

Contingent Claims Analysis of Corporate Investment Under Uncertainty: An Empirical Investigation of the Wealth Effects of Takeovers and Subsequent Divestitures

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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 carried out by acquiring firms 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. These factors 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 return of the buyer's stock before the announcement of the acquisition, the buyer's free cash flows, the payment method, the presence of information asymmetry between bidders, the presence of more than one potential buyers, whether the transaction was characterized as hostile and whether a public takeover offer was made. Furthermore, we include variables that represent the time elapsed between the first acquisition and the first divestiture and between the first acquisition and the last divestiture of each event, the percentage of the total value of the divestitures of each event that represents the value of the first divestiture made by each firm, the numbers of acquisitions and of subsequent divestitures initiated by

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each firm, an indicator variable that equals 1 if the event is cross-border and, finally, an indicator variable that equals 1 if the acquirer and the target(s) in each event belong to the same industry, in order to examine if these factors influence the premium paid.

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 the divestitures are corrections of previous takeovers that were mistakes, while the second explanation is that the divestiture was the original intent prior to the takeover and that the takeover firm extracts value from the takeover-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 takeover 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.

2 Motivation

Several studies have proposed theoretical explanations for the occurrence of mergers and subsequent divestitures. As mentioned above, two main alternative explanations have been proposed. However, the empirical investigation of these occurrences is quite limited and the few empirical studies that have been undertaken, find no consistent evidence that the takeover-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.

3 Literature Review

Several studies that investigate the wealth effects of takeovers and divestitures have been made. Mitchell and Lehn [17] 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 [14] study divestitures by firms that had previously made acquisitions. They categorize divestitures as "successful" or "unsuccessful" using accounting data on the gain or loss on sale from the divestiture, the business press article describing the divestiture and the divestiture sale price. They find that bidder abnormal returns are lower for takeovers 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 returns 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 and significantly correlated with the original acquisition announcement period excess returns.

Fluck and Lynch [9] develop a theory of mergers and divestitures, wherein the motivation for mergers stems from the inability of firms to finance marginally profitable, possibly short-horizon 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 these projects are financed, 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.

Hanson and Song [11] investigate the long-term performance of firms that divest assets to assess whether gains arise from reducing agency costs. 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 remove assets that generate negative synergies and that managerial ownership provides strong incentives to improve operations following the divestiture. Further analysis suggests that the poor performance preceding the divestiture is unrelated to managerial ownership, but the post-divestiture performance is strongly related to the stock ownership by the CEO.

Finally, Marquette and Williams [16] analyse the effect of the takeover and

the subsequent divestiture on the value of the firm that initiates these takeovers. They find that there is a negative wealth effect for the firms that undertake these transactions and a positive wealth effect for the spinoff. However, they find no consistent evidence that these takeovers either benefit shareholders or destroy wealth. They also 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 hypothesis that takeover-divestiture combinations can increase shareholder wealth when they target firms that have growth opportunities that can be appropriated.

Several studies have also examined the acquisition premiums paid. Flanagan and O'Shaughnessy [8] analyse the impacts of core-relatedness and multiple bidders on tender offer premiums and find that the presence of multiple bidders has a greater impact on tender offer premiums when the eventual acquirer is not core-related to the target. In particular, acquirers that are not core-related to the firms they purchase, tend to pay very high premiums when multiple bidders compete for the target. In their analysis, the dependent variable is the bid premium, defined as the percent by which the successful bid exceeded the target's prebid stock price. They use dummy variables to account for core-related transactions, competing bids and to control for White Knights, the presence of termination fees, for deals that included at least some payment in the form of acquiring firm stock, and for the presence of poison pills, as well as continuous variables to control for the percent of the target held by the suitor before the tender offer, the target ROA before the acquisition and the target debt to asset ratio.

Gondhalekar et al [10] examined a sample of cash only acquisitions of Nasdaq. They argue that buyers with low market-to-book ratio and high free cash flows will favor more aggressive acquisition approaches and pay higher premiums. They analyse the impact of free cash flows and investment opportunities on the premium individually using linear regressions and conclude that large cash flows positively influence the premium. This result supports the idea that managers' decisions occasionally serve to maximize their own interests (agency hypothesis, Jensen [13]). They also find that the buyer's debt-to-equity ratio and the relative size, measured as the ratio of the acquirer's market value of equity to that of the target, are significantly and inversely related to the magnitude of merger premiums.

Laamanen [15] shows that acquisition premiums may be justified when target firms' resources are difficult for the market to value. His analysis demonstrates that although higher premiums are paid for R&D related assets, the premiums do not cause negative abnormal returns. Instead of acquisition premiums, abnormal returns are more strongly affected by the target price levels in general. He examines the announcement-day premium and creates a market model for each acquiring firm's stock in order to determine the expected returns, while differences for the model are regarded as abnormal returns for acquirer shareholders. Moreover, he measures R&D growth rate as the growth of the target firm's R&D four years prior to acquisition, and determines a target firm's

market-to-book ratio by dividing target pre-acquisition market value by its book value of equity. Finally, he uses control variables for the target firm's sales, the target firm's debt ratio, the target firm's return on equity, the management's resistance to takeover, the existence of competing bids, industry relatedness, the method of payment, tender offers, mergers of equals, the target firm's industry sector, acquisition timing and the acquirers' investment advisors.

