

# Department Of Corporate Finance

DDIM Double Degree Program

Chair of Financial Statement Analysis

# Bid Premiums and Cumulative Abnormal Returns: An Empirical Analysis on the consequences of the Covid-19 Pandemic

投标溢价和累计超额收益率:对 Covid-19 大流行后果的实证分析

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摘要

本研究的目的是在于调查冠状病毒大流行对并购交易的影响,特别是对投标溢价和短期累计超额收益率的影响。

考虑到主要理论框架,最初的假设是上述的指标受到了这场疫情的负面影响。具体而言, 我们将回答以下研究问题:"投标溢价和累计超额收益率到底在多大程度上受到了 Covid-19 大流行的影响?";此外,疫情爆发的严重程度是否与效果恶化有关,以及我们是否可 以观察到跨行业的差异也会作为辅助问题一并被研究。

为了回答这些问题,我们对美国、加拿大、英国、德国、西班牙、意大利、法国、荷兰和 瑞士经营的上市公司进行的 174 笔交易组成的样本进行了多次回归分析。

研究结果证实了我们最初假设的一半,表明了累计超额收益率确实有受到当前疫情危机的 负面影响。而另一方面,我们所获得的结果否定了大流行对投标溢价的负面影响。相反, 我们发现了两者之间的正相关关系。当大流行的严重性和跨行业的差异也被一起研究时, 我们并没有检索到坚固的结果。

关键词:并购交易,财务报表分析,投标溢价,累计超额收益率,Covid-19大流行

# Abstract

The following analysis aims at investigating the impact of the coronavirus pandemic on M&A transactions and, in the specific, how bid premiums and short-term cumulative abnormal returns have been affected.

The initial hypothesis, considering the main theoretical framework, is that the above measures were negatively impacted by the health crisis. In the specific, we will answer to the following research question: "To which extent Bid Premiums and CAR have been impacted because of the COVID-19 Pandemic?"; also, ancillary questions investigating whether the severity of the outbreak is linked to a worsening of the effect and if we can observe cross-industry differences considering the impact of the pandemic.

In order to answer to those questions, several regression analyses have been performed on a sample composed of 174 transactions undertook by listed companies operating the following countries: United States, Canada, United Kingdom, Germany, Spain, Italy, France, Netherlands and Switzerland.

Considering the retrieved results, the analysis confirms our initial hypothesis that the cumulative abnormal returns were negatively affected by the current health crisis. On the other hand, the obtained result goes in antithesis concerning the bid premium, for which a positive relationship has been found. Taking into account the severity of the pandemic and the cross-industry differences, no robust result has been retrieved.

Key words: M&A Transactions, Financial Statement Analysis, Bid Premiums, Cumulative Abnormal Returns, Covid-19 Pandemic

# Introduction

The financial environment has always offered enormous opportunities to investors, seeking to efficiently allocate their resources, and to companies, seeking to raise capital and expand their growth horizon. Besides the importance of a predominant and efficient local financial market in order to positively impact the overall economic growth, those markets are often impacted by robust and durable crisis that could lead to dreadful consequences, impacting the global economy as a whole, even if originated in just one single country. In fact, this cumulative or domino effect has been even more vigorous as global economies started to be highly dependent among each other, mainly due to a strong globalization pressure and increased technological capabilities. In this context, one of the most recurring examples is the 2008 great recession, which initially originated in the United States and afterwards, severely influenced the overall global economy. This crisis was mainly induced by irrational and irresponsible behaviors of multiple market agents which ultimately caused a massive economic crash which damaged investors' confidence toward the financial markets. Anyhow, while most incidents are caused by market agents' misconducts, in some cases the instability within the markets can be triggered by external factors like a once in a century global pandemic.

