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ACQUISITION PREMIUM:
REPRESENTATION AND RELATION WITH LEVERAGE

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Firma

Simone Donninelli Paolini

to my Family

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ABSTRACT

One of the most critical issue in M&A operations is the acquisition premium. This quantity is usually expressed as a percentage value.

This thesis explains how the acquisition premium is usually represented by business analysts and academic literature. We highlight advantages and limits of this common premium measure. The purpose of our analysis is to prove the intuition of academics that the pre-deal leverage of the target company may overstate the dimension of percentage acquisition premium. We also analysed possible adjustment methods to correct this effect for the purpose of business valuation.

This document is organized in four main chapters. The first chapter introduces the main concepts on the issue and the theoretical framework of reference. It illustrates how the value created in M&A operations is represented, how values are computed and the link between value and acquisition premium. The second chapter contains a theoretical analysis on the representation of acquisition premium and its relationship with leverage through an intense academic literature review. It illustrates different studies on premiums and how these studies reported them. Moreover, we provide the reader with theoretical examples to understand the effect of pre-deal leverage and we report the results of an important academic research on this issue. The third chapter represents the core of this thesis and contains an empirical analysis to verify our hypothesis. We used statistical and econometric tools to understand the relationship of pre-deal leverage and acquisition premium in the EU M&A market. Further, we investigate possible alternative solutions to express premiums. The fourth and last chapter provide the reader with an adjustment method suitable for the EU M&A market. Additionally, we illustrate the differences between the alternative ways of expressing premiums and this helpful method.

VALUE CREATION IN M&A

1.1 Introduction

The shareholder value approach says the ultimate objective of the enterprise's managers must be the maximization of shareholder's equity value. This principle should push managers to increase the overall enterprise's value. Among all the viable options, mergers and acquisitions (M&A) are the most important strategic tools which enhance value through inorganic growth of an enterprise (Manelli & Pace, 2009).

M&A are complex events in business life. They quickly reallocate a huge amount of resources among entities and people involved. From a general point of view, a merger combines different companies in a unique economic and legal entity, while an acquisition is a purchase of an entity (target) by another. In both cases, the transfer of a controlling interest ownership from the seller to the acquirer takes place in exchange of a price (DePamphilis, 2014). The interest acquired allows the new owner to exert control over the target. Hence, this kind of transactions give rise to a deep change in the ownership structure and stewardship of the acquired entity.

The main actors of these events are the seller and the acquirer of the target, namely the shareholders of the subject enterprise. However, M&A involve many professionals and other entities. Each of these has got a specific role and various tasks throughout the process. They are the top management of the target and the acquirer, corporate lawyers, accountants, investment banks and public authorities.

The process is formed by several steps and requires different documents for each phase. Even if it can vary widely depending on the tendency of the transaction (hostile or friendly), it always starts with a strategical phase. After this first step, there is the core of the process, which goes from the screening of potential targets to the valuation of the ones most fitting the acquirer's selection criteria. The transaction legally ends with the negotiation and deal closing phase. However, the last phase of integration plays one of the most critical role. This ultimate step allows the acquirer to realize all the planned improvements and synergies, therefore obtaining the supposed incremental value creation.

All M&A transactions have many common elements, but each specific deal is unique to a certain extent, especially from the point of view of synergies (Kengelbach, et al., 2013). As consequence, a high level of attention must be paid when analyses of these operations are performed. This is especially true, when analysts utilize as reference, data from a group of peers, to make comparisons.

1.2 Value Creation Framework

As value creator tools, M&A operations must be analysed carefully to verify their potential to generate new value. The value creation framework helps to figure out whether a M&A operation creates value and to whom this value goes from a quantitative point of view. The scheme compares acquirer and seller sides of the transaction, respectively represented by the left and the right columns illustrated in chart 1.

Chart 1 - Acquisition Evaluation Framework
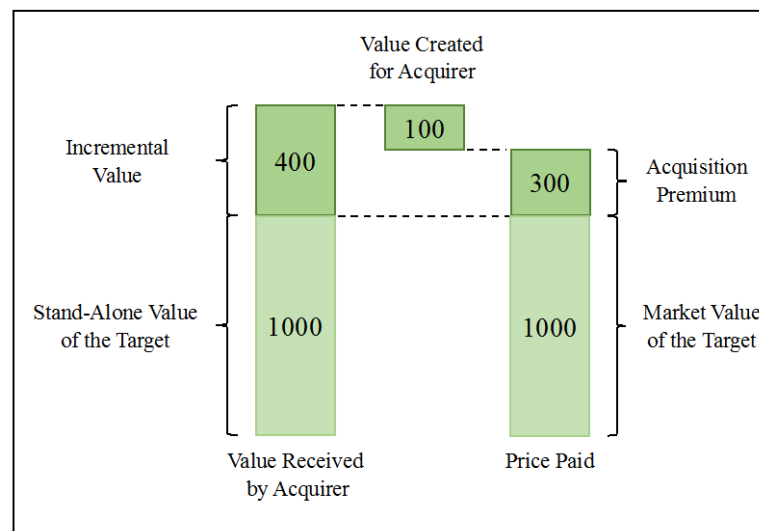
Source: Koller et al., 2015 with adaptation

The overall value received by the acquirer can be seen as the sum of the stand-alone value of the target under the stewardship of the current management and the incremental value that would be generated after the transaction. Hence, the difference between the value received by the acquirer and the price paid by the acquirer is the value created for the acquirer.

$$Value\ Created\ for\ Acquirer = Value\ Received - Price\ Paid$$

Whereas, the value received by the seller is the price paid by the acquirer. Consequently, the difference between the price paid and the market value of the target is the new value created for the seller also called acquisition premium.

$$Value\ Created\ for\ Seller = Price\ Paid - Value\ of\ the\ Target$$

Obviously, the greater the acquisition premium the lower will be the value created for the acquirer and vice-versa (Koller, et al., 2015).

A common use of the framework is to help the acquirer and the seller to visualize the offer price range. The upper bound of the range should be the value received by the acquirer. If the acquirer pays a greater price than the maximum value he would receive, he wastes value. In particular, if he pays exactly the upper bound amount, all the value created flows into the pocket of the seller. Further, he should take into account the risk that, the incremental value he is going to pay, would never realize. On the other side, the lower bound of the range is the market value of the target. Note that, in normal circumstances the seller would never sell the entity for this value, but he will ask always for a premium. Hence, one of the reasons the acquirer is willing to pay a premium is to push the current owner to sell its interest (DePamphilis, 2014).

Because of this reasoning, the price offered should lay in the middle between the maximum bid the acquirer is willing to pay and the minimum bid the seller is willing to accept. However, the final price paid is always matter of negotiation and bargaining powers, which strongly influence the outcome of each M&A transaction.

1.3 The Difference between Price Paid and Value

A famous sentence and a strong principle in business valuation practice is: *"price is what you pay, value is what you get"*. This statement highlights the fact that prices formed on markets may differ widely from interests' valuations. Fundamental analysis is a practice based on the idea that enterprise shares have an intrinsic value and prices tend to converge toward it in the middle-long run. However, the idea that interests have an inherent value is elusive because value is always a relative concept (Penman, 2011).

In other words, prices are expression of supply and demand forces within the market place, hence they represent objective data. While, valuations are subjective estimates made by appraisers for specific purposes, sometimes very different among them, using vary methodologies and information (Guatri & Bini, 2005).

The first reason for Guatri & Bini of these discrepancies is the influence of some factors after the valuation process. These factors can be internal and/or external to the enterprise. Regarding external factors, these are mainly related to financial capital markets, which can vary by their level of efficiency. In general, a highly efficient financial market has the tendency to reflect rapidly and consistently the fundamental value variations in the negotiated prices. For what concern internal factors, the authors found the ability of "communicating value" to be the key element through which the enterprise can reduce the gap between price and value. This ability is enhanced by the transparency and effectiveness of communication and by the strategical and financial credibility of the enterprise.

The second reason stated which can explain these discrepancies is related to the object exchanged. Interests with different features like control power or marketability show different prices and different values.

An important consideration about limits to empirical analysis on these discrepancies has to be made. There is a big difference between data available for listed companies and unlisted companies. For listed companies, shares are frequently traded on stock exchanges and valuation reports are periodically issued by financial analysts. Note that these prices are referred to marketable minority shares. Moreover, transactions involving the exchange of majority interests are not so common. Otherwise, for unlisted companies, data like valuations and prices are hard to obtain for two main reasons. The first is that exchanges of majority and especially for minority interests are far less frequent than listed companies. While the second reason is that unlisted companies have a much less stringent legislation about public information, hence it is not easy to obtain private valuations and prices of interests exchanged for these companies (Appraisal Practices Board, 2015).

1.4 Stand-Alone Value of the Target

Bearing in mind the value creation framework, the starting point to figure the possible offer price out is the stand-alone value of the target. It represents the value of the target lead by the current management in normal on going circumstances. To quantify this value there are various valuation methods. The two main categories are the absolute and the relative valuation

methodologies. The most common in business practice for the first category is the discounted future cash flows model (DCF), while for the second category we referred to comparable multiples methods.

The DCF method is based on the forecasted future cash flows that the business generates during its entire life. Once estimated, the projections are discounted back to the present value at a given rate of return also called cost of capital. The DCF valuation process is divided in two parts. The first part of the process is to value the cash flows that have been specifically forecasted for a period of 3 or 5 years usually. While, the second part considers the rest of the cash flows as a perpetuity called terminal or continuing value. In particular, the perpetuity can represent the value of a stable stream of cash flows or a growing stream of cash flows. The enterprise value is the sum of the present value of the first part plus the present value of the second part. This value is the result of the discounted cash flows arising from the operating assets of the entity. Hence, the enterprise value is owed to debtholders and shareholders. To obtain the equity value, so the value of the target, the last step is to deduct the value of liabilities from the enterprise value (Gaughan, 2015).

The comparable multiples methods are quick and easy to value a target enterprise and their use is increasing through time and space. The comparable multiples methods can be applied to:

- Comparable companies
- Comparable transactions

Even if they could seem very similar, indeed they are very different. The first one uses a group of listed peers and prices formed on financial markets from which financial analysts compute multiples to be applied to the target data. Whereas, the second one involves only transactions like M&A where a controlling interest of peer companies is exchanged.

In both approaches, to build a careful multiples analysis there are three guidelines to respect:

1) Use the correct multiple
2) Calculate the multiple in a consistent manner
3) Use the right peer group

In business valuation practice multiples are divided in two categories: equity side and asset side. The most common multiples used are the price to earnings ratio, the enterprise value to EBITDA ratio, the price to book ratio and the price to revenues ratio. Particularly important is to compute the multiple in a consistent way, so the numerator and the denominator must be based on the same underlying assets. With respect to comparability, a good point to start is to

define peers within the same industry. Moreover, to select the right enterprises in the industry, it is useful to look for similar long-term growth and returns prospects (Guatri & Bini, 2005).

A difference to be pointed out between the absolute and relative valuation methods is about the final outcomes. With the first method, the outcome is the value of the whole equity of the evaluated entity. Whereas with the second method, the result obtained is usually a per share value, which is then multiplied by the outstanding shares to reach the whole equity value. At the end, both methods provide a number expressed in a defined currency term which is the valuation of the target enterprise.

1.4.1 Levels of Value

The outcome of valuation methodologies depends on the characteristics of the object being valued. Precisely, two features which mostly influence the valuation process and the results are whether the target is listed on a financial market and the percentage of equity interest exchanged. The first feature expresses the fact that when an enterprise is listed, its shares are traded on stock exchanges. While the second feature expresses the fact that the interest exchanged can be whichever quantity between a thin fraction of the equity and the whole amount of it. Both these characteristics do influence the degree of control over the enterprise and the degree of marketability/liquidity of the specific interest exchanged.

The degree of control over an enterprise is directly related to the percentage of equity interest owned because of the governance rules to appoint the board of directors. Note that to gain the control, so the power to govern the enterprise at will, it is not needed to purchase the 100% of the outstanding shares. Not even a stake greater than 50% is indispensable. The acquirer can purchase less shares and still owns control in particular situations. There are numerous legal tools and practical conditions that can allow to control the enterprise without the majority of the outstanding shares. For instance, voting rights can be differentiated among different shareholders classes or when the remaining part of shares are highly spread among investors (Mellen & Evans, 2010). A quasi comprehensive illustration of the levels of ownership and their relations with control is represented in chart 2.

Chart 2 - Levels of Ownership

Majority Interests
1. 100% ownership
2. Ownership sufficient to liquidate, merge, etc.
3. 51% operating control

Minority Interests
4. 50%–50% ownership
5. Less than 50%, but the largest block of stock ownership
6. Less than 50%, but with swing vote powers
7. Less than 50%, but with cumulative voting powers
8. Pure minority interests
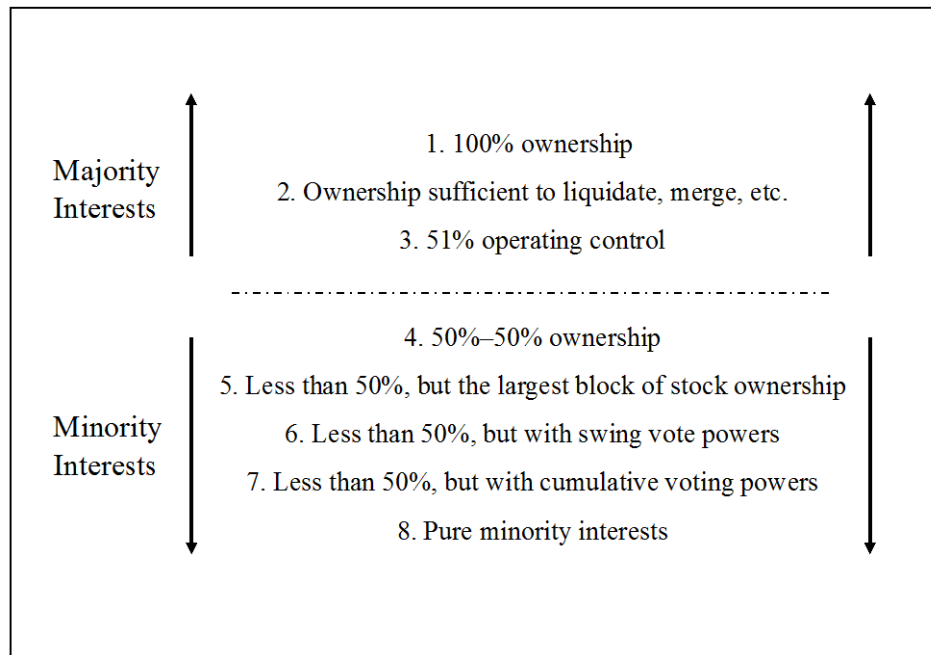
Source: Hitchner J.R., 2011 - Adaptation

With respect to the degree of marketability and liquidity a preliminary remark should be made. Liquidity and marketability are two different features of an interest. Liquidity is the possibility to quickly sell a share without a relevant economic decrease of value whereas marketability is the right to sell it. However, these terms are often used interchangeably in business valuation practice. Furthermore, there is a strong link between liquidity and marketability because the former always implies the latter but the reserve is not true (Hitchner, 2011). The degree of these two characteristics differ from controlling interests to non-controlling interests and from listed to unlisted enterprises shares. For instance, in normal circumstances, publicly traded shares are liquid, controlling interests in private companies are considered marketable but less liquid than the previous case and non-controlling interests in private companies are seen as almost nonmarketable because the low degree of liquidity (Pratt, 2009).