Antoniou et al [3] 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, as proxied by high merger premiums paid, may be partly responsible for acquirers' subsequent underperformance. In their long-run method, they employ the Calendar-Time Portfolio Regression (CTPR) approach to control for the cross-sectional dependence problem arising from industrial clustering in mergers and overlapping returns shared by frequent bidders and they then estimate the Fama-French three-factor model. To test whether the extent of the merger premium paid is a determinant of the long-run post merger performance of acquiring firms, they rank sample firms by merger premiums, they allocate them to one of three calendar portfolios, and they employ zero investment portfolio regressions to assess whether return differentials between paired samples are significant. In the short-run, they use standard event study methodology to calculate cumulative abnormal returns (CARs) for the three day and five day event windows surrounding announcements and calculate abnormal returns (ARs) based on market-adjusted returns. They find no evidence that acquirers paying high premiums underperform those paying low premiums in three years following mergers and the 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.

Dionne et al [7] test the influence of information asymmetry between potential buyers on the premium paid for an acquisition and find that informed buyers (buyers 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. They also identify the factors related to the characteristics of the target, the buyer and the transaction that influence the price paid in a takeover and they estimate their influence using the ordinary least squares method.

More precisely, the 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 return of the buyer's stock before the announcement of the acquisition, the buyer's free cash flows, the hostility of the transaction, the form of the bid (negotiation with the target's managers or public takeover offer), the payment method, the presence of more than one potential buyers and the presence of information asymmetry between bidders.

Schwert [20] estimates the runup as the cumulative abnormal return on the target's stock over a two-month period before the announcement and finds that

a higher runup is associated with a higher premium paid to acquire the target.

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 [5] assert 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 relative to its competitors and should command a higher premium. They find that a market-to-book ratio higher than the median of the industry is associated with a 3% increase in the premium. However, Comment and Schwert [6] obtain a lower premium because some acquirers are attracted by firms that are undervalued in the market.

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 the premium. Schwert [21] examines the impact of past performance on the premium and obtains a negative but nonsignificant coefficient.

Both the size of the target directly and a ratio of the size of the target to that of the acquirer are used in the literature to analyse the influence of company size on the premium paid. Comment and Schwert [6] and Schwert [21] use the target size and conclude that this variable is significantly negatively related to the premium because larger targets are associated with higher integration costs. Gondhalekar et al [10] and Moeller [18] use a relative size variable and find an adverse effect of target size on the premium.

The debt level of both the acquirer and the target influences the premium paid. Gondhalekar et al [10] propose that if an acquirer has considerable debt, its operations will probably be closely monitored by creditors, and they will try to prevent the buyer from paying an overly high premium. They report a significant negative influence of the acquirer's debt ratio on the premium. Moreover, a target that has considerable debt is less attractive and the premium paid to obtain it is lower.

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 [19], managers that possess exaggerated self confidence overestimate their ability to manage the target and, thus, pay high premiums to acquire it. Hayward and Hambrick [12] examine the influence of hubris of the CEO on the premium paid during large acquisitions and confirm that hubris is associated with higher premiums. Agency problems can occur when the acquirer's managers use the company's free cash flows to undertake projects that generate few profits for shareholders. Gondhalekar et al [10] 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 posi-

tively influence 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 [21] 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. He concludes that manifestation of hostility is mainly linked to strategic negotiation. Moeller [18] finds that hostile transactions are associated with higher premiums.

Furthermore, the form of the bid can influence the takeover premium, since public takeover bids do not require approval of the board of the target and are quicker than negotiations with the target’s managers. Betton et al [5] report a drop in premium if potential acquirers make a public offer, while Moeller [18] also reports that a public purchase offer has a negative effect on the premium paid. On the contrary, Comment and Schwert [6], Schwert [21] and Bange and Mazzeo [4] report a positive effect for a public takeover offer.

Finally, several studies have found that the premium can also be influenced by the payment method. Comment and Schwert [6], Schwert [21] and Betton et al [5] find that a wholly cash payment, which implies a prominent tax effect, increases the premium significantly.

4 Data Sample

Our data in this project will be extracted from Thomson One, Compustat and CRSP databases. 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 impose the condition that the acquiring firm owns more than 50% of the target firm after the transaction was completed. We identify the firms that made acquisitions which were followed by divestitures and we match the acquisitions of each firm with the subsequent divestitures based on the two digit SIC codes. Each event in our sample consists of all the acquisitions made by an acquiring firm, in which the target firms have the same two digit SIC code, as well as the divestitures made by the same firm, in which the target firms whose activities or assets sold have the same two digit SIC code as the target firms in the initial acquisitions. One event can be comprised of one or more acquisitions and one or more divestitures. Finally, we impose the restriction that the total value of the acquisitions of each event is higher than the total value of the subsequent divestitures. Our sample consists of 678 events.

