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Assessing the impact of Industry in M&A success

José Miguel Jerónimo Alves Fernandes

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Professor Youtha Cuypers

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Abstract

The purpose of this thesis is to assess whether a company's industry has a significant impact on the success rate of an M&A deal. The theoretical analysis is divided in three main determinants which are believed to support differences in performance – Premiums, Revenues & Costs and Integration. The empirical study regressed the Premiums and CARs for three distinct industries. The main results suggest both the acquirer's industry and the premiums paid are, as hypothesised, relevant when explaining M&A success. Furthermore, evidence shows knowledge-intensive firms – Pharmaceutical and Software - tend to pay higher premiums but achieve better CARs.

Keywords: M&A, Performance, Industry, Premium

I. Introduction

Mergers and Acquisitions (M&A hereafter) have become one of the most important strategic manoeuvres at a company's disposal. Whether the objective is to hastily increase market power, to expand to a new geographic location, or to diversify, an M&A is, in theory, a promising approach to be taken into consideration.

There has been a tremendous dissemination of M&A culture and best practices throughout different companies, industries and economies. Even though the mainstream scientific research unanimously agrees that M&A activity is cyclical, mainly driven by economic, regulatory and technological shocks, it shows a clear long-term growing trend (Harford, 2005). According to J.P.Morgan, the global M&A deal value has rocketed from 1.1 US\$tn in 1996 to 5 US\$tn in 2015, representing 6% of the GDP (J.P.Morgan, 2016).

The outcomes of such tactic, however, pose an interesting conundrum. Research suggests that while target companies benefit from M&A activity, shareholder's value in the acquirer's firms tends to be destroyed (Bruner, 2004). Presented with this evidence, the first question which comes to mind is: "Why has M&A activity increased so much over the years if evidences show that it has destructive effects on the acquirer firm?". This apparent inconsistency is known as the "M&A Paradox". A possible explanation may lay in the outcome's variance. Despite being negative overall, there are managers who believe they can create value and companies which are actually successful in their efforts.

The aforementioned predicaments have led many researchers to deeply study what constitutes success and what drives it in M&A. Despite the endeavours towards the end of the XX century and beginning of the XXI, the literature remains rather incomplete and filled with contradictory theories and findings. The overwhelming majority of research focuses on deal-specific variables which, despite having gathered consensus on its significance, still provide

little insight into the determinants of M&A success (Kaplan, 2000). With that in mind, it becomes essential to investigate an alternative set of variables which might shed some light on the drivers of post-acquisition performance (King, Dalton, Daily, & Covin, 2004).

The present thesis aims to enrich the current state of the art by exploring a fairly neglected variable – the company’s industry as a determinant of M&A success. Analysing the acquirer’s perspective, this paper will begin by assessing the theoretical foundations which might suggest differences in outcomes between industries, followed by an empirical study. Supported by the existing literature and taking into consideration the specific characteristics of industries and M&A activity, this paper will be concentrating on the Pharmaceutical and Healthcare, Banking and Software industries. Nevertheless, deal-specific variables above-mentioned will also be emphasised and tested for significance.

The importance of this thesis goes beyond the academic purpose. A further comprehension of M&A success determinants is crucial for companies and therefore, for the economy. By broadening our knowledge horizons on the matter, companies are allowed to make better informed decisions and, consequently, to improve the outcomes.

The remainder of the paper is structured as follows. Section II provides a literature review, mainly on M&A success determinants. Section III begins by describing the dataset, the underlying assumptions used and the financial and econometric methodology employed. Furthermore, it also alludes to industry specific characteristics with the purpose of testing the hypothesis that different industries have different M&A success rates. While Section IV presents the findings and a discussions of the results, Section V offers a conclusion and final remarks to the study.

II. Literature Review

Throughout the rich yet conflicting literature on the determinants of M&A success, there appear to be three factors which are extensively mentioned as playing an important role. The premiums paid by the acquirer, the opportunities for revenue synergies and efficiency gains resulting from the deal, and lastly, the integration process between the two firms.

Premiums

A premium – the difference between the price offered by the acquirer and the actual value of the target company – is perhaps the most fiercely negotiated condition on an M&A contract. The mainstream research concludes that its terms alone can heavily influence the analysts' perspective on the deal and, therefore, severely impact the stock returns. "*Ceteris paribus, it is axiomatic that the higher the premium paid, the lower the ultimate returns to the acquirer from a given acquisition.*" (Hayward & Hambrick, 1997).