To reflect different degree of control and different degree of marketability into valuation of various interests, appraisers have developed tools to adjust the outcome of valuation methodologies. These tools are premiums and discounts like the control premium and the discount for lack of marketability. They can be applied to increase or reduce the result of valuation processes to properly reflect interest features.

Premiums and discounts can be also seen as links between different levels of value. Mercer is the first, who described and illustrated the levels of value and the relationships among them. This classification is a milestone in the business valuation practice and a useful reasoning tool.

The framework he developed is represented by a chart, but since there are contradictory opinions, this is continuously changing. Chart 3 provides the most recent illustration.

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Chart 3 - Levels of Value
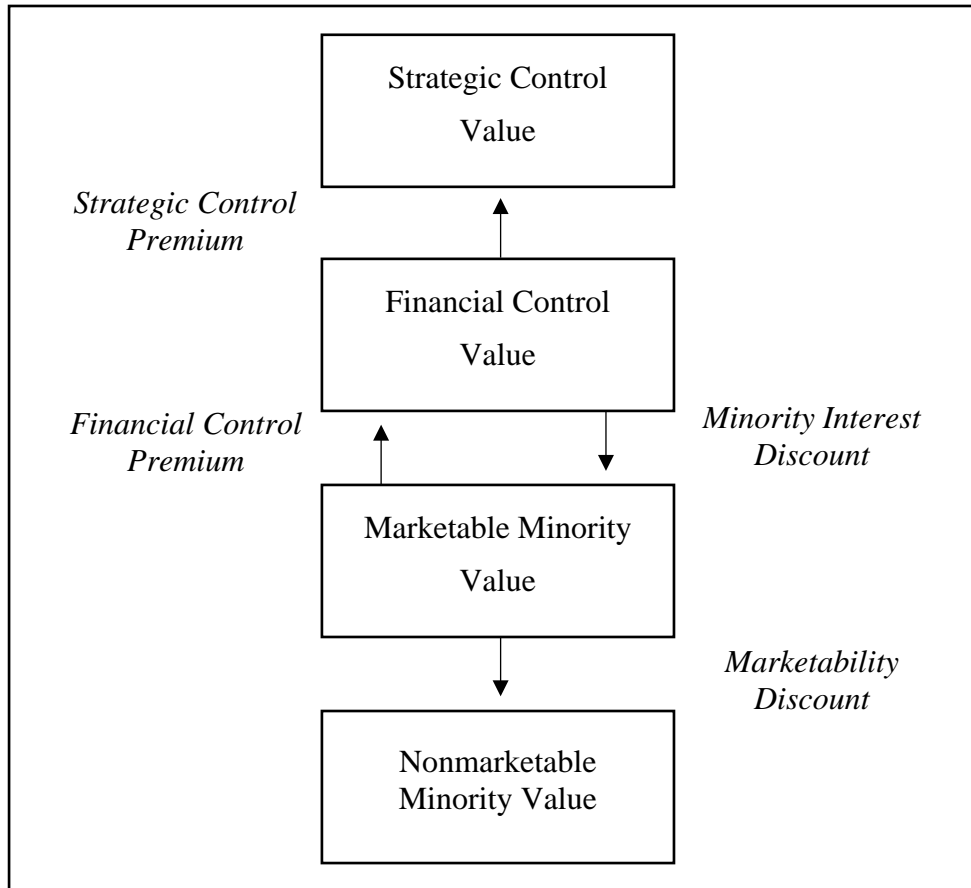
Source: Mercer C.Z. and Harms T.W., 2008

Each level is related to an interest with different level of control and marketability. For Mercer, the marketable minority value is the base level of value to which the other levels must be referred and computed. It represents the value of a minority interest in a publicly traded enterprise. If we apply a discount for lack of marketability we would obtain the nonmarketable minority value. This is the value of a minority interest in a privately held enterprise not listed in a stock exchange. Otherwise if we apply a control premium we reach the financial control value also called control stand-alone value. This is the value of a controlling interest. Although this kind of interest is considered to have a high degree of marketability, it has been seen that selling this interest requires time and effort. The highest level of value is the synergistic or strategic value. This is due to the value that a strategic buyer might extract and pay in an M&A transaction to acquire control of the entity (Mercer & Harms, 2008).

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1.4.2 Valuation Methods and Levels of Value

As previously mentioned, the stand-alone value of the target is obtained through accounting and financial procedures which imply specific methods varying between absolute and relative valuation methodologies. However, each different method leads to a different level of value. Given this fact, it is fundamental to clearly know which is the level of value resulting from the selected method, to reach the desired interest valuation through the application of the adequate premiums or discounts at the end of the process (Mellen & Evans, 2010).

Pratt explains that in some cases valuation methods provide a clear level of value, while in other cases there is a significant debate over the resultant level of value. Obviously, this confusion complicates the use of premiums and discounts. With respect to absolute valuation methodologies, each of these approaches can lead to every level of value.

To understand the value obtained with a specific absolute method, the analyst should clearly know the assumptions underlying the model. The first assumption to specify is about the cash flows or earnings being discounted or capitalized. If these projections reflect streams that a control owner would expect to realize then a control premium is already embedded into the valuation. Vice-versa if the projections do not reflect streams that a control owner would expect to realize then to obtain a control level valuation, the use of a control premium may be recommended. The second assumption to specify about the model is the rate of return. Given the fact that the rates of return are obtained from market data of public companies, some analysts believe that absolute methods produce a marketable minority value. However, this is a misconception because, in the words of Pratt, *"There is little or no difference in the rate of return that most investors require for investing in a public, freely tradable minority interest versus a controlling interest"*.

With respect to comparable multiples methods, the obtained level of value is different whether the analyst uses the comparable transactions approach or the comparable companies approach. With the first approach, multiples are computed from data based on transactions entailing ownership transfers of controlling interests. Hence, a control premium is already included in the price paid, because an interest which allows to control the enterprise is exchanged. With this approach, the resulting value is at control level. Starting from this valuation, to appraise a minority interest it will require a discount for lack of control. Whereas, the second approach uses prices of a peer group of publicly traded companies to obtain multiples. Consequently, the value obtained by this approach reflects the way in which markets evaluate public companies shares. Usually on stock exchanges thin fractions of ownership are traded, then a marketable minority level of value is the obtained valuation (Pratt, 2009).

1.5 Managerial Improvements and Synergies

The value received by the acquirer should coincide with the maximum amount the acquirer is willing to offer. This maximum value is composed by the stand-alone value of the target and the incremental value the acquirer thinks can extract from the deal. The incremental value is due to improvements achievable by the acquirer. These improvements are a critical issue because they are concrete determinants of the offered price. From this point of view, the acquisition premium can be seen as a function of the incremental value.

A distinction to bear in mind is that the nature and the amount of the incremental value are different depending on the type of transaction. The possibilities are a transaction which implies only a change of the controlling owner and a transaction which implies a substantial combination of the two entities, no matter if the legal entites remain separated (DePamphilis, 2014).

In the first case, the acquirer only gains the control of the enterprise. It can be considered a financial investor, like private equity firms, and its objective is typically to identify companies with future growth opportunities and durable competitive advantages. Once an attractive target has been identified, the financial investor buys the shares to obtain the control. This is an equity investment and usually the investor realizes a return on it with a sale or an IPO in the future. It evaluates the target and base the offer price on the possibility to better manage its operations, financials and applying a better corporate governance. In the second case, two companies are combined together. The acquirer can be considered a strategic investor and its objective is to identify companies whose products or services can be synergistically integrated with its to create incremental long-term value for shareholders. They can be firms in related type of business, such as competitors, suppliers and even customers. For this second type of buyers the incremental value generable is not only due to a better management of the target but also to synergies between the target and the acquirer. For this reason, strategic buyers evaluate and can pay more for a target with respect to financial buyers (Malenko & Gorbenko, 2014).

The incremental value which financial investors can obtain through the change of target stewardship is the value of control as proposed by Damodaran. He suggests to compute the expected incremental value as the product between the value arising from changes in the entity management and the probability these changes will occur. If we look at the target as a collection of operating assets only, we can consider the whole enterprise value as the present value of financial cash flows, so we have the following formula of value:

$$Enterprise\ Value = \sum_{t=1}^{t=N} \frac{\text{E}(Cash\ Flow_t)}{(1+r)^t}$$

The incremental value of the enterprise can arise from an increase in cash flows, an increase in the expected growth, an extension of the period of high growth or a reduction in the cost of financing. Insights about the likelihood component are hard to figure out but this is influenced by management changing procedure, legal restrictions, inertia, conflict of interests and corporate charter amendments among the others (Damodaran, 2005).

Further, for strategic buyers the surplus of value with respect to financial investors arise from synergies. These are indirectly defined as the value of the combined entity $V_{(a+b)}$ less the value of the two separated entities summed together $V_A + V_T$.

$$Synergies = V_{(A+T)} - (V_A + V_T)$$

The total amount of synergies is the sum of operational synergies, financial synergies, fiscal synergies and market synergies less the costs to implement these synergies. The result is the value of net synergies which is another component of the incremental value in case of entities combination (Manelli & Pace, 2009). Even in this case the final value of synergies should be weight for the probability that these synergies will eventually arise. However, if the likelihood component of former managerial improvements were hard to figure out, this probability could be even harder to point out because of the greater complexity of the transaction.

As a matter of notation, given the above definition of synergies, we must assume that the value of the target (V_T) is already maximized as stand-alone and no other value of better management can be added.

1.6 Private Benefits of Control

Another way to increase value for controlling shareholders is to divert it from the non-controlling shareholders to themselves. This way of increasing value is feasible only when a majority interest with control power does not represent 100% of equity. Moreover, the principle can be extended toward all relationships involving stakeholders of the enterprise.

The extracted value can be monetary or no-monetary and it is due to the control power that controlling shareholders have with respect to other shareholders. For instance, a no-monetary benefit is the "psychic" value that some shareholders simply attribute to being in control, though this hardly explains the premium paid for a controlling interest. Examples of monetary benefits shareholders can gain are the excess compensations and perquisites to particular related parties like relatives or even themselves as managers. Another possibility is to arrange favourable supply, demand or financing agreements with corporations related to the controlling owners. It is worth noting that, it is not forbidden to have transactions with related parties, but it is difficult to assess whether the conditions are "fair" with respect to the market. This possibility of value transfer can eliminate or at least reduce the non-controlling returns (Hitchner, 2011). The private benefits extractions are associated with less developed financial markets and concentrated ownership. Moreover, these phenomena are highly widespread in countries where there is a lack of protection of non-controlling shareholders (Dyck & Zingales, 2004). These practices are referred as "tunnelling" and usually they are illegal. However, in the real world they happen and they are valuable in business transactions. Their effect is to increase the upper bound offer price range. They can be seen in higher premium paid for control when the buyer is resident in a country with lack of protection for non-controlling shareholders. The countermeasures against these extractions are: better accounting standards, better legal law enforcement, higher market competition, higher level of media transparency, more stringent controls on tax compliance.

CHAPTER 2

ACQUISITION PREMIUM

2.1 Introduction

The economic rationale of M&A transactions is the creation of new value for both entities shareholders. As stated in the previous chapter, when these events take place they entail the transfer of the controlling interest ownership from the seller to the acquirer in exchange of price. The core element of the change of ownership is the transfer of the enterprise control. A definition of control summarizes it as *"the power to direct the management and policies of a business"* (The International Glossary of Business Valuation Terms, 2010). In particular, who has control can exercise the so-called prerogatives of control. Pratt provides a non-exhaustive list of what the holder of control power can do:

- Decide on levels of compensation for officers, directors, and employees;
- Decide with whom to do business and enter into binding contracts, including contracts with related parties;
- Decide whether to pay dividends and, if so, how much;
- Register the stock for a public offering;
- Repurchase outstanding stock or issue new shares;
- Make acquisitions or divest subsidiaries or divisions;
- Buy, sell, or hypothecate any or all company assets;
- Determine capital expenditures;
- Change the capital structure;
- Amend the articles of incorporation or bylaws;
- Sell a controlling interest in the company with or without participation by minority shareholders;
- Select directors, officers, and employees;
- Determine policy, including changing the direction of the business;
- Block any of the above.

All these prerogatives have led many to think that control has got intrinsic value. Hence, they sustained that a premium for control should be paid to reflect this feature into valuations (Pratt, 2009).

At this stage a substantial difference must be pointed out. The ownership structure can be composed by a different number of shareholders owning a different percentage of shares. In this case, each shareholder owns an interest with a specific degree of control. For instance, there could be a majority shareholder owing the 60% of shares representing a controlling position and the remaining 40% of shares spread among other shareholders representing non-controlling positions. This ownership structure gives rise to *"control asymmetries"* among shareholders' interests. Consequently, these asymmetries justify the existence of premiums and discounts for control level differences (Bruner, 2004). This view is coherent with the definition of the International Glossary of Business Valuation Terms (2010) stating that control premium is *"an amount or a percentage by which the pro rata value of a controlling interest exceeds the pro rata value of a non-controlling interest in a business enterprise, to reflect the power of control"*.