Table 1 presents the number and the value of the acquisitions and the divestitures that are included in our sample. It consists of 2010 acquisitions that were followed by 1011 divestitures. The average value of the acquisitions for the full sample is \$ mil. 786.69 and the average value of the subsequent divestitures

is \$ mil. 203.51.

Table 1
Number and value of acquisitions and divestitures

Year	Num. of acq.	Av. value of acq. (\$ mil.)	Num. of div.	Av. value of div. (\$ mil.)
1999	413	1,124.71	25	403.52
2000	360	1,272.71	36	234.64
2001	255	632.10	53	118.78
2002	205	524.79	95	121.23
2003	171	427.93	113	117.01
2004	196	586.37	80	170.63
2005	170	672.64	132	231.24
2006	126	341.37	129	378.78
2007	78	361.74	122	226.46
2008	30	505.89	107	201.43
2009	6	156.67	119	117.36
Total	2010	786.69	1011	203.51

Figure 1 presents the number of acquisitions and divestitures, which constitute the events, per year. The highest number of acquisitions is observed in 1999, there is a declining tendency, and the lowest number is observed in 2009. This was expected, since our sample covers the years 1999-2009 and there are many acquisitions in the years 1999 and 2000 that were followed by divestitures within the next decade, but only few acquisitions in 2008 and 2009 that were followed by divestitures until the end of 2009. On the contrary, the number of divestitures is increasing and the highest numbers are observed in 2005 and the following years, since there are few divestitures that took place in 1999 and followed acquisitions of 1999 and more that took place between 2005 and 2009 and followed acquisitions of the 6 previous years.

Figure 2 presents the average value of the acquisitions and the divestitures included in our sample, per year. The highest average values of acquisitions are observed in 1999 and 2000, where we observe and the highest number of acquisitions, and the lowest value in 2009. The highest average values of divestitures are observed in 1999 and 2006 and the lowest values in 2001-2003 and in 2009.

Figure 3 presents the number of days between the first and last acquisition of each of the events that include more than one acquisition (419 events). In 25.1% of the events the time interval between the first and the last acquisition is up to 1 year (365 days), in 21% of the events it is between 1 and 2 years, in 15.5% between 2 and 3 years, in 10.26% between 3 and 4 years, in 7.6% between 4 and 5 years, in 6.7% between 5 and 6 years, in 6.9% between 6 and 7 years, in 3.8% between 7 and 8 years, in 2.6% between 8 and 9 years and in 0.5% between 9 and 10 years.