The knowledge-intensive nature of some industries would suggest an immediate disadvantage for the acquirer concerning the premiums paid. The existence of asymmetric information poses a troubling hindrance, particularly in these types of industry. Intangible assets are much more difficult to value which may lead to incorrect decisions. Originally, the acquirer might overbid the target expecting it to be worth more than it actually is. Furthermore, it might even lead to a more severe situation in which the wrong target is chosen based on an overvaluation of its intangible assets (Coff, 1999). Literature on persuasion and negotiation suggests that in the presence of asymmetric information in favour of the target, the acquirer will fall for the "winner's curse"¹ and overpay for the assets (Samuelson & Bazerman, 1985). These

¹ The "winner's curse" states that in an auction, in the presence of incomplete information, the winner/buyer will rarely be able to negotiate a fair price and will succumb to the target's bargaining power.

hindrances can be even more troubling when considering deals which target human capital rather than a product.

An industry's reliance on Research and Development (R&D hereafter), whether it is measured by expenditure or growth, has also proven to be a statistically significant variable to explain the premiums paid (Laamanen, 2007). Technology-based acquisitions have been proven to report average premiums 8p.p superior to other targets – regardless of the event window (Kohers & Kohers, 2001).

Hypothesis 1: Knowledge-intensive firms pay higher premiums.

Nevertheless, a very beneficial practice which allows companies to overcome some of the aforementioned concerns is the existence of pre-merger alliances between the target and the acquirer. Research suggests that firms absorb information about each other and learn how to create value during the alliance's period, particularly, in research alliances (Anand & Tarun, 2000). Additionally, analysing stock fluctuations, acquirers which had previous alliances with the target, were rewarded with higher average abnormal returns when compared with those which had not (Higgins & Rodriguez, 2006).

Agency costs and managerial hubris have been shown to have a massive impact on the premiums paid and, consequently, on the outcomes of M&A deals (Jensen & Meckling, 1976). Shareholders, with limited control over the company, delegate the decision power to managers who have private interests which might not to be aligned with the company. The result is likely to be an excessive exposure to risk (Gorton & Rosen, 1995). *“The directors of such companies, being the managers rather of other people's money than of their own, it cannot well be expected, that they should watch over it with the same anxious vigilance with which the partners in a private company watch over their own.”* (Smith, 1776). Regarding managerial hubris, managers tend to have an idealistic view of their qualities and overestimate the advantages they can

leverage from the M&A. Consequently, the forecasted gains exceed the actual performance (Roll, 1986).

Lastly, the existence of multiple bidders is also associated with higher premiums paid by the “winners”. Several factors, such as industry consolidation or higher growth rates, can lead to these bidding wars (Giliberto & Varaiya, 1989).

In accordance with the literature, two main hypothesis can be formulated for later testing:

Hypothesis 2a: The premiums paid by the acquiring firm differ according to the company's industry.

Hypothesis 2b: The premiums are a relevant variable when explaining M&A performance.

Revenue enhancement and cost contention

Having analysed the premium as a decisive pre-merger factor, it is now important to elaborate on one of the two post-merger determinants of success identified – whether the two firms combined are able to enhance revenues and contain costs better than they would individually.

An initial path towards revenue enhancement is the acquisition and distribution of a new product. Whether the objective is to create network effects or to complement a broken product pipeline, M&A can be a feasible solution (Bower, 2001). While cross-selling is also a possibility, studies suggest such synergies are harder to capture and tend to be heavily scrutinized by investors (Bruner, 2004). Regarding network and lock-in effects, by acquiring complementary product, firms are able to influence the clients' decision process towards their

product, creating positive externalities.² This strategy is rather common in technological environments (Arthur, 1989). Addressing the product line, 71% of acquirers were reported to have concretely improved their product pipeline through M&A efforts (Higgins & Rodriguez, 2006). Furthermore, pre-merger alliances deeply strengthen this logic by being positively correlated with new product development (Rothaermel, 2001).

A combination of different functional strengths across merging firms can also create value (Damodaran, 2005). It is a common practice for smaller firms to heavily focus on R&D and be acquired at a prototyping stage. Larger firms tend to profit from economies of scale in production. In the case of excess capacity, the gains are even greater. Geographical or product line overlap are also factors which emphasise the possibility for cost synergies mainly through divestitures of physical assets and personnel (Capron, 1999). However, firms can also learn and profit from each other to increase process efficiency. Throughout the value chain, acquirers are also believed to have a better supply chain, sales and marketing expertise (Danzon, Epstein, & Nicholson, 2007). In technological industries, due to the constant innovation environment, knowledge depreciates at higher rates which grants a particular importance to a faster time-to-market (Glazer & Weiss, 1993).

Particularly among larger firms from the same business, M&As may lead to a market consolidation which allows for aggressive pricing strategies (Cybo-Ottone & Murgia, 2000). However, these policies have a clear impact on the company's clients. There is the danger of new competitors or the relation between the company and client might be damaged leading to a higher than expected churn rate from the clients (Pilloff & Santomero, 1997). Data supports that the bigger the M&A deal, the more important these revenue and consolidation effects are (Berger & Humphrey, 1992).

