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Determinants of deal premium In Software and manufacturers companies

Mergers and Acquisition : strategy creation, latent competition and information issues

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SUMMARY

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INTRODUCTION

Mergers and acquisitions activities for many years have been one of the main determinants for the business growth of a company . The managers of the firm have always relied on that as a way to expand their business and company performance , because many companies lack the necessary resources to stay competitive in the future . Merger and Acquisition (M&A) are one of the core topics in the corporate finance field .

In this thesis I am going to focus on mergers and acquisitions takeover premium, which shows the extra premium that bidder companies could pay to acquire a target company after a mergers and acquisitions transaction. For a management team is of a particular relevance knowing what the deal premium drivers are . These drivers will help them to quantify the deal size and the amount of the premium for the two types of industries studied . This topic is covered by previous studies by analyzing a large number of merger and acquisition transactions in order to understand what are the drivers that determine the premium amount . However almost no attention has been put on the different premium drivers for industries operating in different sectors .

This thesis examines which are the drivers of deal premium, in merger and acquisition transactions, for two different types of industries , one where the main operations are focused on software and online services, and the other one where the main operations are manufacturing related .

Some of the main questions that we will try to respond are :

- *What are the premium drivers that determine the takeover premium in recent years ?*

- *Are there differences of premium drivers on the takeover premium different for the type of industry for which the bidder is in ?*
- *Do software companies tend to be more over evaluated respect to a 'normal' company ?*

In order to respond to these questions , we will perform the study thorough three parts.

In the **first part** we will analyze the main value creation theory when the bidder needs to evaluate a potential target , then we will focus on the synergies that arise from the merger and acquisition operation and trying to understand why two firms want to merge . We will continue by describing and analyzing the process of a merger and acquisition operations , with a focus on the most important steps toward a successful implementation and how a bidder evaluate different candidates as a target company . At last , we will describe the determinant of deal premium according to the precedent literature focusing on firm-related drivers and agency costs.

In the **second part** , we will start our analysis on two datasets one for each type of industry taken in consideration, created on a sample of different merger and acquisition transactions occurred in the U.S from 2010 to 2019 . We will explain initially how we constructed the datasets and then we continue describing the econometric model used in order to perform this analysis of the two datasets and finally what are the deal premium drivers that we used as parameters in the model .

In the **third part** , we will use the outcomes of the analysis of the second part . At first , we will analyze the output by commenting them and highlighting the most relevant results , then we will continue by doing a comparison of the outputs for the two datasets , trying to explain from what these differences could be caused and by responding to a list of assumption to be verified with these data .

CHAPTER 1
FUNDAMENTALS OF THE THEORY

In this section we will proceed to illustrate a brief description of the procedure that leads to the creation of the merger entity .

1 .1 Process of Merger and Acquisition

The decision to make a merger or acquisition for a bidder is a difficult task and require several steps for the management of the buy side to understand if it's advantageous for their company . Generally this process takes time , on average six months to a whole year , and the completation of the deal is an important step because it finalizes the pre-transaction activities but is only a small part of the entire process . Due to the complexity the management of the bidder company is often backed by advisors (financial advisor , legal advisor , fiscal advisor , strategic advisor) and external auditor (which main task is to assess the due diligence)

The process can be articulated in three macro-phases as suggested by Conca (2010) :

1. *Analysis and strategic evaluation*
2. *Deal structuring and negotiation*
3. *Post-M&A integration*

1.1.1. *Analysis and strategic evaluation*

At first a careful analysis from a strategic point of view is performed , we can subdivide this section into 3 subsections :

a. **Definition of a strategy** : The starting point is to analyze the strategic position on the market, where the M&A project will be implemented in a coherent manner . Hitt et al. (1995) defined strategy as “an integrated and coordinated set of commitments and actions designed to exploit core competencies and gain a competitive advantage”.

b. **Target profile identification** : the most fundamental step to increase the success of the operation is to select the right target companies . In order to identify the target companies which satisfy the strategic and value creation objectives of the firm, is useful to first identify the key competences that the merger firm will need to achieve its objectives, and subsequently match these competences against the resources and capabilities that the different targets need . Chatterjee et al. (1992), have explored the impact of culture in the deal, and they discovered that cultural similarity between acquirer and target has a significant positive effect on shareholders gains. Ideally , the key for a successful M&A transaction is a target company which is :

   - undervalued ;
   - it has a high fair market value ;
   - it has an inefficient use of resources and capabilities .

c. **Looking for alternatives** : By going beyond the value chain and market boundaries and try to explore other market in which the firm is willing to enter

1.1.2. *Deal structuring and negotiation*

The second macro-phase of the M&A process regard the initiation, management, and conclusion of the negotiation. The outcome of the previous part is a specific targets list, from which the acquirer has to select the right partner for the transaction. Here the role of the management is as important as in other phases, since normally they rely on external specialists.

We divide this section in subcategories , (Conca, 2010):

a. **Target selection and first contact** : The acquirer start to interact with the potential targets in order to obtain information about the possibility to generate synergies, the probability to reach an agreement, the estimated price, and other critical aspects. At the same time, a confidentiality agreement is signed, defined as a "Non-Disclosure Agreement" (NDA), under which the parties undertake not to transfer to third parties any confidential data or information received or known in the course of the transaction.

b. **Target valuation** : Determining its evaluation is one of the key moments in the process, each company should be evaluated separately to see whether is possible to create synergies. As we will talk later on how evaluate a company ,the classic method is by using the future FCF that can be determined by using a pro-forma income statement prepared for both the firms, and so by using past data is possible to estimate future FCF for individual companies, however it is much more complicated to estimate both entities free cash flow after the M&A.

c. **Formalization of the deal** : The process goes on with the formalization of the relationship between the involved parties, through the so-called letter of intent (LOI), which represent an important step, since it proves the willingness of the parties to conclude the deal . After having signed the letter of intent, the process needs the fulfillment of further mandatory procedures, among which the most important is the due diligence. Technically, these are analyses and audits referred to the target company. The scope of the analysis may differ from case to case, although in more complex and larger transactions the analyses are of at least six different types: financial analysis, market-product analysis , operational analysis , accounting and fiscal analysis, legal and labor analysis, environmental analysis . Through the due diligence, a buyer can define the appropriate price for the target and the method of payment, anticipate potential risks and liabilities, specify the important provisions to negotiate with the other party, analyze the competition issues, and clarify that the target is as it seems, so with the due diligence a bidder can corroborate the merger decision or opts to walk away (Conway, Rouse, 2001).

1.1.3. *Post-M&A integration*

After signed the deal the integration process starts . According to Karim and Capron (2016) , it is not just a matter of establishing a new management and organization, merging firms have to redefine their activities by adding, redeploying, recombining or divesting assets with the aim of adapting the resource base to the new context . At the start the Post m&a integration was analyzed from an acquiring-oriented approach, where the targets “disappear”, fully incorporated in the

acquirer activity , but Haspeslagh and Jemison (1991) doubt on this approach and suggested a different opinion, defining the Post m&a integration as “the process of creating value with a new bundle of resources that is obtained when two organizations merge, while balancing the economic benefits and organizational costs involved”. According to them companies must establish in their strategy on which extend the integrated capabilities of the two entities should be merged together within the same structure or maintained separate within the boundaries of the firms.

1.2. The synergies

Synergies are considered the scope of a merger and acquisition activity , since they provide to the company added value , they can increase corporation ‘s efficiency , extending available resources , creating new products, and reaching new markets , and enable the acquirer company to access innovative technology (Larsson, Finkelestein, 1999) and consequently also the shareholder value will increase as a result of the merger .

Therefore, a process of value creation is based on the optimal use of the company’s resources and abilities in this constrained environment. From a resource-based view, companies possess different abilities and resources . The combination of resources of two companies builds the basis of value creation in the context of mergers. These special abilities or resources that companies possess are the reason for combining the two companies and could be of various natures: technology, product, market access, finance, marketing, human resources. Based on these different resources, different arguments have been proposed on how the combination of resources of two merging firms creates value. These arguments include economies of scale, economies of scope, market power, coinsurance, and financial diversification. All arguments that can be addressed as synergies.

Synergy describes the additional value that is created by combining two companies, creating opportunities that would not have been available to the companies operating separately (Seth, 1990 A). This relation can be represented by the formula:

$$V(M) > V(B) + V(T)$$

Where V(M) is the value of the combined companies and V(B) and V(T) respectively for the stand-alone value of the bidder company and target company . Then the value of synergies is the difference of the value of the combined companies and the stand-alone value of the two companies:

$$S = V(M) - (V(B) + V(T))$$

Synergy is defined by the literature as incremental wealth to the shareholders of both merging firms due to the merger (Sayan Chatterjee 1986) .

From a company's strategy point of view , the idea is that a bidder in order to have a particular ability or product , instead of making that particular product by itself by spending a lot of financial resources or trying to enter in a new market where it takes time to be a valid member , it can opt to merger with or acquire another company who already possess those capabilities . This is the so called 'make vs buy' decision , that the bidder's management had to take by looking to all the possibilities available and the consequences before undertaking this investment. As a general rule the acquire will go for the merger/acquisition deal only if the internal cost associated for the acquisition of a particular capability is higher than the cost to acquire the target company , but this decision is also highly impacted by the transaction costs defined by Coase (1937), in his book "The Nature of the Firm" as "the cost of providing for goods and services through the market rather than providing them from within the firm". Transaction costs include the return required by the supplier or distributor, the costs of contracting, of monitoring the compliance and the enforcement in the event of breach. These costs are difficult to estimate, due to information asymmetry between the

buyer and the seller. This is when the corporation' s strategy must be clear and very specific about the objectives that it wants to reach in the future , in order to take the best choice for their company.

Ansoff (1988), believed that a strategy consists of four main elements: Market scope, Development, Competitive Advantage and Synergy. He considered synergies as the reason why the value of the whole corporation can be greater than the sum of each part; it includes not only tangible assets as land or equipment, but even the sharing of intangible assets like reputation and technology.

Ansoff (1988) broken down the definition into four main types of synergies:

1. Synergies of sales: by combining the distribution channels, inventory systems and logistic, sales increment or cost reductions may arise.
2. Synergies in production: by sharing the resources, the degree of utilization of plants and machines will rise, leading to a cost reduction.
3. Synergies in investments: a combination of investments can lead to eliminate overlapping investments.
4. Synergies in management: managerial capabilities and skills can be transferred into the new reality, which in turn may either reduce the costs or improve the efficiency

Michael Porter and Victor Millar (1985) in their book "How information gives you competitive advantage" set out an important theory to explain synergies, that is based on three different forms of interrelations:

1. Tangible interrelationship: activities of the value chain that can be shared between two business unit due to mutual clients, infrastructures, and technologies.
2. Intangible interrelationship: allows a transfer of know-how and management skills between different areas.