Figure 1: Number of acquisitions and divestitures per year

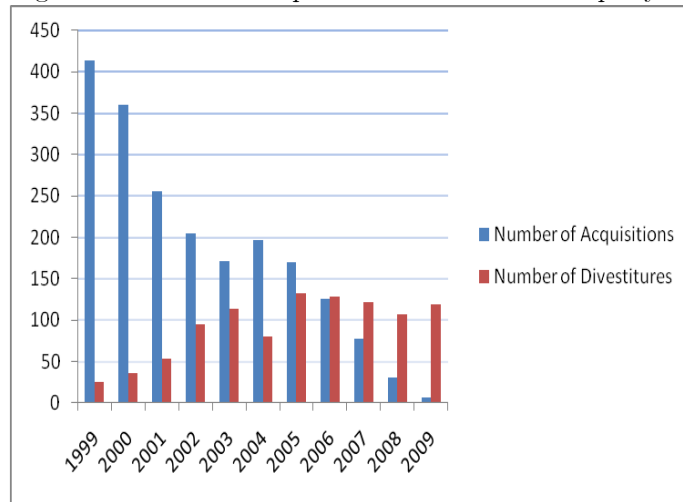


Figure 2: Average value of acquisitions and divestitures per year

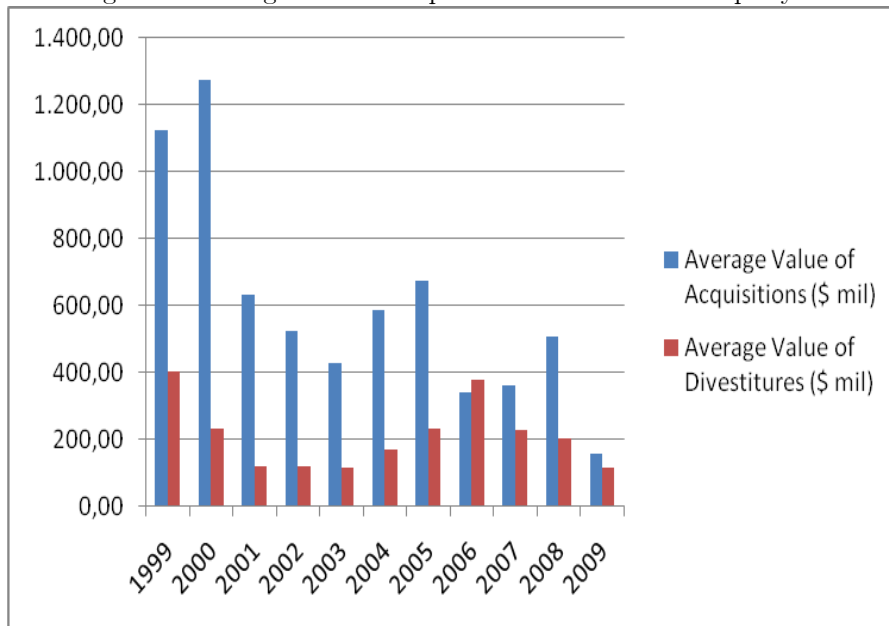


Figure 3: Days between first & last M&A

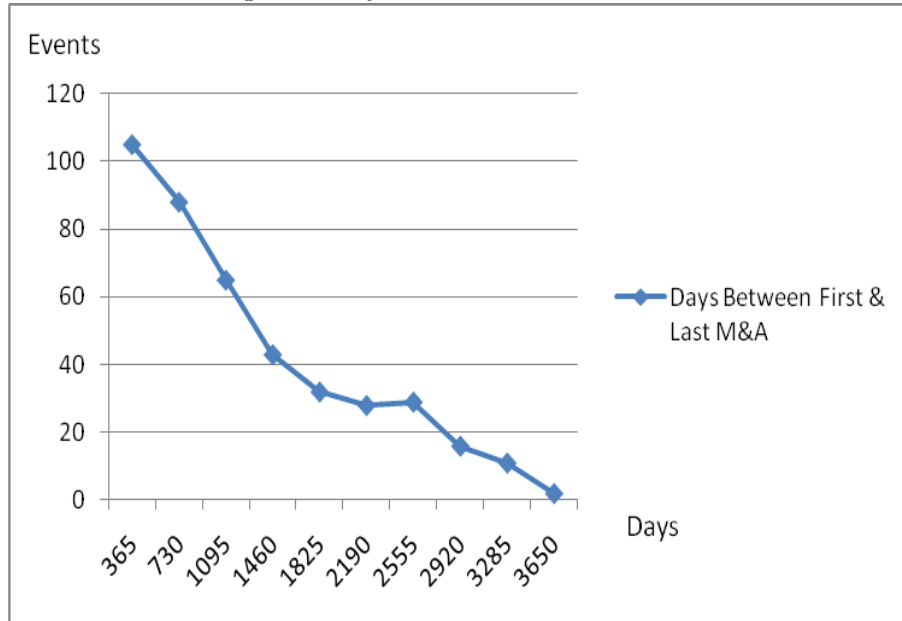


Figure 4 presents the number of days between the first and last divestiture of each of the events that include more than one divestitures (176 events). In 38.1% of the events the time interval between the first and the last divestiture is up to 1 year (365 days), in 13.1% it is between 1 and 2 years, in 17.6% between 2 and 3 years, in 6.8% between 3 and 4 years, in 6.25% between 4 and 5 years, in 6.8% between 5 and 6 years, in 7.4% between 6 and 7 years, in 2.3% between 7 and 8 years, in 1.14% between 8 and 9 years and in 0.6% between 9 and 10 years.

Figure 5 presents the number of days between the first acquisition and the first divestiture of each event for the full sample. In 14.6% of the events the time interval between the first acquisition and the first divestiture is up to 1 year, in 14.9% between 1 and 2 years, in 13.7% between 2 and 3 years, in 13.4% between 3 and 4 years, in 11.4% between 4 and 5 years, in 10.3% between 5 and 6 years, in 7.4% between 6 and 7 years, in 6.5% between 7 and 8 years, in 4.6% between 8 and 9 years, in 2.1% between 9 and 10 years and in 1.2% between 10 and 11 years.

Table 2 presents the number of firms that have made acquisitions and subsequent divestitures, and the number of events that correspond to each firm. Our sample consists of 644 firms that engaged in 678 events. One firm engaged in 7 events (acquisitions and subsequent divestitures in 7 industries, based on the two digit SIC codes of the target firms), one firm engaged in three events, 26 firms engaged in two events and the rest 616 firms engaged in one event.

