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Merger & Acquisition:

an analysis of main factors and Covid 19 effects on takeover premium

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Abstract

The thesis has the object of introducing the reader to the market of firms through a synthesis of the main literature and a statistical analysis on the factors which influence the market premium in a M&A operation. The literature on this subject is very large and includes many factors in the ones affecting the takeover premium. The factors listed range from the type of operations to the relative size of the actors and many others. In the thesis many of these factors will be considered and the degree with which they influence the takeover premium will be evaluated. Moreover, the effects of Covid 19 pandemic are analyzed to understand whether it has a significant influence on the M&A premium.

In order to deliver what said before, an empirical analysis on a M&A operations sample is presented to refute or confirm the main literature on takeover premium affecting factors. The mentioned empirical analysis consists in a multi-factor regression which will highlight the most significant variables affecting the takeover premium. The multi-factor regression is a statistic model based on a dependent factor and multiple independent ones, also called explanatory variables. The model is used to predict the behavior of the dependent variable through the values of the independent variables and their coefficients. The experimental error of the model is represented by the so-called residuals. During the analysis, the Covid 19 outbreak effects will be taken into consideration by looking both to operations occurred before and during the pandemic.

Finally, the conclusions from the empirical analysis indicate that the significative factors influencing the takeover premium are the run-up in the target stock price before the announcement date, the presence of a financial acquirer in the transaction, the cash percentage in the takeover offer and the deal size. Indeed, the analysis shows that all the mentioned factors have a positive relation with the takeover premium paid to the target companies. However, the empirical model still shows a low level of variance explained by the model, witnessed by the low value of the adjusted r-squared index. Since the research area of takeover premiums affecting factors is still very wide, more factors could be introduced to the model in order to increase the variance explained by the model improving the model itself.

Introduction

The thesis here presented intends to answer to the question "which factors influence the most the target takeover premium?" and to analyze the effect of the Covid 19 pandemic on M&A operations' premiums. In the following chapters, the M&A literature will be analyzed to highlight the possible takeover premium affecting factors and to evaluate them empirically in the final part of this thesis, extracting the most significative ones. The takeover premium is the difference among the market price paid by the acquirer for the target and the estimated real value of the company acquired in the M&A operation, namely the share price multiplied by the number of shares. There can be many factors affecting the premium such as the degree of competition, or the different aims of the operation, or still the anti-takeover tools used by the target. The main reasons which can lead a firm to engage in a M&A transaction and recognize a premium to the target are typically the expected synergies created with the acquisition, the expected increase in market power, the diversification aim, the target unique resources and management personal reasons.

The thesis topic was selected because of personal interest in the world of finance and in how a firm can buy another one integrating it in the existing firm structure. Moreover, the selection of thesis work on the merger and acquisition world is also affected by the many interesting reasons behind an acquisition. An interesting example of it can be the Disney & Pixar case. Indeed, this case of a successful acquisition by Disney witnesses one of the main reasons behind the decision of going for a M&A. As it can be read in many reports of the two companies, the two firms started their collaboration mainly because Disney needed the competencies of Pixar in making computer based animated characters, while Pixar mostly lacked the distribution network of Disney. The complementarity of the two firms was witnessed by their first movie produced, which earned the greatest movie revenues for that period. Then, complications occurred in the contractual agreement between Disney and Pixar which motivated the first to acquire the second, in order to achieve the same synergies already experienced before.

The aim of the work here presented is to present a synthesis of the literature about M&A premiums, to test the various hypothesis on factors affecting the takeover premium with an empirical analysis and to evaluate a new possible factor such as the Covid 19 outbreak. In the first chapter, the most relevant theories on takeover premiums affecting factors will be presented and discussed to understand which ones can be significant for the latter analysis. The second chapter will illustrate the methodology of the analysis and introduce the reader to the third chapter. The third chapter will be

focused on the empirical analysis to find a set of results that could be evaluated against the ones of previous literature. Finally, in the last chapter, the conclusions on the analysis conducted will be provided to the reader.

The work behind the thesis implied different phases. In the first one, literature research has been carried out through the carefully selection of the most relevant literature articles on the subject matter. Then, during the second phase, the most relevant and interesting theories about factors influencing the takeover premium have been selected and reported. The third phase consisted in the research of the positively and negatively impacted sectors in the world economy during the pandemic. In the fourth phase, the operations related to the period before Covid 19 and to the one during the pandemic have been collected, together with their main particularities. Finally, in the last phase, some multiple regression on the factors affecting the takeover premium have been performed on excel worksheets. The results of these regression analysis have been evaluated against literature theories and conclusions based on the analysis have been formulated and provided to the reader.

The thesis here presented shows the significancy of the run up in target stock price before the announcement date, cash percentage in the offer, deal size and financial acquirer factor. Among these four significative factors, the first two have a positive effect in line with the literature theories, while the last two go against them. Many other factors resulted to be non-significative such as EBIT, toehold position and tender offer. Thanks to the F test results, the various models resulted to be significative, that makes statistically acceptable the conclusions of this work.

Takeover premium literature theories

In this first chapter, the most relevant theories about takeover premiums affecting factors will be summarized and explained, to introduce the reader to the thesis subject matter and to make it easier to understand the empirical analysis shown in the following chapters.
The first thing to say about takeover premium is that the literature found evidence of it in various M&A events, and its positive impact on target shareholders has been demonstrated. This finding may look obvious now, but, not more than forty years ago, target management believed that takeovers were harmful to the target company shareholders.

Managerial resistance to takeover is associated with greater takeover premium by literature. According to literature, one reason for it is that with this target companies' behavior, only the most profitable deals in the end are concluded, increasing the average takeover premium for target companies. This phenomenon takes the name of truncation of the distribution of takeovers and is also consistent with the evidence of larger takeover premiums with tender offers than with mergers. However, more recent studies found that the distinction between merger and tender offer only hides a payment method effect. Indeed, Huang and Walking (1987), based on their research, suggested that higher returns for targets are obtained with tender offers rather than with merger agreement. They found that there was insignificant difference between the two modalities of takeover previously mentioned, after controlling for degree of resistance and payment method.

Eckbo (2000) analyzed bid jumps and their effect on takeovers, founding higher average initial premiums in single bid contests offer than in multiple bid contests. In his analysis, he found that the average initial and final premium in multiple bidder contests was respectively 41% and 53%, while for single-bidder contests, the initial premium averaged 45%. This finding is coherent with the preemptive bidding hypothesis. To better understand the preemptive bidding hypothesis a short description is provided. Fishman (1988) elaborated a preemptive bidding model in which he assumed that bidders must pay an investigation cost to identify competitors' private valuations of the target. If both bidders enter, an open English auction with costless bidding will take place. In a typical English auction, the auctioneer announces the opening bid for the object of the sale, then the interested buyers start bidding on the item on sale, with the auctioneer accepting higher bids as they come. In the end, the highest bid at any time is considered the standing bid, which can only be displaced by a higher bid from competitors. In the end, if there are no higher bids than the standing bid, the item is sold to

the bidder with the standing bid at a price equal to the bid. A preemptive bid is an initial bid that deters the second bidder from paying the investigation cost and joining the auction. A high initial bid signals that the initial bidder has a relatively high private valuation for the target, which reduces rival bidders' expected value of winning. With a sufficiently large investigation cost, the expected value of winning is negative and therefore the rival does not enter.

Eckbo (2009) also shows that initial and final offer premiums are higher if the bidder is public: indeed, premium with public bidders is 46%, while with private bidders is 40%. Moreover, looking at average premiums he found that they are almost equal in all-cash and all-stock or mixed offers. However, performing a regression analysis he discovered that all-cash bid premiums tend to be higher. Furthermore, during his analysis, contests with hostile targets resulted to have both the highest initial bid premium achieving a 5% higher premium with respect to friendly targets and final offer premium, 16% higher than for friendly targets. Another finding of Eckbo (2009) analysis is that takeover premiums are greater after the 1980s.

Analyzing bidding strategies, Eckbo (2009) found that takeover premiums are lower in case of toehold bidders and result to be unaffected by the existence of a target poison pill or by a hostile attitude of the target to the initial bid.

A toehold is simply a small, but significant equity position in a company, which helps the acquirer company in attempting to buy the company whose shares have been purchased. A toehold may be a disadvantage to an acquirer and the reason for this is that targets may not be willing to negotiate with an acquirer who has a toehold in the target company. Indeed, often a bidder with a toehold is viewed as hostile and therefore he may be denied the possibility of examinate the target’s books and agree a termination agreement. Moreover, a toehold must be large to be worth it.

A poison pill is the option to dilute the value of a block-holder ownership. The ownership of the block-holder is diluted by allowing shareholders different from the block-holder to purchase new shares at half price. Defenders of poison pills theories state that a poison pill increase the target's bargaining power. Following this hypothesis, the obvious consequence should be that the use of poison pills in a negotiation lead to higher takeover premiums. However, as found by Eckbo (2009), targets using poison pills do not benefit of higher premiums with respect to targets not using poison pills. Coherent results with what found by Eckbo (2009) have been reported by many other studies. Some of the possible hypothesis on what is the reason for this no effect of the poison pills usage for Eckbo are:

- No bargaining power deriving from the use of poison pills because of the non-credible threat of triggering the pill.
- Bargaining power deriving from poison pills usage is used in favor of management instead of trying to benefit shareholders

Officer (2003), Bates and Lemmon (2003) found and demonstrated that takeover premiums are much greater in presence of a target termination agreement. A termination fee is a penalty on the seller, which must be paid in case the target retires from the deal. The fee is thought to compensate the acquirer for the time and resources spent in negotiating the deal. Acquirers ask for a termination agreement when the seller has the option to receive other bids from other interested acquirers. The termination fee can be used to decrease the competing bids, since new bidders must take account of the cost that the target company will incur when breaking the termination agreement. Target termination fees can be used by managers of the target company to make sure that the target is acquired by a certain bidder, offering them to continue working in the new entity. In this way, target shareholders will receive lower premium, because the existence of a termination fee decreases the number of potential competing bidders resulting in a lower price paid for the target's shares and therefore a lower takeover premium. Target termination fees can also have a different purpose, by allowing the target to focus on a particular potential acquirer to commit that bidder to fully invest in the acquisition. Indeed, the target company may want to agree a termination fee to convince the bidder to reveal some important private information in their negotiations. There could be many information that the acquirer could be reluctant to reveal, such as future post-takeover projects for the target's assets because, for example, other interested bidders could exploit such information and adjust their bid to submit a more valuable one. Termination fees, therefore, force other potential acquirers to increase the value of their bid because of the information revealed by an incumbent potential acquirer. Finally, Officer (2003) concluded that after checking for bidder, deal and target characteristics which could affect the premiums, the M&A premiums in presence of a target termination fee were potentially 7% greater.