3. Competitor interrelationship: due to the existence of competitors in different countries, which compete in more than one industry.

According to (Lubatkin, O'Neill, 1987) the interrelationship between the acquirer and the target can reduce the systematic risk , hence its rate of return is less affected by external factors . External factors could be any macroeconomic phenomenon (disturbance theory) or a process, in which the merger is the process outcome instead of being the cause of the process (process theory). This thesis is also supported by Lewellen (1971) , who correctly argues that mergers reduce the risk of default, and thereby increase debt capacity. He then claims that higher debt capacity leads to greater optimal leverage, tax savings, and value for the merger firm .

However , looking at all the theories about synergies we can see two macro areas in which we can subdivide the results of a synergy :

- Financial synergies
- Operational synergies

We will analyze them in detail and explain what the results would be , of a merger and acquisition activity, on the merger entity .

1.2.1. Financial synergies

In a Modigliani-Miller (1958) world without taxes, bankruptcy costs, informational asymmetries, or agency costs, there are no purely financial synergies, and capital structure is irrelevant to total firm value but in a world with taxes and default costs, however, capital structure matters. Therefore, changes in the scope of the firm that affect optimal capital structure typically create financial synergies.

Financial synergies can be positive (favoring mergers) or negative (favoring separation). When activities' cash flows are imperfectly correlated, risk can be lowered via a merger or initial consolidation a lower risk reduces the expected default costs, so financial synergies in acquisitions can be used to alleviate its own constraints through acquisition, where the resulting leverage to finance the deal , could give tax benefits, as first suggested by Lewellen (1971).

Separate capital structures and separate limited liabilities may allow for greater leverage and financial benefits than when activities are merged with the resultant single capital structure. Where , or through separate entity or by a special purpose entity (SPE) both activities allow to have its appropriate capital structure, with an optimal amount of debt and equity.

In 1971 , Lewellen discusses the advantage of mergers based on financial, or capital structure, synergies, and later Chatterjee (1986) found that mergers based on financial synergies generate more value than those based on operational synergies.

However , thanks to a study carried by Healy et al. (1997) , after analyzing a sample with the 50 largest US acquisitions , they proved the opposite of Chatterjee (1986) , strategic acquisitions outperform financial acquisitions due to higher synergetic gains in strategic merger. Hence, for Healy et al. operating synergies seem to outperform financial synergies in their ability to create value . Even though they are not as relevant as the operational one , the possible benefits of financial synergies should be always considered during a merger and acquisition process.

1.2.2. Operational synergies

These synergies are represented by :

1. Economies of scale
2. Market power

3. Complementary resources

Economies of scale

The principle of the economies of scale is the bigger the company's operations the lower the costs per unit produced. This is referred as cost advantages strategy . Due to size or scale of operations the costs per unit of output are reduced by spreading fixed costs over a higher quantity of units of output. The reduction of fixed costs per unit of output is associated with reducing sales, general and administrative expenses through the consolidation of headquarters and support functions. This concept is also studied by Sudarsanam (2010), where he says that a cause of the synergies is the possibility of achieving economy of scale, by referring to the decrease in production cost when there is an increase in the business size.

Typically areas within a corporation that usually benefit from economies of scale are advertisement, research, and development as well as the optimization of distribution and procurement by reducing transaction costs in the supply chain (Porter, 1980) impacting as a consequence operation efficiency. A more efficient use of assets in place is a typical improvement in operating efficiency due to scale. These cost reducing synergies are usually associated with the physical consolidation of operations of the merging companies. Therefore, these synergies depend much on the fit of the merging companies and their cost structure (Severiens, 1991) . These findings are well seen in production-related economies of scale where higher the similarity of the operations are present , then more likely reducing production costs with synergies is possible , by showing lower operating expenses.

Market power

Market power refers to a company's relative ability to manipulate the price of an item in the marketplace by manipulating the level of supply, demand or both.

A company with substantial market power has the ability to manipulate the market price and thereby control its profit margin, and possibly the ability to increase obstacles to potential new entrants into the market. Firms that have market power are often described as "price makers" because they can establish or adjust the marketplace price of an item without relinquishing market share, but in order to clarify better the concept of market power we have to describe what Horizontal merger and Vertical merger are.

Vertical mergers involve the combination of firms that carry out different stages of a vertical chain. When a company merges with another that carries out the immediately preceding upstream activity it results in a backward integration, while if it acquires a firm operating in the immediately following downstream activity in the vertical chain it results in forward integration (Sudarsanam, 2010).

On the other hand , Horizontal merger occurs when the two merging firms sell the same product; even if the product sold is not exactly the same but the two entities share certain commonalities, such as technology, market or knowledge base we can talk about horizontal merger, hence where they see themselves as competitors . This type of mergers are typical in industries and sectors where products are in the mature or declining stages of the product's life cycle.

The concept of market power is different according to how we move on the value chain . From a vertical merger point of view, a company that has market power over other market participants will use its market power in order to generate additional profits and companies will engage in merger activities to enhance their market share or put-up entry barriers for potential competition.

On the other hand , market power in horizontal mergers typically leads to greater opportunities for collusion, which results in gains to market participants through increased revenues (Stigler, 1968) , supporting this result the oligopoly model can be used to explain a raise in prices after a horizontal merger by a market leader company. Other support is given by (Esfahani , 2019) where he investigates the profitability of horizontal mergers within dynamic oligopolistic industries featuring price stickiness and founded that when there is no cost saving, any decrease in the number of firms is socially harmful for the reason that the decrease in producer surplus does not compensate for the decline in consumer surplus. As a consequence , regulators must watch out for mergers motivated by only reducing the number of competitors . In mature market is more likely to observe market power synergies due to overcapacity and horizontal acquisition of a competitor is an existing strategy in the space .

Since market power has a high impact on the final consumer (in term of final price offered),before two companies enter into the conclusion of the merger or acquisition deal , they must wait the authorization by the Antitrust Regulator of the country where the merger take place . Since in this thesis there will consider U.S companies, we will briefly explain the antitakeover policy in the U.S.

U.S Antitrust policies

Antitrust compliance in the United States consists of two aspects: whether the transaction is illegal under the Clayton Act because its effect might be to lessen competition or tend to create a monopoly, and whether a filing must be made under the Clayton Act, the so-called Hart-Scott-Rodino Act (HSR).

If a filing is required, then the deal cannot close until the waiting period has expired. HSR does not change or add to the substance of the antitrust laws; its only purpose is to give the government a

chance to review acquisitions before closing and enforce the antitrust laws preemptively where necessary. Certain cooperative activities that could violate substantive antitrust law (primarily where the parties are competitors) must be avoided before closing, and the bidder must avoid assuming beneficial ownership of the acquired party (in any transaction, even one raising no competition concerns) until the HSR waiting period has expired .The failure to comply with HSR, even absent any substantive antitrust problems, can cause the violator to incur severe monetary sanctions (*Merger control in the US* reference) .

Once it has been determined that the submission of a filing will be required, both the acquiring person and the acquired person must prepare the necessary premerger notification. The proposed acquisition may not be consummated until the waiting period (usually 30 days) has expired or been terminated early. If a filing is required, the transaction is put on hold while the FTC (Federal Trade Commission) and DOJ (Department of Justice) review it. If they take no action, the transaction may be consummated when the waiting period is over.

The federal antitrust laws in the U.S prohibit business practices that lessen competition and result in consumers' paying higher prices for goods and services. The antitrust laws also address the lessening of non-price competition, such as business practices that lessen competition by resulting in diminished quality or a slower pace of innovation (Clayton Antitrust Act) . Antitrust laws aim to stop monopolization, and anti-competitive mergers and acquisitions with the use of both civil and criminal enforcement (*Antitrust Laws FTC* reference) .

A well-known example of the enforcement of antitrust laws , it is when FTC questioned the merger between General Electric and a competitor company , since the rival firm manufactured competitive non-destructive testing equipment. The merger was later approved but with the only

condition that GE would liquidate its non-destructive testing equipment business. So , Antitrust laws have protected the consumer and competitors against market manipulation by some dominant market player .

1.2.3. Complementary resources

According to Barney (1991) , resources are considered : “All assets, capabilities, organizational processes, firm attributes, information, knowledge controlled by a firm that enables the firm to conceive of and implement strategies that improve its efficiency and 14 effectiveness.”

In a merger which aim for synergies from complementary resources two companies combine different set of resources that are assumed to be mutually supportive. Even if two firms have similar assets they may have different profiles , and the combination of resources and capabilities could provide a strong and unique competitive advantage (Sudarsanam, 2010).

From a resource-based view, the combination of a complementary set of resources is thought to be beneficial to a company as the complementarity leads to the creation of opportunities and the mitigation of threats. When two companies combine their complementary resources is in order to achieve Cost-reducing synergies , also called economies of scope . The difference between economies of scope and economies of scale lies if such economies are achieved within a single-product setting , in this case called economies of scale, but if they are achieved in a multi-product setting, they are referred to as economies of scope (Seth, 1990). Economies of scope exist when the joint production of two products is less costly than the cost of production of these goods by two separate firms (Severiens, 1991). Other complementary resources are complementary product lines, technologies, know-how, geographical markets, and customer groups (Teece, 1980). These

categories of complementary resources have the scope of enhance the revenues rather than cost reductions.

1.3. M&A for diversification purpose

In the previous paragraphs we have seen how having similar resources or knowledge can be the cause of mergers and acquisitions, however, according to some research there are cases in which companies choose to invest in sectors completely different from their reference sectors in search of diversification. Diversification strategies are performed by companies that want to reduce the risk connected with operating in one single sector, so if it has some problem in that sector such as technological or financial , the company will fail without harming the other businesses that operate in different sectors .

According to Weston (1970) diversification through merger is preferred over diversification through internal resources, since many companies may lack the necessary resources to carry out the business properly, so the acquirer opt to merge in order to have also the know-how and competences embedded inside the firm .

Other support on this thesis ,claim that , combining businesses units with imperfectly correlated cash flows can lead to a reduction in systematic risk and hence the combined cost of capital (Hann, Ogneva , Ozban , 2013) .

Real case example of this could be Kellogg . It snapped up organic protein bar manufacturer RXBAR for $600 million to lift its struggling line of cereals and bars. It also

presented an opportunity for the legacy food manufacturer to make headway in the rapidly growing natural food industry (*Reuters* article).

However, diversification may be reached also with other methods apart from merger and acquisition. Booz, Allen, and Hamilton (1985) research defined diversification may be accomplished by different methods including internal development, acquisitions, joint ventures, licensing agreements .This will lead us to the next paragraph , which are the alternatives to merger and acquisition in order to have access to a particular resource .