Figure 4: Days between first & last divestiture

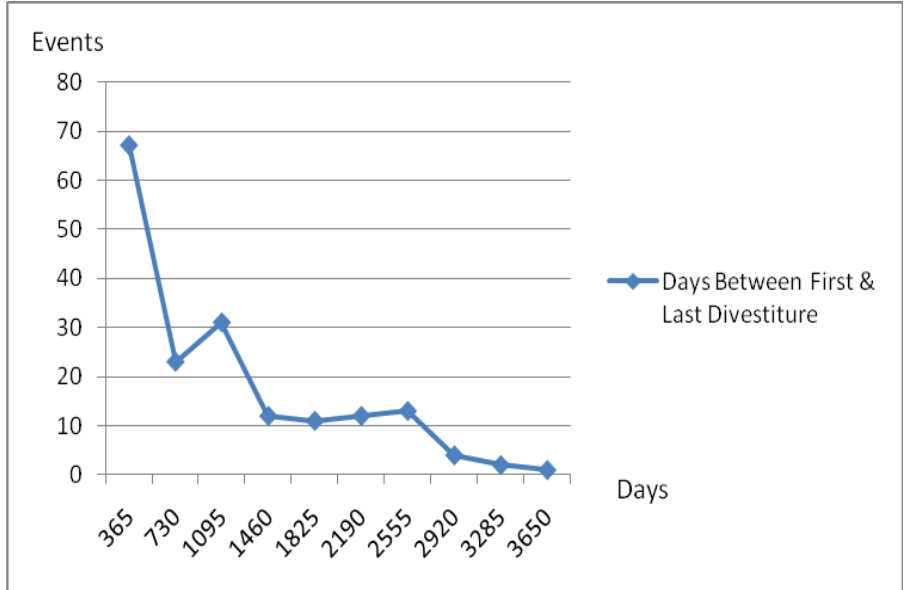


Figure 5: Days between first M&A & first divestiture

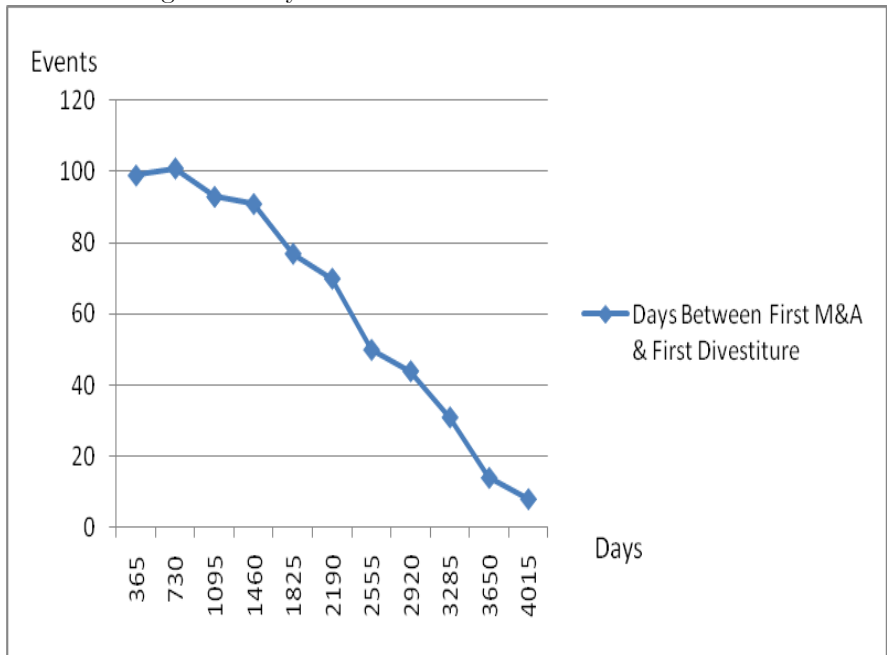


Table 2
Number of Firms & Events

	Num. of firms	Num. of events
	616	1
	26	2
	1	3
	1	7
Total	644	678

Of the 678 events, 217 consist of only one acquisition and one subsequent divestiture. Table 3 presents the number of the acquisitions and the divestitures that are included in these one-to-one events, and their average value. The average value of the acquisitions is \$ mil. 564.39 and the average value of the divestitures is \$ mil. 117.62. Also, table 3 presents the time interval between the acquisition and the divestiture of each event. The average number of days between the acquisition and the divestiture is 1015.52.

Table 3
Number and value of acquisitions and divestitures, and time interval between acquisition and divestiture for one-to-one events

Year	Num. of acq.	Av. value of acq. (\$ mil.)	Num. of div.	Av. value of div. (\$ mil.)	Days bet. acq. & div.
1999	50	908.80	12	315.86	1,182.80
2000	39	733.11	4	65.19	1,393.64
2001	24	359.66	18	103.65	1,231.38
2002	26	235.05	25	79.19	1,004.15
2003	17	521.93	23	81.89	962.76
2004	15	308.47	15	45.60	802.27
2005	16	380.98	33	103.46	618.25
2006	15	250.11	20	105.49	471.40
2007	9	1,056.32	23	67.70	483.11
2008	3	25.25	16	432.32	413.33
2009	3	256.33	28	37.87	87.33
Total	217	564.39	217	117.62	1,015.52

Figure 6 presents the number of acquisitions and divestitures that comprise the one-to-one events of our sample, per year. The highest number of acquisitions is observed again in 1999 and the lowest in 2008 and 2009, while the highest number of divestitures is observed in 2005 and the lowest in 2000.

Figure 7 presents the average value of acquisitions and divestitures that comprise the one-to-one events of our sample, per year. The highest average value of acquisitions is observed in 2007 and the lowest in 2008, while the highest average value of divestitures is observed in 2008 and the lowest in 2004 and 2009.