From this point of view, control premium and discounts for lack of it are modelled as variables inversely related like in the following formula:

$$\% \ discount = 1 - \left(\frac{1}{1 + \% \ premium} \right)$$

The upside generated by the premium should be perfectly matched with the downside generated by discounts. The result of control asymmetries is a difference in the valuation between controlling interests and non-controlling interests but the net effect on the enterprise valuation must be equal to zero. These adjustments are consistent with the theory of private benefits of control.

The other possibility is that the whole equity is acquired by a unique shareholder. In this case, there are no control asymmetries, hence no premium for control is reasonable (Guatri & Bini, 2005). It is true that the new owner is acquiring the control power but as recognized by the Appraisal Practice Board (APB): *"the prerogatives of control have little inherent value, but rather have value to the extent that their exercise enhances the economic benefits available to the owner of the subject controlling interest"* (2015). However, the rise of economic benefits is better reflected by the acquisition premium.

2.2 Acquisition Premium

The acquisition premium, also called takeover premium, has been previously defined as the difference between the price paid and the market value of the target. This variable is much more concrete and measurable than the control premium and in academic literature it is widely studied.

Dombret, Mager & Reinschmidt (2008) analysed the influence of country and industry variables on the magnitude of takeover premium. The country effect is much more relevant than the industry effect. In their study, US and UK showed higher premiums than Germany and France. The reason of these differences is due to social and economic features. The industry effect is less relevant but we need to emphasise the exception of financial sector which shows significantly lower premiums than global takeover premiums. The reasons behind this result may be the strong regulations of financial industry and the lower exploitable synergies compared to other industries.

Afterwards Madura, Ngo and Viale (2012) deepen the study of industry effect trying to explain why premiums vary across industries and over time. They suggested that expected synergies may vary among industries, thus synergies may drive premiums. Further, industry growth prospects may enhance competition and consequently increase premiums. They found higher premiums in industries which experienced high growth, high concentration and have more R&D investments, whereas premiums resulted to be lower after deregulation events.

Kengelbach, Utzerath, Kaserer and Schatt (2013) in a research for BCG highlighted that in M&A transactions, acquirers share expected synergies through acquisition premiums. Successful deals show a synergy sharing of around 30% of total synergies. Moreover, they showed that synergies not only vary among industries but they vary widely also within the same industry thus each deal has got specific value creation opportunities.

Another variable which may influence the acquisition premium is the nature of the buyer. Bargeron, Schlingemann, Stulz and Zutter (2008) stated that public buyers pay consistently higher premiums than private buyers. However, the spread of premiums is much more pronounced between public buyers and private equity buyers. Their conclusion associates the higher premium paid by public acquirer to expected economic benefits due to synergies with respect to private equity buyers. They also noted that the presence of managerial ownership of buyers levels the differences due to the public or private nature of the buyer.

De La Bruslerie (2013) investigated the relation between the acquisition premium and the means of payment. Theoretically each deal can be closed by cash, shares or a mix of them. The

author found that premiums and cash payments are positively related. The higher the premium, the higher the percentage of cash set up in the agreement. The means of payment is influenced by the risk embedded into the M&A transaction and asymmetries of information. He showed that when an empirical analysis is performed the analysts should not mix the regimes of payment. A sample formed by deals with different means of payment would assume a continuum from cash to shares payments while M&A transactions are empirically characterized by full cash or full shares payments.

Dionne, La Haye and Bergerès (2015) assumed that blockholders of target's shares have the possibility to be better informed. In case of takeovers, authors showed that blockholders pay lower premiums with respect to others because of asymmetry of information.

Takeover premiums have been also studied by Schlingemann & Wu (2015) who analysed the influence of the selling method. They found that targets can maximize the takeover premium obtained using auction as sale method because it increases competition among bidders in comparison with negotiated sale.

Another relation analysed is between takeover premium and financial independence of targets. Jindra and Moeller (2015) built an indicator of financial independence and showed that highly independent targets have more bargaining power during the negotiation phase of M&A deals. As a result, they are able to obtain higher premiums.

In an interesting research, Trapkov, Yakoub and Buhui (2014) found a negative relation between premiums received by targets shareholders and the retention of the target CEOs. The suggested conclusion is that CEOs have got considerable conflicts of interest during takeovers. CEOs may help acquirers to pay lower premiums in exchange of personal benefits like good jobs in the new company.

Sris, Kose and An (2012) tested the relation between takeover premium and the investor's divergence of opinion on the target equity's value. When opinions are divergent, authors conclude that the takeover premium is higher. However, it is also true that very divergent opinions tend to limit takeovers.

Each research mentioned, involves mainly listed companies because of the ease to find data and information, however they slightly differ in defining the studied variable. In the article of Madura & Ngo, they decided to consider different alternatives to measure the acquisition premium. The first way to measure the premium is through the percentage difference between the deal's value and the target firm's market value one day before the announcement date. This definition highlights the increase of value the bidder offers with respect to the prevalent market

valuation. Financial press commonly use this approach when they refer to a recent bid. The main limit of measuring the premium with a so narrow time window is that it does not reflect the leakage of information occurring before the announcement, and which practically would show a more expensive acquisition. The leakage phenomenon has been demonstrated by Schwert (1996) and its influence is mostly concentrated in the 20 trading days before the announcement date. This shortcoming pushed the authors to develop a second way to measure the premium. This variation considers as target firm's market value the price of shares four weeks (20 trading days) before the announcement date. Even if, this new way takes into consideration the pre-announcement leakage effects, both approaches have the limit of not considering the post announcement movements of prices. The solution provided is a third way of measuring the premium. It is defined as the difference between the target's value at the effective (completion) date of the M&A and the price four weeks before the announcement. Even this measure is not exempt from shortcomings. However, its main flaw is not about the quality of the measure but about the complexity of the computational process, because the period between the announcement of the M&A and the effective date is different for each takeover (Madura & Ngo, 2008). These three ways to compute the acquisition premium are the most important in literature.

A variation proposed by the APB to select the target firm's market value is to consider not a single price at a specific pre-deal date but the average of stock prices over a limited period of time preceding the announcement date. They believe this approach to improve relevance and reliability of data.

Professionals in business practice but also academic researchers in universities can use different databases to obtain data on acquisition premiums. Some of these sources are the FactSet Mergerstat®/BVR Control Premium Study, the S&P Capital IQ and the Thomson Reuters SDC Platinum™. For instance, the BVR Control Premium Study defines its Mergerstat® Control Premium as the "premium computed by comparing the price ultimately paid to the unaffected stock price". The formula is:

$$Mergerstat ® \ Control \ Premium = \left(\frac{Purchase \ Price \ per \ Share \ in \ Home \ Currency}{Unaffected \ Price \ in \ Home \ Currency} - 1 \right)$$

Where, the numerator is the total consideration paid per share for the target firm's shares, denominated in the home currency of the target company. While the denominator is the target company's common stock price per share unaffected by the acquisition announcement. The

stock price is selected by the database after analysing each transaction (Business Valuation Resources, 2016).

Considering the SDC database, some authors deepen the study on data choice in relation with premiums computation. The SDC records two relevant dates, the date announced (DA) and the original data announced (ODA). The DA is the date when the first public disclosure about the transaction is made, whereas ODA is the date when the target is publicly known to be a takeover candidate. They observed that the premiums are underestimated when the DA is used as reference to the price rather than the ODA. This result denies the common hypothesis used in many studies which assume no information of the M&A are available to the market before the announcement date. Thus, it proves the existence of a leakage effect and recommend the use of ODA while estimating premiums (Mulherin & Aziz Simsir, 2015).

2.3 Representation and Relation with Leverage

Considered the different ways by which the acquisition premium can be defined and computed, they all have a common characteristic. The outcomes of these approaches are always percentage differences based on the equity value of the target entity. Although the acquisition premium is a monetary amount resulting from the difference between two values, price paid and stand-alone value of the target, academics, professionals and financial press represent it as a percentage. This is the traditional way of expressing premiums and it can be defined as "equity foundation approach" (Appraisal Practices Board, 2015). The reason and advantage behind this choice of representing premiums as percentages is due to the possibility of enhancing comparability among transactions which involve firms of different size.

An important insight on the representation of the acquisition premium was pointed out by Timothy Meinhart in 2013. He stated that the pre-acquisition leverage of the target company may influence the reported acquisition premium of an M&A transaction. More precisely, the risk of representing premiums in the traditional way is that percentage premiums may result to be overstated, simply because the traditional way does not consider the effect of leverage (Meinhart, 2013).

The idea behind this overestimation effect starts from the capital structure of the target. A high level of indebtedness chosen by the target allows the acquirer to obtain the control of the overall enterprise with less cash or shares with respect to a target with a lower level of indebtedness (more capitalized), other things equal. At the same time, the acquisition premium paid is related to benefits arising from the M&A transaction, like managerial improvements, synergies and/or

private benefits of control. These increases in value come from the entire enterprise and not just the equity. Therefore, when the capital structure of the target firm shows a high level of indebtedness, the absolute amount of the acquisition premium is compared with a low level of equity. As consequence, if all the other factors are equal, more levered targets may imply bigger percentage acquisition premiums. The following charts illustrate graphically this intuition and the relationship between the percentage acquisition premium and the leverage:

Chart 4 - Consideration for 100% of Equity
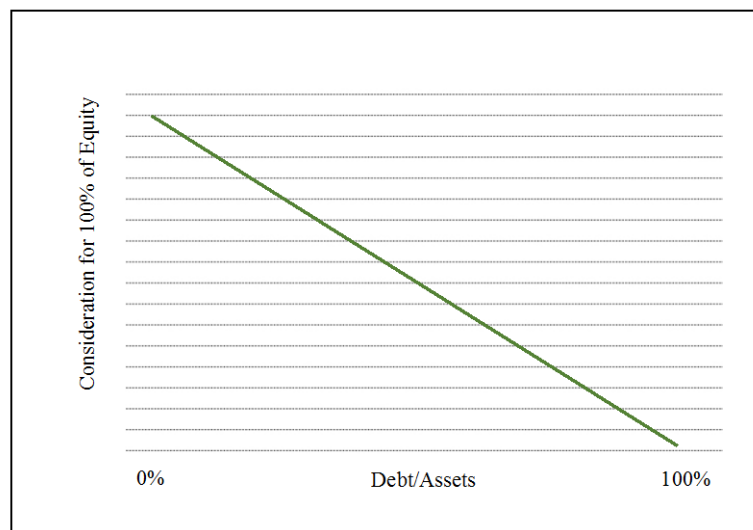
Source: Covrig et al., 2015 with adaptation

Chart 5 – Cost of Premium
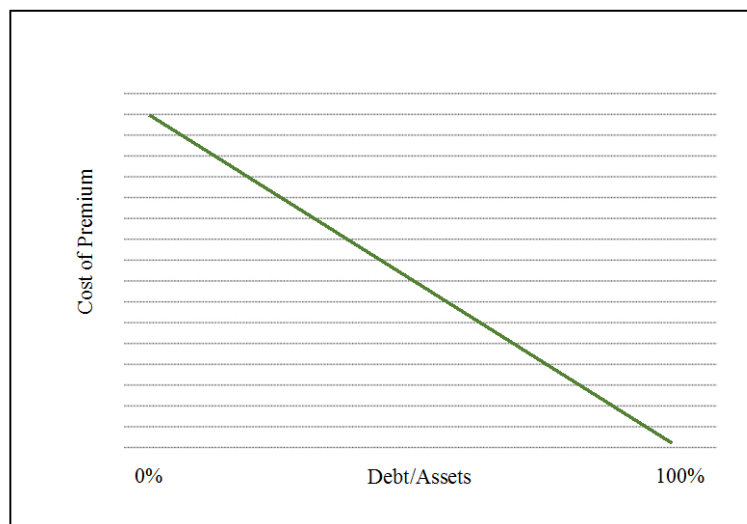
Source: Covrig et al., 2015 with adaptation

Chart 6 - Percent Acquisition Premium

Source: Covrig et al., 2015 with adaptation

All charts have the leverage on the horizontal axis as independent variable, represented by the debt to assets ratio. It can vary from 0% (no debt financing) to 100% (full debt financing). At the same time, each of those relates the leverage with a different dependent variable: consideration paid for the 100% of equity, cost of premium and percentage acquisition premium. Chart 4 shows a decrease in the amount of consideration paid for the part representing the stand-alone value of the whole equity as the leverage (Debt/Assets) increase, other things equal. This is due to the enterprise value formula:

$$Assets\ value = Liabilities\ value + Equity\ value$$

At the same time, Chart 5 shows a negative relation between the monetary amount of premium and leverage. As leverage increase the cost of premium on equity goes down.

Finally, Chart 6 points out that the percentage acquisition premium rises with leverage, other things equal. Hence, a high leveraged target would show a bigger premium than a lower leveraged target (Covrig, et al., 2015).

A practical example to better understand the overestimation effect and a possible solution is provided in chart 7 below. Assume three target companies A, B and C. The underlying hypothesis of this example is companies to be similar. They operate in the same industry and they have relatively similar operations. The traditional way of expressing acquisition premiums would show three different percentages because of the different capital structures of the companies. In particular, company A with a lower level of debt shows a lower percentage

premium (35%) with respect to company C (70%) which has a higher level of debt. Company B which has a level of debt comprised between companies A and C has a percentage premium of 47%. These differences create a range of percentage premiums that vary widely without an economic underlying reason but only because of a computational issue.

For instance, if the reason of computing the premium is to use historical data to derive a control premium, valuation analysts use to compute the average of a comparable set of similar companies. In this case, if the three companies were used as comparables with the equity foundation approach the derived control premium would be 51%. As theoretically stated, the problem of this data is caused by the fact of not considering the different capital structures of comparable companies.