² A notable example is Microsoft Windows and Microsoft Office.

An acquisition to overcome poor in-house R&D is also a practice which must be mentioned. On an efficiency perspective, the literature is in complete disagreement. Obviously, this point is more important to some industries than others. Some studies find evidence of substantial scale and increases of productivity³ in research-intensive industries (Schwartzman, 1976). However, the fair majority has a different perspective finding evidence to support the existence of diseconomies of scale in R&D (Cockburn & Henderson, 2001).

Integration Process

Research on the integration process finds evidence that it is one of the main determinants in value creation and is reported to be responsible for more than 50% of all unsuccessful deals (Habeck, Kroger, & Tram, 2000).

The main fields of study tend to focus on knowledge transfer, employee turnover and organisational fit. Considering knowledge a key driver for M&A deals, knowledge-intensive industries would find the most worrying hindrances in their endeavours to integrate. However, studies suggest that there are some characteristics which may aid the knowledge transfer. For instance, a systematic codification of knowledge has proven to be helpful. The more standardised the industries in their approach to knowledge codification, the easier the transfer (Kogut & Zander, 1992). Furthermore, through experience, and mainly in standardised industries, the acquirers are able to reduce the implicit costs of knowledge transfer (Teece, 1977).

A second conundrum arises from the difficulty in integrating people and mixing cultures. This is particularly worrying for industries in which human capital is of paramount importance. Acquirers are not simply purchasing the product/service; they want the team of talented people who created it and can enrich their stock of knowledge and capabilities

³ Measured as the ratio between output and the R&D expenditure. Output measure vary according to the industry.

(Cannella & Hambrick, 1993). For smaller firms, which tend to be targeted, there is an organizational structure which is drastically compromised in M&A deals. Talented employees are often incentivized by smaller companies due to an increased responsibility. These incentives tend to change which results in a higher than average churn rate from the human capital (Zollo, Singh, & Puranam, 2003). The more important the human capital, the higher impact this variable has on the overall viability of the deal.

There are also struggles concerning higher rankings in the corporations (both target and acquiring firms). “Power plays” at the top of the hierarchy result in an executive’s higher than normal turnover rate with harmful consequences (Walsh & Ellwood, 1991).

Based on the abovementioned determinants, two additional hypothesis, similar in nature to the previous two, can be conjectured:

Hypothesis 3a: M&A deals will result in different industries having different cumulative abnormal returns.

Hypothesis 3b: The industry in which the deal is negotiated is a significant factor when explaining M&A performance.

III. Data and Methodology

Sample

In order to perform the desired analysis, a sample of M&A deals, with a particular emphasis on the acquirer’s variables, was required. Such sample was collected from the Thomson Eikon database and Datastream. With the purpose of mitigating noise and reducing unwanted variance in the study, a series of restrictions were applied to the data collection.

(1) Both the bidder and target firms must be from the United States of America, not to be influenced by cross-border implications. To easily calculate stock returns, (2) the acquirer must be listed on either the NASDAQ stock exchange or on the New York Stock Exchange. To preserve the integrity of the estimation-window, (3) all acquiring companies had to be listed for at least one year prior to the announcement date. (4) All deals must be completed and (5) have a reported deal value of over \$100 million. (6) Acquirers must belong to one of the following industries: Pharmaceutical & Healthcare, Banking or Software⁴. (7) The target must belong to the same industry as the acquirer, so as to avoid diversification. (8) The acquirer could not have had previous ownership and, at the time of the deal, must have acquired 100% of the target firm. The data was carefully examined to avoid confounding events; (9) Companies with dividend pay-outs during the event-window were excluded from the study. (10) The sample includes deals announced from the first of January 2010 (01/01/2010) to the present day.

The sample is composed by 176 M&A deals. However, one of the desired variables, the premium paid by the acquirer, is only available in the deals in which the target is public. As a coincidence, all of those observations were mergers rather than acquisitions. With that in mind, a sub-sample constituted by 95 observations will also be considered in the study with the purpose of studying the premiums impact, by industry, in Cumulative Abnormal Return (CAR hereafter).

Table 1: Summary of the data							
n = 176				n = 95			
Pharma	40 (23%)	Cash	75 (43%)	Pharma	20 (21%)	Cash	27 (28%)
Software	45 (25%)	Stock	44 (25%)	Software	14 (15%)	Stock	38 (40%)
Banking	91 (52%)	Mixed	57 (32%)	Banking	61 (64%)	Mixed	30 (32%)
Public	101 (57%)	Merger	146 (83%)				
Private	75 (43%)	Acquisition	30 (17%)				

⁴ It was important that the industries chosen had available information and had relevant in the M&A activity. However, the most important criteria was the amount of literature on each industry which would allow for a more accurate interpretation of the empirical results.