Figure 8 presents the average number of days that intervene between the acquisition and the divestiture of each event, per year. The highest time interval is observed between the acquisitions that took place in 2000 and their

Figure 6: Number of acquisitions and divestitures per year for one-to-one events

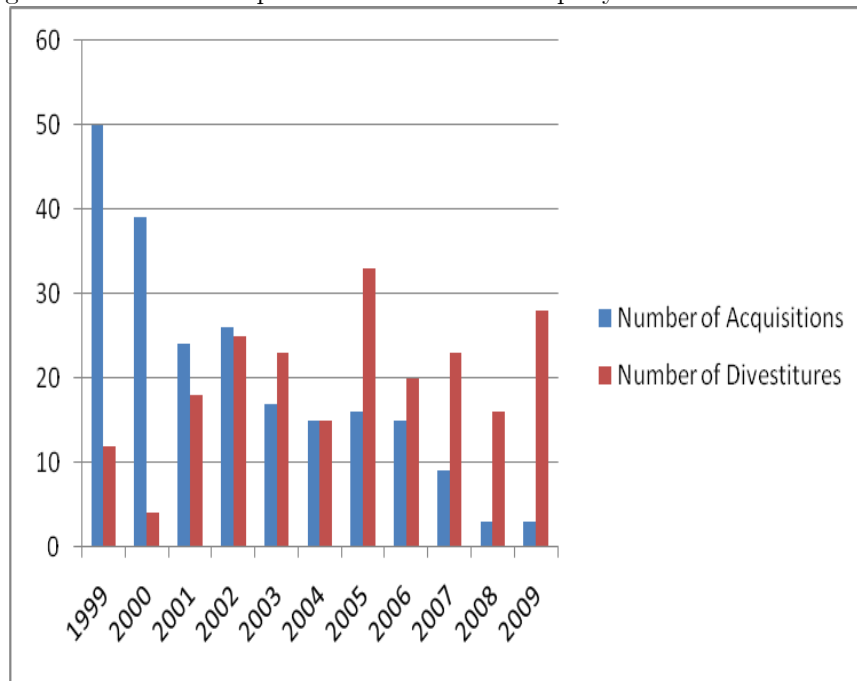


Figure 7: Average value of acquisitions and divestitures per year for one-to-one events

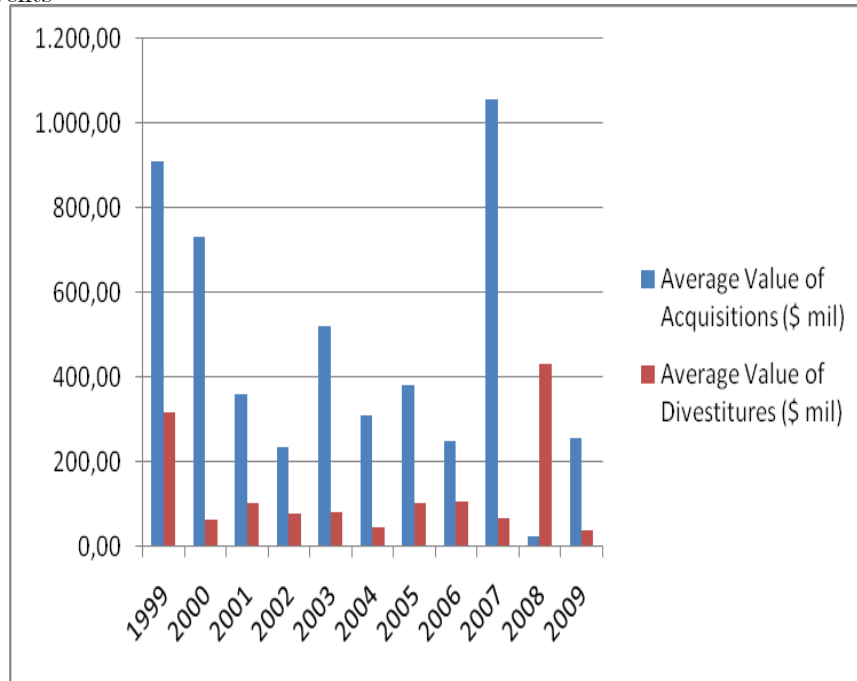
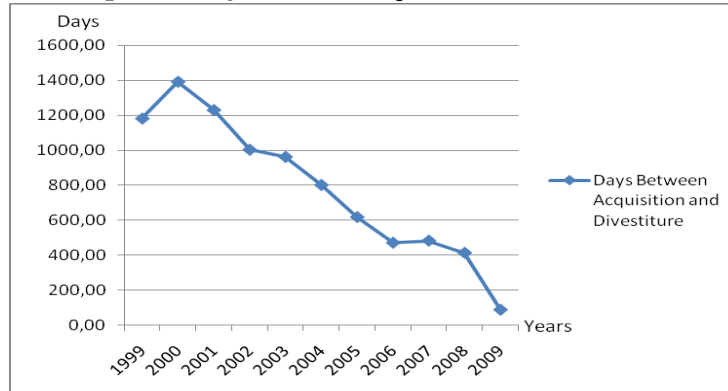


Figure 8: Days between acquisition and divestiture



subsequent divestitures, and the lowest, as expected, between the acquisitions and the subsequent divestitures that took place in 2009.