Chart 7 - Example

	Target Company A	Target Company B	Target Company C	Average Premium
Market Value of Aggregate Equity Prior to M&A Announcement	100,000	75,000	50,000	
+	+	+	+	
Market Value of Debt Prior to M&A Announcement	30,000	55,000	80,000	
=	=	=	=	
Market Value of Invested Capital Prior to M&A Announcement	130,000	130,000	130,000	
Acquisition Premium Offered for the Equity	35,000	35,000	35,000	
Equity Foundation Approach				
A - Monetary Value of the Acquisition Premium	35,000	35,000	35,000	
B - Market Value of Aggregate Equity Prior to M&A Announcement	100,000	75,000	50,000	
	=	=	=	
A/B - Percentage Acquisition Premium based on Equity	35%	47%	70%	51%
Total Invested Capital Foundation Approach				
A - Monetary Value of the Acquisition Premium	35,000	35,000	35,000	
C - Market Value of Invested Capital Prior to M&A Announcement	130,000	130,000	130,000	
	=	=	=	
A/C - Percentage Acquisition Premium based on TIC	27%	27%	27%	27%

Source: Meinhart T.J., 2013 with adaptation

The solution proposed by Meinhart and subsequently by the APB (2013) is to express the acquisition premium as a percentage based on the total invested capital of companies before the deal. This new approach tries to take into account the different level of indebtedness of the comparables. It should align the percentage acquisition premiums avoiding the distortion caused by the overestimation effect.

It is true that adopting the equity foundation approach as way to express the acquisition premium has the advantage of enhancing the comparably among targets with different sizes, but it also worsens the comparability of companies with different capital structures. The

suggested solution is defined as "total invest capital (TIC) foundation approach", it maintains the percentage format which allows size comparability and it has the additional advantage of overcoming the leverage effect. Thanks to these pros, the best practices suggested by APB advise to use the TIC foundation approach to express the acquisition premium.

2.3.1 Results of Empirical Analysis

To empirically verify the above explained relationship between the acquisition premium and the leverage, Covrig, McConaughy and Travers (2015) performed an empirical analysis. They tested the link between the observed percentage acquisition premium with the pre-acquisition leverage. Their aim was to prove the distortion in percentages due to the overestimation effect caused by leverage.

The final sample was extracted from the FactSet MergerStat®/BVR Control Premium Study and contained 1,020 observations of all-cash acquisitions from 2003 to 2013 made in the U.S. with an observed equity control premium from 0% to 200%. They stated that negative premiums and over 200% premiums were outliers. Moreover, they excluded from the sample section 6 of the Standard Industrial Classification (SIC) containing financial institutions.

The selected dependent variable was the *mergerstat® control premium*, this was computed comparing the price paid to the unaffected stock price. Whereas the explanatory variables of their model were the percent unaffected equity (PCTUNAFFEQ) as a reverse measure of leverage, the total invested capital (TIC), the sales as size of the business, EBITDA over SALES as a proxy of profitability, synergies as the potential for increasing economic benefits, dummy variables for the type of acquirer like strategic, financial or horizontal, dummy variables to specify the year in which the transaction took place and dummy variables for the industry of the target company.

The first type of analysis they performed was a simple descriptive and correlation analysis of the data. The result of those analysis was the decision of deepen the statistical study because the percentage acquisition premium, TIC and EBITDA profit showed a drop with a decrease of leverage, represented by an increase of the PCTUNAFFEQ. This pushed the authors to analyse data with a multivariate regression analysis. Chart 9 shows the results of their regressions.

Chart 8 - Results of Regression Analysis by Covrig et al.

Regression	1	2	3	4	5	6	7
	Control Premium	Control Premium	Control Premium	Control Premium	Control Premium	Control Premium	Control Premium
C	0.641	0.596	0.787	0.756	0.828	0.817	0.875
t-statistic	*19.542*	*17.939*	*16.553*	*15.707*	*17.176*	*14.498*	*13.713*
LOG (TIC)	-0.105	-0.075	-0.078	-0.079	-0.078	-0.078	-0.074
t-statistic	*-8.721*	*-5.745*	*-6.064*	*-6.152*	*-6.144*	*-6.134*	*-5.715*
EBITDAtoSALES		-0.336	-0.332	-0.312	-0.306	-0.305	-0.301
t-statistic		*-5.828*	*-5.853*	*-5.495*	*-5.400*	*-5.373*	*-5.242*
PCTUNAFFEQ			-0.220	-0.242	-0.245	-0.247	-0.240
t-statistic			*-5.545*	*-6.049*	*-6.156*	*-6.160*	*-5.845*
STRATEGIC				0.068			
t-statistic				*3.465*			
FINANCIAL					-0.083	-0.083	-0.087
t-statistic					*-4.128*	*-4.126*	*-4.259*
SYN						0.000	0.000
t-statistic						*0.393*	*-0.199*
Industry *Dummy*							YES
Time Dummy *Dummy*							YES
Adj. R^2	0.069	0.098	0.133	0.133	0.136	0.136	0.160

Source: Covrig et al., 2015

These regressions analysis have been performed to better understand the link between control premium and the leverage, controlling for several variables which resulted to be correlated with premium. The first three regressions confirmed the negative correlation of control premium with TIC, profitability (EBITDAtoSALES) and the percentage of equity (PCTUNAFFEQ). The regression 4 and 5 introduce the type of acquirer[1], showing that premiums paid in strategic acquisitions are higher than in financial acquisitions. Regression 6 shows the potential of synergies to be a statistically insignificant explanatory variable. The last regression includes all the explanatory variables, including industry and time dummies. It concludes that all the variables are statistically significant apart from synergies and reach an adjusted R-squared of 16%.

Covrig, McConaughy and Travers affirm the analysis to prove a strong relationship between control premium and the leverage. The greater the leverage, the bigger the percentage of control premium. This result is coherent with the best practice suggested by the appraisal practice board and the intuition of Meinhart. Moreover, the authors suggest to use the significant explanatory variables as selecting criteria by valuation analysts, whenever a panel of comparables is needed to compute the control premium in an M&A transaction.

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[1] Strategic and Financial dummy variables were found to be strongly negative correlated. Authors decided to do not consider them at the same time in the regression model.

The last important result is deductible from the sign of the coefficients in chart 8. All the coefficients of the explanatory variables, with exception of strategic acquisitions, are negative. The marginal effect of each variable would reduce the impact of leverage on control premium. These results resize the impact that the appraisal practice board suggests the leverage may have on expressing the acquisition premium with the equity foundation approach.

2.4 Adjustment Methods

After the empirical analysis of the relationship between the acquisition premium and the leverage, the same authors developed two methods to adjust the observed percentage acquisition premiums for valuation purposes (Covrig, et al., 2016). The adjustment or normalization processes should allow valuation analysts to correct the distortion caused by the leverage on premiums observed in markets. As previously stated, stripping out the leverage effect would enhance the comparability of data.

2.4.1 Method 1: De-Levering and Re-Levering

The first method is based on two equations provided by the APB (2015). It expresses the acquisition premium based on the TIC foundation approach as a function of the acquisition premium based on the equity foundation approach. The first equation is called de-levering formula, while the second is called re-levering formula. As matter of notation, we indicate the new representation proposal of the acquisition premium as premium$_{(TIC)}$ and the traditional representation as premium$_{(E)}$. While equity stands for the market value of equity and TIC (total invested capital) is the value of the equity plus the face value of all interest-bearing debt and book value of preferred stock outstanding before the M&A announcement date.

De-levering formula:

$$Premium_{(TIC)} = Premium_{(E)} \times \left(\frac{Equity}{TIC}\right)$$

Both, premium$_{(TIC)}$ and premium$_{(E)}$ are expressed as percentages. The Equity/TIC ratio is a representation of leverage. This equation shows that an increase in leverage represented by a

decrease of the equity/TIC ratio, results in a lower acquisition premium(TIC). Restating the equation, the traditional premium(E) can be expressed as dependent variable.

Re-levering formula:

$$Premium_{(E)} = Premium_{(TIC)} \times \left(\frac{TIC}{Equity}\right)$$

Consequently, it can be seen from the rearrangement obtained that premium(E) rises when leverage increase (overestimation effect). This set of equations can be applied to a panel of similar transactions, which should involve comparable targets only differing in their capital structures and premiums. The application of this method produces a reference premium(E) from comparables which should not be overstated by leverage. This reference premium(E) is then used on the specific target equity to obtain the monetary amount of acquisition premium for the specific transaction.

The computational process is simple and it is composed by two parts. The first part requires the use of the de-levering formula. Applying this formula to each comparable M&A transaction, we derive all premiums(TIC). Each premium(TIC) is obtained multiplying the observed premiums(E) of the comparable firm by its pre-deal Equity/TIC ratio. Then, the average of all these premiums(TIC) is computed. This is the outcome needed for the second part. Once the average premium(TIC) is obtained, the second part of the process requires the use of the re-levering formula. Applying the second formula, we can compute premium(E) for the specific target. The target premium(E) is obtained multiplying the average Premium(TIC) of comparables by the equity/TIC ratio of the target. The Premium(E) found takes into account the differences due to the various capital structures of the comparables. A numerical example to better understand the process is provided in chart 10.

In this example three past transactions involved companies with very different capital structures. From a high levered comparable 1 with a pre-deal Equity/TIC of 20%, to a low levered company 3 with a pre-deal Equity/TIC of 90%, thus with an increasing level of capitalization. The simple average of the observed premiums(E) on markets is 40.7%. This is the commonly used data to compute the acquisition premium which could be offered in an M&A operation. Whereas the resulting premium(E) after the normalization process, performed by method 1, is 28%.

Chart 9 - Example of Method 1

1) Computation of Comparable Transactions Premium(TIC)

	Comparable 1	Comparable 2	Comparable 3		Average
Premium(E)	50.0%	40.0%	32.0%	A	40.7%
Pre-deal Equity/TIC	20.0%	50.0%	90.0%	B	53.3%
Premium(TIC)	10.0%	20.0%	28.8%	A x B	19.6%

2) Computation of Target Premium(E)

Equity/TIC of the Target	70.0%	C
Average Premium(TIC)	19.6%	D
Premium(E)	28.0%	D/C

Source: Covrig et al., 2016 with adaptation

As it can be seen, the traditional procedure tends to overstate the acquisition premium. In this case, the overestimation account for almost 13 percentage points more.

The authors note that given the benefits of the method, namely the method tries to take into account the effect of leverage to avoid possible overestimations, this procedure shows some flaws. They point out that *"although the subject (target) Equity/TIC of 70% is higher than the Equity/TIC values of Comp 1 and Comp 2, the re-levered subject company's control premium of 28% is lower than the control premia of Comp 1 and Comp 2"*. This seems to me a right conclusion but not a limit of the method. In fact, the expected premium(E) for a target with an Equity/TIC of 70%, so lower than Comp 3 and higher than Comp 2 and 1, should lie between the respective premium(E) of comparables 2 and 3 given by the proportional relationship of acquisition premium[2] and leverage. Hence, the limit of this method is that the found premium(E) (28%) should be higher than the premium(E) of comp 3 (32%) which has a lower leverage than the target company.

Further the de-levered acquisition premiums of the comparables, namely premiums(TIC), have a wide range of variance from 10% to 28,8% while in theory this range should be very narrow.

The opinion is that these flaws are due to excess sensibility of this adjustment method which is solely focused on changes of the capital structure. As authors showed in the previous article, the effect of leverage on the acquisition premium is not so important as the de-levering and re-levering method implies because it is moderate by the negative effects of other variables like deal size, target profitability, presence of financial buyers or positive effect of the presence of

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[2] See chart 6

a strategical buyer. This was clearly visible by the coefficients of the regression analysis that showed negative marginal effects of the other variables.

2.4.2 Method 2: Calibration

The second method is an attempt to solve the shortcomings of the first method. Method 2 takes advantage of the multivariate regression model of Covrig, McConaughy, and Travers (2015)[3]. Using regression 3 of chart 8 and the average values of their previous study, namely the mean value of EBITDA to sales ratios and the log of the mean of total invested capitals, the authors extracted an adjustment factor to correct the influence of pre-deal Equity/TIC ratio in the de-levering and re-levering formulas.

The adjustment factor is obtained through a so-called "calibration" process. The aim of this process is to find a factor that combined with the de-levering formula, using the coefficients of the regression analysis and adding the average values of the explanatory variables, produces a premium$_{(E)}$ which is the same of an unlevered firm (expressed by a value of PCTUNAFFEQ equal to 100%). The adjustment factor makes the premium$_{(E)}$ obtained with the modified formula and different capital structures equal to the expected premium$_{(E)}$ of the unlevered firm and takes into account other influencing factors.

The authors applied the adjustment factor to the formulas of the first method and the results are two modified equations.

Modified De-levering formula with the adjustment factor

$$Premium_{(TIC)} = Premium_{(E)} \times \left[1 - \left(100\% - \frac{Equity}{TIC} \right) \times Adjustment\ Factor \right]$$

Modified Re-levering formula with the adjustment factor

$$Target\ Premium_{(E)} = \frac{Average\ Premium_{(TIC)}}{\left[1 - \left(100\% - \frac{Equity}{TIC} \right) \times Adjustment\ Factor \right]}$$

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[3] See subparagraph 2.3.1

From their computations, using market data, the factor has resulted to be 0.5. Using the same data of the chart 10, a new example to better understand the process of method 2 is provided in chart 11:

Chart 10 - Example of Method 2

	Comparable 1	Comparable 2	Comparable 3		Average
1) Computation of Comparable Transactions Premium$_{(TIC)}$					
Adjustment Factor from regression Analysis = 0.5					
Premium$_{(E)}$	50.0%	40.0%	32.0%	A	40.7%
Pre-deal Equity/TIC	20.0%	50.0%	90.0%	B	53.3%
Premium$_{(TIC)}$	30.0%	30.0%	30.4%	A x B	30.1%
2) Computation of Target Premium$_{(E)}$					
Equity/TIC of the Target	70.0%	C			
Average Premium$_{(TIC)}$	30.1%	D			
Premium$_{(E)}$	35.5%	D/C			

Source: Covrig et al., 2016 with adaptation

The first step is to compute premiums$_{(TIC)}$ for each comparable with the modified de-levering formula. In this example, they result to be very close to 30%. The narrow range of premiums$_{(TIC)}$ is consistent with theory and it is due to the calibration process. In the second step the target premium$_{(E)}$ is computed using the modified re-levering formula. The obtained premium$_{(E)}$ in the example is 35.5%. Note that, this value is comprised between the premiums$_{(E)}$ of comparables 2 and 3 as well as the Equity/TIC ratio of the target is comprised between Equity/TIC ratios of comparables. This is a remarkable result because it reflects the theoretical framework in which the acquisition premium is proportional to leverage. In fact, the Equity/TIC ratios are aligned with premiums$_{(E)}$ of comparables and target.