Dependent variable

The first step when discussing M&A success must be to define what, in this paper's perspective, constitutes success. That will be the dependent variable in the study. Such topic remains, to this day, extremely controversial (Bruner, *Deals from Hell: M&A Lessons that Rise Above the Ashes*, 2005). The optimal solution would involve knowing exactly how the company would perform in the absence of the M&A. However, since that is obviously impossible, research has settled for a sub-optimal performance measure. Even though "accounting studies" (based on accounting statements) have proven to be useful, the majority of the academic papers follows the "event study" methodology (Zollo & Meier, *What Is M&A Performance?*, 2008). Said approach was built on the assumption that in efficient capital markets (such as the ones in the sample), stock prices are continuously refined by new information (Bouwman, Fuller, & Nain, 2003). However, investor's lack of insight regarding implementation issue may lead to wrong assessments (Schoenberg, 2006).

Despite the aforementioned hindrances, this paper follows the "event study" method to measure M&A success. Therefore, the dependent variable will be the CAR (Brown & Warner, 1985)⁵. The "CAR" will be defined as the difference between a stock's actual return and its expected return (had the event never happened).

$$A_i^t = R_i^t - E(r)_i^t \quad (1)$$

Where A_i^t represents the abnormal return for the stock i for the day t ; R_i^t and $E(r)_i^t$ define the real and the expected return of the stock i for the day t , respectively.

In order to calculate the security's expected return, the market model approach, which is based on the CAPM⁶ was followed:

⁵ Every step followed in the methodology section was based on the work of Brown & Warner (1985).

⁶ Capital Asset Pricing Model is a model which aims to calculate the theoretic return of a security.

$$E(r)_i^t = R_f^t + \beta * (R_m^t - R_f^t) \quad (2)$$

Where R_f^t represents the return of a risk-free asset for the day t ; β is a measure of a stock's systematic risk; R_m^t is the return of the chosen benchmark for the day t

However, to do so, it was necessary to use a benchmark for the stocks. The choice was the Standard & Poor's 500 – an American stock market index which comprises 500 major companies from the NYSE and the NASDAQ.

While the return of the benchmark (S&P 500) is calculated based on the index's capitalization, the return of a security is calculated based on its stock price, as follows:

$$R^t = \frac{p^t - p^{t-1}}{p^{t-1}} \quad (3)$$

The safest assets (and the ones commonly used) are the American treasury bills. Since the maturity should be adjusted to the investment, this thesis uses the 90 days treasury bills. However, since the returns are being calculated on a daily basis, the T-Bills Yield-to-maturity –YTM- must be divided by the days of the year (365)⁷.

Lastly, the systematic risk (β) is computed through a regression analysis⁸. The historical returns of a given stock are compared with market's returns with the purpose of identifying a correlation between results. Knowing how a firm's shares behave in comparison to the market allows to predict which would have been the expected return in a situation in which the return of the market is observable⁹.

Once the aforementioned information is calculated, the CAR is simply the sum of the daily abnormal returns for the days within the event window.

⁷ Some thesis only take in consideration the working days and therefore only divide the YTM by 250.

⁸ This paper used the formula "Slope" on Microsoft Excel.

⁹ $\beta > 1$ mean, in theory, that the company/industry is more volatile than the benchmark. This values are to be expected mostly from high-tech companies in which there is the possibility for higher returns but also higher risk.

$$CAR = \sum_{t=a}^{t=b} A_i^t \quad (4)$$

Where a and b represent the first and last day of the event window, respectively.

Two different time windows were used in this thesis in which the M&A announcement day is considered to be 0. The first period, called estimation window was [-230;-30]. Its purpose was to perform a regression analysis with the data from the company's and the market's return in order to estimate the value of β . There was a special concern for the window not to involve other M&A deals which could comprise the results. It is also important that the final day is 30 days before announcement for it not to be influenced by the actual deal.

The actual event window was considered [-7;+7]. It was crucial to have the returns from the days before the announcement to account for information leakage which could reflect on the market before day 0¹⁰.

Industry as an explanatory variable

The most important explanatory variable considered, and the one around which the study was designed, is the acquirer's industry. As previously mentioned, the main purpose of this thesis is to test whether different industries had different M&A success rates. In order to do so, three industries were considered for the empirical study: Pharmaceutical & Healthcare, Banking and the Software industry. These industries were compared across the three dimensions considered in the literature review (premium paid by the acquirer, synergies and integration process)¹¹. The earliest objective was to be able to produce an educated prediction on the M&A outcomes. However, such comparison is also useful to interpret the regression's results.

¹⁰ The returns from day -7 were calculated with the stock prices from day -8.