1.3.1 Alternatives to merger and acquisition

Mergers and acquisitions are not the only way when a company want to have access to a resource . Recalling the buy vs make decision stated before , one possible way to obtain a resource or a competence is to create it internally , by investing in research and innovation . Product and service innovation is a great challenge for any company , usually requiring much time , that is why investors may get nervous and deciding to not conclude the merger process if is too much time consuming .

Other possible solution that could be explored to bring new product/service on the market are :

- *Partnership* : A strategic alliance may be formed when two or more organization joint to develop new products or services, enter new markets, or improve resource conversion processes. A partnership must be distinguished by a joint – ventures , when there is a contractual agreement, but the alliance is independent from the organizations innovative level . By using a joint-venture, companies pool resources in order to accomplish a specific project, and normal they form a separate limited company for the project, in order to protect the rest of their businesses in the case of failure (Meyer, Wang 2015). Generally, with the partnership or joint ventures two company can reach the same output of a

merger or acquisition but keeping them legally separated . As with the acquisitions, there can be tension because of different management cultures and styles, or incompatible traditions. However, if a joint-venture is created and managed carefully, it represent a viable way to success, by leveraging the expertise of partners and gaining access to new markets and networks, a joint-venture can create quicker value for shareholders

- *License agreement* : when a company has already an attractive product or service, and it can grow by selling or license to another company. This allows the licensor to expand its activity using the capital and resources of the licensee, while still exercising control over underneath intellectual property (Meyer, Wang 2015) .

1.4. Determinants of deal premium

After having introduced how the value of a company is determined, the formation of synergy and what is the process of merger and acquisition, we enter into one of the main topics of this thesis, the determination of the deal premium. As we have seen in the paragraph regarding the acquisition process, at the time of the offer to the target company, the price for the acquisition is offered as the value of the company plus a premium component that is linked to synergies.

On what basis and parameters is this deal premium determined?

Do the parameters have the same weight in determining the premium in all sectors?

Here we will introduce the control variables that are taken into consideration by the existing literature , for studying the takeover premium .

1.4.1. Deal premium theory and measurement

When a bidder must determine an initial bid , it must choose it in a way that is both below its own reservation price and above the price at which target shareholders are willing to accept to ensure the acquisition completes and that it also creates value for the bidder (Müller & Panunzi, 2004). In effect the bidder should be willing to offer a premium over market value when it estimates a gain from the combination (Gujarati & Porter, 2009)

Walkling & Edmister (1985) was one of the first to examine the bidder issue in determining the initial bid. They argue that a too high a bid will lower the gain to the bidder, while a too low bid increases the probability of rejection . Another study conducted by Jennings & Mazzeo (1993) highlights the effects that the initial bid can have on two important factors , the decision by targets to resist the bid and the decision by competitors to contest the bid . Both results in higher premiums.

The determination of an optimal bid is fundamental into the negotiation phase , in fact the initial bid is inversely correlated to the time of the negotiation , so a higher bid will decrease the time for the negotiation process since the existing shareholder don't need to negotiate for an higher valuation .

When it comes to calculate the premium , a simple bid premium formula is the difference between the estimated real value of a company and the actual price paid to obtain it . . However , by looking at the previous literature seems that the most used formula by academics is :

$$Deal\ premium = \frac{offer\ \ price - target\ stock\ price_{1-month\ before}}{target\ stock\ price_{1-month\ prior\ before}}$$

Thus , the premium represents the paid excess for buying a target company above its market valuation . This equation uses the offer and the target share price one month prior to the offer announcement date to allow us to better analyze the results . The target stock price 1-month before is chosen in a way that the stock price of the target is unaffected by rumors of an acquisition , so it is important to determine an appropriate period of time to avoid runup effects. Run up effect is defined by academics when investors buy target stock due to rumors with the only intent to speculate on it . According to Gaughan (2009), professional investors often do this kind of trading speculation, and he calls it merger arbitrage . The consequences on the stock price after a run up effect is that the premium will appear smaller because the market price will be closer to the offered one, and the convenience for the target shareholder will fade away . In order to avoid that , a lot of academics seems to considerate that the span of time of 1 month prior the announcement date is sufficient to have an unaffected target share price. But of course, there are other academics that believe that is not sufficient 1 month in order to have an unaffected stock price , so they opt for a price 40 days prior to announcement (Gondhalekar, Sant & Ferris 2002).

1.4.2. Free cash flow theory

Conflicts of interest between shareholders and managers inside companies happen due to the separation of ownership and control . This conflict is referred in the literature as agency costs and arise from shareholders' inability to monitor managerial action. Managers are the agents of shareholders, and their main purpose should be to maximize shareholder wealth , but because both parties are self-interested, there are serious disputes between them over the best corporate strategy choice .

Jensen (1986) studied the agency costs associated with FCF hypothesis . He claims that shareholders' limited ability to monitor opportunistic managerial behavior creates a potential for managers to spend internally generated cash flows for their own benefit rather than for maximizing firm value.

Free cash flow is the excess of cash that is required to fund all of a firm's projects, and it must be paid out to shareholders if the firm is aiming maximize value for shareholders in the form of dividends . However , dividends payment to shareholders reduces the resources under managers' control, thereby reducing managers' power and potentially subjecting them to look for capital on capital markets increasing the liability position of the companies . Financing projects internally certainly has more benefit for managers since they avoid monitoring by shareholders and don't put more debt into companies balance sheets , alleviating them from the need to repay interest on it .

The deal premium paid in an acquisition is influenced by the amount of cash that bidder management can spend and firms with high levels of excess cash flows are likely to initiate value-destroying M&A transactions (Jensen, 1986) . Findings also supported by Harford (1999) claiming that firms with high cash holdings tend to make value destroying acquisitions using their excess cash holdings

One of the main reasons why acquisitions end up being considered failed is because of overevaluation incurring into a too wide paid deal premium . Roll (1986) was one of the first to present a theory to explain the overpayment problem observed in acquisitions through his hubris hypothesis of takeovers. He hypothesizes that bidders will tend to pay higher deal premiums when they have cash at hand .By using his assumption , proves of managerial hubris were found a little later by Berkovitch & Narayanan (1993) studying takeovers in the United States and by Goergen & Renneboog (2004) focusing in Europe.

FCFs can be used as a control variable for studying the potential damage caused by overinvestment. In fact with little FCF, managers have fewer economic resources to use . In this case, investment in additional projects has to be financed by external funds from the capital market, where managers will be subject to extra monitoring as claimed by Stulz (1999) . On the other hand , managers of firms with high FCFs can finance investments by internal funds and therefore avoid extra monitoring from the capital marketers .

1.4.3. Method of payment

From theoretical studies seems that also methods of payment for a merger and acquisition could impact the potential deal premium , but we will analyze as first the choice, that lead the bidder management team to choose a method of payment over the other .

The choice between the methods of payment is based on several hypothesis , one of them is the agency costs between manager and shareholders . For example , when the managerial ownership in a company is relevant the acquiring firms' managers with a relatively large fraction of shares seems that they would prefer to offer cash rather than share exchange in order not to dilute their control after the completion of the acquisitions (Martin, 1996) . Another explanation is that it may be linked to business cycles and firms' stock market performance as well. In this regard, Moore (1980) and Martin (1996) suggest that equity exchange is preferred to cash offer in booming stock market. However , even when there is a boom in the stock market and the stock deal seems to be the best choice, the bidder has to consider the effect of the type of offer on market participants. Myers & Majluf (1984) claims that cash offer as good news with regard to the value of

bidding firms' shares and consider share exchange as bad news, implying an overevaluation of the company .

Fuller, Netter & Stegemoller (2002) showed a level of information asymmetry regarding the valuation of stock since insider knows the actual value of the stock (either it is over or undervalued) . This will lead them to use stock as a payment measure depending on their actual situation, practically, if their stock is over-valued by the market , they would gain more by offering stock and if it is under-valued , they would lose and chose the cash option . However , performing a stock swap is also dangerous for target firm since the actual value of the bidder's stock could be not truthful , thus preferring cash over a stock deal . So , stock financing forces target shareholders to share the risk that the acquirer may have overpaid , and this could be an explanation of why stock offer is preferred to the cash one is when the bidder is unsecure about the evaluation of the target (Hansen 1987)

On the other side , common results observed in a more modern literature are suggesting that cash financed acquisitions tend to outperform stock exchange acquisitions, in spite of the greater potential impact of valuation errors in cash offers (Sudarsanam, 2010). This phenomenon could be explained by the higher premium that target shareholders demand in stock exchange offers to minimize their valuation risk .

However, other academics such as Gondhalekar, Sant, & Ferris (2002) suggest that also the use of cash offer could push up deal premiums , because the cash signals higher synergies. Huang and Walking (1987) , also , find that cash offers are associated with significantly higher returns. This effect could be explained by the taxes . In fact , target shareholders will demand higher premiums for cash bids to compensate for an immediate taxation of their gains.

1.4.4. Deal value

Deal value is defined as the total value paid by the acquirer to conclude an acquisition operation. A lot of literature can be found on the argument , such as , Peterson and Peterson (1991) that showed a high correlated of deal value to abnormal returns. Switzer (1996) has also reported a statistically significant influence on post-acquisition operating performance when considering deal value as the dollar size of the offer or its natural log.

This implies that for a small target company , a bidder can both more easily afford to pay a higher premium, since the dollar cost of a higher premium is not prohibitive (Hsieh & Walkling 2005) and a higher probability of success to conclude the acquisition due to the smaller deal size (Walkling & Edmister 1985).

Even if , the deal value increases the success of deal , we must highlight that the amount of deal value will have consequences on both the financial position and post-operating performance of the merger entity . It is especially evident when the acquisitions are funded by debt, so higher the deal size greater will be the pressure on financial resources causing an increasing chance of financial distress, and also the pressure on post-acquisition operating performance

1.5. FIRM RELATED CHARACTERISTICS

Previous empirical studies indicate that firm-related factors are important in explaining the variation in deal premiums.

1.5.1. Leverage

There is only little empirical work on the relation between the acquirer's leverage and the takeover outcome, sometimes even controversial , but those few studies have demonstrated that the leverage should also be taken in consideration for the formation of the premium .

Eddey (1991) argues the preference of acquirers over targets with high liquidity and low leverage , in order to decrease the leverage of the combined entity. High leverage can also be a driver for being acquired if the company suffers from financial distress (Danzon, Epstein & Nicholson 2007). Support for insolvent companies being acquired as a means for avoiding bankruptcy is even supported by the findings of Shrieves and Stevens (1979), who found that 15.2% of M&A targets are close to bankruptcy when acquired.