The comparison of method 1 with method 2 highlights the fact that method 1 is based only on the leverage factor and consequently overstate the resulting premium$_{(E)}$. Thanks to the calibration process and the adjustment factor, the modified formulas provide results which are more aligned with theory. Method 2 exploits the benefits of using market data which are known influencing the acquisition premium and not only adjusting it for the effect of leverage.

EMPIRICAL ANALYSIS IN THE EU MARKET

3.1 Introduction

Several studies involving the acquisition premium were listed in the previous chapter[4]. Most of empirical researches had the aim of demonstrating relationships between the acquisition premium, or equivalent forms of premiums, and specific explanatory variables of interest. The importance of premiums for corporate finance researchers and practitioners is due to the fact that *"often there is more money at stake in determining what discounts or premiums are applicable to some business valuations, than there is in arriving at the base value itself"* (Pratt, 2009).

The insight of Meinhart about the computational bias of acquisition premium and the interest of the Appraisal Practice Board to develop a guideline on the measurement of what they call the *"market participant acquisition premium"*, pushed Covrig, McConaughy, and Travers to deeply investigate the issue of premium representation. Their main focus was the analysis of the relationship between the traditional way of expressing premiums and the pre-deal leverage of target companies in the Mergers & Acquisitions market of US. In fact, they argued that if there is a positive relationship between the target leverage and the percentage premium, this proves the overestimation effect of the traditional representation. The proposed solution by the APB is to express the acquisition premium as a ratio based on the total invested capital and not based on the equity value of the target company. Even if the empirical results of Covrig et al. were quite impressive and validate this proposal, this way of expressing premiums in business practice and academic literature is still at the embryonic phase. Furthermore, they tried to develop two methods to adjust the existent data on premiums for the purpose of business valuations. The first one is a simple proportional method, while the second one is a more sophisticated method which imply the use of market data through a so-called calibration process.

The only empirical research in academic literature on the representation of acquisition premium is the study of Covrig et al., so we decided to contribute the academic knowledge through an

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[4] See paragraph 2.2

updated study in the Mergers & Acquisitions market of Eurozone. It is relevant to analyse the representation issue in this market because of the difference between the US and the aggregate EU markets. The next sections analyse and discuss an empirical support to verify the possible presence and the magnitude of the relationship between premium$_{(E)}$[5] and the pre-deal leverage of target company within the Eurozone. The analysis uses many of the explanatory variables found in the academic literature and past empirical researches as control variables to enhance results. Moreover, we try to determine whether alternative measures of premiums, like premiums based on TIC or enterprise value, would be free of this computational bias.

3.2 Hypothesis

Academic literature suggests that leverage has the effect of increasing the dimension of percent premium$_{(E)}$ because of a mere computational distortion. This may be referred as an overestimation effect of the traditional way of expressing premium based on the pre-deal equity value. The existence of this effect can be proved verifying whether, on average, an increase of target pre-deal leverage corresponds to a higher percentage value of premium$_{(E)}$, other things equal.

Another hypothesis we want to verify through our analysis is that expressing premium on TIC value (premium$_{(TIC)}$) or expressing premium on enterprise value (premium$_{(EV)}$) are better ways to represent premium which could allow a greater level of comparability. This is because, they should be less influenced by the pre-deal leverage. The existence of this condition can be proved verifying whether, on average, a variation of pre-deal leverage does not substantially influence the dimension of alternative measures of the premium. Hence, they should be uncorrelated to pre-deal leverage of target company, other things equal.

3.3 Data

3.3.1 Sample and Data source

To verify our hypotheses, we extracted all M&A transactions from the S&P Capital IQ database[6]. Our sample was formed by all completed mergers, acquisitions and acquisitions of

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[5] See subparagraph 2.4.1

[6] S&P Capital IQ developed by McGraw-Hill financial is one of the most reliable and comprehensive financial database available on the market containing detailed information of stocks, transactions, deals and estimates and a leading provider of multi-asset class and real time data, research and analytics.

majority interest, which imply an exchange of control[7]. All transactions were completed between 2000 and 2016. As a matter of data availability, we selected only transactions which involved publicly listed targets at the time of deals. As a geographical restriction, the sample had only targets with headquarters based within the Eurozone[8].

We considered only 100% cash acquisitions as means of payment, as suggested by empirical researches (de La Bruslerie, 2013). We excluded SIC 6 which represents finance, insurance and real estate sectors and limited the observed premium(E) to the range 0% and 300% excluded. In fact, transactions showing a negative or zero premium were not considered relevant for the purpose of the present analysis, while transactions showing a premium greater than 300% were considered outliers. Furthermore, we dropped all companies with negative or zero total invested capital and enterprise value. Based on these selection criteria, we obtained a sample of 1310 observations with complete data.

3.3.2 Variables

Our statistical analysis used the following variables, which were extracted for each observation from the S&P Capital IQ database. In addition, some variables were constructed starting from data of the database.

Dependent Variables:

Premium(E) – Percentage premium computed by comparing the monetary amount of premium to the pre-deal equity value of target company.

= [(MONETARY AMOUNT OF PREMIUM / PRE-DEAL EQUITY VALUE) – 1]

Where, *Monetary Amount of Premium* = Implied Equity Value – Pre-Deal Equity Value.

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[7] In order to filter transactions that involve control transfers, we selected only those transactions in which buyers gained a control position of more than 50% of outstanding shares.

[8] Eurozone: Austria, Belgium, Bulgaria, Channel Islands, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Gibraltar, Greece, Hungary, Iceland, Ireland, Isle of Man, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Monaco, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom

Where, *Implied Equity Value* = Target Market Value of Equity based on the offer price per share times the total reported outstanding shares at the time of transaction.

Where, *Pre-Deal Equity Value* = Target Market Value of Equity based on the price per share 1 month (30 days) prior the announcement date of the transaction times the total outstanding shares.

Premium$_{(EV)}$ = Percentage premium computed by comparing the monetary amount of premium to the pre-deal enterprise value (EV) of target company.

= [(MONETARY AMOUNT OF PREMIUM / PRE-DEAL ENTERPRISE VALUE) – 1]

Where, *Pre-Deal Enterprise Value* = Net Financial Position + Minority Interests + Pre-Deal Equity Value

Where, *Net Financial Position* = Total Debt – Cash & Equivalents. These last two elements and the value of minority interests were extracted from the last available financial statement of the targets before the announcement date.

Premium$_{(TIC)}$ = Percentage premium computed by comparing the monetary amount of premium to the pre-deal total invested capital of target company.

= [(MONETARY AMOUNT OF PREMIUM / PRE-DEAL TOTAL INVESTED CAPITAL) – 1]

Where, *Pre-Deal Total Invested Capital* = Total Debt + Minority Interests + Pre-Deal Equity Value

Independent Continuous Variables:

EQUITYtoTIC = Percentage measure of pre-deal leverage of the target computed as pre-deal equity value to total invested capital

= (PRE-DEAL EQUITY VALUE / PRE-DEAL TOTAL INVESTED CAPITAL)

For the purpose of computing the equitytoTIC ratio we added minority interests to the pre-deal equity value at the book value of last available financial statement. EquitytoTIC is the main independent variable and is used as proxy of financial structure of the target.

EV = Pre-deal enterprise value of target company, as previously defined. Since the Pre-deal EV vary from millions of euro to billions of euro, in the regression analyses we use the logarithm base e of the pre-deal EV. Minority interests where added at the book value like S&P Capital IQ suggests. This variable is used as proxy for stand-alone value of the target.

TIC = Pre-deal total invested capital of target company, as previously defined. Since the Pre-deal TIC vary from millions of euro to billions of euro, in the regression analyses we use the logarithm base e of the pre-deal TIC.

Sales = Amount of sales as reported in the last available financial statement of target company. Since the sales vary from thousands to billions of euro, in the regression analyses we use the logarithm base e of the sales. This variable is used as proxy for size of business.

EBITDA margin = Percentage ratio between the EBITDA and the sales as reported in the last available financial statement of the target. This variable is used as measure of operating profit margin, to approximate the profitability of the target business.

Independent Categorical Variables:

Acquirer - This dummy variable describes type of buyer involved in the transaction. The dummy variable takes value = 0 if the acquirer is a financial buyer or it takes value = 1 if the acquirer is a strategic buyer.

Attitude - These dummy variables describe whether the attitude of the deal was hostile, friendly or at the beginning was friendly and then became hostile.

Country - Each dummy of the countries' list takes value of 1 if the country of the target is the same of the dummy otherwise 0. There were created 33 country dummies since 34 countries were considered. The country segmentation was based on the location of the targets headquarter.

Cross Border - This dummy variable describes whether the transaction involves a buyer and target located in the same country (dummy value = 1) or in different countries (dummy value = 0).

Industry - Each dummy of the industries' list takes value of 1 if the industry of the target is the same of the dummy otherwise 0. There were created 8 industry dummies since 9 sectors were considered. The industry segmentation was based on the primary first two-digit SIC CODE of the target.

Year - These dummy variables describe the year of completion of the transaction. Each dummy of the years' list takes value = 1 if the year of the transaction is the same of the dummy otherwise 0. There were created 16 time dummies because 17 years were considered.

With respect to academic literature we did not include the variable representing potential synergies, because the access to these kind of information as externals is difficult and extremely imprecise. Moreover, in the cited regression analysis[9] this variable has resulted to be statistically insignificant.

Because of the great diversity of regulations of public M&A markets (Herbert Smith Freehills, 2015) and more generally, of different market rules within the Eurozone, we decided to add the country explanatory variable as proxy of these conditions. As literature suggests, we considered also the possibility that the buyer was not based in the same country of the target through the cross border explanatory variable. Another aspect that we improved in our analysis is the introduction of an attitude explanatory variable, meaning the attitude of management toward the transaction.

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[9] See sub-paragraph 2.3.1 – chart 8

3.4 Empirical Analysis

3.4.1 Descriptive Statistics

The main information about the categorical variables of the sample are shown in tables 1-3.

Table 1 – Transactions by Year
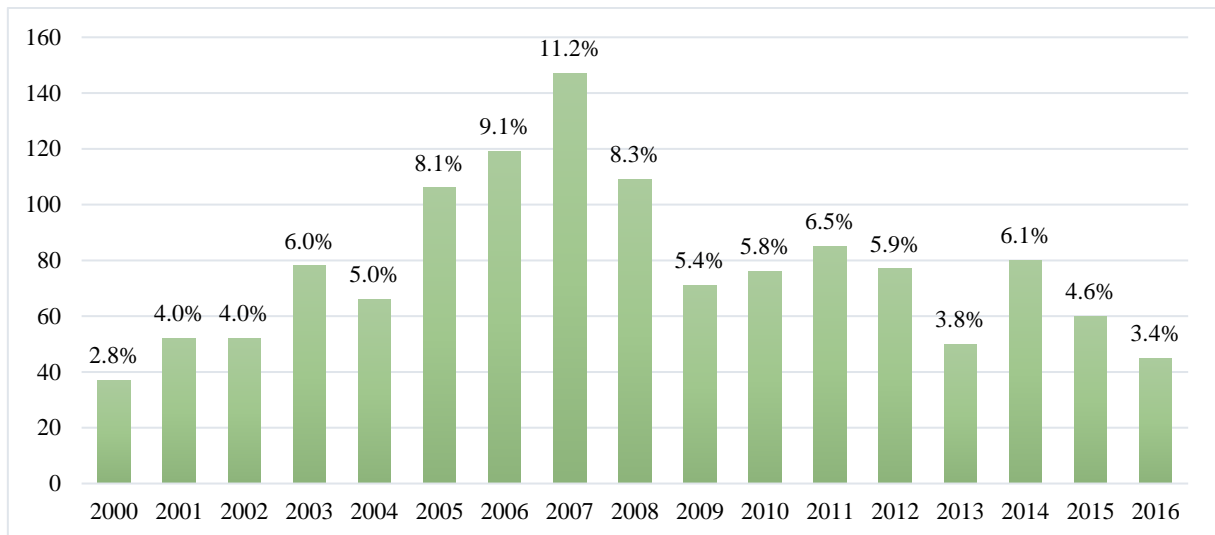
Source: our calculations

The number of transactions by year in the sample and the percentage of deals with respect to the whole sample is represented in table 1. The first half of the table shows an increasing trend until 2007, then an alternate decrease in volume is visible. This change in trend clearly coincide with the financial crisis of 2008 started in the United States and spread all over the globe. Note that, the sample is formed by 58.47% transactions completed before and during 2008 and 41.53% of transactions completed after 2008. To account for this important event, we built a dummy explanatory variable to better specify the regression model.

The spatial localization of deals is shown in table 2. As previously stated, the country variable is used as proxy for market regulation differences. Not surprisingly, the vast majority of targets companies of the sample (41.69%) was based in United Kingdom. In fact, this country has an attractive company law system and the most important financial market within the Eurozone. France (10.52%) and Germany (6.94%) represent respectively the second and the third place of the ranking table.

To improve our analysis, we tried to use the grouping system of the United Nations (2017)[10].

