying for acquirer shareholders. There are however, some theoretical, real options papers, which prove that paying a high acquisition premium may be

**Table 3.** Empirical results - original sample

| **Sample** | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Constant ($\beta_o$) | 0.467055* (0.0501) | 0.678556*** (0.0011) | 0.489381* (0.0649) | 0.747310*** (0.0002) | 0.534582** (0.0159) | 0.704146*** (0.0003) |
| Acquirer leverage ($LEV^A_i$) | -0.019782 (0.9356) | -0.122121 (0.6221) | -0.020770 (0.9327) | -0.100166 (0.6877) | -0.013832 (0.9549) | -0.120526 (0.6260) |
| Acquirer market-to-book ($MB^A_i$) | 0.007498 (0.7202) | -0.011994 (0.5648) | -0.009360 (0.6524) | -0.012955 (0.5302) | -0.009751 (0.6378) | -0.012935 (0.5305) |
| Runup ($RUNUP^T_i$) | 1.223834*** (0.0000) | 1.237593*** (0.0000) | 1.227316*** (0.0000) | 1.239528*** (0.0000) | 1.225183*** (0.0000) | 1.239400*** (0.0000) |
| Target size ($SIZE^T_i$) | -0.060657*** (0.0018) | -0.058038*** (0.0031) | -0.060380*** (0.0019) | -0.057389*** (0.0035) | -0.060565*** (0.0018) | -0.057778*** (0.0032) |
| Target leverage ($LEV^T_i$) | -0.136864 (0.5063) | -0.181664 (0.3784) | -0.146638 (0.4767) | -0.197368 (0.3365) | -0.152895 (0.4552) | -0.189006 (0.3561) |
| Target market-to-book ($MB^T_i$) | -0.015794*** (0.0005) | -0.015494*** (0.0006) | -0.015843*** (0.0005) | -0.015528*** (0.0006) | -0.015832*** (0.0005) | -0.015512*** (0.0006) |
| Industry ($IND_i$) | 0.053612 (0.6191) | 0.031246 (0.7719) | 0.053158 (0.6236) | 0.041154 (0.7041) | 0.056215 (0.6018) | 0.032440 (0.7630) |
| Tender offer ($TO_i$) | 0.169437 (0.2514) | 0.149012 (0.3127) | 0.162128 (0.2721) | 0.139309 (0.3432) | 0.158337 (0.2811) | 0.144166 (0.3257) |
| Cash payment ($CASH_i$) | -0.053608 (0.5648) | -0.092550 (0.3255) | -0.050996 (0.5839) | -0.087926 (0.3504) | -0.050601 (0.5862) | -0.091578 (0.3296) |
| Num. of days: 1st acq.-1st div. ($FND_i$) | 0.000052 (0.4424) | 0.000023 (0.7299) | - | - | - | - |
| Num. of days: 1st acq.-last div. ($LND_i$) | - | - | 0.000018 (0.7556) | -0.000035 (0.4760) | - | - |
| % of value of first divestiture ($VFD_i$) | 0.281857** (0.0176) | - | 0.299639** (0.0365) | - | 0.274581** (0.0202) | - |
| % of value of first divestiture / all acquisitions ($VFDAA_i$) | - | 0.456891** (0.0208) | - | 0.442684** (0.0258) | - | 0.463635** (0.0182) |
| Adjusted $-$ $R^2$ | 0.199511 | 0.198683 | 0.198087 | 0.199805 | 0.200682 | 0.201212 |
| F-statistic | 7.548112*** | 7.514219*** | 7.489848*** | 7.560180*** | 8.255838*** | 8.279830*** |
| Prob. F-statistic | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| Durbin - Watson | 1.958635 | 1.993681 | 1.965683 | 2.009964 | 1.968970 | 2.000469 |

*, **, *** denote significance at 10%, 5% and 1%, respectively.