In another study on the takeover premium, Bargeron (2005) discovered that premiums paid to targets are lower when a target management tender agreement is in place.

Moeller (2005) studied the effect of target CEOs on takeover premium. In particular, he found evidence on lower takeover premium in the presence of powerful entrenched target CEOs. He also empirically demonstrated that takeover premiums in the 90s are higher when target ownership is

characterized by large external block-holders and low share owned by CEOs and inside directors. Other studies analyzing the 80s period showed that targets characterized by high shareholders control are negatively correlated with abnormal bidder returns.

According to Chatterjee, John, and Yan (2012) and their studies, takeover premiums are positively correlated with the degree of disagreement between the earnings forecasts on the target firm. Indeed, they demonstrated that the higher the disagreement between the forecast, the higher the takeover premium.

Levi, Li, and Zhang (2008) investigated the effects on takeover premium of the board structure and gender composition. According to their findings, when bidding firms have a female CEO, the takeover premiums tend to be lower. Moreover, also the target board of directors' gender composition affects the takeover premium. Indeed, target firms shows lower premiums, the higher their board's composition consist of female directors. Specifically, they found that the premiums with a female bidder CEO are about 70% smaller with respect to the case of a male bidder CEO and that increasing the target female share of board by 10%, decrease the premium of about a 15%.

In Mulherin (2012) research, strategic bidding and the impact of the bidders' number in a M&A operation are studied, evaluating, in this last case, the wealth effects of auctions against the ones of a negotiation. Generally, one can think that the auction results in a higher price paid for the target shares because of the higher number of bidders and therefore a high degree of competition with respect to a negotiation. This common sense is refuted by the author that, with his work, shows that the wealth effects between the two types of selling methods are comparable. Moreover, as indicated by Boone and Mulherin, the findings of Mulherin are in line with the models of French and McCormick (1984), Hansen (2001), Povel and Singh (2006), and Ye (2004), which state that the auction versus negotiation decision implies a trade-off between competition and information costs.

In the work of Elkinawy and Offenberg (2013), the target CEOs' executive compensation is also considered as a factor affecting the takeover premium. In particular, they studied how accelerated vesting of CEO equity awards impact on the amount of takeover premium. They found that in presence of accelerated vesting occurrence, takeover premiums result to be significantly larger.

Fich, Tran and Walkling (2013) studied the role of golden parachutes in affecting the takeover result. A golden parachute is a substantial payment received by the target management when the takeover

completion results in a dismiss of the current target management. This benefit facilitates the takeover completion since it prevents managers to reject takeover offer in order not to lose their future compensation. In the work of the authors, it emerges a positive correlation between the significancy of the golden parachute and the chance of takeover completion, but also a negative correlation between the significancy of the parachute and the amount of takeover premium. Indeed, the higher the significancy of the parachute granted to target management, the higher the chance of takeover completion, but also the lower the resulting takeover premium. The authors show that more significant parachutes result in higher takeover completion.

Jenter and Lewellen (2015) focus their studies on whether CEOs who are close to retirement can impact the likelihood of receiving a successful takeover bid. The authors discover that when target CEOs are close to the retirement age, the probability of receiving a successful bid increase.
However, this does not reflect in any way on the takeover premiums when CEOs are close to 65 years old, denying any hypothesis that close to retirement CEOs tend to sell the firms with lower premium. As it can be noticed by the latest listed theories and finding of the main literature on takeover premiums, self-interest by management certainly plays a role in the likelihood of successful takeovers and on the amount of premium enjoyed by the target firms.

Ismail (2011) studied a sample of 366 operations to understand if the fact that management communicate their estimates on future synergies can affect the takeover premium paid to the target company. The author does not find any correlation between the two and instead hypnotize that it may be an expedient to persuade the shareholders in endorsing the deal. He also reports that target firms experience higher premium when they have high growth potential and are profitable at the time of the transaction, while the acquirers are low potential firm and therefore tend to overpay the target.

In the publication by Huang, Jiang, Lie and Yang (2014) the effect of having an investment bank in the board of directors on the success of takeovers and on the amount of takeover premium resulting from the transaction are investigated. Through their research, they discovered that the probability of making acquisitions is higher in firms with investment banks present in the board, than in firms that do not have them in the board. Moreover, these acquisitions result to have lower premiums paid to the target companies, especially when the target firm is relatively large with respect to the acquiring firm. The authors suggest that a possible explanation could be that investment banks advice to the board may not only help the acquirer in the selection and evaluation of the target, but also ensure a better negotiation in terms of lower advisory fees.

Bodnaruk and Rossi (2016) investigated the role of dual holders in a takeover deal and their influence on the amount of the premium paid to the target company. Dual holders are financial conglomerates which have both bond and equity holdings in the target firm. The authors found that these dual holders may have differing incentives in the deal, due to the eventual appreciation of their bond for example. They found that takeover premiums are lower for operations in which a large share of target ownership is in the hands of dual holders. This mechanism is reinforced if the takeover bid seems to benefit bond holders. The authors suggest a possible explanation for this mechanism. A risky company, which becomes targeted by a less risky acquirer, experiences an appreciation in the value of the company both in term of equity and debt. Therefore, there is an incentive for dual holders to accept a lower premium, because of the appreciation of their bonds.

The effect of preemptive bidding and of target resistance to takeover on mergers and acquisitions premiums paid to target companies are investigated by Dimopoulos and Sacchetto (2014), which develop and test a theoretical model for this aim. Through a Monte Carlo simulation, the authors were able to answer to the question "why premiums are so high in a single bid contest?" and, specifically, whether it depends on preemptive bidding or target resistance. A preemptive bid by a participant to the auction, is an initial bid which signals to the competitors the higher valuation for the target company. In this way, the potential acquirer tries to deter the other participants to the auction from submitting a bid and the higher takeover premium paid to the target firm reflects the cost of deterring any potential acquirer from bidding. The second possible explanation refers to target resistance and suggests that an acquirer might pay higher premium in order to discourage the target from resisting to the takeover bid. Therefore, following this explanation, the higher takeover premium would reflect the cost to break the resistance of target. The results from the Monte Carlo simulation suggest that the higher takeover premium is better explained by the target resistance motivation, rather than the preemptive bidding's one. However, preemptive bidding still contributes to increase the takeover premium paid to the target, even if in a smaller part compared to the larger effect of breaking the target resistance.

Another area of research is the one concerning the influence of run up in target stock price on the takeover premium paid to the target company. Betton, Eckbo, Thompson, Thorburn (2014) contributed to this area of research analyzing the target stock price run up in the days before the announcement date of the target takeover and evaluating if this phenomenon affects, in some way, the amount of takeover premium paid to the target firm. The authors suggest that runup could reflect

a costly feedback loop for the acquirer: run up may reflect the public disclosure of information about future synergies with the acquirer company and therefore increase the price paid by the acquirer. If the run up in the stock price reflects public disclosure of highly valued synergies between the target and the acquirer, the runup may serve as a signal about the value of the impending bid. Thus, the bid may be higher to reflect this acknowledgement of valuable synergies. However, this hypothesis is then rejected from the empirical analysis developed by the authors.

Chatterjee, John, and Yan (2012) analyzed how investors' estimates about the target firm can affect the takeover premium paid to the target company. They suggest that the premium paid to the target firm can be affected by the disagreement in the market perception of the target company. More specifically, the authors demonstrate that the divergence of opinion is positively correlated with the takeover premium of the transaction enjoyed by the target company. Moreover, if disagreement in the estimates is higher, the possibilities of a firm to become a target of a takeover bid are lower.

In the work of Uysal (2011), the role of the acquiring company's capital structure in the number of deals undertaken and the effect on takeover premium paid to the target firm are evaluated. The author looks at acquiring companies which have a debt larger than the one allowed by the firms' own debt ratio. The findings of Uysal are that not only firms in this debt situation undertake significantly lower number of M&As operations, but also tend to pay lower premium to the target company with respect to companies with a more balanced capital structure. Uysal also reports that overleveraged firms are more likely not to use cash in their bids. Moreover, this type of firms, due to their condition, tend to target smaller companies and to pursue only the most value enhancing transactions, suggesting that overleveraged firms are more selective when undertaking a takeover.

Gogineni and Puthenpurackal (2017), using a large sample of takeover agreements from 2003 to 2012, evaluated the effects of the inclusion of go-shop provisions in takeover deals. Go-shop provisions are a financial tool which allows the target to shop itself for a better deal for a limited period after the announcement date of the ongoing takeover with a certain acquirer, soliciting bids from other possible bidders. Through the findings of the authors, it can be understood that this financial tool is more likely to be found in negotiated takeovers, with financial acquirers, in targets with low valuation uncertainty, higher institutional ownership and with relatively good governance. The authors also investigated the effect of go-shop provisions and found their positive correlation with takeover premiums paid to the target, in particular with negotiated deals.

Nguyen and Phan (2017) evaluated whether government policies may influence the chance of takeovers occurrence. Specifically, they demonstrated that the effect of uncertainty in government policies like public spending, taxes and monetary policies is a decrease in the number of deals and an increase in the time needed to complete the takeover. The author's research also indicates that companies react to the uncertainty, increasing the use of takeover payments through stocks and paying lower takeover premiums to the target firms. Therefore, acquirers can create greater value for their shareholders in terms of M&As' transactions, undertaking deals during periods characterized by high policy uncertainty.

About the deal initiation, the main literature indicates that in seller-initiated deal, takeover premiums are lower with respect to bidder-initiated deals, and that target CEO compensation is affected by the takeover initiation. During private negotiations for a takeover, target companies can grant unscheduled stock option to target CEOs which can be a tool comparable to golden parachutes, since it grants a sufficient compensation for the future stream of compensation loss due to the merger. Indeed, the use of such a financial tool leads to a greater possibility to be acquired but results in lower premium paid to the target firm. Thus, when deals involve unscheduled stock options it implies a wealth transfer from target shareholders to acquirer shareholders.
The literature considers that targets which grant their CEO unscheduled options get lower premiums. One possible explanation, for the literature, can be that these firms are of lower quality. Following this hypothesis, unscheduled stock options granted to target CEO are a signal of the lower quality of targets and therefore it leads buyers to pay a lower takeover premium. This explanation, however, resulted to be inconsistent when tested.

Heitzman (2011) analyzed the consequences of the equity grants to target CEOs in deal negotiations. According to the author, equity grants conceded in takeover negotiations may reflect acquisitions information and provide bargaining incentives. Finally, the author does not find any meaningful correlation between negotiation grants and takeover premiums in the sample considered.

Agrawal, Cooper, Lian &Wang (2013) examined the effects of the firms' choices on advisors when they are about to undertake a takeover on deal's outcome. Specifically, evaluating a large sample of transactions, the authors found that when deals exhibit common advisors, they usually show longer completion time and acquirers tend to pay lower premiums to target companies. The authors also found that private sellers which hire advisors for selling the company generally can receive higher premiums. Moreover, between these target companies that choose to hire advisors for selling the

company, the ones which hire top-tier advisors are associated to higher takeover premiums. Finally, the authors suggest that, generally, hiring M&A's advisors help the seller to negotiate a better transaction.