Table 4 presents the number of events that consist of one or more acquisitions and one or more divestitures. As mentioned above, 217 events consist of one acquisition and one divestiture, 285 consist of one divestiture and more than one acquisitions, 42 consist of more than one divestitures and one acquisition and 134 consist of more than one acquisitions and more than one divestitures. In total, 259 events include only one acquisition and 419 events more than one acquisitions, and 502 events include only one divestiture and 176 more than one divestitures.

Table 4

Number of events that consist of one or more acquisitions and divestitures

	Divestitures			1	Acquisitions
	1	More than 1	Total		
	217	42	259		
	285	134	419	1	More than 1
Total	502	176	678		

Table 5 presents the distribution of the firms which are included in our sample, according to their industry. We follow the macro industry classification of Thomson One database. 18.2% of the firms in our sample belong to the “High Technology” macro industry and 16.4% belong to the “Energy and Power” macro industry. On the contrary, only 4% of the firms belong to the “Retail” macro industry, 5% to the “Real Estate” and 5% to the “Consumer Staples” macro industries.

Table 5

Classification of firms by industry based on Thomson One

Acquirer macro industry	Num. of firms
Consumer products and services	34
Consumer staples	32
Energy and power	106
Financials	60
Healthcare	58
High technology	116
Industrials	49
Materials	38
Media and entertainment	52
Real estate	32
Retail	26
Telecommunications	41
Total	644

Table 6 also presents the distribution of the firms by industry, based on their two digit SIC codes. The highest numbers of firms belong to two digit SIC codes 73, 13, 48 and 36¹. SIC code 73 includes 81 firms, SIC 13 and SIC 48 include 53, and SIC 36 includes 50 firms. SIC codes 01, 15, 17, 31, 44, 45, 46, 75 and 95² include only one firm.

¹73: Services: Advertising, Advertising agencies, Consumer credit reporting, collection agencies, Equipment rental & leasing, Employment agencies, Help supply services, Computer programming, Prepackaged software, Computer integrated systems design, Computer processing & data preparation, Computer rental & leasing, Business services, 13: Crude petroleum & natural gas, Drilling oil & gas wells, Oil & gas field services, 48: Radiotelephone communications, Telephone communications, Telegraph & other message communications, Radio broadcasting stations, Television broadcasting stations, Cable & other pay television services, 36: Power, distribution & specialty transformers, Motors & generators, Electric housewares & fans, Electric lighting & wiring equipment, Household audio & video equipment, Telephone & telegraph apparatus, Radio & TV broadcasting & communications equipment, Electronic components & accessories, Printed circuit boards, Semiconductors & related devices, Electronic coils, transformers & other inductors, Electronic components, Miscellaneous Electrical machinery, equipment & supplies, Magnetic & optical recording media.

²01: Agricultural production, 15: General bldg contractors, Operative builders, 17: Construction – special trade contractors, Electrical works, 31: Footwear, 44: Deep sea foreign transportation of freight, 45: Air courier services, 46: Pipe lines, 75: Services – automotive repair, services & parking, Services – auto rental & leasing, 95: Water waste & management.

Figure 9: Number of firms by industry

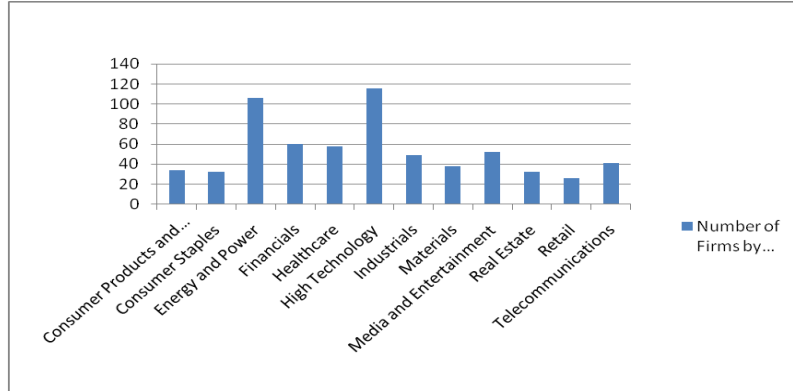


Table 6

Classification of firms by industry based on the two digit SIC codes

First 2 dig- its of SIC	Num. of firms	of	First 2 dig- its of SIC	Num. of firms	of	First 2 dig- its of SIC	Num. of firms	of
01	1		37	11		60	28	
10	7		38	25		61	6	
12	4		39	4		62	7	
13	53		40	2		63	10	
15	1		42	2		64	2	
17	1		44	1		65	6	
20	19		45	1		67	34	
23	6		46	1		70	5	
24	4		47	3		72	3	
26	5		48	53		73	80	
27	11		49	40		75	1	
28	36		50	10		78	4	
29	5		51	5		79	3	
30	4		53	2		80	12	
31	1		54	3		82	2	
32	2		55	3		83	2	
33	8		56	2		87	8	
34	7		57	2		95	1	
35	20		58	10		Total	644	
36	50		59	5				

Figure 9 presents the distribution of firms by industry based on the macro industry classification of Thomson One database.