Table 2 - Transactions by Country

Country	Value
United Kingdom	41.76%
France	10.46%
Germany	6.87%
Sweden	5.73%
Netherlands	5.65%
Norway	4.58%
Poland	3.44%
Italy	2.67%
Ireland	2.21%
Switzerland	1.98%
Belgium	1.60%
Spain	1.45%
Denmark	1.45%
Finland	1.37%
Austria	1.22%
Greece	0.84%
Russia	0.76%
Channel Islands	0.76%
Cyprus	0.69%
Slovenia	0.61%
Czech Republic	0.61%
Romania	0.46%
Portugal	0.38%
Luxemburg	0.38%
Hungary	0.38%
Croatia	0.38%
Bulgaria	0.38%
Lithuania	0.31%
Monaco	0.15%
Latvia	0.15%
Ukraine	0.08%
Malta	0.08%
Isle of Man	0.08%
Iceland	0.08%

Source: our calculations

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Eastern Europe	Belarus, Bulgaria, Czechia, Hungary, Poland Republic of Moldova, Romania, Russian Federation, Slovakia, Ukraine
Northern Europe	Channel Islands, Denmark, Estonia, Faeroe Islands, Finland, Guernsey, Iceland, Ireland, Isle of Man, Jersey, Latvia, Lithuania, Norway, Sark, Svalbard and Jan Mayen Islands, Sweden, United Kingdom of Great Britain and Northern Ireland
Southern Europe	Andorra. Bosnia and Herzegovina, Croatia, Gibraltar, Greece, Holy See, Italy, Malta, Montenegro, Portugal, San Marino, Serbia, Slovenia, Spain, The former Yugoslav Republic of Macedonia
Western Europe	Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands, Switzerland

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The percentage distribution of deals by sub-regions in the sample is the following: Northern Europe 58.47%, Western Europe 28.32%, Eastern Europe 6.79%, Southern Europe 6.41%.

The industry classification of targets is another sample feature considered. The segmentation performed was done through the use of the primary Standard Industrial Classification of the acquired companies. The formed groups are based on the first digit of the SIC code excluding the SIC 6 as suggested by literature.

Table 3 – Percentage of Transactions by Industry
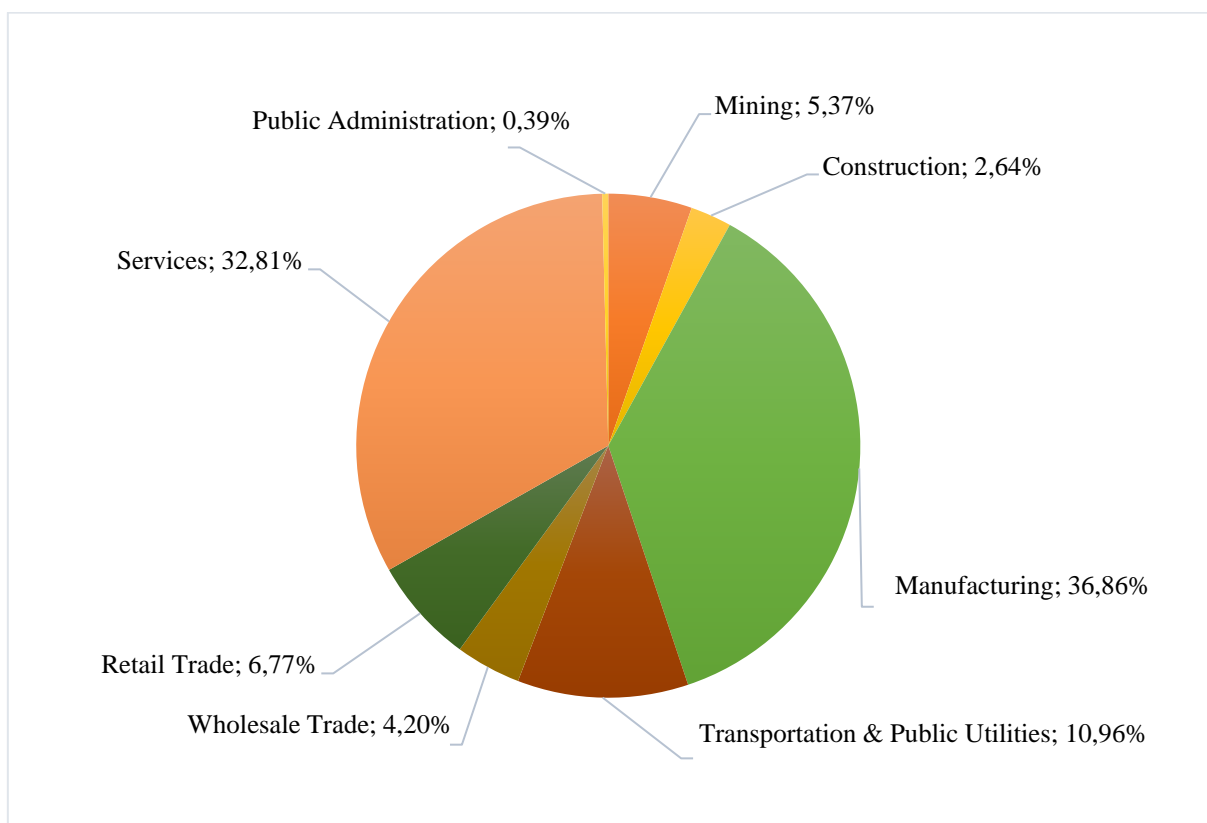
Source: our calculations

In table 3 we can see that main sectors involved are manufacturing with 36.86% and services with 32.81%. Transportation & public utilities represent the third position in ranking while the other categories are residuals.

We conclude the qualitative description describing the attitude of the transaction and the type of acquirer. For what concern the attitude, the vast majority of transactions were classified as friendly 97.48% while only a thin fraction was classified as hostile 1.60% and the smallest one

as friendly to hostile 0.92%. Whereas, with respect to the type of acquirer, 77.89% were defined as strategic buyers and 22.11% as financial buyers.

The main statistical descriptive information on the continues variables of sample are contained in table 4.

Table 4 – Descriptive Data

	Mean	Median	Min	Max	Std	Skewness / Kurtosis
Premium(E) %						2.61 /
	39.80	30.01	0.00	289.35	37.82	12.94
Premium(EV) %						5.53 /
	40.26	26.38	0.00	679.22	57.40	47.16
Premium(TIC) %						2.64 /
	30.05	22.55	0.00	235.13	29.13	13.69
Sales (€mln)						7.20 /
	558.83	106.74	0.00	22270.80	1566.59	73.78
EV (€mln)						14.29 /
	698.14	109.61	0.05	65887.06	2603.74	313.85
TIC (€mln)						13.45 /
	758.15	126.49	0.30	66891.06	2716.04	282.97
EBITDA margin %						-2.93 /
	10.90	10.27	-182.32	107.49	22.31	26.48
Equity to TIC %						-1.00 /
	79.08	84.61	5.58	100.00	21.01	3.31

Source: our calculations

It shows the three different ways of representing premium. Premium(E) is the traditional representation method and has a median value of 30.01%, premium(EV) and premium(TIC) respectively show medians of 26.38% and 22.55%. This decreasing trend is in line with our expectations because the relations among Equity value, Enterprise value (EV) and Total Invest Capital (TIC). It is important to notice that the same trend is not visible with respect to mean values. In particular, Premium (EV) has a mean of 40.26%. This is due to the fact that median indexes are less subject to extreme values of distributions while arithmetic mean values do not. It worth noting that premium(E) and premium(TIC) vary from little more than 0 to little less than 300, this because of the selection of this range was done on premium(E) at the sample level. Given the way in which TIC was built, as the sum of equity value, minority interests and total debt amount, we conclude that TIC is always greater or equal to the equity value. This is important because it is reflected in the property that premium(E) is always greater or equal to premium(TIC). All this reasoning is not valid for enterprise value because it is the sum of equity value and net financial position (NFP). The NFP assumes positive values when debt is greater

than cash & equivalents but in extreme cases it assumes negative values. When NFP is negative the premium$_{(EV)}$ resulted to be greater than premium$_{(EV)}$. In our sample, 17 observations showed a negative NFP.

From a theoretical point of view, TIC and EV represent the same thing, namely the company stand-alone value. It is usual in finance to prefer the enterprise value as measure. TIC is always greater than EV by definition and the range of values in the sample vary for both measures from less than 1 million to around 65 billions of Euro[11].

The pre-deal equity to TIC ratio vary from 5.58%, which represents a transaction involving a highly-levered company, to 100% which represents an unlevered company. However, the mean and median values show that on average, target companies have a low level of debt.

3.4.2 Correlation Matrix and Statistical Analyses

As preliminary way to understand the relationships and influences among different ways of expressing premium and each specific explanatory variables at the aggregate sample level, we used a simple correlation matrix. This matrix is reported in table 5. It contains all three dependent variables and the continuous explanatory variables. Within the matrix are shown all the correlation values among variables.

All three ways to represent premiums are weakly negative correlated with Sales, EV, TIC and EBITDA margin. With reference to equity to TIC, its correlation with premium$_{(E)}$ is negative as expected from theory. Whereas, the correlation between equity to TIC and premium$_{(EV)}$ is positive and even more positive is the correlation between it and premium$_{(TIC)}$.

An important aspect to highlight is the very strong positive correlation between EV and TIC. It suggests a possible multicollinearity problem between these two variables. The same is true for their logarithms. As a consequence, they could not be used together in the same regression model.

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[11] All monetary quantities were converted from the transaction currency to euro at the date of transactions

Table 5 – Correlation Matrix

	Premium (E)	Premium (EV)	Premium (TIC)	Sales	EV	TIC	EBITDA margin	EQUITY to TIC
Premium (E)	1							
Premium (EV)	0.6146	1						
Premium (TIC)	0.8429	0.7501	1					
Sales	-0.0529	-0.0816	-0.0906	1				
EV	-0.0807	-0.0869	-0.0962	0.6453	1			
TIC	-0.0814	-0.086	-0.0976	0.6576	0.9988	1		
EBITDA margin	-0.1446	-0.1807	-0.1854	0.0381	0.1539	0.1547	1	
EQUITY to TIC	-0.1349	0.2062	0.2387	-0.1317	-0.0914	-0.0927	-0.1103	1

Source: our calculations

As further tools of analysis we used tables 6 and 7. Both these tables are built following academic literature. The first step of the building procedure is to sort all the observations with respect to a selected meaningful variable of interest. Once the observations are sorted in ascending order, the second step is to segment all the variables of the sample in 5 classes with the same number of observations each one. The last step is to compute a position index for each class, like the median, to understand how the variables vary with respect to the variable selected as ordering criteria. We introduced also the percentage variation (Δ%) among classes to help the reader to better visualize trends[12].

Table 6 – Descriptive Data: Medians of classes sorted by Sales

	Class 1 (smallest)	Class 2	Class 3	Class 4	Class 5 (largest)
Premium (E) %	34.71	30.43	30.77	29.35	25.86
Δ%		-14.05%	1.10%	-4.85%	-13.50%
Premium (EV) %	35.68	27.12	26.13	24.53	21.16
Δ%		-31.55%	-3.82%	-6.53%	-15.91%
Premium (TIC) %	28.42	23.11	22.53	21.14	18.72
Δ%		-22.96%	-2.56%	-6.59%	-12.90%
Sales (€mln)	14.52	46.91	106.74	269.55	1,272.80
Δ%		69.04%	56.05%	60.40%	78.82%
EV (€mln)	17.57	47.25	107.61	205.48	1,175.59
Δ%		62.82%	56.09%	47.63%	82.52%
TIC (€mln)	22.67	54.11	124.62	241.39	1,289.71
Δ%		58.11%	56.58%	48.37%	81.28%
EBITDA margin %	7.95	10.61	11.18	11.45	10.02
Δ%		25.09%	5.07%	2.43%	-14.26%
Equity to TIC %	96.61	90.56	83.10	80.19	75.61
Δ%		-6.68%	-8.99%	-3.62%	-6.06%

Source: our calculations

Table 6 applies this analysis technique to the sample with respect to sales variable. This variable is considered to be a proxy of target business size. In this table, class 1 contains all the observations with the smallest values of sales, whereas class 5 contains all the observations with the largest values of sales. It can be observed that all three measures of premium decrease as the target business size increases. Hence, buyers pay a smaller percentage premium for bigger targets than for smaller ones. As expected EV and TIC increase with sales. This is logic since big businesses usually need a big amount of resources and have a higher value. The same increasing trend is visible for EBITDA margin. However, class 4 shows a slight stabilization of the margin which precedes a decrease of 14.26% in class 5 . As result, the sample data analysis

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[12] Red figures indicate a negative percentage variation

show that middle businesses are the most profitable. The main explanatory variable for the purpose of our analysis, namely the pre-deal leverage expressed as equity to TIC ratio, shows an intense decrease. It means that as sales increase, hence businesses become bigger, companies use more debt to finance their operations.

Table 7 - Descriptive Data: Medians of classes sorted by EQUITY to TIC

	Class 1 (smallest)	Class 2	Class 3	Class 4	Class 5 (largest)
Premium (E) %	34.03	29.54	27.38	27.90	30.86
Δ%		-15.18%	-7.90%	1.88%	9.59%
Premium (EV) %	15.67	22.69	25.74	30.77	38.17
Δ%		30.93%	11.85%	16.35%	19.38%
Premium (TIC) %	14.46	20.00	22.74	26.68	30.72
Δ%		27.72%	12.05%	14.77%	13.15%
Sales (€mln)	183.07	165.88	150.88	76.68	46.59
Δ%		-10.36%	-9.95%	-96.77%	-64.58%
EV (€mln)	162.73	193.96	180.06	80.11	47.34
Δ%		16.10%	-7.72%	-124.77%	-69.22%
TIC (€mln)	180.34	214.90	205.32	107.22	57.85
Δ%		16.08%	-4.66%	-91.50%	-85.34%
EBITDA margin %	10.00	10.33	11.73	9.95	9.47
Δ%		3.17%	11.96%	-17.88%	-5.10%
Equity to TIC %	48.67	70.62	84.61	96.05	100.00
Δ%		31.08%	16.54%	11.91%	3.95%

Source: our calculations

Table 7 uses as sorting criteria the equity to TIC ratio, the explanatory variable we are the most interested in. As the previous table, class 1 contains companies with the smallest values of equity to TIC ratio, so it is formed by the most leveraged targets. Whereas class 5 contains companies with the largest values of equity to TIC ratio, so it is formed by the least leveraged targets. Companies in class 1 have a leverage median of 48.67%, while companies in class 5 have a leverage median of 100% (no-debt financing).

The first thing to notice is the trend of premium(E). For the first three classes, which are related to a leverage decrease, corresponds a decrease of the percentage premium(E) as expected by theory. However, this trend is reversed in the last two classes. This change in trends was not expected from theory nor from the previous correlation matrix. With respect to premium(EV) and premium(TIC), both of them show a strong increase as long as leverage decrease. The variables EV and TIC slightly increase for the first two classes but they collapse in the last three classes for low leveraged targets. The only constant decreasing trend is shown by sales.