In the literature not only appear the leverage of the target as an indicator of future returns , but also the leverage of the bidders . Very interesting are the work of Maloney, McCormick, & Mitchell (1993) which found a positive relation between bidders' leverage ratios and bidder returns. Also, of a particular relevance the study of Lang, Stulz, & Walkling (1991) claiming a negative relation between bidders' leverage ratios and target shareholders' returns. Both studies consider bidders' preexisting leverage , not the incremental debt raised to finance the acquisition.

1.5.2. Size of the target

Since the size of the target is directly linked with its valuation when a target is relatively small compared to the bidder, it can more easily afford to pay a higher premium, since the cost of a higher premium is not prohibitive due to the small initial valuation . A prove of this is given by Billett and Ryngaert (1997) which find that target abnormal returns are smaller when the target is larger relative to the bidder . Also , there is less likelihood for companies with a certain size to be acquired due to financial constraints of the potential bidder , since it could be very difficult for the bidder

finance the deal when the target company has a size bigger than the bidder . Even if it's difficult , in theory is not impossible thanks to some financial instruments like pledged shares and Leverage Buyout . A prove that high level of bidder's leverage was used in merger and acquisition of the past is the one given by Holmstrom and Kaplan (2001) , showing that tender offers in the 1980s takeover wave where highly leveraged . So , we can claim that expected bidder expected return on investment should be positively associated with target relative size (Lang and Walkling 1991)

1.5.3. R&D

Investments in R&D result in the creation of useful intellectual property that might increase the number of interested acquirers , fostering as a consequence the value of the target firm in relation to the importance of the underlying patents

Hall (1999) found that bidders tend to pay a higher premium on targets with higher R&D intensities . Desyllas & Hughes (2009) also found the variable to be relevant in studying the deal premia , claiming that a high R&D intensity (he focused on the technology sector) makes a company more likely to be targeted as a potential target. If the probability of being targeted in a takeover attempt increases with R&D intensity, there is also the possibility to overestimate the bid since high levels of Research and development do not imply high levels of innovation output .

Are common the cases in which companies invest heavily in research and development and still produce fewer patents and new products than their competitors . That is why , when this control variable is taken in consideration in the literature , it is always related to the revenues , thus linking the associated costs of innovation to the actual economic input of the firm .

1.5.4. Executive Compensation Package

Another control variable that appears in the literature is the Executive Compensation package. This is directly linked with the Agency Costs , since the compensation package will shape the behavior of the management team (CEOs in particular) towards decisions for the sake of the shareholders .

Agrawa (1994) find that acquisitions attempted to occur more frequently in industries where CEOs have over the industry average compensations , where cash is preferred to stock options . Other evidence, that connects the bidder CEO compensation with the deal premium, are given by Hubbard & Palia (1995) , which found a negative association between deal premium and CEO ownership in the bidder's firm, suggesting that bidding CEOs are not willing to pay a higher premium over a target company if they would have had high level of shares in the company . Thus , CEOs with higher ownership will act more like a shareholder and tend pay a lower bid premium .

1.6. Company Valuation

The scope of valuing a company is to give a quantification of the overall worth of a business entity. In this process, an individual or entity assigns a price tag to a business after using a number of financial, economic, and accounting based methods .

The reason why we focus on evaluation in this thesis is related to the valuation of a company that want to acquire a business and determine a price range to pay for such company , or in the case in which the company want to merge with another one to enhance their market position or growth in a given industry or industries . With an accurate representation of the company's value, it can be used to determine the right amount to be paid , for acquiring the target , after taking into consideration both financial and operational performances .

The three primary areas associated with the determination of a business valuation : Accounting, Economics, and Business and Operations related .

- **Accounting** : Their primary perspective is to represent business value in terms of dollars based on financial statements and other related company information . The main elements that are computed are the Gross cash flow , cost of capital , leverage, and intangible assets .
- **Economics** : Identify which are the factors of the industry that affect business performance. Economic studies involve a wide variety of topics and aspects associated with a company and their interaction with the industry (Riley 2003) , and also concerning the overall market and market related factors.
- **Business related and Operations Research** : understanding business process modeling and supply chain analysis , alongside KPI analysis and benchmarking of competitors , provides a framework for understanding the business components and performance aspects that effect overall business value. Through the analysis of business process modeling and supply chain analysis can lead to the identification of the value drivers in a company (Malone 1999)

These are the inputs of the several models that exist in the literature to evaluate a business . However , the methodology used to compute the valuation is as important as the classification of the inputs .

1.6.1. Business Valuation Methodologies

Business valuation is generally performed using three methods : asset-based valuation, comparable company method and discounted cash flow method.

The **asset-based valuation** method involves estimating the fair value of the assets and liabilities of the company. The comparable company method involves finding publicly traded companies most like the one being appraised and assigning a similar price-to-earnings ratio derived from the comparable companies to the earnings of the companies being appraised. In this method, all company assets and liabilities are re-valued to a standard value such as fair market value, fair value, intrinsic value or other representations of standard value. Appraisals of all company assets such as machinery, real estate and intangibles are performed to the standard value. Appraisals are also made for the company liabilities. This can be done with analytical procedures for collective revaluation or by individually revaluing the assets of the company. The end result of this analysis is the "owners' equity" that results from the standard accounting equation.

The **Discounted Cash Flow (DCF)** method is based on the idea that company value should be based on its anticipated future economic benefits. In essence, it involves projecting a future stream of income at a discrete time and then a terminal point (or continuing concern value) and then discounting the future stream of earnings back to a present value based on the economic risk associated with the earnings stream. The DCF method provides a net present value representation of the firm based on the projections. Depending on the type of valuation, the economic income could be represented by net cash flow after taxes, gross profits, net operating profits, dividends or other applicable measures from which value is to be assigned for the company. Obviously, a key in this method is developing the projected future earnings. One must thoughtfully construct the projection of future earnings. These projections include more than historical performance. The economics of the company and the industry must be analyzed and accounted for in the analysis and projections for the future should be made based on a detailed analysis, then , the projected future cash flow should include factors such as new product development, product life cycles, competition and other value metrics associated with company operation . The DCF method is heavily used in

merger and acquisition situations because the future projections and the discount rate used in the analysis may be specific to the purposes of the merger and acquisition activity .

The **Comparable company** valuation method, similar companies to the one under inspection , are used to develop a representation of the value of the company in question. A key in this method is using the data available regarding similar companies to develop a ratio/factor/multiple that can then be applied to a financial measure of the company to determine its overall value. The value measure is usually a multiple computed by dividing the price of the guideline company's stock by some relevant economic variable of the company being valued (Pratt 2000). Some of the economic variables that are used as multiple/ratio , might be net sales, net cash flow, dividends, net income before taxes or others. Typically, this measure is developed on an operating basis, with non-operating items being treated separately. One of the difficulties with the comparable company's method is that when the financial markets are in a bull phase , companies may be overvalued and when the financial markets are bearish, companies may be undervalued , so stock performances may not be too accurate to represent the actual value of the company (Hall 2003)

1.6.2. Technique used for Software companies

By looking at the traditional method used to evaluate a company , comparable analysis is the one used for most of software companies , an exception could be the one that rely on a SaaS business model where the recurring revenue facilitate the valuation using the DCF .

In High-tech/software companies tangible asset holdings and the size of the company's asset base are less important because when the technology is the primary asset, most or all of the value in the company comes from intangibles, including intellectual property and human capital. Such

dynamic assets can be difficult to evaluate with mathematics models , respect to property, plant, and equipment . So , managers tend to use a comparable methodology due to the difficulty to actually evaluate intangible assets , by looking at significant financial measures (including sales and sales growth, operating margins, asset efficiency, and cash flow) as a basis for their decision-making process . These measures are adjusted , by managers using industry-specific metrics, such as sales dollars per customer or website hits per advertising dollar .

The way this companies are evaluated , is easily subject to human errors , like the choice of the ratios they want to use , leading sometimes to a non-truthful valuation .

CHAPTER 2
MANUFACTURING AND SOFTWARE COMPANIES : DESCRIPTION AND DIFFERENCES

In our analysis we take in consideration two macro industries : manufacturing and software . Our aim is to separate the results and compare the outcome of the two regressions in order to see the differences in the takeover deals between these two macro industries looking for possible explanations of the regressions outcome . So, we will describe these two macro industries by explaining the differences in business operations , related cost's structure and overall environment according to the existing literature .

2.1. MANUFACTURING

Manufacturing can be referred as the 'transformation of materials and information into goods for the satisfaction of human needs'. It is a system that combine different phases in order to transform the product , but it always starts with a product design as the first phase , and the output of finished goods are last stage of this process . Hopp and Spearman (2000) state that a manufacturing system is "an objective-oriented network of processes through which entities flow". They give explanation about the meaning of these words , by referring to 'objective' as low cost - high sales purpose for the company , with 'processes' they refer to the physical processes that interact with each other during the transformation of the product , and 'entities' describes the actual component/parts to be manufactured or information to control the above .

Hopp and Spearman (2000) , provide clear explanations of the commonly known areas of practical manufacturing process types too . The main types discussed by these authors are project, jobbing, batch, mass, and continuous manufacturing , by showing the different type of production that can occur in this space :

1. Project based manufacturers . They focus on low volume specialized processes such as yacht manufacturers
2. Jobbing manufacturers . They focus on multiple products with low volume for example heavy equipment for industrial use
3. Batch manufacturers . They concentrate on a few major products with less process variety , a typical example could be the food industry , where ethe machinery are built ad hoc for a specific recipe
4. Mass producers . They focus on high volumes products and little variety , an example could be the automotive sector
5. Continuous manufacturing . They produce products , with little or no product or process variation or stoppage since the demand is very stable . These are generally companies in the energy space such as oil & gas producers and power suppliers

2.1.1. COST DRIVERS

Costs can be associated with the economic resources necessary to support work activities or to produce final outputs , such as manpower, equipment, real facilities, and suppliers . Therefore, costs are the amount of money spent for the production of the output . During the product development cycle, engineering teams cause and fix costs for the development of a product. At

the beginning of the product development cycle, no costs are fixed but once engineering teams take a decision, they create fixed costs , since transformation on the work-in-progress product are performed . So , the decisions taken in the first stage of the product development cycle heavily influence the costs caused by engineering teams during the manufacturing process .

We can decompose the Total product cost in :

- Research and development cost
- Production and construction cost : Manufacturing/ construction costs , operations analysis , quality control , logistic costs
- Operations and maintenance cost : Product operation , product distribution , product maintenance , Inventory , maintenance training for operators

An important element in the manufacturing sector that could be an important cost driven is the geometry of the product or design . For geometry we refer to the shape, dimensions, and accuracy of the final product . The influence of the design on the final cost of production is reported by Ehrlenspiel, where he claims that only the design , of the final product , is responsible for 20%-30% of the total product costs (Wierda, 1988) . Decomposing the elements of geometry we can see on how each of them contribute to the total production cost . By increasing the level of accuracy, for example , it will lead to the usage of more resources , such as machine tools and specific equipment, which can increase the overall production costs . The shape can also cause increasing production costs, a smartphone with diamond shaped corners requires ad hoc machinery to give this output , rather than a mobile phone with rounded corners . The materials are one of the most relevant cost divers for products since , high quality raw materials generally come at a higher price.