In the work of Atkas, de Bodt & Roll (2010) an analysis of potential competition, using several different empirical proxies, and of bidding costs effects on the takeover premium paid to the target company is carried out. The authors found that latent competition is positively correlated with the bid premium offered to the target company in negotiated deals and that bidding costs are instead negatively related to it.

Gorbenko & Malenko (2012), in their research, used data from a sample of auctions operations to investigate the effects of both strategic and financial type of bidders. They start from a classification of the potential acquirers in two main groups: the financial bidders and the strategic bidders. Then, they estimated the valuation for both type of bidders as the maximum willingness to pay from their bids. From their analysis, it resulted that strategic bidder have, on average, higher valuations for all targets with respect to financial bidders. Going more in details, the authors discovered that strategic acquirers show higher valuations for targets which have higher investment opportunities, while financial acquirers are willing to pay higher premiums for target performing poorly or having fewer investment opportunities. The authors suggest that the lower takeover premium paid to target companies by financial acquirers can be due to the higher experience in dealing with poorly managed firms and from access to cheaper forms of debt. Moreover, they also indicate that valuations by various financial bidders are less dispersed with respect to estimations of the various strategic bidders. Finally, authors show that valuations of financial acquirers seem to be more correlated to economic conditions like stock performances and the cost of debt.

In the end, here is a quick summary of factors influencing and not influencing the takeover premium according to the literature and provided by Eckbo (2014).

The takeover premiums result to be lower:

- in case the target's book-to-market ratio exceeds the industry median
- if the acquirer receives a shareholder tender agreement from target insiders
- the higher the target total equity capitalization before the bid
- if the initial bidder has a positive toehold
- if the initial bid is a tender offer.

The takeover premiums result to be higher:

- if the type of initial bid is an all-cash one
- the higher the dispersion in financial forecasts on the target company
- if the acquirer is a public firm
- in the period after the 1980s
- if a target termination agreement is included in the operation.

The takeover premiums result to be unaffected by:

- whether the merger is horizontal or conglomerate
- target stock liquidity
- in case of multiple bidders
- hostility to the initial bid
- a target poison pill.

The analysis

The empirical analysis conducted aims to discover which are the most significant factors affecting the takeover premium in a M&A operation between the ones cited by the most relevant literature on the subject. Moreover, the model is further widened including an analysis on the possible effect of the Covid 19 pandemic on takeover premium and therefore the significancy of it as a factor is evaluated. The mentioned further analysis on Covid 19 pandemic effect on takeover premium paid to target companies is carried out by:

- Building two samples of operations, one in the covid pandemic period and another in the period before
- Building two samples, in which the first is composed of only operations where the acquirer belongs to the best performing sector during the pandemic and the second is composed by only operations where the acquirer belongs to the worst performing sector during the pandemic
- Building a unique sample with all the operations, involving transactions both in the pre-covid and pandemic period, and belonging to both the best and worst performing sectors

Before moving to the multiple regression model, the criteria with which the sample of operations has been composed should be understood. The sample of operations is built picking up M&A transactions belonging to both the globally best and worst performing sectors during the pandemic and before it, according to the reliable statistics by Statista. In order to understand which sector has been the worst and the best in the pandemic period considered, a Statista and MarketWatch study on the global performance of the various sectors in the pandemic period has been consulted. During this step, the various percentage change in the overall prices of the different global sectors have been considered to select the best and worst performing sectors during the pandemic. As it can be seen from the following figure, the best sectors during Covid 19 resulted to be the technological one and the cyclical goods one, namely the sector that include the goods that are considered non-essential by consumers, while the worst are the energy and real estate sectors. In the figures, the relative positions of the mentioned sectors in the pandemic period analyzed can be observed.

During Covid 19

Best	Technology
Second best	Cyclical goods

Figure 1 Best sectors during Covid 19

During Covid 19	
Worst	Energy
Second worst	Real estate

Figure 2 Worst sectors during Covid 19

The data about every single operation has been extracted from the Eikon Refinitiv database, discarding operations with lack of data. The database, indeed, offers the possibility of searching through the various operations with a section dedicated to the M&A transactions. In the section mentioned, there is the chance to apply many filters to specify the sample of data to obtain as output of the research. For the purpose of this thesis, the announcement date, the premium one month prior to announcement, the deal attitude, the sector, the form of the transaction and the acquirer public status have been chosen as filters. The announcement date has been set to the period between the first of January 2016 and the middle of September 2021, including in this way both the pre-Covid 19 period and the pandemic period. Following the recommendations from past literature, the premium selected, namely the percentage increase, or decrease, in the stock price of the target company, is the one relative to four weeks before the announcement date. This last filter was applied to include in the sample only the operations for which information about the takeover premium were available. Another factor that has been considered is the deal attitude, namely the attitude of the takeover offer or negotiation, that can be classified as friendly, neutral, or unsolicited. The last case occurs when the target company does not have any willingness to sell or merge and the acquirer send a so-called unsolicited offer. The sectors selected for the analysis are taken from the best and worst sectors during the Covid 19 pandemic. As said before the best sector resulted to be the technological and cyclical goods ones, while the worst resulted to be the energy and real estate ones for the pandemic period considered. The acquirer public status has been applied as a filter to include in the sample only the companies for which the information about their being private or public were available. From the sample of operations obtained using these filters, each operation has been analyzed singularly to identify the many factors included in the regression model. Last filter that has been applied is the form of the transaction which allows the selection of the type of operations between acquisition of

partial assets, acquisition of majority assets, acquisition of partial interest, buyback, merger, and many others. The type of transaction selected for the analysis are merger and acquisition of majority assets transactions, in order to include only the significative merger & acquisition and not to include the acquisition of minority shares. The factors taken into consideration for the analysis are:

- Unsolicited or hostile offer
- Delisting on termination
- Cash percentage of the offer
- Private status of the acquirer company
- Run-up in the target price before the takeover announcement date
- Verticality of the operation
- Presence of a toehold from the acquirer company in the target company
- Earnings before interests and taxes of the target company
- Presence of a tender offer in the operation
- Logarithm of the deal size expressed in US dollars millions
- Presence in the operation of a scheme of arrangement
- Presence of a private negotiation
- Financial type of acquirer
- Sector; energy, real estate, technology, cyclical goods
- Period; pre o during Covid 19

The unsolicited or hostile offer variable is a dummy variable, namely a variable that can assume only the values zero or one. It assumes the value equal to one when the offer is not solicited by the target company. Intuitively, the expected effect on the takeover premium should be positive, since a hostile or unsolicited offer from a possible acquirer should encourage the resistance of the target firm and, therefore, increase the takeover premium of the transaction to break the resistance of the target company.

The delisting on termination is again a dummy variable that corresponds to one when the parties agree that on deal termination the target company is delisted from the stock market. The effect of this event is not one of the main investigated by the takeover premium literature, therefore it is not easy to formulate a reasonable guess on the positive or negative influence on the takeover premium. However, a delisting of the target company included in the M&A deal would take away from the target shareholder a source of investment, therefore it is reasonable to think of a higher price asked by the target to compensate the shareholders.

The variable that represents the cash percentage offer is a percentage value expressing the proportion of cash in the consideration structure of the takeover offer. Generally, the literature suggests that the higher the percentage of cash, the higher the amount of takeover premium paid to the target company. According to the literature, one of the possible explanations is that with a cash offer the value of a future synergy will be enjoyed by the acquirer only, while with a stock swap only a part of the synergy value will accrue to the acquirer with the remaining part being enjoyed by the target shareholders. Following this reasoning, a cash offer should compensate the target shareholders for the future value of the synergy that will be lost in absence of a stock swap type of offer. Therefore, since a higher cash percentage of the takeover offer signals the extent to which the acquirer believes in the high value of future synergies to both the investors and the target shareholders, it may increase the price requested from the target company to sell the firm.

The private status of the acquirer company is a dummy variable which has the value of zero for public status and one for private status. This variable has been included in the analysis to investigate if public acquirers tend to pay higher takeover premiums to target companies, with respect to the takeover premiums paid by a private acquirer. In this way, at the end of the analysis, it will be possible to see if the results confirm or not the findings of previous literature research, which suggest that public acquirers tend to pay higher takeover premiums to target companies.

The run-up in the target price before the takeover announcement date is a percentage value which shows the percentage increase of target price in the period before the takeover announcement date. A run is a statistic term which indicates a series of only increasing or decreasing value in a certain interval. The run-up value is obtained observing the target company stock price's behavior in the period before the announcement date of the takeover. Specifically, it is calculated as the percentage increase or decrease in the stock price in the period right before the announcement date, from the beginning value of the series to the last of it. Intuitively, it is expected that run up in the target company stock price is positively related to the amount of the takeover premium paid to the target firm. According to the literature, a possible explanation for this positive correlation is that run up in

the stock performance is a phenomenon related to the market sentiment on the good outcome of the transaction, in terms of value creation from the future synergies between the two merging companies.

The verticality of the operation is modelled through a dummy variable which assumes the zero value for a horizontal operation, namely an operation in which the target company belongs to the same sector of the acquirer company, and one for a vertical operation, the one in which the target company belongs to a different sector with respect to the acquirer company. A horizontal acquisition occurs because the acquirer wants to expand its production, increase its capacity, or expand its market share. A vertical acquisition, instead, occurs when the acquirer's aim is to lower costs, increase productivity or achieve greater synergies. Generally, one could expect vertical acquisitions to show higher takeover premiums because of the more complexity of evaluating a firm which does not belong to the acquirer's own sector. Another possible reason for higher takeover premium in case of vertical acquisition could be that the value coming from synergies and greater productivity is greater than the one coming from the increase in the acquirer market share.

The presence of a toehold from the acquirer company in the target company is represented through a percentage value which expresses the percentage of the target company owned by the acquirer company. The toehold represents an acquisition technique which consists in the acquisition of a minority share in the target ownership prior to the takeover offer. It is a strategic move, often done by firms who are seeking to acquire the target company, generally with a hostile offer, which allows the acquirer to gain more and more control before publicly attempt to acquire the target company. Toehold acquisitions are overall associated with lower takeover premium. According to literature, one possible reason is that a toehold acquisition may be viewed as a move to signal the willingness of the firm to acquire the target in future and therefore it may deter the bidding competition decreasing the final price for the target company. Another possible explanation for this negative relationship between toehold and takeover premium reported by literature, is that owning already a part of the shares means that the firm with a toehold position shares information about the company and this information may be useful to better evaluate the firm value and the future value of possible synergies, resulting in lower premium with respect to the case of an acquirer without a toehold position.