Given the not clear trends of table 7, in particular with respect to premium(E), we decided to deeply investigate the relationship between premium and leverage with a multivariate regression analysis controlling for several factors which can influence the premium.

3.4.3 Multivariate Regression Analysis

To better investigate the influence and magnitude of each explanatory variable on premium(E), and in particular the relationship between premium(E) and pre-deal leverage, we developed a multivariate regression analysis and table 8 shows the results of various regression models.

Table 8 – Multivariate Regression Analysis with robust se

Regression of Premium (E)								
	1st	2nd	3rd	4th	5th	6th	7th	8th
Constant	0.517	0.546	0.543	0.836	0.814	0.828	0.740	0.798
t-statistic	15.35	16.09	16.07	11.12	6.42	6.46	5.51	9.46
$Log_e(SALES)$	- 0.057	0.078	0.071	0.049	0.083	0.082	0.089	0.070
t-statistic	- 4.03	3.26	2.93	2.12	2.96	2.96	3.11	2.86
$Log_e(EV)$		- 0.151	- 0.136	- 0.133	- 0.166	- 0.160	- 0.163	- 0.159
t-statistic		- 6.60	- 5.63	-5.57	- 5.96	- 5.76	- 5.58	- 6.08
EBITDA margin			- 0.140	- 0.163	- 0.144	- 0.150	- 0.148	- 0.150
t-statistic			- 2.41	- 2.75	- 2.28	- 2.38	- 2.36	-2.56
EQUITY to TIC				- 0.317	- 0.354	- 0.352	- 0.348	- 0.332
t-statistic				- 4.47	- 4.45	- 4.43	- 4.42	- 4.35
Acquirer					0.099	0.097	0.097	0.095
Dummy = strategic					4.20	4.14	4.01	4.16
Cross Border					0.077	0.075	0.075	0.074
Dummy = yes					3.60	3.50	3.50	3.43
Attitude					YES	YES	YES	
Dummy								
Industry					YES	YES	YES	
Dummy								
Sub-regions					YES	YES	YES	
Dummy								
Time-Crisis						- 0.066		- 0.075
Dummy = before						- 3.06		- 3.45
Year							YES	
Dummy								
BIC	1136	1091	1090	1056	1044	1041	1122	990

Source: our calculations

We started adding $\log_e$(Sales), $\log_e$(EV) and EBITDA margin sequentially in the first three regressions. In the 4th regression, the equity to TIC variable is finally added. It is important to say that we decide to use the natural logarithm of sales and EV because of the scale of these variables which was millions of euro. Furthermore, we inserted only the enterprise value and not the TIC because of multicollinearity. The choice of EV was based on two reasons: the first one is that EV should be more representative of the stand-alone value of the target and the second is that after various statistical attempts EV better fits the regression models.

Since the very first regression, we performed for each one the test for heteroskedasticity. The test results confirmed the presence of heteroskedastic errors, then we applied the robust option in the statistical software and computed the robust standard errors to get reliable significance t-statistics.

As we can see from the table, the coefficient of $\log_e$(Sales) shows in the first model a negative relation, but adding the other independent variables it changes sign and the coefficient becomes positive, which is in contrast with the results of the correlation matrix and table 6. Hence, more complete regressions suggest that, bigger businesses receive slightly higher premiums(E) everything else constant. However, $\log_e$(EV), EBITDA margin and equity to TIC confirm the negative relation with the dependent variable as was found by the correlation analysis but not clearly visible in table 7. Regression 5 integrates the previous models with the explanatory categorical variables specified as dummies. Not relevant changes were seen in the previous coefficients and all of them remain statistically significant. The 6th and 7th regressions were simply a comparison to decide how to insert the time dummies variables. The division of observations in before and after financial crisis was a better variable to complete the model and we preferred it.

The 6th regression resulted to be the most complete model and correctly specified. The equation of this complete model is the following:

$$Premium_{(E)} = \beta_0 + \beta_1 \cdot \log_e(Sales) + \beta_2 \cdot \log_e(EV) + \beta_3 \cdot EBITDA\ margin + \beta_4 \cdot EquitytoTIC$$
$$+ \beta_5 \cdot Acquirer + \beta_6 \cdot Cross\ Border + \beta_7 \cdot Time\_Crisis + \beta_k \cdot Attitude_k$$
$$+ \beta_j \cdot Industry_j + \beta_i \cdot Sub\_regions_i + \varepsilon$$

Although the 6th model was the most complete and it uses all the variables we extracted from the database, applying the bayesian information criterion (BIC) we found a value of 1041. To

find a model with a better specification level, we built the 8th regression which have a BIC of 990, the smallest value of BIC among our models. We preferred using BIC as a comparison index because of the presence of heteroskedasticity which did not allow the use of the adj-R^2. The equation of the 8th model is the following:

$$Premium_{(E)} = \beta_0 + \beta_1 \cdot \log_e(Sales) + \beta_2 \cdot \log_e(EV) + \beta_3 \cdot EBITDA\ margin + \beta_4 \cdot EquitytoTIC$$
$$+ \beta_5 \cdot Acquirer + \beta_6 \cdot Cross\ Border + \beta_7 \cdot Time\_Crisis + \varepsilon$$

Although model 6th and 8th substantially differ in variables contained, the results found are quite the same. All the coefficients are statistically significant in both models, showing the same relationships and the same magnitude of marginal effects among the dependent variable and the explanatory variables. This result was expected by previous analyses with the only exception of sales effects.

It worth noting that the acquirer dummy is positive related with premium(E), meaning that strategic acquires pay a higher percentage premium with respect to financial buyers. This is to be expected by theory (Malenko & Gorbenko, 2014). Another result, which coincides with the empirical analysis of Dombret et al. (2008), is the positive effect of a cross border transaction on the premium(E). The coefficient suggests that foreign buyers pay higher premiums with respect to buyers within the same country. Moreover, being the coefficient of time-crisis variable negative, we can conclude that, on average, transactions happened before the financial crisis registered a lower premium(E).

However, for the purpose of our study, the most important result is the negative strong influence of the equity to TIC ratio toward premium(E). Hence, the greater the pre-deal leverage of the target the higher the premium(E). Therefore, the acquisition premium expressed as a percentage based on pre-deal equity value suffers an overestimation effect caused by per-deal leverage of the target company. Our result coincides with the results of Covrig et al. which validate our first hypothesis.

3.6 Analyses of Premium(TIC) and Premium(EV)

Once the relationship between pre-deal leverage and premium(E) has been verified, we analysed the representation suggested by the APB. They suggest to express the premium based on total invested capital of the target company. As a further attempt to better express the premium, we

conducted also the same analysis on the premium expressed in relation with the enterprise value.

We essentially obtained the exact same measures that Covrig et al. compute through the use of their first adjustment method, namely the de-levering and re-levering method. Specifically, we obtained the measures of premium after the first de-levering phase of method 1[13].

From the theoretical framework, our expectation is to find that as the pre-deal leverage of the target company change, this would not significantly influence the dimension of premium(TIC) or the premium(EV). Hence, the marginal effect of the equity to TIC on these representations of premium variable should be close to zero.

The previous correlation matrix shows that both these alternative measures are strongly positively correlated with equity to TIC at the aggregate sample level. Even the analysis performed by table 6 shows the same results. In fact, median values of premium(TIC) and premium(EV) rise substantially as long as the equity to TIC increase.

After these rough results, we applied the 8th regression model used to investigate premium(E). This regression analysis allows to clean from influences of other factors the alternative measures of premium. Given the presence of heteroscedastic errors we compute as in previous regressions the robust standard errors to obtain meaningful t-statistics. Table 9 shows the results.

Table 9 – Multivariate Regression Analysis

	Regression of Premium(TIC)		Regression of Premium(EV)	
	coefficient	t-statistic	coefficient	t-statistic
Constant	0.191	4.81	0.324	4.07
Log$_e$(SALES)	0.047	2.41	0.242	4.13
Log$_e$(EV)	- 0.114	- 5.59	- 0.399	- 5.49
EBITDA margin	- 0.119	- 2.23	- 0.144	- 1.43
EQUITY to TIC	0.266	8.45	0.450	7.65
Acquirer	0.083	5.54	0.115	4.00
Cross Border	0.047	3.09	0.082	2.98
Time-Crisis	- 0.057	- 3.55	- 0.109	- 3.74
BIC	294		1885	

Source: our calculations

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[13] See sub-paragraph 2.4.1

All the coefficients are statistically significant, with the only exception of EBITDA margin for premium$_{(EV)}$. Looking at the coefficients of equity to TIC for both regressions we see a strong positive relationship. It means that these alternative ways of measuring premium vary substantially as long as the leverage increase or decrease, other things equal. Hence, they are not uncorrelated with pre-deal leverage of target companies.

We empirically proved that this simple proportional way of adjusting the premium for leverage has an important shortcoming as suggested by a theoretical example provided by Covrig et al.. Simply expressing premiums based on pre-deal values of TIC or EV systematically generates percentage premium values, which are related with the pre-deal leverage. As suggested by literature this is due to an excess of sensitivity of the computation method based on changes in leverage and which does not take into account the other factors.

3.7 Summary of Results

From our empirical analysis, we proved the existence of the relationship between premium$_{(E)}$ and the pre-deal leverage of the target company in the EU market. This allow us to accept our first hypothesis, namely the existence of an overestimation effect due to the way by which acquisition premiums are usually expressed by professionals and academics. Hence, our results confirm the intuition of Meinhart and it is coherent with the results found by Covrig et al. in their study on US market.

Another important result of our empirical analysis is the rejection of the second hypothesis. In particular, neither premium$_{(TIC)}$ nor premium$_{(EV)}$ resulted to be uncorrelated to the pre-deal leverage of the target. Both of them show a strong negative relationship with leverage. It means that as long as leverage increase these percentage measures of premium decrease. This effect suggests an underestimation effect due to these alternative ways of expressing the acquisition premiums.

It worth noting that side results of our study confirm well known academic researches on acquisition premium. In particular, our results confirm that strategic acquirers pay higher premiums with respect to financial buyer, cross border transactions register higher premiums with respect to domestic transactions and that after the financial crisis of 2008 premiums are higher.

An important remark should be made about possible improvements on our study. One of the most crucial step of our empirical analysis is the selection of premium$_{(E)}$. As we have seen in

the previous chapter 2 there are different ways to compute this important measure from a time frame point of view. In our study, we applied a fixed time frame of 30 days before the announcement of the transaction as S&P Capital IQ and other studies suggested. However, the use of the FactSet Mergerstat®/BVR Control Premium Study could significantly enhance the reliability of premiums. This database has the advantage of carefully analyse each transaction and select the appropriate pre-deal equity value not influenced by the leakage effect. While in our case, premium$_{(E)}$ could not be leakage-free.

THE CALIBRATION METHOD IN THE EU MARKET

4.1 Introduction

As already said in chapter 3, the premium paid by the acquirer is a relevant part of the total consideration paid. This premium has the aim of pushing the current owner to sell its shares.

In business valuation practice, the comparable transaction method is one of the most common way to understand which should be the monetary amount of premium to pay for the target company. This method is composed by two steps. In the first step, a set of comparable transactions is selected following different criteria like size, industry and profitability of target companies. The percentage acquisition premium paid by acquirers is computed for each transaction. The first step ends with the computation of the average premium$_{(E)}$ of these acquisition premiums. In the second step, this average value is multiplied by the stand-alone value of target equity, so obtaining the monetary amount of value which should be paid as acquisition premium.

Given the results of our study, this method has an important shortfall. The use of premium$_{(E)}$ to compute the average premium may not be correct. In case of comparable transactions which involve targets with different levels of pre-deal leverage the use premium$_{(E)}$ may cause distortions in the computation of the monetary amount of premium (Covrig, et al., 2016).

To fix this shortfall, Covrig et al. suggests two methods to adjust the acquisition premium observed in comparable transactions. The first one is a simple proportional method. It simply substitutes the denominator of premium$_{(E)}$ with the TIC value or EV value. However, given the results of empirical analyses on premium$_{(TIC)}$ and premium$_{(EV)}$, we conclude that the first method tends to understate the acquisition premium and probably generate a too wide range of average values to be used in the second step of the process.

Because of these flaws, they developed the second method, which we referred as "Calibration method". This second method uses market data and modified versions of de-levering and re-levering formulas. In the next sections, we tried to adapt this method for Eurozone, so we replicated the calibration process to extract an adjustment factor from the EU market data and applied it to modified formulas. As last point, we built a re-levering sensitivity matrix which may be a useful tool for business analysts. This matrix contains measures of re-levered

premium$_{(E)}$ depending on average de-levered premium$_{(TIC)}$ of comparables and pre-deal leverage of target company.

4.2 Computation of the Adjustment Factor

The second adjustment method takes advantage of the two de-levering and re-levering formulas which are respectively used in the first and second part of the adjustment process of the first method.

De-levering formula:

$$Premium_{(TIC)} = Premium_{(E)} \times \left(\frac{Equity}{TIC}\right)$$

Re-levering formula:

$$Target\ Premium_{(E)} = Premium_{(TIC)} \times \left(\frac{Average\ TIC}{Equity}\right)$$

As was shown in the previous chapter, expressing acquisition premiums based on the TIC or EV value of target company understate the values of percentage premiums. Hence, these formulas systematically overstate the effect of leverage on the computation of premium$_{(TIC)}$ reducing their values.

The equity to TIC ratio represents pre-deal leverage in the two formulas. From a mathematical point of view, the equity to TIC ratio can vary from 0 to 1. An equity to TIC ratio equal to 0 represents a situation in which the company is completely financed by debt. An equity to TIC equal to 1 represents a situation in which the company is completely finance by shareholder funds. Considering the way by which formulas are built, premium$_{(TIC)}$ is always lower than premium$_{(E)}$ by the effect of the leverage factor.