The type of production method used to manufacture a product , has a significant influence on the production costs , since they are required to transform raw material into the final product . The goal of the management team is to minimize the variable costs during production planning decisions . Due to the presence of restriction , such as technical restrictions , logistic restrictions for resources (not availability) , operations have to be allocated wisely to the available resources . The variable costs generally are composed by extra payments for overtime work, the price for subcontracting minus the variable costs for in-house production, inventory costs due to excessive Work in Process (WIP), lateness cost and earliness costs for short time delivery of blank materials.

Furthermore , the changing technology, increased customer expectation supplier attitudes and increased competition has also meant that maintenance of the systems has also been considered as an important cost driver for manufacturing company when the demand increase . The maintenance cost is defined as "The total cost of retaining an item in, or restoring it to, a state in which it can perform its required function , higher management is money, and so the costs and values of maintenance to the company should be expressed in cash terms as part of the system of management " (Sherwin, 2000) .

Another common cost is logistics cost is probably transportation, along with the inventory and inventory-keeping related costs. The transportation cost is the cost of shipping the item from a supplier to a manufacturer . This cost can vary from 10% to 40 % of the value of the total cost and many manufacturers consider transportation cost part of the fixed ordering cost . Tyndall & Bushner (1985) computed that transportation and warehousing represent about 80% of overall distribution cost in most companies . Weber (2002) discusses the recording of transportation costs in a greater detail and differentiates between company internal (transportation from one warehouse to another) and external transportation (to customers or partners); transportation

with its own fleet and third- party transport services; and regular and as-needed transport. Since the transportation choice depends on the company , and assuming every company aim to minimize these costs , transport costs among competitors' companies are a key cost driver in order to outperform competition .

Inventory costs alongside transportation costs are one of the key elements of logistics costs . It can be defined as the cost associated with warehousing activities , where the main task is the handling of the goods such as receiving supplier orders , moving goods , order picking, packing and shipping . Other elements to be included in the warehouse costs , are the one that occur in running the warehouse.

The Council of Supply Chain Management Professionals give us some direction on which cost to include in inventory cost :

1. the opportunity cost of holding inventory (the capital cost)
2. shrinkage
3. obsolescence of raw material, WIP and finished goods inventory
4. channel obsolescence (material that goes obsolete while in distribution channel and under buy-back agreements)
5. field service parts obsolescence

2.2. Tech company

The definition of tech companies that is used in this thesis is based on available literature , according to which there is a general way to classify a tech company (Damodaran , 2001)

- Companies that deliver technology-based or oriented-products , hardware , and software.
- Companies that use technology to deliver product and / or services that are delivered in a more conventional way

Even if there are also a lot of subcategories there is one that must be highlighted : SaaS Companies. SaaS stand for 'Software as a Service' and provide a service by delivering and maintaining software . The SaaS company hosts the application , and the software SaaS company's server while its user has remote access . The users have access to the software by a subscription program that grant the user a license to use the product , but the maintenance and the operation are responsibility of the producer . Orjala (2012) explained that in SaaS model, software is executed on a service provider's server and service is delivered to customers through the Internet. As a result, in most cases , customers can use the offered service without installing it into their own laptops or computers allowing portability among different devices .

Since this service holds a high degree of intangibility, it makes it a challenge to measure the costs of the services delivered. However, we were able to identify better what are the costs in this type of industry , by analyzing the internal cost structure of the most known companies in this field thanks to their disclosed balance sheets.

2.2.1. Costs drivers SaaS company

From the description of the SaaS company above we can derive and classify the costs that incur within the company . As we know , the two main categories of expenses are Costs of Goods Sold (

COGS) and Operating Expenses. Both represent different types of expenses and are important metrics from managerial and investor points of views.

Cost of Goods Sold

Cost of Goods Sold is defined as the direct costs attributable to the production and delivery of the goods or services sold by a company. As we are dealing with a SaaS company, the following costs will generally be included in COGS:

1. Hosting Costs
2. Employee costs related to keeping the production environment running
3. Employee costs for customer support/success of the application, but excluding any sales costs for up-sells, or cross-sells
4. Cost of any third-party software or data that is included in your delivered product third-party, web fees examples could be : Content delivery networks, embedded software
5. Any other direct employee costs required to deliver the ongoing service
6. customer on-boarding costs
7. cloud and database fees.
8. support personnel and customer care costs
9. Data communication expenses
10. Website development and support costs
11. Professional services and training personnel costs

Operating Expenses

On the other side we have the Operating Expenses which are costs incurred by a company through its normal business operations. In other words, costs which are not directly attributable to the sale or delivery of a product or service. This would generally include:

1. rent
2. advertising
3. legal & professional fees
4. Marketing

R&D expense

Software is one of the most R&D-intensive industries. On average, leading software companies invest roughly 10–15 percent of their revenue in R&D. Despite the already high spend on software R&D, the scale of investment is growing rapidly. During 2017–18, the industry saw an average increase in software R&D spend of 26 percent. Just as for the industry as a whole, this R&D investment is concentrated in software companies based in the United States; these companies account for 73 percent of the global software R&D spend . Software development is challenging on many dimensions, including throughput, cost, and quality. Software errors range from the fairly minor, which cause no more than frustration for the user, to highly serious and even fatal. This inefficiency costs companies dearly, damages their reputations, and is symptomatic of deeper problems

Different companies follow varying approaches for their R&D spending. Some might want to work on their existing product and market, choosing one of the following:

- Make incremental changes inside current product.
- Introduce core improvements to the product.
- Keep the essential operations going
- Explore a completely new product and expand into new markets.

A widely used cost allocation for software companies valid for both growing and mature software venture : 40% of revenue is generally given to the Marketing department , 20% to R&D costs and G&A costs gets 20%.

Thanks to research of *Blossom Ventures* (link in the references),we can have a better view on the expenditures in the R&D department for the firm in the market , in fact they reviewed various companies at their IPO between 2016-2018 and analyzed the costs attributed to R&D for a set of companies . The takeaways are the following:

- 23% of revenue in the listed companies goes to R&D.
- Companies spend millions on research and development. The presented data set median is $21mm.
- There's a wide range of R&D spend in the industry. Some companies allocate as little as 2%, and others go all in and more (up to 117% according to the research).
- Research and development are a fixed cost at its core. As the company grows, it usually starts reducing its R&D allocation percentage but continues getting a similar result.

M&A activities , in this sector, are heavily used to boost the R&D department as we can see from the story of some most renown software companies . Unity Software who went public in 2019 is

one of them , and its famous due to the high number of acquisitions made before becoming a public company . Unity has performed four important acquisitions since founding, which were meant not only to increase the perceived value of their offering, but also increasing their revenues by acquiring performing companies .

2.3. Implications

As we have explained so far , there a quite a lot of differences between those two industries , from both an operational and demand point of view . One of the main differences that comes up by looking at the literature is their different ability to innovate . Since , firms engage in open innovation to reduce the new product development time as well as the time to market (Jacobs & Waalkens, 2001) , is a matter of fact that for software related companies , there is the advantage of being asset lighter respect to the manufacturing ones and are its way easier for software firms satisfy the customer demand , with little time to market . Manufacturing companies , on the other hand , in order to launch new products or new production line , require more time due to construction period , legal permission , licenses and redefinition of supply chain structure . This will lead to a higher time to market value for the industry as a whole caused by not only the asset's cost requirements but also the time spent on marketing research . Another fair advantage that software companies have is that , in order to acquire new information for the creation of new products , collection of surveys from targeted customers is not the only possible way to do product innovation , but thanks to their software products can collect the amount of data needed in order to satisfy customer requirements and evolving their products as the chancing demand .

These differences between the two different cost's structure and potential reachable demand of these types of industry will result to an impact on their company valuation in function of the intrinsic sector related characteristic. What we want to find with this study is that , if also the takeover premia control variables are affected by this intrinsic characteristic , so , affecting in different ways the average value of the takeover premium for their industry .

CHAPTER 3
DATASET AND MODEL DESCRIPTION

3.1. DATA

The data used in this thesis are gathered from the Refinitive Eikon database, which provides data on completed M&A transactions , but also provides company financial information as well . This study focuses on listed American companies due to the large amount of available transaction data.

3.1.1. Sample construction

The sample period used in this paper extends from 2010 to 2019. The choice regarding its length is made somewhat arbitrarily, guided by the availability of acquisition data. We consider American companies divided by sectors , available on the Refinitive Eikon database are included in the data sample if their shares have been publicly traded between 2010 and 2019. As R&D is a variable of interest in this study, firm years with missing entries for R&D expenditure are dropped from the sample. This screening process yields a total of 157 manufacturing companies and 167 software companies.

As software companies we can group together industries like :

- Internet Software & Services ,
- IT Consulting & services ,
- Software

On the other hand , the targeted industries , that are labelled manufacturing companies , are :

- Automotive & Auto parts ,
- Automotive & Components ,
- Food and Beverage ,
- Machinery ,
- Other industrial ,
- Pharmaceutical ,
- Textiles & Apparel

3.1.2. Acquisition screening

For an acquisition to be included in the sample, it has to fulfill a few additional criteria relative to the companies in the data set. First, its announcement day must have been between January 1, 2010, and December 31, 2019. Second, the acquirer needs to obtain 100% of the outstanding shares in that transaction, excluding all the deals with less than 100% , we do this to avoid the complexities of mixed control rights that arise in mergers . Additionally, the takeover premium paid by the acquirer needs to be higher than 0%. The screening criteria used to screen for the acquisitions are summarized in the Table below .