The variable representing the earnings before interests and taxes of the target company, EBIT, is a numeric value expressed in millions of US dollars. It is calculated as revenues minus all the expenses excluding taxes and interests. It represents a profitability indicator of the company and, in this analysis, has been considered to measure if there are any correlations between the target company performance and the takeover premium paid by the acquirer firm. Intuitively, one should expect that the better the performance of the target, the higher the premium that the acquirer will pay. Therefore,

a higher value of the earnings before interests and taxes is expected to be related to a higher takeover premium for the target firm.

The tender offer variable models the presence of a tender offer in the operation using a dummy variable which assumes a value equal to one if the takeover offer is a tender offer or zero otherwise. A tender offer occurs when a possible acquirer solicits existing shareholders of the target company to tender their shares usually in exchange for a higher price with respect to the market current valuation of the target shares. Since the aim of a tender offer is to persuade as many shareholders to tender their shares as possible, the purchaser has to offer a price higher than the market current one. Due to this mechanism the takeover premium paid to the target firm should be higher when a tender offer is included in the deal. However, a part of the literature thinks that the distinction between merger and tender offer only hides a different payment method.

The deal size is included in the analysis' factors to establish if the total valuation of the deal, expressed in US million dollars, can play a role in the determination of the takeover premium paid by the acquirer company in the transaction. In order not to bias the whole analysis, to the value of the deal size has been applied a logarithm. In this way, the abnormal effects of such a variable are avoided. Literature suggests that there may exist a negative correlation between the target deal size in a takeover transaction and the takeover premium paid to the target firm. The explanation provided by literature in favor of this statement is that the deal size may reflect the unobserved inherent complexity of the deal.

The presence in the operation of a scheme of arrangement is analyzed using a dummy variable assuming a value of one when the deal includes a scheme of arrangement. The scheme of arrangement is a compromise between the company and its creditors or members approved by the court to restructure the company. It can be used to allow a bidder to acquire all the shares of the company, especially in case of financial distress. Since in most cases the use of scheme of arrangement is a signal of financial difficulties, the expected effect on the takeover premium is negative.

The presence of a private negotiation is modelled with a dummy variable assuming a value equal to one when the operation occurred in the private negotiation modality or zero otherwise. Private negotiation and auction are the most common modalities in which an acquisition can be carried out. Therefore, this variable has been included in the analysis to investigate if it can play an important role in the definition of takeover premium paid to target companies. The common view is that the best way to have a higher price, and therefore a higher takeover premium, in a M&A transaction is to rely on an auction, since it allows for a greater competition with respect to a negotiation, which only allows for one company to bid. Consequently, an auction should result in a better price for target

shares. However, a part of literature evaluating the auction and negotiation effects on the takeover premium paid to target firms believes that the two types of company selling are comparable in terms of takeover premium. Therefore, the choice between the two is only based on the tradeoff between information cost and competition.

The typology of acquirer is another variable included in the analysis of the factors affecting the takeover premium paid to the target company in a M&A transaction. The variable representing this factor is a dummy one, assuming a value equal to one if the acquirer is a financial one or zero otherwise. In M&As operations the type of acquirer is mainly strategical or financial. A strategical acquirer is a company that engages in a takeover to buy the target, aiming at the future synergies and at creating long term value. It only targets companies which can strategically fit with itself and its business. A financial acquirer, on the opposite, does not look at long term value creation through strategic takeovers, but, instead, prefers to look at acquisitions as an investment opportunity to exploit and from which deriving an immediate gain by a future exit from the acquired company. It often looks at stable businesses which can provide a stable stream of cash flows. From past literature research, it results that strategic bidder have, on average, higher valuation with respect to the financial acquirers. According to the literature, one possible reason for this difference can be in the different target of the two types of acquirers. Indeed, since strategic bidders are more interested in future synergies, they may pay more thinking about a greater future value creation. On the financial acquirer's side, their experience on the stock market, negotiation and valuation may be an advantage when trying to strike a better price for the acquirer company and thus lower the takeover premium paid to the target firm. However, a part of past literature suggests also that it may be a matter of more dispersed valuation by strategic bidders and of the different type of target chased by the two types of acquirers.

The sector variable is a dummy one, equal to one if the acquirer sector is one of the best performing sectors during the pandemic identified before, or zero if it is instead one of the worst performing ones during the Covid 19 period of diffusion. This kind of variable wants to highlight the best and worst sector in the pandemic period considered. Intuitively it is expected that acquirers belonging to one of the best performing sectors can afford to pay a higher takeover premium for their target, while firms belonging to one of the worst performing sectors are thriftier when formulating a bid for their target.

The period, pre o during Covid 19, is represented through a dummy variable which value is zero if the operation occurred before the Covid 19 outbreak or one if it occurred during the pandemic. This variable has been included in the analysis to test if the pandemic has had any effects on the takeover premium paid in the M&As transactions. It is expected that operations occurred in the pandemic period should exhibit lower takeover premiums with respect to the operations occurred in the period

before the pandemic. Indeed, the pandemic has led many firms to lost profits and less liquidity, therefore as in every crisis period it is expected that firms save budget on extraordinary operations such as M&As transactions.

Almost all the variables descripted before, were selected from the ones that literature consider to be impacting on the takeover premium size.

The evaluation method is based on a multiple regression analysis performed on Microsoft Excel. Multiple regression analysis is a statistic model that can be used to analyze the relationship between a dependent variable and several independent variables also called explanatory variables. The objective of the analysis is to predict the assumed values from a dependent variable, starting from knowledge of those observed on several independent variables. The model is based on the equation:

$$y_i = \beta_0 + \beta_1 x_{1i} + \ldots + \beta_m x_{mi} + \varepsilon_i$$

where y represents the dependent variable, x_1 the first independent variable, x_m the m-th independent variable, β_0 the intercept, namely the value that y would have if all the independent variables are null, β_1 the coefficient of the first independent variable which express the change in y for a unitary change in x_1 keeping the rest of the equation fixed, β_m the coefficient of the m-th independent variable which express the change in y for a unitary change in x_m keeping the rest of the equation fixed and ε_i which represents the experimental error, accounting for variability in the behavior of the dependent variable.

Two hypothesis tests can be performed, one aimed to test the significance of the whole regression model and the other to test the significance of the various coefficients. The first mentioned test is performed calculating the F of Snedecor, by dividing the mean of regression squares for the mean of residuals squares. The significancy is evaluated then using F distribution tables and looking at the p-value. A p-value lower or equal to 0,05 implies the significancy of the whole model. The second test, instead, is performed for each coefficient and implies the calculation of Student's t. The evaluation of significancy is performed looking at the p-value and consulting the T tables. A p-value lower or equal to 0,05 implies the significancy of the coefficient.

Another tool that helps understanding the value of the model built is the R squared which estimates the proportion of variance explained by the model. The R squared is calculated dividing the sum of residuals' squares by the sum of total squares. R squared values can range from 0 to 1. A value of R squared equal to zero implies that the model does not explain the variance of y, while a value equal to one would mean a perfect model that explain completely the variance of y.

One problem to be considered during the multiple regression analysis is the one of multicollinearity. It happens when the explanatory variables are highly correlated among themselves and can cause the coefficients to be unstable, but also can give non significative independent variable and in the meanwhile a significative value of the whole model.

During the analysis, excel calculates the best estimation of the independent variables' coefficients in such a way that the mean squared error is minimized. In the model, the takeover premium is set as the dependent variable, while the possible affecting factors listed by the literature are set as independent variables.

The output of the multiple regression analysis shows an analysis of the variance and the regression's statistics.

Variance Analysis					
	Degrees of freedom	Sum of squares	Mean squares	F	Significancy of F
Regression	14	282169,92	20154,994	6,919799806	8,801E-13
Residuals	402	1170887,6	2912,6557		
Total	416	1453057,5			

Figure 3 Regression's statistics

Regression's statistics	
Multiple R	0,440670477
Squared R	0,19419047
Adjusted squared R	0,166127451
Standard Error	53,96902525
Observations	417

Figure 4 Analysis of variance

Analysis of variance

	Coefficients	Standard error	T statistic	Significancy value	Superior 95%	Inferior 95%
Intercept	-6,43686491	10,521014	-0,61181032	0,541009108	14,24621382	-27,1199436
Hostile/ Unsolicited	16,72495754	10,787497	1,550402	0,121831932	37,931912	-4,481996
Private	-1,17929005	8,963976674	-0,13155880	0,895399087	16,44283627	-18,8014163
Vertical	6,733077633	5,465387642	1,231948779	0,218688324	17,47738844	-4,01123317
Toehold	-11,4615040	23,38531541	-0,49011543	0,624319592	34,51128207	-57,4342901
Tender offer	0,326120985	6,92728679	0,047077737	0,962474649	13,94435398	-13,2921120
Delisted	2,258505717	6,773087209	0,333452921	0,738966275	15,57360043	-11,0565889
Cash offer	12,46978641	6,848401927	1,820831567	0,069375728	25,93294102	-0,99336819
Run-up*	39,4225487	4,869767629	8,095365468	6,86552E-15	48,99594045	29,84915695
Deal size Log*	7,70169526	2,842065979	2,709893197	0,007018528	13,28886349	2,11452703
Negotiation	-32,7498455	31,79452753	-1,03004661	0,30360745	29,75446486	-95,2541559
Scheme of arrangement	6,093640767	7,457619751	0,817102637	0,414353754	20,75444613	-8,56716459
Financial acquirer	0,871428164	10,32197805	0,084424532	0,93276093	21,16322585	-19,4203695
EBIT (USD million)	-0,00030505	0,001728082	-0,17652925	0,85996707	0,00309215	-0,00370226
Covid	4,579604026	6,62185406	0,691589393	0,489594434	17,59739211	-8,43818405

Figure 5 Analysis of variance

The regression's statistics includes information about the multiple R, squared R, adjusted squared R, standard error, and the number of observations. Multiple R is the correlation coefficient and therefore expresses the overall linear correlation between the dependent variable and the predicting variable. The squared R is calculated squaring the value of the multiple R and tells which amount of the variance is explained by the model. The adjusted squared R is used in place of squared R when there

are multiple independent variables. The standard error represents the average distance between the observed values and the regression line.

The analysis of variance includes the information about the degrees of freedom and the sum of squares for regression, residuals and total, the mean squares for regression and residuals, and the F test of the whole model. The degrees of freedom represent the number of values that are free to vary in the dataset and is obtained subtracting one to the size of the sample. The regression's degrees of freedom are the number of independent variables, while the residuals' degrees of freedom are obtained subtracting the regression degrees of freedom from the total ones. The sum of squares is used to represent the dispersion of data and is calculated through the sum of square differences. As said before, three type of sum of squares are calculated. The total sum of squares represents the total variation in the sample and is obtained summing the squared difference between the values in the sample and the mean value of the sample. The regression's sum of squares describes how well the model represents the data and is obtained summing the squared difference between the values estimated by the regression line and the mean value of the sample. The residuals' sum of squares represents the variation in the modelling of the error and is obtained summing the squared difference between the observed values and the values estimated by the regression line. The mean squares represent the variance in the model and are calculated dividing the sum of squares by the degrees of freedom. The F test, as already said, can measure the significancy of the regression model by evaluating multiple coefficients simultaneously. It compares the fit of an only intercept model with the complete model, namely the one with all the coefficients.