To reduce the effect of pre-deal leverage we modify the influence of equitytoTIC component in the formulas. The solution adopted is to lower the influence of equity to TIC ratio through the use of an adjustment factor. Precisely, we substitute the equity to TIC ratio with the following formula.

$$\left(\frac{Equity}{TIC}\right) = 1 - \left(100\% - \frac{Equity}{TIC}\right) \times Adjustment\ Factor$$

To obtain the result of decreasing the effect of equity to TIC ratio component, the adjustment factor has to assume values comprised between 0 and 1. We then substitute this expression into the previous formulas, obtaining two modified versions of the de-levering and re-levering formulas.

Modified De-levering formula with the adjustment factor

$$Premium_{(TIC)} = Premium_{(E)} \times \left[1 - \left(100\% - \frac{Equity}{TIC}\right) \times Adjustment\ Factor\right]$$

Modified Re-levering formula with the adjustment factor

$$Target\ Premium_{(E)} = \frac{Average\ Premium_{(TIC)}}{\left[1 - \left(100\% - \frac{Equity}{TIC}\right) \times Adjustment\ Factor\right]}$$

Once the formulas are built, we extract the adjustment factor using the calibration process. The first step of this process is to select the appropriate regression model to compute the expected premium(E) under different leverage conditions and using average values of the previous sample. We decided to use a slightly different version of the 4th regression model of previous chapter. The model is below illustrated.

$$Premium_{(E)} = \beta_0 + \beta_1 \cdot \log_e(Sales) + \beta_2 \cdot \log_e(EV) + \beta_3 \cdot EBITDA\ margin + \beta_4 \cdot EquitytoTIC$$
$$+ \beta_7 \cdot Time\_Crisis + \varepsilon$$

We decide to use all the statistically significant continues variables and the time_crisis dummy, because of the will of computing an adjustment factor from transactions which occurred after the financial crisis. Too far transactions could be misleading since their acquisition premiums resulted to be systematically lower than recent transactions.

Table 10 – Adjustment Factor Calibration and Comparison between Methods

|	Regression coefficients	Average Values of Independent Variables																				
Constant	0.867																					
Log$_e$ (Sales)	0.053	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
Log$_e$ (EV)	-0.130	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.84
EBITDA margin	-0.169	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Time-crisis	-0.081	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EquitytoTIC (%)	-0.313	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5	0
Expected premium$_{(E)}$ (%)		31	33	34	36	37	39	41	42	44	45	47	48	50	51	53	55	56	58	59	61	
Expected premium$_{(TIC)}$ (%) using the de-leverling formula (11° method)		31	31	31	31	30	30	29	28	27	26	25	23	22	20	18	16	14	11	9	6	3
Adjustment Factor	0.57																					
Expected premium$_{(TIC)}$ (%) using the modified de-leverling formula (2° method)		31	32	32	33	33	33	34	34	34	34	33	33	32	32	31	31	30	30	29	28	

Source: our calculations

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After the estimation of the regression coefficients, we computed different expected premiums(E) as long as the pre-deal leverage variable varies and keeping fixed the other variables at average values of the sample.

At this point, to compute the adjustment factor we applied the de-levering formula for each dimension of leverage. We fixed a random adjustment factor and we computed for each equation the distance among premium obtained and the premium(E) with equity to TIC equal to 100% (unlevered company). Finally, we chose the adjustment factor which minimizes the square distances between obtained premiums and the unlevered premium(E).

Given EU market data and an expected premium(E) equal to 31.15% at a 100% of equity to TIC we derived an adjustment factor which minimizes the square distances of 0.57. Table 10 reports all data relative to calibration and the two methods applied.

To better explain the effects of applying the two different methods, we graphically illustrate the data of table 10 in table 11.

Table 11 – Acquisition Premiums
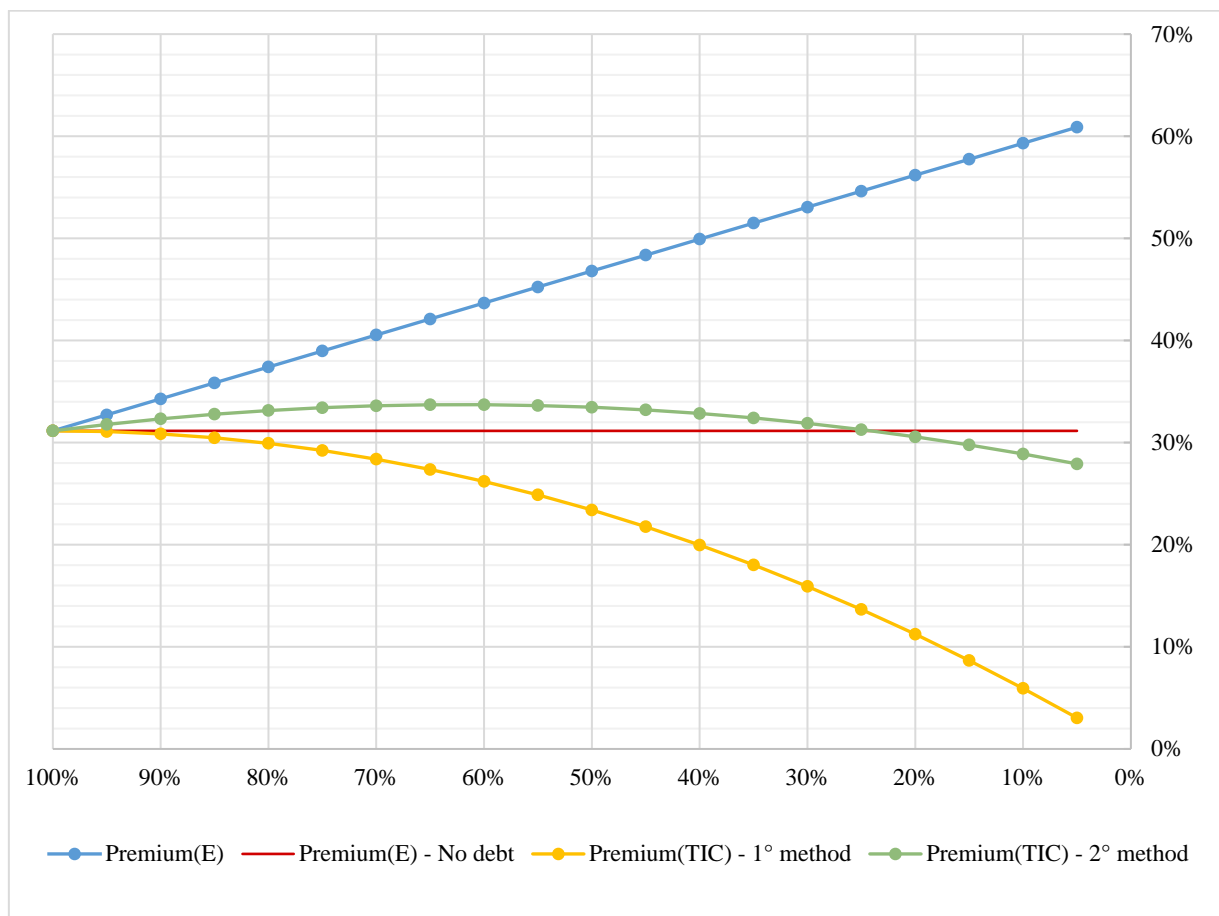
Source: our elaboration

The above table reports the outcomes of the forecasting process using the regression model, de-levered premium(TIC) using the 1° method and de-levered premium(TIC) using the 2° method with EU market data. On the horizontal axis, we have the equity to TIC independent variable varying from 100% (no debt financing) to 0% (full debt financing). While on the vertical axis are shown the values of premiums as dependent variables. The red line is the benchmark of reference at a value of 31.75%.

The blue line represents all the expected premiums(E) obtained by the regression model. We notice the increasing trend of the expected premium(E) given the increase of leverage.

The yellow line and the green line are respectively the application of 1° method and 2° method. In particular, the yellow line show premiums(TIC) computed using the simple de-levering formula. A clear decreasing trend is visible. This is the underestimation effect previously shown from our statistical analysis. Another flaw of the first method is the wide range of premium(TIC). In fact, it varies from 31.75 at 100% Equity to TIC to a 11.24% at 20% of Equity to TIC.

The green line show premiums(TIC) computed using the modified de-levering formula with an adjustment factor of 0.57. It first increases until 60% of equity to TIC and after it decreases. This second method has the advantage that values generated are around the expected premium(E) of an unlevered company (red line). This is an advantage given the hypothesis that pre-deal leverage must not influence the premium. Moreover, this method generates a narrower range of premiums(TIC). It varies from 33.71% at 60% of equity to TIC to 30.57% at 20% of equity to TIC.

Another important point to highlight is that the adjustment factor computed for US market is equal to 0.50 and the adjustment factor for EU market equal to 0.57. A higher adjustment factor means that the influence of leverage is lower. Further, we have to remark that their adjustment factor was computed starting from data which include older transactions from 2003 to 2013, while our regression excludes transactions which occurred before the financial crisis.

4.3 Sensitivity Matrix

Once the average value of premiums(TIC) have been computed, the second step of the process implies that this percentage value is multiplied by the target equitytoTIC ratio. This operation gives as outcome the re-levered percentage premium(E), which can be finally used to compute the monetary amount of the acquisition premium. This quantity will be added to the target stand-alone value and give an idea of the possible consideration which should be paid.

Table 12 – Sensitivity Matrix

Target EQUITYtoTIC value (%)

Average of Comparables Premium$_{(TIC)}$ (%)	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5
0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.5	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	5	5	5	5
5.0	5	5	5	5	6	6	6	6	6	7	7	7	8	8	8	9	9	10	10	11
7.5	8	8	8	8	8	9	9	9	10	10	10	11	11	12	12	13	14	15	15	16
10.0	10	10	11	11	11	12	12	12	13	13	14	15	15	16	17	17	18	19	21	22
12.5	13	13	13	14	14	15	15	16	16	17	17	18	19	20	21	22	23	24	26	27
15.0	15	15	16	16	17	17	18	19	19	20	21	22	23	24	25	26	28	29	31	33
17.5	18	18	19	19	20	20	21	22	23	24	24	25	27	28	29	31	32	34	36	38
20.0	20	21	21	22	23	23	24	25	26	27	28	29	30	32	33	35	37	39	41	44
22.5	23	23	24	25	25	26	27	28	29	30	31	33	34	36	37	39	41	44	46	49
25.0	25	26	27	27	28	29	30	31	32	34	35	36	38	40	42	44	46	48	51	55
27.5	28	28	29	30	31	32	33	34	36	37	38	40	42	44	46	48	51	53	56	60
30.0	30	31	32	33	34	35	36	37	39	40	42	44	46	48	50	52	55	58	62	65
32.5	33	33	34	36	37	38	39	41	42	44	45	47	49	52	54	57	60	63	67	71
35.0	35	36	37	38	40	41	42	44	45	47	49	51	53	56	58	61	64	68	72	76
37.5	38	39	40	41	42	44	45	47	49	50	52	55	57	60	62	66	69	73	77	82
40.0	40	41	42	44	45	47	48	50	52	54	56	58	61	64	67	70	74	78	82	87
42.5	43	44	45	46	48	50	51	53	55	57	59	62	65	68	71	74	78	82	87	93
45.0	45	46	48	49	51	52	54	56	58	61	63	66	68	71	75	79	83	87	92	98
47.5	48	49	50	52	54	55	57	59	62	64	66	69	72	75	79	83	87	92	98	104
50.0	50	51	53	55	56	58	60	62	65	67	70	73	76	79	83	87	92	97	103	109
60.0	60	62	64	66	68	70	72	75	78	81	84	87	91	95	100	105	110	116	123	131
70.0	70	72	74	77	79	82	84	87	91	94	98	102	106	111	116	122	129	136	144	153
80.0	80	82	85	87	90	93	97	100	104	108	112	117	122	127	133	140	147	155	164	174
90.0	90	93	95	98	102	105	109	112	117	121	126	131	137	143	150	157	165	175	185	196
100	100	103	106	109	113	117	121	125	130	134	140	146	152	159	166	175	184	194	205	218
125	125	129	133	137	141	146	151	156	162	168	175	182	190	199	208	218	230	242	257	273
150	150	154	159	164	169	175	181	187	194	202	210	218	228	238	250	262	276	291	308	327
175	175	180	186	191	198	204	211	219	227	235	245	255	266	278	291	306	322	339	359	382
200	200	206	212	219	226	233	241	250	259	269	280	291	304	318	333	349	368	388	411	436

Source: our elaboration

Table 12 illustrates a sensitivity matrix of the modified re-levering step. On the first left column, the average possible values of comparables premium$_{(TIC)}$ are listed in ascending order; while on the first row, the possible target equity to TIC values are listed from a no debt value (100) to a highly debt value (5). The values inside the matrix are all the possible combinations of re-levered premium$_{(E)}$ using the modified formula with the EU adjustment factor of 0.57.

This can be a useful reasoning tool for analysts who wants to figure out the influence of these two components on the outcome. First of all, keeping fixed the target equity to TIC ratio, we see that the increase of re-levered premium$_{(E)}$ is proportional to the increase of average comparables premium$_{(TIC)}$. Whereas, keeping fixed the average comparables premium$_{(TIC)}$ we see that premium$_{(E)}$ has an exponential trend.

The re-levering step is fundamental to complete the process and correctly represent the target premium$_{(E)}$. Hence, the whole calibration method allows analyst to computed target premium$_{(E)}$ not influenced by the pre-deal leverage.

CONCLUSION

The theoretical framework is exhaustive and specific. The common way of expressing the acquisition premium overstates its measure because of a computational bias. Hence, using this traditional representation does not allow an effective comparison among transactions which shows different target capital structures.

Despite the possible improvements, the empirical analysis performed proved the existence of the relationship between pre-deal leverage and the acquisition premium expressed as percentage based on the equity value. Our results support the intuition of Meinhart, validate the conclusion of the Appraisal Practice Board and confirm the results of Covrig et al.

Alternative ways of expressing premium resulted to be inappropriate since they are related with the target capital structure. However, the calibration method adapted to the EU M&A market seems to be a suitable tool to adjust past acquisition premiums for the purpose of business valuation.

All these conclusions are useful insights for academics and professionals of M&A market which could allow them to improve their valuations and remove a systemic bias in figuring out the possible acquisition premium that should be paid. We want to remark that the final price paid in an M&A transaction is always the result of an intense process and influenced by bargaining power of different counterparties.

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