1.	Announcement date	1/1/2010 to 31/12/2019
2.	% acquired	= 100%
3.	Takeover premium paid	>0%
4.	Deal size	Disclosed

5.	R&D	Must be disclosed
6.	Transaction Status	Completed
7.	Acquirer Location	United States
8.	Bidder Revenues	Disclosed

Table . 7.1 Criteria for cleaning the dataset

By using this criterion , we obtain an initial sample of 157 acquisitions for manufacturing companies and 167 for software companies. We drop the observations where we cannot obtain the required data on bidder- and target characteristics, which reduces the sample for software and manufacturing companies respectively to 132 and 137 . The sampling assumption that we made in order to shape our datasets are :

1. **Staggered fiscal year :** Around 23 target companies in our sample (from both datasets combined) have staggered fiscal years (fiscal years not ending on 31 December). In order to avoid some inconsistencies during the analysis , during the measurement of financial indicators such as target leverage, ROA across targets. We searched in the Refinitive Eikon database to obtain bidder free cash flow, revenue and assets for the year before deal announcement .
2. **Unavailable data :** One of our sample selection criteria is that all necessary financial data for the target are obtainable through Refinitiv Eikon database , which leads us to an exclusion of observations. Especially, recalling the *Table-7.1* , when R&D or the revenues of the bidder are not available . In relative terms , the exclusion is not larger compared to the initial sample size .
3. **Outliers :** We exclude outliers when we are unable to identify a reasonable explanation for how the outlier fits into the data or when the outlier is most likely a result of data

measurement errors . We check each variable for potential outliers and if a potential outlier is identified we adjust for these , where is it possible by looking on financial statements or deal contracts (that are available on the Refinitive Eikon database) , otherwise they will be excluded from our analysis . The overall exclusion is given by two outliers where the variable deal premium is above 100% as per the sample selection criteria and one outlier where the target Return on Asset is above 400%.

3.2. Variable measurement

Variable identification and measurement have mainly been based on a thorough review of existing literature and empirical work for firm- and deal-related variables . Below we list the control variables that are in our model and explaining why we decided to use them .

3.2.1. Dependent variable

The Refinitiv Eikon Database provides deal premiums as the percentage difference between the final offer price and the unaffected target stock price 1-day prior and 1-month before the offer announcement date . Sometimes rumors of a potential deal , when the company is listed , can inflate the stock price of a target just before the official offer announcement, a so-called run-up effect. So , we decided to choose the value of the premium 1 – month before , because this approach is in line with the existing literature showed in the *chapter 'Determinant of deal premium'***.**

3.2.2. Independent variable

FIRM RELATED VARIABLE

Company size (**Logsize**)is measured as the natural logarithm of company revenue. Revenue is expected to give a more accurate depiction of the firms' market share, which is typically considered when **assessing** potential anticompetitive problems arising from M&A. The variable is usually expected to be positive associated with acquisition likelihood of a target company.

Resources like new technology and patents can either be developed in house or acquired through M&A transactions. Ali-Yrkkö, Hyytinen & Pajarinen (2004) find a relationship between the number of patents held by companies and the possibility to be acquired. Frey and Hussinger (2006) state that acquisitions can be used to enhance a company's technological competitiveness, although the usefulness of acquired technology is related to industry proximity. If investments in R&D result in useful intellectual property, **R&D** will lead to an increase in the number of potential buyers and R&D tends to increase the value of the firm when it is successful . Gordon M. Phillips & Alexei Zhdanov (2013) shows also that large firms optimally may decide to let small firms conduct R&D and innovate and then subsequently acquire these small innovative companies. Unlike small firms, large firms may find it disadvantageous to engage in an "R&D race" with small firms at intermediate states of demand, as they can obtain access to innovation by acquiring small innovative firms. R&D also varies positively with industry demand and the expected probability that a firm is an acquisition target. Based on this research , we decided to use the natural logarithmic of R&D expenses as parameter of our regression .

Another important variable is the target **leverage** computing it with the D/E ratio . Several empirical studies have found evidence of a significant relationship between target leverage and deal premiums that an acquirer is willing to pay for that target (Walkling & Edmister, 1985).

Leverage is most often used to measure relative bargaining power of the target and bidder based on the argument that the target will have increasing bargaining power with declining leverage and hence is able to demand higher deal premiums. Walkling & Edmister (1985) show that higher deal premiums are associated with declining amounts of leverage.

Earlier empirical findings suggest that larger deal premiums are paid where the bidder and target operate in the same industry (**Relatedness**) and are therefore considered related. We use a dummy to identify acquisitions where the target and bidder operate in the same industry . This variable will be equal to 1 if they operate in the same industry (actually it is sub-industries since we are considering 2 general datasets containing different kind of industries) and 0 if they are different . Related mergers are combinations of firms that have the same or similar product, market or technological characteristics ,these similarities create opportunities for strategic fit (resource sharing, synergies, economies of scope) between the combining firms. The strategic fit improves the competitive position of the combined firm thereby increasing long term financial performance. Core-related acquisitions should, on average, provide greater opportunities for synergies than acquisitions that are not core-related. Since in a core-related acquisition, the area of commonality involves the two firms' primary lines of business, we expect the potential for value creation through synergies to be greater than in a combination of firms that are completely unrelated or where any lines of business that are related are not primary to both firms. Due to their greater potential for synergies, core-related acquisitions lead to higher valuations of the acquisition and hence higher reservation prices for the bidding firm (Titman, 1990)

Another aspect that should be taken into account, are the Agency Costs that deals with the conflicts of interest between the management of a company and the company's owners. For large acquisitions, firms are most often publicly traded and are characterized by dispersed ownership.

The shareholders delegate the everyday operational responsibility to the firm's management team, but they have little power in controlling what management chooses to do with this power. It is in the shareholders' interest that management acts to maximize shareholder wealth. This is most often not the case because management will instead optimize its own utility, which might lead them to pay unnecessarily large deal premiums or even engage in value destroying deals . Jensen (1988) was among the first to theorize on the relationship between **bidder free cash flow** and deal premiums as a possible managerial agency cost. According to Jensen's free cash flow theory of takeovers, managers with high level of free cash flow will be more inclined to engage in deals with an NPV less than zero instead of paying out excessive cash to shareholders, who might be able to invest the funds into other positive NPV investments. This means that as cash reserves are higher for companies with poor internal investment opportunities. Jensen (1988) therefore hypothesizes that a given bidder's takeover activity is positively associated with the amount of free cash flow that it holds and as a consequence also the charged deal premium . In order to check for this phenomenon , we decided to use in our regression model FCF (FREE CASH FLOW) too . FCF is computed using operating cash flow (most common method because it is the simplest and uses two numbers that are readily found in financial statements: operating cash flow and capital expenditures) . Here the formula:

$$FREE\ CASH\ FLOW = OPERATING\ CASH\ FLOW - CAPITAL\ EXPENDITURES$$

However, we decided to relate FCF to the total Asset of the company in order to take in consideration also the size of the company , we called this variable AFCF

$$ACFC = \frac{FREE\ CASH\ FLOW}{TOTAL\ ASSETS}$$

ROA is a measure that have most often been used to measure the target's ability to generate cash flow overall and not only the part attributable to management. As we have seen in the chapter of '*Determinant of deal premium*' it is directly associated with the deal premium , in our analysis we use the ROA associated to the target company .

A possible variable that we want to consider for explaining the deal premium is the response to competitors that use M&A for expanding themselves . In order to check it , we use a variable called **RESPCOMP** (response to competition) which is computed by the number of completed takeover year related and the total number of takeovers in the span of time considered (10 years) , this two-value change across different industries so we can have a better overview of the competition sector-related. This measure should give us a propension for bidder to pay a higher premium as a response to competitors actions .

$$RESPCOMP = \frac{Number\ completed\ takeover}{Total\ takeover\ in\ the\ sector\ considered}$$

The **Market to Book ratio** (also called the Price to Book ratio), is a financial valuation metric used to evaluate a company's current market value relative to its book value. The market value is the current stock price of all outstanding shares (the price that the market believes the company is worth). The book value is the amount that would be left if the company liquidated all of its assets and repaid all of its liabilities. We decided to use this parameter in order to see if a bidder pays a higher premium for high value of market to book ratio of the target company , in fact this ratio is typically used by investors to show the market's perception of a particular stock's value.

$$Market\ to\ Book\ ratio = \frac{Share\ price_{1\ month\ before}}{Book\ value}$$

DEAL RELATED VARIABLES

Sullivan, Jensen & Hudson (1994) highlight that the **type of payment** signals asymmetric information to the market. When estimated synergies are high and the bidder is certain that these will materialize, the bid will be financed by **cash** , on the other hand a bidder will use stock to finance takeovers when it believes its stock price is overvalued . So, we take in consideration cash offer as parameters in our regression analysis because it can hint some explanation of the paid takeover premium . In order to evaluate this, we consider a dummy variable which is equal to 1 if it's a cash offer and 0 if other kind of payment such as stock payment (referred as stock exchange) and mix offers .

The total price paid by the bidder for a target is equal to the **deal size** , which will entail the deal premium. When a bidder obtains 100% control of a target it procures all target shares and assumes all net debt. We use the values of the official transactions given by Refinitive Eikon and consider the natural logarithmic of the value in our datasets .

FIXED EFFECTS

Other's variables that we decided to put in the model are fixed variables which allows us to control for time-invariant unobserved individual characteristics that can be correlated with the observed independent variables. We defined a variable , related to the size of the bidder , that will check for the identity of the bidder (**BIG_COMPANIES**) . Since there are some big companies like

P&G , Apple , Microsoft , Oracle who can perform more M&A activity in the same year and affording to easily overestimate the target companies , in our study we consider Big Companies , firms with a market valuation superior to 500 billion US dollars , so to assess the impact of those firms during the determination of the deal premia .

Below we summed up all the variables that we will use in our regression model , by giving them the names that we will use from now on to identify the regressor .

VARIABLE NAME	FORMULA
CASH_DEAL	1 : cash offer 0 : stock offer
DEALSIZE	Reported value
MKT_BK_RATIO	$\frac{MARKET\ CAP}{BOOK\ VALUE}$
RESPCOMP	$\frac{Takeover\ completed\ in\ 1\ year}{Total\ Takeover}$
R&D	LN(R&D)
LEVERAGE	$\frac{DEBT}{EQUITY}$
ROA Target	$\frac{OPERATING\ INCOME}{TOTAL\ ASSETS}$
RELATEDNESS	1 : same industry 0 : different industry
ACFCT	$\frac{FREE\ CASH\ FLOW\ TARGET}{ASSETS\ TARGET}$

ACFCB	$\frac{FREE\ CASH\ FLOW\ BIDDER}{ASSETS\ BIDDER}$
LOGSIZE	LN(REVENUE)
BC	1 : BIG COMPANY 0 : NOT BIG COMPANY

Table 7.2 list of parameters in the regression and their nomenclature in the analysis

3.3. Methodology

A lot of previous studies conducted the research on deal premium drivers by using linear regression models and this seems to be the dominant method used to identify premium drivers .We decided to use a linear regression model because the biggest advantage of linear regression models is linearity, making the estimation procedure simple and have an easy-to-understand interpretation on a modular level .

3.3.1. Econometric model

Regression analysis focus with developing a linear regression equation by which the value of a dependent variable Y can be estimated given a value of an independent variable X . In multiple regression analysis the value of the dependent variable is estimated on the basis of know values of two or more independent variables.