¹¹ Whether an industry is knowledge-intensive or not, is of the utmost importance for the purpose of this study. However, it is not included as one the three factors since it impacts all of them. With that in mind, there will be frequent remarks explaining the influence this determinant has on each of the factors.

The Banking industry is not knowledge-intensive and therefore, could be expected to have a smoother process of determining and negotiating the terms of the M&A deal. In fact, the major assets are tangible and, generally, easily accessible to potential acquirer's. This characteristic of the industry alone, can prove to be very important when bidding and for the overall success of the acquisition. However, agency costs and managerial hubris appear to heavily affect the banking industry is particular. In an industry survey, Sean Ryan concluded that the vast majority of banking mergers were not in the best interest of equity-holders (Ryan, 1999).

The empirical research conducted on the matter, entirely supports the theory. A survey on a significant sample of banking M&A found that management frequently dismisses consolidation costs and overestimates the revenue synergies when considering a deal in order for it to be more appealing and, ultimately, endorsed (Houston, Christopher, & Ryngaert, 2001). However, the same study also concluded that 66% of the banking M&A deals were negotiated on a fair price¹². For the over bidden transactions, the average abnormal return for the bidder was -8.56%. On the other hand, for the deals in which the analysts approved the price, the average return was -0.004%, proving the importance of the premium for the success of an M&A.

Pharmaceutical and Software, given its knowledge-intensive nature, are expected to pay higher premiums. Nonetheless, there is a long-standing practice of pre-merger alliances on the Pharmaceutical industry. This factor alone allows companies to partially overcome information asymmetries, better value the target's assets and therefore, negotiate lower premiums.

As for the Software industry, not only are alliances not a common practice, there are actually a couple of characteristics which suggest even higher premiums. First of all, network

¹² The team of analysts did not believe that the bidder overpaid for the target.

effects are particularly important in this industry. Therefore, the first-mover advantage gains a special emphasis (McNamara, 2008). This dynamic explains the frequent bidding wars which lead to higher valuations and superior premiums paid by the “winner”. The second theoretical argument supporting the high premiums in the sector derives from the risk associated with timing. In such an innovative high-growth industry, companies which are not even profitable can become dominant enterprises rather quickly. Thus, the acquirer must engage in the takeover at an earlier stage of the growth process, before the price of the target escalates astronomically. This “potential success” involves a very high risk for the buyer (Schief & Schierec, 2013).

Regarding revenue enhancement synergies, theory would suggest there are reliable strategies which the Banking industry could follow. For instance, an M&A deal would allow, given a greater industry consolidation, to follow two main growing strategies: Cross-selling of banking services and secondly, a decrease in deposit fees followed by an increase in loan rates. Empirically, data supports that, on average, the relation with the client is considerably damaged, thus revenue synergies can be neglected when analysing the sources of value creation in this industry (Houston, Christopher, & Ryngaert, 2001). On the other hand, the mainstream literature agrees that M&A deals have a positive impact on the acquirer due to cost synergies in the banking industry. Throughout the research, geographic overlap among the two entities is seen as the most important factor to accomplish scale economies. Rhoades proves that a larger overlap results in additional efficiency gains (Rhoades, 1993). Furthermore, studies also suggest that cost savings intensify with experience and, throughout time, average returns have been increasing (Houston, Christopher, & Ryngaert, 2001).

The Pharmaceutical (which I will use interchangeably with Pharma) and the Software industries are expected to create value from a revenue perspective. While an M&A can be important for companies in the Pharma industry to overcome excess capacity and to create economies of scale, the most significant advantage is related with the acquisition of a possible

new product. Blockbusters usually represent between 50% and 70% of a pharmaceutical company's revenues and larger corporations are more suited to handle production, marketing, distribution and sales than smaller firms. Moreover, M&A has been linked with an improvement in R&D efficiency. In an industry with a high R&D to sales ratio, small progresses in efficiency can have a considerable impact.

As previously mentioned, the Software industry can earn substantial returns from exploiting network effects. It is fairly common for larger firms to acquire smaller start-ups which have developed a feature which can complement their offer and, consequently, further engage the client.

Lastly, the integration process is also expected to be troubling for knowledge-intensive firms, particularly in the Software industry since knowledge tends to be embedded in the human capital. Sizable changes in the work space result in a high churn rate from the target's employees which, many times, destroys the purpose of the M&A (Zollo, Singh, & Puranam, 2003). Knowledge transferability is expected to be easier in the Pharma industry since companies tend to be moved to make a deal with the purpose of buying a patent from a smaller firm, which would not require severe integration. In this case, the knowledge is codified, hence easier to appropriate (Walsh & Ellwood, 1991).

For the Banking industry, knowledge transfers are not such a determinant factor for the overall success of the M&A. Even though integration tends to be fairly costly, it also tends to be rather smooth. Mainly at a lower hierarchical rank, the level of standardisation in the industry's processes results in a suave transition between firms.