The second part of the analysis of variance is summarized in the last figure. It lists all the independent variables, also called explanatory variables, and for each one the coefficient, standard error and t test results are given. Looking at the t test results; the most significant variables can be identified picking the ones with a significancy value lower than the threshold established which is usually set equal to 0,05. The last two columns of the figure indicate the confidence interval in which, with a 95% confidence level, the value of the coefficient is located.

Results

The multiple regression analysis described in the previous chapter has been carried out in various periods and sectors. For each case evaluated, a different model has been built to have the most complete analysis on the factors affecting the takeover premium. In the end five main models have been built:

- All operations in the period before the pandemic
- All operations during the pandemic
- Best performing industry during the pandemic
- Worst performing industry during the pandemic
- All the operations

In the "all operations in the period before the pandemic" model, the sample is composed of only operations in which the announcement date of the takeover is included in the time interval from January 2016 to March 2020, with no distinction in the acquirer sector of business. It includes therefore operations where the acquirer belongs to both the best and worst performing sector during the pandemic. The sample is composed by 493 transactions occurred between 2016 and 2020, from firms located all over the world including completed, pending and withdrawn transactions. The analysis through this model takes account of the following factors: unsolicited or hostile offer, delisting on termination, cash percentage of the offer, private status of the acquirer company, run-up in the target stock price before the takeover announcement date, verticality of the operation, presence of a toehold from the acquirer company in the target company, earnings before interests and taxes of the target company, presence of a tender offer in the operation, logarithm of the deal size expressed in millions of US dollars, presence in the operation of a scheme of arrangement, presence of a private negotiation, financial type of acquirer and sector. During the analysis more than one combination of these factors has been analyzed to find the better model able to describe better the significant determinants of the takeover premium. Therefore, in the following figures the first and last combination of factors are reported. Going from the first model to the last model, in each step the factor with the lower degree of significancy is eliminated from the combination of factors included in the model to explain the takeover premium behavior. This procedure increases the significancy of the model while decreasing a little the R squared index. Specifically, the significancy of the model goes from the value of 3,009E-11 of the first model with all the before listed factors to the value of

1,95E-13 of the last model. The value of R squared, instead, decreases going from the value of 0,152 of the first model to the value of 0,1509 of the last one. However, since this is a multiple regression analysis it is better to look at the value of adjusted R squared, instead of looking at R squared value that is more appropriate in case of linear regression. Looking at the adjusted R squared value, it can be noticed that, contrarily to the R squared, it increases going from the value of 0,1272 to the value of 0,1351 showing an improved predictive capacity of the model, even if the improvement is very limited. The same trend can be noticed in the value of the standard error, which decrease, even if also here just a little, going from the value of 0.8213 in the first model to the value of 0.8176 in the last model. That decrease on the standard error value witnesses an improvement in the precision of the model, since the observations fall nearer to the regression line with respect to the first model. Another output variable which decreases are the degrees of freedom, going from the 14 of the first model to the 9 of the last one, following the reduction in the factor mix considered in the model.

Looking at the factors considered in the first model, it can be noticed that only the run-up in target stock price before the announcement date and the financial acquirer factors are below the significancy threshold, respectively with a value of 7.0258E-15 and 0.00684. The deal size factor, in this case, is close to the threshold but still above it, while all the other factors are still far from having a significative value. The output of the first model, therefore, suggests that the only impacting factors on the takeover premium paid to target firms are the run-up in target stock price before the announcement date with a positive effect and the financial acquirer factor with always a positive effect, but lower with respect to the one of the run-ups in the target stock price. Thus, the higher the run up in target stock price before the announcement date, the higher the takeover premium that will be paid to the target company. Same thing, even if with lower impact, for the financial acquirer factor, which resulted to be positively related to the final takeover premium paid by the acquirer to the target.

Variance Analysis					
	Degrees of freedom	Sum of squares	Mean squares	F	Significancy of F
Regression	14	57,86224352	4,133017395	6,125982615	3,0096E-11
Residuals	478	322,4923149	0,674670115		
Total	492	380,3545585			

Figure 6 Pre-covid first model analysis of variance

Regression's statistics	
Multiple R	0,390034768
Squared R	0,15212712
Adjusted squared R	0,127294023
Standard Error	0,82138305
Observations	493

Figure 7 Pre-covid first model regression's statistics

Analysis of variance						
	Coefficients	Standard error	T statistic	Significancy value	Superior 95%	Inferior 95%
Intercept	-0,05439011	0,155559063	-0,34964287	0,726760718	0,251273993	-0,36005423
Hostile/ Unsolicited	0,07458694	0,149795219	0,49792604	0,61876517	0,368925449	-0,21975156
Private	-0,13812151	0,122699753	-1,12568695	0,26086292	0,102976052	-0,37921907
Vertical	0,083800883	0,077079605	1,087199171	0,277496707	0,235257627	-0,06765586
Deal size Log	0,080254785	0,044173641	1,816802572	0,069873469	0,167053308	-0,00654373
Run-up*	0,897639289	0,111622269	8,041758129	7,02585E-15	1,116970269	0,67830830
Toehold	-0,14275141	0,33587538	-0,42501302	0,671018433	0,517223312	-0,80272613
EBIT (USD million)	-5,2831E-05	5,55826E-05	-0,95050716	0,342334955	5,63848E-05	-0,00016204
tender offer	0,019943101	0,100672106	0,198099568	0,843051382	0,217757676	-0,17787147
Sector	-0,07628792	0,088194909	-0,86499244	0,387476831	0,09700971	-0,24958556
Delisted	0,03965231	0,09282436	0,427175692	0,669443717	0,22204654	-0,14274192
Cash offer	0,080921629	0,098108814	0,824815072	0,409887999	0,273699491	-0,11185623
Negotiation	-0,09330384	0,480565808	-0,19415415	0,846137662	0,850978781	-1,03758647

Scheme of arrangement	-0,09694214	0,104369579	-0,92883529	0,35344325	0,108137737	-0,30202203
Financial acquirer*	0,406319419	0,149600361	2,716032349	0,006846346	0,700275042	0,112363795

Figure 8 Pre-covid first model analysis of variance

In the last "all operations before the pandemic" model, the factors are reduced to 9, as said before. Among these nine factors only three resulted to be statistically significative and thus affecting the takeover premium. The three significative factors are the run-up in target stock price before the announcement date, the deal size and the financial acquirer factor, respectively with the significance value of 1.69E-15, 0.048 and 0.0069. These values are all located below the significancy threshold and, except for the financial acquirer factor, are lower with respect to the past value in first model which implies an increase in the significancy of the related factors. Comparing the output of the last model to the one of the first model, it can be therefore noted that a new significant factor has emerged, namely the deal size factor, and that the significancy of the factors has improved, except for the financial acquirer factor. Furthermore, the impact on the takeover premium paid to target companies is almost the same with respect to the first model. In conclusion, the last model shows that run-up in target stock price before the announcement date, deal size and the financial acquirer factor are the affecting factors on the takeover premium paid to the target companies. All the mentioned factors have a positive effect, of which, the strongest is the run-up one.

Variance Analysis					
	Degrees of freedom	Sum of squares	Mean squares	F	Significancy of F
Regression	9	57,40540294	6,378378104	9,539447841	1,95218E-13
Residuals	483	322,9491555	0,668631792		
Total	492	380,3545585			

Figure 9 Pre-covid last model analysis of variance

Regression's statistics

Multiple R	0,388491993
Squared R	0,150926029
Adjusted squared R	0,135104774
Standard Error	0,817699084
Observations	493

Figure 10 Pre-covid last model regression's statistics

Analysis of variance						
	Coefficients	Standard error	T statistic	Significancy value	Superior 95%	Inferior 95%
Intercept	-0,05554532	0,147102674	-0,37759560	0,705896899	0,233494904	-0,34458554
Private	-0,14319309	0,120317533	-1,19012662	0,234581265	0,093217335	-0,37960353
Vertical	0,081207698	0,07653701	1,06102522	0,289208694	0,231594322	-0,06917892
Deal size Log*	0,08443685	0,042619636	1,981172462	0,048138615	0,168179647	0,000694053
Run-up*	0,906562055	0,110089636	8,234762931	1,69619E-15	1,12287582	0,690248289
EBIT (USD million)	-5,3582E-05	5,50786E-05	-0,97282754	0,331125958	5,46413E-05	-0,00016180
Sector	-0,07862872	0,087352559	-0,90013076	0,368499233	0,093009238	-0,25026668
Cash offer	0,089825565	0,09138575	0,982927479	0,326135231	0,269388296	-0,08973716
Scheme of arrangement	-0,10370591	0,099992172	-1,03714030	0,300189418	0,092767472	-0,30017929
Financial acquirer*	0,401820586	0,148297756	2,709552718	0,006976893	0,693209013	0,11043216

Figure 11 Pre-covid last model analysis of variance

In the "all operation during the pandemic" model, the sample is composed of only operations in which the announcement date of the takeover is included in the time interval from March 2020 to September 2021 with no distinction in the acquirer sector of business. It includes therefore operations where the acquirer belongs to both the best and worst performing sector during the pandemic. The sample is

composed by 143 transactions occurred between 2020 and 2021, from firms located all over the world including completed, pending and withdrawn transactions. The analysis through this model takes account of the following factors: unsolicited or hostile offer, delisting on termination, cash percentage of the offer, private status of the acquirer company, run-up in the target stock price before the takeover announcement date, verticality of the operation, presence of a toehold from the acquirer company in the target company, earnings before interests and taxes of the target company, presence of a tender offer in the operation, logarithm of the deal size expressed in millions of US dollars, presence in the operation of a scheme of arrangement, presence of a private negotiation, financial type of acquirer and sector. During the analysis more than one combination of these factors has been analyzed to find the better model able to describe better the significant determinants of the takeover premium. Therefore, in the following figures the first and last combination of factors are reported. Going from the first model to the last model, in each step the factor with the lower degree of significancy is eliminated from the combination of factors included in the model to explain the takeover premium behavior. This procedure increases the significancy of the model while decreasing a little the R squared index. Specifically, the significancy of the model goes from the value of 0,023 of the first model to the value of 0,0016 of the last one. The value of R squared, instead, decreases going from the value of 0,178 of the first model to the value of 0,166 of the last one. Being this model a multiple regression analysis, it is better to look at the value of adjusted R squared, instead of looking at R squared value. Looking at the adjusted R squared value it can be noticed that, differently from the R squared, it increases going from the value of 0,0884 to the value of 0,1162 witnessing an improved predictive capacity of the model, even if the improvement is limited. The same improvement can be noticed in the value of the standard error, which decreases, even if only a little, going from the first to the last model. That decrease on the standard error value witnesses an improvement of the precision of the model, since the observations fall nearer to the regression line with respect to the first model. Another output variable which decreases are the degrees of freedom going from the 14 of the first model to the 8 of the last one, following the reduction in the factor mix considered in the model.