For multiple regression analysis the principal assumption is :

1. The relationship can be represented by a linear model

2. The dependent variable is a continuous random variable
3. Homoscedasticity
4. Successive observed values of the dependent variable are uncorrelated
5. The conditional distributions of the dependent variable are all normal distributions.

We focus on ***12 independent variables*** , and we perform a cross-sectional analysis on two sample using multiple regression . The model on the samples is specified as follows :

$$PR1M = \beta_0 + \beta_1 \text{CASH\_DEAL} + \beta_2 \text{DEALSIZE} + \beta_3 \text{MKT\_BK\_RATIO} + \beta_4 \text{RESPCOMP} + \beta_5 \text{R\&D} + \beta_6 \text{RELATEDNESS} + \beta_7 \text{ROA target} + \beta_7 \text{ACFCT} + \beta_8 \text{ACFCB} + \beta_9 \text{LOGSIZE} + \beta_{10} BC + \beta_{11} \text{LEVERAGE} + \varepsilon$$

PR1M is the deal premium , and it's calculated as the difference between the target unadjusted share price 1-month prior to the announcement date and the offer price over the unadjusted target share price 1-month prior to the announcement date . The other parameters are described in the paragraph **' Variable measurement '** with the respective name in the **Table-7.2** . We aspect the interaction terms to be significant and therefore we estimate the same model for the two industry groups Manufacture and Software .

Methodology Limits

There are several limitations that must be considered in relation to method chosen in this study, firstly the ones relating to the assumptions of multiple linear regressions . Multiple linear regression is a method that oversimplifies reality . A crucial issue is that when two or more predictors are highly correlated both with each other and with the criterion, the shared variance will be included in the multiple regression analysis when the one independent variable is introduced , this is called multicollinearity . However, multicollinearity causes no special problem

for inferences associated with the overall regression model, such as F test for the significance of the regression effect, confidence intervals for the mean of the dependent variable, and prediction intervals for individual values of the dependent variable. Even if we are aware of the limitations by using multiple regression , we have to highlight the method's ability to point towards relevant relationships in the real world .

3.3.2. Squared partial and semi partial correlation

The partial and semi-partial (also known as part) correlations are used to express the specific portion of variance explained by eliminating the effect of other variables when assessing the correlation between two variables (James 2002). When we deal with regression are preferred squared partial and squared semi-partial correlation coefficients .

We decided to use this method in order to assess the ***individual contribution*** of an independent variable, on the total variation in dependent variable . This contribution is called **Squared Semi-partial correlation** and it explains any *increment in the R-square* value when an independent variable is added to the regression model

By considering two variables as an example , X1 and X2 , the squared partial regression coefficient is computed as such :

$$r^2_{X2.X1|Y} = R^2_{X2.X1Y} - r^2_{X2.Y}$$

With X , we represent the variable that doesn't enter in the regression equation . It **contributes** to the dependent variable with a correlation of $r^2_{X2.X1|Y}$. $R^2_{X2.X1Y}$ is the R-squared value from the regression model which contain both independent variables .

In pair with the Squared Semi-partial correlation is generally used also the **Squared partial correlation** which represent the ***proportion of the variation in dependent variable*** that was left unexplained by others independent variables , but that *has been explained by the independent variable we add into the model* . The formula is :

$$r^2_{YX2.X} = \frac{R^2_{X2.X1Y} - r^2_{X2.Y}}{1 - r^2_{X2.Y}}$$

According to the theory , the sum of the *squared semi-partial coefficients* should be equal to the squared multiple coefficients of correlation . However , these formulas overestimate the contribution of each variable when the independent variables are highly correlated among them , so the variance caused by such correlation lead to a sum of 'the semi-squared coefficients of correlation ' that is not equal to the squared multiple coefficients of correlation.

In our analysis we apply these formulas in our model for the twelve independent variables . Even if this can create problems of high correlation , due to the high number of parameters , we use this method in order to have a 'generic approximation' of the value of the Squared semi-partial correlation and create a ranking among the independent variables, to see which ones increment the most the R-squared value when added to the model . We do this for both the considered sectors , and then compare the results in function of the variability contribution on the dependent variable .

CHAPTER 4
RESULT'S ANALYSIS

In this section, we will present the results of this study where the primary purpose is to investigate the differences of the firm-related factors and deal related factors respect to the deal premiums in mergers and acquisitions announced in the period 2010 to 2019 , for the two industries taken into examination (Software and Manufacturer related) .

4.1. Expectation

Before starting the analysis , we studied the acquisitions in these two macro sectors and looking at the deals and existing theory , we made some assumption that we intend to verify with the data collected .

The Assumptions are :

1. Software companies pay a higher overevaluation on average

2. R&D should have a greater effect in software companies as they tend more to use M&A to acquire new technological knowledge.

3. We expect that Manufacturing companies are willing to pay a higher premium in order to acquire companies with high ROA than software companies .

4. We expect that leverage of the target negatively affects the deal premium valuation because it's regarded as a poor performance indicator of the management team .

5. We expect that for manufacturer companies FCF/ASSET TAGET (ACFCT) ratio impact positively the deal premium, because they are willing to pay more for high performance business .

Before assessing the validity of the above hypothesis , we will first proceed to analyze the outputs' results , divided by category , pointing out the main values and comparing them with the existing literature. Then we will perform a comparison between the categories by using the outcomes of the squared partial correlation formulas for each sector and explaining which are the intrinsic elements that could produce that difference . Lastly , we will respond to the Assumption that we made before starting the analysis .

4.2. Regression Output

Table-8.1 reports the outcomes of the regression analysis for the two individual industry groups . The F-stat of both industries is highly significative (p-value < 0.0001) and the model for manufacturers explains 35.2% of the total variation in deal premium using the R-squared , while the software related companies model explains the 29.9% of the total variation .

A variable that comes to be an important determinant of the deal premia is the ***FCF/ASSET BIDDER (ACFCB)*** . In both the models it has a significant value and has a positive impact on the average value of deal premium . The positive effect of *ACFCB* is greater for acquisitions that occur in software related industries compared to manufacturers (respectively equal to 5.01 and 3.28) . This is in line with the tendency of the companies to pay using Internal Cash Reserves instead of going on capitals market for raising money , without the necessity of increasing the post-deal leverage putting the management team under monitoring by the shareholders (Stultz 1999) . Thus

, there is the presence of agency problems where the management team tend to overestimate the target company due to the high level of cash available (Free Cash Flow Theory) , in accordance with the literature showed in chapter '*Determinant of deal premium '* .

The dummy *variable* ***BIG_COMPANIES*** that we introduced in our models , appears to be significant for both industries , with a p-value of 0.011 for manufacturers and 0.035 for software companies . The regression indicates a high positive association of this control variable over the paid premia . One possible interpretation is that a company with a high market capitalization (>500D USD) , performing merger and acquisition activities, there is a great impact on the deal premia , where according to our results, with an average value of 4.99 for manufacturers in comparison with a 3.18 average value for software related companies .

Unexpected is the result from the control variable RELATEDENESS . By looking at the p-value column the *RELATEDNESS* control variable comes out to be not significant from both of the analysis . As we explained in *Chapter 'determinant of deal premium'* , it's a parameter that helps us to understand the diversification of the investments versus the strengthening of the core-related acquisition . The fact that it is not significant in this study could be due to a reduced sample size , since the correlation between deal premia and potential synergies (in case of core-related acquisition) has already been demonstrated by previous studies such as Titman (1990) .

So , even if some parameters have shown value of no significance on both models , most of the relevant independent variables that we wanted to study , in order to respond our expectations , are significant considering an $\propto = 0.05$.

Table 8.1 Regression results

	Manufacturer Companies				Software Companies			
	Coefficient	*Standard error*	*Stat t*	*p-value*	*Coefficient*	*Standard error*	*Stat t*	*p-value*
Intercept	84.4274	21.9585	3.8449	0.0002	102.5018	34.3946	2.9802	0.0035
DEALSIZE	-0.6418	0.2692	-2.3838	0.0186	-2.1729	1.1505	-1.8887	0.0612
BIG_COMPANY	4.9978	1.9521	2.5602	0.0116	3.1805	1.5000	2.1203	0.0359
ACFCB	3.2841	1.1364	2.8899	0.0045	5.0118	2.0493	2.4456	0.0158
Logsize	-0.4074	1.7162	-0.2374	0.8128	-1.3955	0.6419	-2.1739	0.0316
RELATEDNESS	1.6477	0.8574	1.9217	0.0569	3.6104	2.0536	1.7581	0.0811
R&D/REVENUES	-0.4608	0.1671	-2.7581	0.0067	0.2633	0.1253	2.1017	0.0375
Leverage	-0.0315	0.0147	-2.1464	0.0337	0.2325	0.1238	1.8776	0.0629
ACFCT	-2.3828	1.0145	-2.3486	0.0204	0.2946	0.1414	2.0837	0.0391
MKT-to-Book ratio	0.9676	0.3968	2.4384	0.0161	2.2016	1.1081	1.9867	0.0491
ROA TARGET	0.3454	0.1188	2.9069	0.0043	-1.5422	0.6642	-2.3219	0.0218
RESPCOMP	3.0020	18.6414	0.1610	0.8723	1.2513	6.8358	0.1830	0.8551
CASH_DEAL	1.3620	0.6704	2.0317	0.0443	4.0226	1.6884	2.3826	0.0187
R squared		0.3524					0.2990	
Correct R squared		0.2848					0.2423	
Observation		157					167	
F		3.9595					3.4511	
significance F		0.000041					0.00024	

Notes : Table 8.1 shows the estimated outcome of the multi regression analysis performed on the deal premium by using firm- , deal , industry factors . The dependent variable *PR1M* is the premium paid relative to the share price of the target one month prior to the announcement date . The independent variables are measured as follow : *DEALSIZE* is the size of the target expressed in total price paid , *BIG_COMPANY* is a dummy variable to express companies with a market cap above 500B USD , *Logsize* is the natural logarithmic of company revenue , *RELATEDNESS* is a dummy variable that look if the bidder and the target operate in the same industry , *ACFCB* is computed as FCF of the bidder over its total assets , *R&D/REVENUES* is the reported R&D expenditure over the revenues , *Leverage* is the reported leverage of the company on Refinitive Eikon Database , *ACFCT* is computed as FCF of the target over its total assets ,*MKT-to-Book ratio* is the market cap over the book value reported in the database ,*ROA TARGET* is the reported operating income over the total assets , *RESPCOMP* is the number of completed takeover in the year of the acquisition over the total takeovers considered in the referred industry , *CASH_DEAL* is a dummy variable if the deal use a cash option .