To conclude, it is clear that industries display distinctive characteristics which would suggest different performances across the aforementioned determinants. However, little

research has been done regarding the relative importance of said factors¹³. Thus, theoretically, despite being able to predict the performance for each individually, the overall success of the M&A remains undetermined. Nevertheless, empirical research has been conducted on the matter. Such studies would suggest the Pharmaceutical industry to be the best performer, followed by Software (Higgins & Rodriguez, 2006). Banking was reported as the worse performed, even showing negative outcomes for the bidder (Houston, 2001).

In this paper, the empirical impact of the variable will be tested following two different methodologies: Firstly, a hypothesis test will assess whether the mean of the CARs for each industry are different than 0 (Equation 5). Secondly, if so, a hypothesis test, measuring the difference of means between industries will conclude whether there are statistically significant disparities in the CARs¹⁴. Lastly, the variable will be regressed as an explanatory variable¹⁵.

$$t = \frac{\bar{x} - \mu}{\frac{S}{\sqrt{n}}} \quad (5)$$

Where \bar{x} represents the sample's mean; μ stands for the null hypothesis' value for the population's mean; S is the sample's standard deviation.

Control Variables

Despite the *industry* being the critical variable in this study, there are others which may be useful to shed light on the M&A success puzzle.

First and foremost, the importance of the method of payment appears to be paramount and consensual. Cash bids (when the deal is fully paid in currency to the target's shareholders) generate higher returns than stock acquisitions (the deal had an agreement regarding stock swap

¹³ For instance, Pharma might create more synergies while Banking pays lower Premiums. Without knowing the relative impact of each factor, the outcome is undetermined.

¹⁴ Excel Add-in "Data Analysis". T-test: Two samples with unequal variance.

¹⁵ The software chosen for the purpose was "Eviews".

transaction) (Gregory, 1997). Equity bids may signal investors that management believes their shares are overpriced (Servaes, 1991). While stock mergers have been reported to earn returns of -25%, cash acquisitions performed significantly better with returns of 62% (Loughran & Vijh, 1997).

Analysing the nature of the target (whether it is public or private), research has found better outcomes when acquiring a private entity (Hansen & Lott, 1996). Not only were the average returns higher, there was also a larger probability for positive outcomes. Also, acquisition of assets is separated from mergers to test whether the differences in the integration processes are relevant

Additionally, in respect to the bidder, friendly mergers have also outperformed hostile takeovers. The most frequent explanation is that the market associates hostile bids with higher premiums due to the target's strategies to preserve its independence (Goergen & Renneboog, 2002).

It would also be interesting to assess whether the premiums paid by the acquirers were statistically significant. However, since the information about the premium is not available for some of the deals, the second regression will be based on the second sample (a sub-sample of the first). Lastly, it is vital to check whether this thesis' predictions concerning the premiums paid by each industry are correct. With that in mind, the test-statistics performed for the CARs concerning the different industries will also be employed for the premiums.

IV. Main Findings and Discussion

As previously stated, the first stage of the empirical section was the hypothesis tests concerning the industry, using the data from the main sample. The results can be found in the following Table 2.

Table 2: Hypothesis tests

	t-Statistic¹⁶	P-value	Conclusion¹⁷
<i>Hypothesis</i>			
<i>H₀: $\mu_1 = 0$</i>			
Pharmaceutical	2,506***	0,0082	Reject H ₀
Software	1,3629*	0,0899	Reject H ₀
Banking	1,2877	0,1006	Not Reject H ₀
<i>Hypothesis</i>			
<i>H₀: $\mu_1 = \mu_2$</i>			
Pharmaceutical & Software	0,7465	0,2287	Not Reject H ₀
Pharmaceutical & Banking	1,791**	0,0394	Reject H ₀
Software & Banking	0,7690	0,2225	Not Reject H ₀

The abovementioned statistics display some interesting results. According to the data, both the Pharmaceutical and the Software¹⁸ industry earned positive, statistically significant, cumulative abnormal returns as a result of M&A activity. The Pharmaceutical evidence corroborates the work of Higgins and Rodriguez (2006) which had obtained an average 3.91% CAR, significant at 1%, for a three-day event window. On the other hand, the results contradict the research which had found negative CARs or, employing different success measures, had reported decreases in the Return on Investment after the merger (Ravenscraft & Long, 2000) (Demirbag & Tatoglu, 2007). Regarding the Software industry, the outcomes are corroborated by other studies on the matter which, as in this paper's literature review, mentioned the network effects as an important determinant of revenue synergies (Léger & Yang, 2004)¹⁹.