Looking at the factors considered in the first model, it can be noticed that only the run-up in target stock price before the announcement date and the cash percentage in the takeover offer factors are below the significancy threshold respectively with a value of 0.00468 and 0.0257. The output of the first model, therefore, suggests that the only impacting factors on the takeover premium are the run-up in target stock price before the announcement date with a positive effect and the cash percentage in the takeover offer with always a positive effect but higher with respect to the one of the run-ups in the target stock price. Therefore, the higher the run up in target stock price before the announcement date, the higher the takeover premium that will be paid to the target company. Same thing, but with

higher impact, for the cash percentage in the takeover offer which results to be positively related to the final takeover premium paid by the acquirer to the target.

Variance Analysis					
	Degrees of freedom	Sum of squares	Mean squares	F	Significancy of F
Regression	14	5,899932534	0,421423752	1,983722407	0,02383137
Residuals	128	27,19243384	0,212440889		
Total	142	33,09236637			

Figure 12 During-covid first model analysis of variance

Regression's statistics	
Multiple R	0,422240231
Squared R	0,178286813
Adjusted squared R	0,088411933
Standard Error	0,460913104
Observations	143

Figure 13 During-covid first model regression's statistics

Analysis of variance						
	Coefficients	Standard error	T statistic	Significancy value	Superior 95%	Inferior 95%
Intercept	0,066800708	0,153391241	0,435492322	0,66393859	0,370311486	-0,23671007
Hostile/ Unsolicited	-0,09565572	0,133920542	-0,71427222	0,476359401	0,169328949	-0,36064039
Private	-0,23412552	0,159304353	-1,46967435	0,14410363	0,081085357	-0,54933640
Vertical	-0,03706713	0,084541987	-0,43844649	0,661801747	0,130213627	-0,20434790

Deal size Log	0,054652402	0,042222199	1,29439971	0,197857729	0,138196237	-0,02889143
Run-up*	0,14546906	0,050540825	2,878248646	0,004687738	0,245472717	0,045465404
Toehold	0,170915681	0,371098	0,460567508	0,645890442	0,905196477	-0,56336511
Tender offer	-0,12089347	0,109188709	-1,10719755	0,270284879	0,095155044	-0,33694198
Sector	0,13978724	0,087221937	1,602661493	0,111474316	0,312370745	-0,03279626
Delisted	-0,01861147	0,113647903	-0,16376432	0,870174977	0,20626032	-0,24348326
Cash offer*	0,226703457	0,1004904	2,255971296	0,025769226	0,425540882	0,027866033
Scheme of arrangement	0,055326431	0,109406004	0,505698309	0,613938208	0,271804902	-0,16115204
Financial acquirer	-0,16534618	0,182651726	-0,90525386	0,367031698	0,196061466	-0,52675382
Negotiation	-0,31004498	0,33371032	-0,92908420	0,354594237	0,350257897	-0,97034787
EBIT (USD million)	1,32023E-05	1,73018E-05	0,763057979	0,446832858	4,74368E-05	-2,1032E-05

Figure 14 During-covid first model analysis of variance

In the last "all operations during the pandemic" model, the factors are reduced to 8. Among these eight factors, only two resulted to be statistically significative and thus affecting the takeover premium paid to target companies. The two significative factors are the run-up in target stock price before the announcement date and the cash percentage in the takeover offer, respectively with the significance value of 0.00359 and 0.01368. These values are both located below the significancy threshold and are lower with respect to the past value in first model which implies an increase in the significancy of the related factors. Comparing the output of the last model to the one of the first model, it can be noted that no new significant factor has emerged. Moreover, the impact on the takeover premium is quite the same with respect to the first model. In conclusion, the last model suggests that run-up in target stock price before the announcement date and the cash percentage in the takeover offer are the affecting factors on the takeover premium paid to the target companies. All these factors have a positive effect, of which, the strongest is the cash percentage in the takeover offer.

Variance Analysis					
	Degrees of freedom	Sum of squares	Mean squares	F	Significancy of F
Regression	8	5,493463068	0,686682884	3,334027638	0,001643312
Residuals	134	27,5989033	0,205961965		
Total	142	33,09236637			

Figure 15 During-covid last model analysis of variance

Regression's statistics	
Multiple R	0,407435806
Squared R	0,166003936
Adjusted squared R	0,116213126
Standard Error	0,453830326
Observations	143

Figure 16 During-covid last model regression's statistics

Analysis of variance						
	Coefficients	Standard error	T statistic	Significancy value	Superior 95%	Inferior 95%
Intercept	0,083679656	0,136499877	0,613038328	0,540890086	0,353652629	-0,18629331
Private	-0,24044668	0,14975995	-1,60554729	0,110727542	0,055752404	-0,53664576
Deal size Log	0,046029532	0,039150143	1,175718122	0,241792215	0,123461693	-0,03140262
Run-up*	0,1436286	0,048450531	2,964438092	0,003590307	0,239455309	0,047801892
Tender offer	-0,15548441	0,093832574	-1,65704087	0,099850773	0,030100071	-0,34106889
Sector	0,131726607	0,082796754	1,590963423	0,113974251	0,295484159	-0,03203094
Cash offer*	0,240589284	0,096298649	2,498366135	0,013686127	0,431051233	0,050127335

Financial acquirer	-0,11034174	0,167098643	-0,66033895	0,510169868	0,220150258	-0,44083374
Negotiation	-0,33603976	0,325061131	-1,03377405	0,303103906	0,306874514	-0,97895404

Figure 17 During-covid last model analysis of variance

In the "best performing industry during the pandemic" model, the sample is composed of only operations in which the acquirer belongs to one of the best performing sectors during the pandemic. It includes operation where the acquirer belongs to the technology or cyclical goods industries, which are the ones who performed better in the pandemic. The sample is composed by 416 transactions occurred between 2016 and 2021, from firms located all over the world including completed, pending and withdrawn transactions. The analysis through this model takes account of the following factors: unsolicited or hostile offer, delisting on termination, cash percentage of the offer, private status of the acquirer company, run-up in the target stock price before the takeover announcement date, verticality of the operation, presence of a toehold from the acquirer company in the target company, earnings before interests and taxes of the target company, presence of a tender offer in the operation, logarithm of the deal size expressed in millions of US dollars, presence in the operation of a scheme of arrangement, presence of a private negotiation, financial type of acquirer and period. During the analysis, more than one combination of these factors has been analyzed to find the better model able to describe better the significant determinants of the takeover premium. Therefore, in the following figures the first and last combination of factors are reported. Going from the first model to the last model, in each step the factor with the lower degree of significancy is eliminated from the combination of factors included in the model to explain the takeover premium behavior. This procedure increases the significancy of the model while decreasing a little the R squared index. Specifically, the significancy of the model goes from the value of 8,8E-13 of the first model to 3,33E-15 of the last model. The value of R squared, instead, decreases going from the value of 0,194 of the first model to the value of 0,1938 of the last one. However, since this is a multiple regression analysis it is better to look at the value of adjusted R squared instead of looking at R squared value. Looking at the adjusted R squared value, it can be noticed that, differently from the R squared, it increases going from the value of 0,166 to the value of 0,176 witnessing an improved predictive capacity of the model, even if the improvement is very little. The same improvement can be noticed in the value of the standard error, which decreases, even if only a little, going from the first to the last model. That decrease on the standard error value witnesses an improvement of the precision of the model, since the observations fall nearer to the regression line with respect to the first model. Another output

variable which decreases are the degrees of freedom going from the 14 of the first model to the 9 of the last one, following the reduction in the factor mix considered in the model.

Looking at the factors considered in the first model, it can be noticed that only the run-up in target stock price before the announcement date and the deal size factors are below the significancy threshold respectively with a value of 6.86552E-15 and 0.007018528. The cash percentage in the offer factor is close to the threshold but still above it, while all the other factors are still far from being significative. The output of the first model, therefore, suggests that the only impacting factors on the takeover premium are the run-up in target stock price before the announcement date with a positive effect and the deal size with always a positive effect, but lower with respect to the one of the run-ups in the target stock price. Therefore, the higher the run up in target stock price before the announcement date, the higher the takeover premium that will be paid to the target company. Same story, even if with lower impact, for the deal size which results to be positively related to the final takeover premium paid by the acquirer to the target.

Variance Analysis					
	Degrees of freedom	Sum of squares	Mean squares	F	Significancy of F
Regression	14	282169,9196	20154,99426	6,919799806	8,80146E-13
Residuals	402	1170887,586	2912,655687		
Total	416	1453057,506			

Figure 18 Best sector first model analysis of variance

Regression's statistics	
Multiple R	0,440670477
Squared R	0,19419047
Adjusted squared R	0,166127451
Standard Error	53,96902525
Observations	417

Figure 19 Best sector first model regression's statistics

Analysis of variance						
	Coefficients	Standard error	T statistic	Significancy value	Superior 95%	Inferior 95%
Intercept	-6,43686491	10,52101386	-0,61181032	0,541009108	14,24621382	-27,1199436
Hostile/ Unsolicited	16,72495754	10,78749735	1,550402007	0,121831932	37,93191155	-4,48199646
Private	-1,17929005	8,963976674	-0,13155880	0,895399087	16,44283627	-18,8014163
Vertical	6,733077633	5,465387642	1,231948779	0,218688324	17,47738844	-4,01123317
Toehold	-11,4615040	23,38531541	-0,49011543	0,624319592	34,51128207	-57,4342901
Tender offer	0,326120985	6,92728679	0,047077737	0,962474649	13,94435398	-13,2921120
Delisted	2,258505717	6,773087209	0,333452921	0,738966275	15,57360043	-11,0565889
Cash offer	12,46978641	6,848401927	1,820831567	0,069375728	25,93294102	-0,99336819
Run-up*	39,4225487	4,869767629	8,095365468	6,86552E-15	48,99594045	29,84915695
Deal size Log*	7,70169526	2,842065979	2,709893197	0,007018528	13,28886349	2,11452703
Negotiation	-32,7498455	31,79452753	-1,03004661	0,30360745	29,75446486	-95,2541559
Scheme of arrangement	6,093640767	7,457619751	0,817102637	0,414353754	20,75444613	-8,56716459
Financial acquirer	0,871428164	10,32197805	0,084424532	0,93276093	21,16322585	-19,4203695
EBIT (USD million)	-0,00030505	0,001728082	-0,17652925	0,85996707	0,00309215	-0,00370226
Covid	4,579604026	6,62185406	0,691589393	0,489594434	17,59739211	-8,43818405

Figure 20 Best sector first model analysis of variance

In the last "best performing industry during the pandemic" model, the factors are reduced to 9. Among these nine factors, only three resulted to be statistically significative and thus affecting the takeover premium paid to target companies. The three significative factors are the run-up in target stock price before the announcement date, the deal size and the cash percentage in the takeover offer, respectively

with the significance value of 2.26185E-15, 0.003510699 and 0.04562018. These values are all located below the significancy threshold and are lower with respect to the past value in first model, which implies an increase in the significancy of the related factors. Comparing the output of the last model to the one of the first one, it can be therefore noted that a new significant factor has emerged, namely the cash percentage in the takeover offer, and that the significancy of the factors has improved. Moreover, the impact on the takeover premium is quite the same with respect to the first model. In conclusion the last model suggests that run-up in target stock price before the announcement date, deal size and the cash percentage in the takeover offer are the affecting factors on the takeover premium paid to the target companies. All of them show a positive effect, of which, the strongest is the run-up one.