4.3. Results performing the squared partial correlation

We computed the squared partial correlation and the semi-partial correlation for both datasets by using the formulas and procedure showed in the *chapter 'Dataset and Model'* . Our aim is to assess the variability contribution of each variable to the total variability of the model . So , the squared partial correlation between the Base case (in which we have all the 12 control variables) and each variable VARX (general control variable) gives us the proportion of variance that is not

explained in the others control variables but in the considered VARX . We summarized the results in the *Table-8.2 .*

Table 8.2 Results squared partial and semi-partial correlation

	Manufacturers		Software	
	Squared partial correlation	***Squared semi-partial correlation***	***Squared partial correlation***	***Squared semi-partial correlation***
DEALSIZE	*5.51%*	*3.78E-02*	*4.06%*	*2.97E-02*
BIG_COMPANY	*11.44%*	*8.37E-02*	*8.74%*	*6.72E-02*
ACFCB	*8.69%*	*6.17E-02*	*8.96%*	*6.90E-02*
Logsize	*3.54%*	*2.38E-02*	*3.91%*	*2.86E-02*
RELATEDNESS	*4.13%*	*2.79E-02*	*6.00%*	*4.48E-02*
R&D/REVENUES	*8.22%*	*5.80E-02*	*5.03%*	*3.72E-02*
Leverage	*8.19%*	*5.78E-02*	*3.20%*	*2.32E-02*
ACFCT	*9.18%*	*6.55E-02*	*3.74%*	*2.73E-02*
MKT-to-Book ratio	*8.51%*	*6.03E-02*	*8.06%*	*6.15E-02*
ROA TARGET	*5.77%*	*3.97E-02*	*5.64%*	*4.19E-02*
RESPCOMP	*9.42%*	*6.74E-02*	*1.07%*	*7.56E-03*
CASH_DEAL	*4.45%*	*3.02E-02*	*8.11%*	*6.19E-02*

We can arrange the results of squared partial correlation in the *Table-8.3,* in a form of ranking in order to visualize better the differences between the two industries regarding which control variable impact the most the variability of their own model .

Table8.3 Ranking of the independent variables across the two sectors

Manufacturers	**Ranking**	***Software***
BIG_COMPANY	**1st**	*ACFCB*
RESPCOMP	**2nd**	*BIG_COMPANY*
ACFCT	**3rd**	*CASH_DEAL*
ACFCB	**4th**	*MKT-to-Book ratio*
MKT-to-Book ratio	**5th**	*RELATEDNESS*

R&D/REVENUES	**6th**	*ROA TARGET*
Leverage	**7th**	*R&D/REVENUES*
ROA TARGET	**8th**	*DEALSIZE*
DEALSIZE	**9th**	*Logsize*
CASH_DEAL	**10th**	*ACFCT*
RELATEDNESS	**11th**	*Leverage*
Logsize	**12th**	*RESPCOMP*

Notes : The ranking is done according to the squared semi-partial results in Table8.2 . We show the results in this way to better visualize the final outcome and allowing a better comparison between the two industries chosen

The results show how using the same parameters for analyzing the determination of the deal premia in these two industries , they have different impact on the total variability of the dependent variable . We are going to use these outcomes for supporting our conclusions on the previous stated expectation.

High impact on the variance of both models , according to the table8.3 , is expressed by two relevant control variables which the **BIG_COMPANY** and **FCF/ASSET BIDDER** parameters , by showing on how the FCF agency costs , as discussed in chapter 'DETERMINANTS OD DEAL PREMIUM ', affect greatly the variance of the system when present into the models of both industries.

4.4. Discussing the expectation

In this Section we describe the regression results in individual subsections for each hypothesis , by referring to the two individual regressions models on industry groups to check the expectations . We also discuss implications of our findings and the existing theory that support our results .

Software companies should tend on average to pay a higher takeover premium due to a higher likelihood of overevaluation

The result of the regression models shows a higher value for the intercept of software related companies with an average of 102.5 and a standard deviation of 34.39 , respect to the manufacturers where the average deal premium is 84.42 and a standard deviation of 21.95 . This result supports our initial assumption , and from the span of time considered (2010/2019) our analysis suggests that software related companies have been acquired for an average deal premium higher than manufacturers one .

This can be also caused by the different methods for evaluating a company since its more difficult to value a technological one . Unless its business model is not based on recurring revenues a DCF model is not the optimal choice , and it's preferred a Comparable valuation . Since this method is in function of the comparable company 'stock value (Pratt 2000) , we tend to see an overevaluation when stock prices of comparable companies are rising , especially in market's bubbles . Wessels (2005), also support this hypothesis , observing that the valuation of companies that are valued by using share prices, according to authors, fluctuate more than those of based on a discounted cash flow (DCF) valuation. Also , many software companies listed or private can be classified as growth stock due to a higher price-earning ration respect to the average of the different industries . Since software companies fall in this class , the existing theory have found that high long-term forecasted growth and high current earnings growth tend to be associated with high PE ratios (Penman 1996) , so this could lead to easily overestimate the returns on the investment .

R&D should have a greater effect in software companies as they tend more to use M&A to acquire new technological knowledge.

R&D intensity has relatively the same value contribution to the total variability of the model both for software and manufacturers as we can observe from the table-8.3 . Regressions 'result for both models show the significance of this variable into explaining the deal premia . The hypothesis that we wanted to test seems to be accepted by our analysis , by showing the positive association that appear between this variable and the dependent one , and on the other hand a negative impact of this variable into explaining the premia in the manufacturing sector . Table-8.1 shows the estimate for software companies to be equal to +0.26 and significant at the 5%-level (p-value = 0.0375). We therefore find support for this assumption from our regression model .

Trying to analyze the different causes that can lead to this outcome , the different correlation that appear for the two sectors on the R&D/REVENUE variable can be explained by the high capital expenditure that software companies perform . This result has been shown also by Desyllas & Hughes (2009) , suggesting the importance for bidders to invest in Targets which are high R&D intensive , typically targets which hold a high number of intellectual properties , and Laamanen (2007) who claims that R&D investment in target firms are a key source of synergy creation, inducing the acquiring part to pay bulky deal premia for such targets.

We expect to find that Manufacturing companies , are willing to pay a higher premium in order to acquire companies with high ROA than software companies .

The ROA control variable results in line with the expectations , by showing a high significant positive correlation equal to 0.345 for manufacturer companies with a p-value of 0.0043, different from software companies where is found a negative one , with an average value of -1.52 and a standard deviation of 0.664 . So , the stated hypothesis is supported by our findings by showing that manufacturers are willing to pay a maximum premium of +0.46 on the average value of deal premium .

The profitability for software companies does not increase the average deal premium showing that for this sector , financial driven acquisitions are less common than strategic acquisitions supporting the findings of Healy et al. (1992) .

We expect to observe the leverage of the target positively affects the deal premium valuation because it's regarded as a poor performance indicator of the management team , underperforming the company .

We find that leverage appears to be a significant variable to explain the takeover premium. It affects positively the deal premium for the software companies and negatively the manufacturer industries with an impact , respectively of 0.23 and -0.03 . However , the significance level is different between the two regressions , in fact the leverage parameter appears to be significant only in the manufacturers' regression with a p-value of 0.033 as we can observe from *Table8.1 .* Hence , from our analysis , a negative correlation between this control variable and the premia appears .

High LEVERAGE in the target company , is a signal of bad management decision of the target companies , especially the ones that are in financial distress . The rationale behind this acquisition seems to be acquiring underperforming companies , restructure them by changing management team or selling non-core related assets in order to increase the profitability . As previously highlighted , software companies have a different asset base composition and mainly utilize intangible assets. Due to accounting standards on intangible assets differ from tangible assets , we can assume that the asset base could be too low for targets in software space , which could lead to higher ratios . Furthermore , there are no uniform reporting standards for intangible assets, which could lead to issues with comparing assets across software firms. Another different element between manufacturers and software firms is that software companies generally hold less debt and use stock options in their compensation schemes more often (Damodaran 2009) , thus showing different intrinsic approaches to finance themselves .

We expect manufacturer companies FCF/ASSET TARGET ratio to impact positively the deal premium, they are willing to pay more for high performance business .

FCF/ASSET TARGET (ACFCT) appears significant in the manufacturer regression with a p-value of 0.020 and in the software one with a p-value equal to 0.039 . Our results show that there is a negative correlation between the ACFCF variable and the deal premia for manufacturers with an average value of -2.38. This is opposed to the results that we found for software companies where there is a positive correlation and a positive impact of 0.29 . This outcome does not support our expectation about the control variable for manufacturer companies but only for software related one .

By looking at *table-8.3* , the target cash flow *for the software companies does not seem* to be a key element into explaining the variance on the deal premium . A possible cause of this can be explained by the different elements that comes in the evaluation of the businesses in the two sectors . Since , in software related companies , intangible assets and know-how of the target have a higher value for the bidder if we compare it only to cash flow performance .

CONCLUSION

In the early 2000s software companies' merger and acquisition deals in this industry were clearly over evaluated with high level of registered paid premium . Once busted the bubble , a lot of companies that have been acquired started to don't meet the expectations , leaving the buy side dealing with the aftermarket consequences . Because , at that time these types of companies where pretty new , so questions about the correctness of the determination of the deal premia became a hot topic among firms and investment banks . The typical ones where 'Could we use the same valuation methods as non-technical ones? ' ' Is the technology beneath actually so valuable that can explain that deal size amount ?' . In order to respond those questions, the literature about merger and acquisition came into help but due to the lower amount of data for high tech and software firms where little at the time the results produced were not sufficient . Only after a decade , at the beginning of the 2010s, enough data about these companies were available and started to emerge new parameters , that must be considered in the determination of the premia when dealing for this type of companies .

By using data from 2010 to 2019 , the result of this research confirms that with using a pre-determined set of independent variables for the determination of deal premia , without taking into consideration the industry in which they operate , it could lead to an evaluation error , leaving the buy side to question about the usefulness of the merger or acquisition .

This study contributes to the literature by showing how the parameters related to *agency cost* have a great contribution over the deal premia for software companies and manufacturers , and they are unrelated with the types of industry . Our results show how the Free Cash Flow of the bidder, and the proxy variable Big Companies influence most of the variance explained by the regression and their contribution on the average value of deal premia is quite relevant . Parameters like Free Cash Flow of the Target and ROA are significant from our research , in line with the existing literature . However , the output of the regression show that for software related companies, they do not

contribute to the premium in the same way it happens for manufacturers . In fact , we found a negative impact of the ROA control variable on the deal premium and a low variance explained for free cash flow of the target for software firms , hinting how target financial indicator do not contribute heavily to the determination of the premium for this sector .

With this thesis we also wanted to prove that performing an M&A activity , in any industry , without having clear what are the external and internal variables that affect the most the deal premia , is a great mistake of the buy side . By paying an over evaluated takeover premia without considering proper control variable industry related , it will leave the post-merger entity to deal with both operational and financial burdensome .

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