The Banking industry reported an average positive CAR of 0.742%. However, that result was not statistically significant thus we may assume that the average M&A deal in the sector does not create nor destroy value for the acquirer. The vast majority of the studies

¹⁶ The critical values of the *t*-distribution can be freely accessed on the following webpage: <http://www.sjsu.edu/faculty/gerstman/StatPrimer/t-table.pdf>

¹⁷ Three, two and one asterisks (*) denote statistical significance at 1%, 5% and 10% levels, respectively.

¹⁸ The Pharma and Software industry reported average CARs of 3.35% and 1.91%, respectively.

¹⁹ The same study has also found that for some event windows, the CAR were not statistically significant.

conducted in the banking industry have report a destruction of value on the acquirer's side (Frame & Lastrapes, 1998). As previously stated, Houston, James and Ryngaert (2001) concluded that while the returns in the Banking industry were negative, they had been improving since the beginning of the 90s. The main motive advanced was an increasing and focus on cost savings and on exploiting cost synergies. This reasoning might help explain the divergence between the results obtained in this paper and the bulk of literature.

Analysing the differences between means, the CARs of the Pharmaceutical and Banking are the only pair which is statistically significant. This value is extremely esteemed since it hints that the variable *industry* might, in fact, be relevant to explain the outcomes of M&A deals.

The next step, according to the methodology, was the estimation of a model to explain the dependent variable – CAR. To do so, two categorical variables²⁰ related with the acquirers' industry were created and regressed in the model. The outputs are displayed in Table 3:

Table 3: Complete Regression

Variable	Coefficient	t-Statistic	P-value
Constant	0,020856	0,9986	0,3194
Pharmaceutical	0,030564	1,716*	0,0878
Software	0,011702	0,6391	0,5236
Public ²¹	-0,040837	-3,04***	0,0027
Cash	-0,010388	-0,6205	0,5357
Stock	0,009451	0,6212	0,5353
Merger	0,013288	0,6856	0,4939

Table 3 is vital to address the research proposal on whether the *acquirer's industry* was a determinant factor when determining the success of an M&A deal. The statistically

²⁰ Categorical variables assume the values of 1 or 0 to designate the presence of a certain characteristic. Since there are only 3 possible inputs, there is only a need for 2 categorical variables.

²¹ Public is a categorical variable which intends to measure the impact of Public v Private on CARs. The same logic can be applied to Cash and Stock as Method of Payment and Merger as Form of Transaction.

significant, positive coefficient on the “Pharmaceutical” variable supports the claim that Pharma M&As are expected to outperform, in average by 3%, the Banking deals. However, being a significant variable does not mean every industry must perform differently. Data also suggests the Software and Banking industry have similar CARs.

According to the literature review and methodology sections, Banking was predicted to have an advantage over Pharmaceutical and Software across every determinant, with the exception of revenue enhancement synergies. As a result, it is only logical to assume that the impact of that factor alone was able to overcome the remaining. On one hand, the importance of revenue enhancement perspectives might be extremely valuable. On the other hand, the knowledge-intensive industries’ performance on that dimension might be so overwhelming that it overshadows the hindrances on the premium negotiation²² and integration.

The negative coefficient on *Public*, which is significant at 1%, indicates that deals with private targets are associated with higher abnormal returns. This result, as previously mentioned in Section 3, fully corroborates the mainstream literature (Fuller, Netter, & Stegemoller, 2002). A possible explanation for this phenomenon is the bargaining advantage of the public acquirer over the private target. The absence of bidding wars can lead to a decrease in the premium.

Surprisingly, neither the method of payment, nor the form of transaction (merger or acquisition) is statistically significant in this model. First and foremost, throughout literature, deals settled in cash are regularly reported as having higher returns than with stock (Bruner & Asquith, Merger returns and the form of financing, 1990). A plausible speculation for the output could be that the market is interpreting a cash deal as a way to “burn” excess cash, thus being susceptible to management hubris. The figures on the form of payment are also puzzling. Since

²² The relevance of the premium will be addressed further in this paper.

they would entail different integration processes, it would be natural to expect different outcomes.

Having analysed the majority of the independent variables, the sample will now be reduced, as previously explained, to study the behaviour of the premium paid by the acquirers. The methodology consists in regressing the CARs with *industry* and *premium* as the explanatory variables.

Table 4: Premium Regression

Variable	Coefficient	t-Statistic	P-value
Constant	0,008289	1,013052	0,3137
Pharmaceutical	0,040194	2,2977**	0,0239
Software	0,000459	0,026513	0,9789
Premium	-0,034454	-2,3120**	0,0230

The first point worth noticing is that, once again, despite the changes in variables and sample, the categorical variable related with the industry remains as a statistically significant variable. Moreover, the premium paid by an acquirer is also statistically significant, at a 5% level. As expected, the variables coefficient is negative – it is axiomatic that the greater the premium, the smaller the abnormal returns, *ceteris paribus* (Hayward & Hambrick, 1997).