Variance Analysis					
	Degrees of freedom	Sum of squares	Mean squares	F	Significancy of F
Regression	9	281684,0046	31298,22274	10,87473521	3,33833E-15
Residuals	407	1171373,501	2878,06757		
Total	416	1453057,506			

Figure 21 Best sector last model analysis of variance

Regression's statistics	
Multiple R	0,440290882
Squared R	0,193856061
Adjusted squared R	0,176029782
Standard Error	53,64762409
Observations	417

Figure 22 Best sector last model regression's statistics

Analysis of variance

	Coefficients	Standard error	T statistic	Significancy value	Superior 95%	Inferior 95%
Intercept	-6,03783183	9,785435305	-0,61702230	0,537565026	13,19847217	-25,2741358
Hostile/ Unsolicited	16,08915079	10,50423255	1,531682654	0,126377646	36,73847342	-4,56017183
Vertical	6,810207506	5,395368891	1,262232044	0,207588097	17,41647621	-3,79606119
Toehold	-10,8952954	22,85298492	-0,47675590	0,633791816	34,02932482	-55,8199157
Cash offer*	12,40970738	6,189247951	2,005042855	0,04562018	24,57659127	0,242823491
Run-up*	39,55938652	4,796592758	8,247393205	2,26185E-15	48,98857527	30,13019777
Deal size Log*	7,728142236	2,63198514	2,936240831	0,003510699	12,90212425	2,554160217
Negotiation	-33,1516851	31,30394123	-1,05902591	0,290216075	28,38590738	-94,6892776
Scheme of arrangement	5,826744279	6,990888738	0,833476901	0,405064683	19,56950144	-7,91601287
Covid	4,464272285	6,563386513	0,680178179	0,496778359	17,3666414	-8,43809683

Figure 23 Best sector last model analysis of variance

In the "worst performing industry during the pandemic" model, the sample is composed of only operations in which the acquirer belongs to one of the worst performing sectors during the pandemic. It includes operation where the acquirer belongs to the energy or real estate industries, which are the ones who had low performances in the pandemic. The sample is composed by 220 transactions occurred between 2016 and 2021, with firms located all over the world including completed, pending and withdrawn transactions. The analysis through this model takes account of the following factors: unsolicited or hostile offer, delisting on termination, cash percentage of the offer, private status of the acquirer company, run-up in the target stock price before the takeover announcement date, verticality of the operation, presence of a toehold from the acquirer company in the target company, earnings before interests and taxes of the target company, presence of a tender offer in the operation, logarithm of the deal size expressed in millions of US dollars, presence in the operation of a scheme of arrangement, presence of a private negotiation, financial type of acquirer and period. During the analysis more than one combination of these factors has been analyzed to find the better model able to describe the significant determinants of the takeover premium. Therefore, in the following figures the first and last combination of factors are reported. Going from the first model to the last model, in each step the factor with the lower degree of significancy is eliminated from the combination of

factors included in the model to explain the takeover premium behavior. This procedure increases the significancy of the model, while decreasing a little the R squared index. Specifically, the significancy of the model goes from the value of 0,041 of the first model with all the before listed factor to the value of 0,00098 of the last one. The value of R squared, as in the other models, decreases going from the value of 0,1086 of the first model to the value of 0,1068 of the last one. Since this is a multiple regression analysis, it would be better to look at the value of adjusted R squared instead of looking at R squared value, that is more reliable for linear regression. Looking at the adjusted R squared value, it can be noticed that, differently from the R squared, it increases going from the value of 0,048 to the value of 0,077 determining an improved predictive capacity of the model, with a consistent improvement with respect to the first model. Another trend that can be noticed is the one of the standard error values, which decrease, in a consistent way, going from the first to the last model. That decrease on the standard error value shows an improvement of the precision of the model, since the observations fall nearer to the regression line with respect to the first model. Another output variable which decreases are the degrees of freedom going from the 14 of the first model to the 7 of the last one, following the reduction in the factor mix considered in the model.

Looking at the factors considered in the first model, it can be noticed that only the run-up in target stock price before the announcement date and the financial acquirer factors are below the significancy threshold respectively with a value of 0.013 and 0.00016. No other factor in the first model is close to the threshold, meaning that all the other factors are still far from being significative. The output of the first model therefore suggests that the only impacting factors on the takeover premium paid to target firms are the run-up in target stock price before the announcement date with a positive effect and the financial acquirer factor with always a positive effect, but higher with respect to the one of the run-ups in the target stock price. Therefore, the higher the run up in target stock price before the announcement date, the higher the takeover premium that will be paid to the target company. Same story, but with higher impact, for the financial acquirer factor which results to be positively related to the final takeover premium paid by the acquirer to the target.

Variance Analysis					
	Degrees of freedom	Sum of squares	Mean squares	F	Significancy of F
Regression	14	29,10010442	2,078578887	1,793329871	0,041324471

Residuals	206	238,766586	1,159061097		
Total	220	267,8666904			

Figure 24 Worst sector first model analysis of variance

Regression's statistics	
Multiple R	0,329600542
Squared R	0,108636518
Adjusted squared R	0,048058417
Standard Error	1,076596998
Observations	221

Figure 25 Worst sector first model regression's statistics

Analysis of variance						
	Coefficients	Standard error	T statistic	Significancy value	Superior 95%	Inferior 95%
Intercept	0,328308567	0,311320975	1,054566165	0,292859068	0,942092399	-0,28547526
Private	-0,28732338	0,267228811	-1,07519615	0,283544615	0,239530684	-0,81417746
Toehold	-0,73614230	0,720776294	-1,02131869	0,308301375	0,684901795	-2,15718641
Tender offer	0,015185847	0,227495769	0,066752215	0,946843706	0,463704372	-0,43333267
Delisted	-0,05828680	0,189796234	-0,30710199	0,759075961	0,315905331	-0,43247893
Run-up*	0,622879702	0,248703985	2,504502296	0,013037689	1,113211216	0,132548188
Negotiation	0,101093296	0,816710742	0,123781028	0,901609345	1,71127664	-1,50909004
Deal size Log	-0,02935260	0,090847215	-0,32309851	0,746948361	0,149756924	-0,20846212
Cash offer	0,185745106	0,202362653	0,917882345	0,359753874	0,584712521	-0,21322230
Scheme of arrangement	-0,21025141	0,202920505	-1,03612698	0,301357643	0,189815835	-0,61031865
Financial acquirer*	1,352482292	0,352941336	3,832031427	0,000168752	2,048322608	0,656641976

Hostile/ Unsolicited	-0,18417520	0,268202173	-0,68670286	0,493042254	0,344597899	-0,71294830
EBIT (USD million)	1,54912E-05	0,000112198	0,13806965	0,890320238	0,000236696	-0,00020571
Vertical	-8,5954E-05	0,165043667	-0,00052079	0,999584969	0,325305338	-0,32547724
Covid	-0,07479914	0,169881434	-0,44030202	0,660180021	0,260130036	-0,40972831

Figure 26 Worst sector first model analysis of variance

In the last "worst performing industry during the pandemic" model, the factors are reduced to 9. Between these nine factors, only two resulted to be statistically significative and thus affecting the takeover premium. The two significative factors are the run-up in target stock price before the announcement date and the financial acquirer factor, respectively with the significance value of 0.0099 and 0.00011. These values are all located below the significancy threshold and are lower with respect to the past value in first model, which implies an increase in the significancy of the related factors. Comparing the output of the last model to the one of the first model, it can be noted that no new significant factor has emerged and that the significancy of the factors has improved. Furthermore, the impact on the takeover premium is quite the same with respect to the first model. In conclusion, the last model shows that run-up in target stock price before the announcement date and the financial acquirer factor are the only factors affecting the takeover premium paid to the target companies. Both the factors have a positive effect, of which, the strongest is the financial acquirer one.

Variance Analysis					
	Degrees of freedom	Sum of squares	Mean squares	F	Significancy of F
Regression	7	28,62151786	4,088788266	3,640248584	0,000989463
Residuals	213	239,2451725	1,123216773		
Total	220	267,8666904			

Figure 27 Worst sector last model analysis of variance

Regression's statistics	
Multiple R	0,326878966
Squared R	0,106849858
Adjusted squared R	0,077497506
Standard Error	1,059819217
Observations	221

Figure 28 Worst sector last model regression's statistics

Analysis of variance						
	Coefficients	Standard error	T statistic	Significancy value	Superior 95%	Inferior 95%
Intercept	0,204477645	0,104347495	1,959583656	0,051348941	0,410163658	-0,00120836
Private	-0,23937272	0,240226148	-0,99644740	0,320163455	0,234152386	-0,71289782
Toehold	-0,68818852	0,674084857	-1,02092268	0,308449217	0,640543205	-2,01692024
Run-up*	0,625225664	0,240456507	2,600161132	0,009970313	1,099204847	0,151246481
Cash offer	0,19245348	0,184899432	1,040854899	0,299122899	0,556920563	-0,17201360
Scheme of arrangement	-0,19059235	0,191196703	-0,99683911	0,319973696	0,186287683	-0,56747239
Financial acquirer*	1,352600977	0,344307885	3,928463548	0,000115509	2,031288247	0,673913708
Hostile/ Unsolicited	-0,17510306	0,247938972	-0,70623453	0,480814068	0,313625283	-0,66383141