Finally, we should note that 29.7% of the events in our sample are cross-border. This means that at least one target firm, either on an acquisition or a

divestiture included in the event, is based outside the US.

5 Methodology

Following previous studies (Kaplan and Weisbach [14], Antoniou et al [3]), we will use the market model to estimate expected returns for the firms on the announcement day and we will calculate the abnormal returns (ARs) as the actual returns for the sample firms minus the expected returns predicted by the model generated during the estimation period. For both acquirers and targets, we will calculate abnormal returns for the three day and five day event windows surrounding acquisition and divestiture announcements. Moreover, for acquirers, we will calculate abnormal returns for the period beginning five trading days before the acquirer’s announcement that it is seeking control of a target and ending five trading days after the announcement of the ultimately successful bid or outcome. For targets, we will calculate abnormal returns for the period beginning five trading days before the first announcement that a bidder is seeking control of the target and ending five trading days after the announcement of the ultimately successful bid or outcome. We will also cumulate these daily abnormal returns to estimate cumulative abnormal returns (CARs).

Furthermore, following Dionne et al [7] we will estimate the influence of determinants of the premium using the ordinary least squares method. Our model is expressed as follows:

$$\begin{aligned}
 \text{Premium}_i = & \beta_0 + \beta_1 \text{Runup}_i + \beta_2 \text{Market-to-book}_i + \beta_3 \text{Sales growth}_i + \\
 & \beta_4 \text{Size}_i + \beta_5 \text{Leverage}_i + \beta_6 \text{Return on Stock}_i + \beta_7 \text{Free cash flows}_i + \\
 & \beta_8 \text{Market-to-book}_i + \beta_9 \text{Relative size}_i + \beta_{10} \text{Leverage}_i + \beta_{11} \text{Public} \\
 & \text{Offer}_i + \beta_{12} \text{Cash payment}_i + \beta_{13} \text{Hostility}_i + \beta_{14} \text{Multiple Players}_i + \beta_{15} \text{Block-} \\
 & \text{holders}_i + \beta_{16} \text{Number of days}_i + \beta_{17} \% \text{ of value of first divestiture}_i + \\
 & \beta_{18} \text{Number of acquisitions}_i + \beta_{19} \text{Number of subsequent divestitures}_i + \\
 & \beta_{20} \text{Cross-border}_i + \beta_{21} \text{Industry}_i + \mu_i
 \end{aligned}$$

Like Schwert [21] we use the cumulative abnormal return over a two-month period before the announcement to reflect the runup in the share price of the target and we assume that the premium paid increases with the runup. We also include the market-to-book ratio of the target. 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 Bange and Mazzeo [4], we measure past performance by sales growth, defined as:

$$(\text{Total sales}_t - \text{Total sales}_{t-1}) / \text{Total sales}_{t-1},$$

where t represents the most recent fiscal year before the announcement. Like Comment and Schwert [6], we measure the target size as the logarithm of the total assets and we also use the ratio of the size of the target to that of the buyer. We assume that the size variables are 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 and the target's debt and the premium paid.

We use the return on the acquirer's stock for a six-month period before the runup period and we assume that recent performance leads managers to overestimate their ability to manage the target, and is positively linked to the premium paid. To analyse the impact of governance problems, we include the acquirer's free cash flows and we predict a positive relation between the premium paid and the ratio of free cash flows to total assets. We also include the market-to-book ratio of the acquirer's assets 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, and 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.

We use an indicator variable with the value of 1 if the potential acquirer made a public takeover offer and 0 if he chose to negotiate with the managers. 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, and we assume that the influence of this variable to the premium paid is positive. Furthermore, we use an indicator variable that takes the value of 1 when the transaction is defined as hostile according to Thomson One and we predict a positive relation between hostility and the premium, in line with Schwert [21], who concludes that hostility is a negotiation strategy intended to increase the premium paid by the acquirer. To control for the presence of more than one potential buyers, we include an indicator variable that equals 1 if a third party submitted an offer for the target while the first bidder's offer was still pending. We anticipate a positive relation between the presence of more than one bidders and the premium. We also include the Blockholders variable, which equals 1 if the acquirer holds more than 5% of the target's shares before making the offer, in order to measure information asymmetry between bidders. We predict a significant negative relation between blockholders and the premium paid.

We include a variable that represents the time (in days) elapsed between the first acquisition and the first divestiture and between the first acquisition and the last divestiture of each event, and we also include a variable that shows the percentage of the total value of the divestitures of each event that represents the value of the first divestiture made by each firm. We assume that the smaller the time interval and the higher the percentage in value of the first divestiture, 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.

Additionally, following Marquette and Williams [16], we formulate variables that are the numbers of acquisitions and of subsequent divestitures initiated

by each firm, to control for any effects multiple acquisitions and multiple divestitures may have. Finally, we include an indicator variable that equals 1 if the event is cross-border (at least one target firm, either on an acquisition or a divestiture included in the event, is based outside the US) and an indicator variable that equals 1 if the acquirer and the target(s) in each event belong to the same industry, based on the two digit SIC code, in order to examine if these factors influence the premium paid.

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