Taking the latest information into consideration, there appears to be one more required estimation: since the premium is significant, it is mandatory to perform a hypothesis²³ test to determine whether industries pay differently.

Table 5: Premiums by industry

Variable	Mean	t-Statistic	P-value
Pharmaceutical & Banking	63% - 30%	2,635***	0,007734
Pharmaceutical & Software	63% - 41%	1,71326*	0,050056
Banking & Software	30% - 41%	-2,0807**	0,023363

²³ The procedure is analogous to Table 2.

As it became clear with Table 5, the differences between premiums are all statistically significant. As a result, we can affirm that the Pharmaceutical industry pays the highest premiums while banking pays the lowest. It is, therefore, intuitive that knowledge-intensive firms face, as previously hypothesised, greater troubles concerning valuation and consequently, premiums. However, it is curious that the Pharmaceutical industry has higher premiums when compared with software companies. Perhaps the bidding wars in Pharma are fiercer than recalled.

The most interesting scrutiny derives from studying the results from Table 3,4 and 6, together. On one hand, Table 4 proves *premiums* are inversely proportional to CARs. On the other hand, Table 3 and 5 suggest that the industry which pays the highest premiums is the one which performs better, while banking with the lowest premiums also has the lowest CAR average. In theory, Banking is expected to perform reasonably better in matters of integration. Also, while the cost synergies have been studied to be fairly significant, the revenue enhancement strategies are believed to be ineffective. It is in this particular variable that the knowledge-intensive industries may thrive. The software industry is able to build powerful network effects. More importantly, the Pharma companies, while exploiting efficiency gains can also drastically improve their product pipeline and potentially increase their revenues exorbitantly. These factors are now hypothesized to have been responsible for the distinctive abnormal returns of these two industries.

V. Conclusion

The prime purpose of this paper was to determine whether the industry of an acquirer was a relevant element in the effort of explaining M&A success.

The first step towards this objective was an abstract approach which intended to find theoretical foundation for the hypothesis that different industries would have distinct M&A

outcomes. Throughout this endeavour, three main determinants were identified. The premium paid by the acquirer is believed to be inversely proportional to abnormal returns. Secondly, the synergies exploited, both on the revenue and on the cost side are believed to enhance the deal effects. Lastly, there is a review of the main factors concerned with the post-merger integration process.

In order to conduct the empirical verification, several regression and hypotheses tests were performed with the main dependent variable being the cumulative abnormal return. In order to test the industry effect, three different industries were chosen in the sample: the Pharmaceutical, Software and Banking industries. The Pharmaceutical industry was reported as being the top performer of the group with an average CAR of 3,35%, followed by Software with 1,91%. The banking industry, however, did not provide statistically significant average returns. The regression displayed on Table 3 finds further evidence of the importance of the industry when discussing success in M&A deals.

Lastly, the premiums paid at the time of the M&A have also proven to be statistically significant for the M&A outcomes. Pharma was reported as paying the highest premiums, followed by Software and Banking, respectively. Nevertheless, it may be conjectured that the synergies effects on the Pharmaceutical industry overcome its poor performance in the premium negotiation.

Regardless of the results in this study, there are limitations which must be taken into account. Unfortunately, given the restrictions imposed during the sample collecting, every single M&A deal was considered to be friendly. It would have been interesting to test whether hostile takeovers influence the results. Secondly, the lack of information for the premiums on private firms might have also influenced the results by narrowing our second sample to 95 observations. A third and last restriction relates with the lack of information on the acquirers

motivations towards the deal. It would be interesting to have an estimation of the synergies which are expected to be created or the actual economic objectives which the acquirer aims to achieve.

There are two main topics which will be challenging future researchers. On a performance perspective, the cumulative abnormal return is not an ideal metric to measure M&A success. Not only is it not independent from external variance, it is also a poor predictor on a company's ability to exploit synergies and manage the integration process. On the other hand, important work remains to be done on the effects of synergies. Not only is it still troubling to determine whether synergies were created or not, their overall importance over the other factors is still fairly unknown. While this paper hints that synergies tend to be more important than premium, other methodologies must be employed for further confirmation.

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Appendix 1

Table 6: Hypothesis and Results

	<u>Top Performer</u>		<u>Worse Performer</u>
<i>Theory</i>			
Premium	Banking	Pharmaceutical	Software
Revenue Enhancement	Undetermined	Undetermined	Banking
Cost Contention	Undetermined	Undetermined	Software
Integration	Banking	Pharmaceutical	Software
<i>Empirical Literature</i>			
CAR	Pharmaceutical	Software	Banking
<i>Results</i>			
Premium	Banking	Software	Pharmaceutical
CAR	Pharmaceutical	Software	Banking