**Table 4.** Empirical results - joint sample

| **Sample** | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Constant ($\beta_0$) | 0.723944*** (0.0000) | 0.712751*** (0.0000) | 0.712138*** (0.0000) | 0.712900*** (0.0000) | 0.725149*** (0.0000) | 0.712526*** (0.0000) |
| Acquirer leverage ($LEV^A_i$) | -0.040339 (0.7217) | -0.017286 (0.8785) | -0.026577 (0.8146) | -0.018946 (0.8672) | -0.031579 (0.7798) | -0.016207 (0.8860) |
| Acquirer market-to-book ($MB^A_i$) | 0.026995*** (0.0000) | 0.027265*** (0.0000) | 0.027306*** (0.0000) | 0.027260*** (0.0000) | 0.026982*** (0.0000) | 0.027258*** (0.0000) |
| Runup ($RUNUP^T_i$) | 1.152203*** (0.0000) | 1.150329*** (0.0000) | 1.153080*** (0.0000) | 1.150754*** (0.0000) | 1.149212*** (0.0000) | 1.149786*** (0.0000) |
| Target size ($SIZE^T_i$) | -0.067966*** (0.0000) | -0.066910*** (0.0000) | -0.066411*** (0.0000) | -0.066739*** (0.0000) | -0.068557*** (0.0000) | -0.066792*** (0.0000) |
| Target leverage ($LEV^T_i$) | 0.267028*** (0.0031) | 0.273757*** (0.0025) | 0.270471*** (0.0028) | 0.273248*** (0.0025) | 0.270939*** (0.0027) | 0.274878*** (0.0023) |
| Target market-to-book ($MB^T_i$) | -0.001227 (0.1557) | -0.001219 (0.1582) | -0.001216 (0.1590) | -0.001216 (0.1590) | -0.001228 (0.1553) | -0.001217 (0.1586) |
| Industry ($IND_i$) | -0.004361 (0.9125) | 0.000569 (0.9886) | -0.000734 (0.9852) | 0.000330 (0.9934) | -0.003047 (0.9388) | 0.000689 (0.9861) |
| Tender offer ($TO_i$) | 0.047648 (0.3796) | 0.044712 (0.4092) | 0.046004 (0.3955) | 0.044565 (0.4106) | 0.046888 (0.3873) | 0.044171 (0.4145) |
| Cash payment ($CASH_i$) | 0.002878 (0.9451) | 0.009994 (0.8108) | 0.007056 (0.8658) | 0.009544 (0.8194) | 0.005268 (0.8996) | 0.010713 (0.7971) |
| Num. of days: 1st acq.-1st div. ($FND_i$) | -0.000103** (0.0396) | - | - | | -0.000074* (0.0845) | - |
| Num. of days: 1st acq.-last div. ($LND_i$) | - | -0.000089** (0.0153) | -0.000101*** (0.0032) | -0.000091** (0.0184) | - | -0.000083*** (0.0075) |
| % of value of first divestiture ($VFD_i$) | - | 0.024070 (0.7684) | - | | - | - |
| % of value of first divestiture / all acquisitions ($VFDAA_i$) | 0.232280 (0.2604) | - | 0.242548 (0.2085) | | - | - |
| % of value of all divestitures / all acquisitions ($VADAA_i$) | - | - | - | 0.061058 (0.7312) | - | - |
| Adjusted $-$ $R^2$ | 0.176072 | 0.177157 | 0.177701 | 0.177169 | 0.175974 | 0.177490 |
| F-statistic | 45.15773*** | 45.48868*** | 45.65479*** | 45.49215*** | 49.54095*** | 50.04907*** |
| Prob. F-statistic | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| Durbin - Watson | 1.968260 | 1.967968 | 1.970222 | 1.968440 | 1.965689 | 1.967852 |

*, **, *** denote significance at 10%, 5% and 1%, respectively.

economically justified, even in a perfectly rational-expectation framework. One such theory (Alvarez and Stenbacka [2]) assumes that the acquiring firm pays a high premium because it has the option to sell activities outside its core business to a third firm, which can make more efficient use of these resources. Thus, the premium is high because takeover completion makes it possible to exploit synergy gains and it also incorporates the embedded (real) option represented by the potential divestment gains.

In this paper, we empirically investigate the predictions of this real option model directly, by using data from the acquisitions of all U.S. listed firms between 1999-2009. We initially obtain empirical results using a sample of acquisitions that were followed by divestitures of assets that were initially acquired, and we compare these with the results obtained from a joint sample which also includes all the acquisitions of the same period that were not followed by divestitures.

We find evidence that the acquisition premium is influenced by factors identified by previous studies, such as the runup of the target in the two months preceding the announcement of the acquisition, which is positively and significantly related to the premium, and the target size, which is negatively related to the premium. Moreover, we find that the premium is positively related to the value of the divestitures in the case of the original sample, and negatively related to the time interval between acquisitions and divestitures in the case of the joint sample. Based on these findings, we conclude that the evidence provide some support for the theory which states that high acquisition premiums can be justified when a (real) option, which is represented by the potential divestment gains, is embedded in the premium.

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