Figure 29 Worst sector last model analysis of variance

In the "all operations" model, the sample is composed of all the operations in which the announcement date of the takeover is included in the time interval between 2016 and 2021, with no distinction between operations in which the acquirer belongs to the best or worst performing sector during the pandemic. The sample is composed by 416 transactions occurred between 2016 and 2021, with firms located all over the world including completed, pending and withdrawn transactions. The analysis

through this model takes account of the following factors: unsolicited or hostile offer, delisting on termination, cash percentage of the offer, private status of the acquirer company, run-up in the target stock price before the takeover announcement date, verticality of the operation, presence of a toehold from the acquirer company in the target company, earnings before interests and taxes of the target company, presence of a tender offer in the operation, logarithm of the deal size expressed in millions of US dollars, presence in the operation of a scheme of arrangement, presence of a private negotiation, financial type of acquirer, sector and period. During the analysis more than one combination of these factors has been analyzed to find the better model able to describe better the significant determinants of the takeover premium. Therefore, in the following figures the first and last combination of factors are reported. Going from the first model to the last model, in each step the factor with the lower degree of significancy is eliminated from the combination of factors included in the model to explain the takeover premium behavior. This procedure increases the significancy of the model, while decreasing a little the R squared index. Specifically, the significancy of the model goes from the value of 7,65E-08 of the first model to the value of 1,36305E-10 of the last one. Just like the value of significancy, the value of R squared decreases going from the value of 0,0953 of the first model to the value of 0,0944 of the last one. However, the value of adjusted R squared is a better indicator to look at, since the model is a multiple regression, instead of the R squared which fits better in a linear regression. Analyzing the adjusted R squared value, it can be noticed that, differently from the R squared, it improved, even if just a little, going from the value of 0,0735 to the value of 0,0829 witnessing an improved predictive capacity of the model. The same trend can be noticed in the value of the standard error, which decreases, even if only a little, going from the value of 0,775 in the first model to the value of 0,771 in the last one. That decrease on the standard error means that going from the first to the last model there has been an improvement in the precision of the model, since in the last model the observations fall nearer to the regression line with respect to the first model. Another output variable which decreases are the degrees of freedom going from the 15 of the first model to the 8 of the last one, following the reduction in the factor mix considered in the model.

Looking at the factors considered in the first model, it can be noticed that the run-up in target stock price before the announcement date, the cash percentage in the takeover offer and the financial acquirer factors are below the significancy threshold respectively with a value of 5.88E-11, 0.039 and 0.0091. The output of the first model, therefore, suggests that the only impacting factors on the takeover premium paid to target firms are the run-up in target stock price before the announcement date with a positive effect, the cash percentage of the takeover offer with a positive effect too, but lower with respect to the one of the run-up, and the financial acquirer factor with always a positive effect, but lower with respect to the o run-ups and higher than the cash percentage in the takeover

offer. Thus, the higher the run up in target stock price before the announcement date, the higher the takeover premium that will be paid to the target company. Same story, even if with lower impact, for the financial acquirer factor which result to be positively related to the final takeover premium paid by the acquirer to the target. Same positive effect for the cash percentage in the takeover offer, but with a still lower impact than the one of financial acquirer factor.

Variance Analysis					
	Degrees of freedom	Sum of squares	Mean squares	F	Significancy of F
Regression	15	39,46802467	2,631201645	4,372038279	7,65681E-08
Residuals	622	374,3351084	0,601824933		
Total	637	413,8031331			

Figure 30 Final first model analysis of variance

Regression's statistics	
Multiple R	0,308834499
Squared R	0,095378748
Adjusted squared R	0,073563123
Standard Error	0,775773764
Observations	638

Figure 31 Final first model regression's statistics

Analysis of variance						
	Coefficients	Standard error	T statistic	Significancy value	Superior 95%	Inferior 95%
Intercept	0,032951966	0,126114428	0,261286249	0,793958261	0,280613616	-0,21470968
Hostile/ Unsolicited	0,0513292	0,119057744	0,431128608	0,666524233	0,285133039	-0,18247464

Private	-0,09902304	0,104554252	-0,94709728	0,343956998	0,106299047	-0,30434514
Vertical	0,042169743	0,064303323	0,65579415	0,512199074	0,16844766	-0,08410817
Toehold	-0,18187567	0,279895891	-0,6497976	0,516062867	0,367779739	-0,73153109
Tender offer	-0,03468834	0,083847303	-0,41370850	0,679230199	0,129969752	-0,19934643
Covid	0,009076397	0,074533702	0,121775747	0,903115953	0,155444581	-0,13729178
Delisted	0,001015469	0,07872252	0,012899342	0,989712236	0,15560959	-0,15357865
Cash offer*	0,165047273	0,0800709	2,061264131	0,039692903	0,322289324	0,007805223
Negotiation	-0,24302472	0,351716732	-0,69096719	0,489843936	0,4476714	-0,93372085
Scheme of arrangement	-0,02701483	0,085937739	-0,31435353	0,753357955	0,141748431	-0,19577809
EBIT (USD million)	-7,1895E-06	2,34295E-05	-0,30685933	0,759053139	3,88209E-05	-5,320E-05
Deal size Log	0,0549478	0,033962148	1,617912966	0,106188316	0,121642164	-0,01174656
Sector	-0,02445480	0,071628936	-0,34140962	0,732910533	0,116209038	-0,16511865
Run-up*	0,431478252	0,064749381	6,663820525	5,88398E-11	0,558632129	0,304324374
Financial acquirer*	0,332720006	0,127194416	2,615838151	0,0091169	0,582502522	0,08293749

Figure 32 Final first model analysis of variance

As said before, going into the last "all operations" model, the factors are reduced to 8. Among these eight factors, only three resulted to be statistically significative and thus affecting the takeover premium paid to target companies. The three significative factors are the run-up in target stock price before the announcement date, the cash percentage in the takeover offer and the financial acquirer factor, respectively with the significance value of 3.915E-11, 0.0363 and 0.01. These values are all located below the significancy threshold and are lower with respect to the past value in first model which determines an increase in the significancy of the related factors. The deal size factors, in this last model, is approaching the threshold but remains above it. Making a comparison between the output of the last model and the one of the first model, it can be therefore noted that no new significant factor has emerged, but the significancy values are improved, except for the financial acquirer factor. Moreover, the impact on the takeover premium is the same found in the first model. In conclusion

the last model shows that run-up in target stock price before the announcement date, the cash percentage in the takeover offer and the financial acquirer factor are the only affecting factors on the takeover premium paid to the target companies. All the significative factors have a positive effect, of which, the strongest is the run-up one.

Variance Analysis					
	Degrees of freedom	Sum of squares	Mean squares	F	Significancy of F
Regression	8	39,09324287	4,886655359	8,202895897	1,36305E-10
Residuals	629	374,7098902	0,595723196		
Total	637	413,8031331			

Figure 33 Final last model analysis of variance

Regression's statistics	
Multiple R	0,307364681
Squared R	0,094473047
Adjusted squared R	0,082956011
Standard Error	0,771831067
Observations	638

Figure 34 Final last model regression's statistics

Analysis of variance						
	Coefficients	Standard error	T statistic	Significancy value	Superior 95%	Inferior 95%
Intercept	0,015560242	0,11214939	0,138745673	0,889695534	0,235792779	-0,20467229
Private	-0,08557932	0,101096929	-0,84650765	0,397591539	0,112949024	-0,28410767
Vertical	0,036183703	0,062236001	0,581395047	0,561182515	0,158399191	-0,08603178
Toehold	-0,19839371	0,27459659	-0,72249155	0,470260843	0,340843311	-0,73763074

Cash offer*	0,146907114	0,070053188	2,097079634	0,036385185	0,284473546	0,009340683
Negotiation	-0,22447612	0,347578785	-0,64582802	0,518626269	0,458079155	-0,90703139
Deal size Log	0,057302009	0,032299393	1,774089369	0,076532062	0,120729703	-0,00612568
Run-up*	0,429777856	0,063894994	6,726314975	3,91537E-11	0,55525118	0,304304533
Financial acquirer*	0,32254846	0,124857382	2,583335123	0,010009555	0,567736222	0,077360697

Figure 35 Final last model analysis of variance

Conclusion

As a result of the analysis, all the models pass the F test, therefore all of them result to be a significative model. Moreover, all the models indicate at least two significative factors, namely the independent variables with a value of significancy below the threshold of significancy. The model analyzing all the operations in the period before the pandemic indicates the run-up in target stock price before the announcement date, the deal size and the financial acquirer as significative factors affecting the takeover premium paid to the target companies. The model analyzing all the operations in the period of the pandemic indicates the run-up in target stock price before the announcement date and the cash percentage in the takeover offer as significative factors affecting the takeover premium paid to the target companies. The model analyzing the best performing sector operations during the pandemic indicates the run-up in target stock price before the announcement date, the deal size and the cash percentage in the takeover offer as significative factors affecting the takeover premium paid to the target companies. The model analyzing the worst performing sector operations during the pandemic indicates the run-up in target stock price before the announcement date and the financial acquirer as significative factors affecting the takeover premium paid to the target companies. The model analyzing all the operations indicates the run-up in target stock price before the announcement date, the deal size, the cash percentage in the takeover offer and the financial acquirer as significative factors affecting the takeover premium paid to the target companies. The run-up in target stock price before the announcement date has a positive correlation with the takeover premium paid to target companies, which may be related to the expectation of the market on the value creation from the merging of the two companies. The deal size has a positive correlation with the takeover premium paid to target companies, contrarily to what literature suggests, that may be related to the higher expectation on the value of future synergies and market share or also to the higher costs in purchasing a large company. The financial acquirer factor has a positive correlation with the takeover premium paid to target companies, which is not in line with the literature findings and may be due to the type of target chosen by this type of acquirer. Indeed, as it is suggested by the literature, financial acquirers have higher valuation for poorly performing target and that could explain the positive effects found in the analysis. Moreover, looking at the various model it can be noted that in the worst performing sample the impact of financial acquirer factor is way stronger than in the other, while in the best performing sample the financial factor is not even significative. This result seems to support the thesis for which financial acquirer have high valuation for poorly performing target and to explain the positive effect found for this factor. The cash percentage in the takeover offer has a positive correlation with the takeover premium paid to target companies, in line with the literature theories,

which can be due to a kind of compensation for target that will not enjoy the synergies since there is limited or no exchange of shares. It must be reported that the run-up in target stock price is the only factors to be always significative when going through the different models.

Surprisingly, variables like the presence of a toehold in the target company by the acquirer, the hostile or unsolicited offer and the target EBIT, which intuitively are expected to be significative in influencing the takeover premium, are far from being significative in all the models analyzed. However, the characteristic period analyzed and, in some case, the abnormal values of a variable like the EBIT can influence the insignificancy of the mentioned dependent variables. Moreover, some variables like the hostility of the offer and the presence of the toehold can be related among themselves and bias the results of the model.

However, the predicting power of the model, witnessed by the value of adjusted R squared, is still low, therefore caution must be taken in using the model to make predictions. In order to increase it, more possible takeover premium affecting factor could be included in the model widening the analysis here reported in future research.

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