Indeed, starting from January 2020, global markets started to experience the negative impact caused by the Covid-19 virus, which gradually affected all the major global players, starting from China and arriving to the United States and awfully impacting emerging and highly populated economies like India and Brazil. One of the most important issues that generally arises in this context is the loss of market confidence which triggers a self-fulfilling mechanism that ultimately leads to a worsening of the overall economic condition. Obviously, the M&A context, deemed as one of the most important areas within the financial environment, has been highly impacted by the current health crisis and loss in market confidence. In fact, according to a report published by PwC, global deals in 2020 experienced a reduction in volumes of 3% and a value contraction of 9% with respect to the previous year. Therefore, considering the above results, business combinations in 2020 experienced a decrease in terms of value and, moreover, agents within the market arguably postponed their M&A objectives in order to wait for better market condition and a more favorable outlook.

Considering the following dissertation, the purpose of the analysis is to understand whether the Covid-19 pandemic had a significant impact in the context of business combinations, studying the effects of the health crisis on a micro level, considering the bid premium paid by the acquiring company, and on a macro level, considering the short-term cumulative abnormal returns obtained during the announcement of the transaction within the market. The study will not only verify if the current pandemic had an impact with respect to the previous financial year but will also test if, during the crisis period, the severity of the outbreak itself had a significant impact on those measures. Moreover, will we try to understand if we could retrieve significant differences across the sectors involved within the analysis.

Taking into account the analyzed literature, we retrieved multiple academic studies underlying the main determinants of the bid premium computation and the factor the affect the short-term market reactions following the announcement of the transaction. In fact, the initial part of the literature review and theoretical framework aims at underlying the main determinants of the response variables, starting from the *fundamental synergy equation*, thus analyzing relevant studies from Damodaran (2005) and Vulpiani (2014) and arryving at Gomes & Marsat (2019), leveraging on their study on the importance of corporate social responsibility and its impact on bid premiums. Therefore, as we will better explain below, seveal factors will ultimately affect our response variables, depeding also on the context in which those transactions are performed. Anyhow, we did not retrieve any analysis which underlines the role of the Covid-19 virus and how the crisis impacted the aforementioned variables. Therefore, the aim of the analysis is to fill this gap within the literature and understand if the virus triggered a statistically significant impact, within the context of a business combinations, compared with the previous financial year. Moreover, besides the Covid-19 virus itself, the dissertation will also allow us to understand if the analyzed response variables – the bid premium and the cumulative abnormal returns – are significantly impacted by the macro environment. In fact, as described below within the literature review, the macro economic effects on business combinations tend to be difficult to capture and could be volatile depending on the single deal analyzed. In the specific, Xie, Reddy, & Liang (2017) underlined the effects of the local regulatory and bureocratic envinronment and its detrimnetal effect on potential business combinations. Moreover, Rossi & Volpin (2004) focused instead on financial market efficiency, arguing that higher investor protection could ultimately lead to higher premiums paid and, finally, Phan & Nguyen (2017) argued that policy uncertainty have a negative effect on the bid premium and transaction volumes. Anyhow, none of those important academic papaers underlines the detrimental effects that an health crisis could have in the context of a business combintation. Therefore, levereging on this analysis, we could better understand if external factors, undermining market confidence like a global pandemic, could have a significant impact wihtin the M&A environment.

This contribution can be potentially paramount, given also the fact that the current pandemic can be studied without any other major factor impacting investors' market confidence. Indeed, if we take into account the 1919 Spanish Flu, we are not able to retrieve studies analyzing the impact of the crisis on the financial markets and, specifically, on business combinations. Moreover, it's important to understand that during the initial period of the Spanish Flu, other crucial factors like the WWI were raging across all major economies, leading to possible bias results that could not effectively isolate the effect of the health crisis. Indeed, fueled by post-war euphoria, markets in 1919 experienced an enormous growth in value, inconsistently with what we would expect given the raging of the Spanish Flu's second wave. Therefore, considering the coronavirus pandemic, we have a unique opportunity to successfully study the effect of this type of crisis without experiencing strong biases and concretely capture the impact of the Covid-19 pandemic in the context of business combinations.

As previously specified, the dissertation will underline the main factors affecting the level of bid premiums and the cumulative abnormal returns in order to define control variables that could allow us to efficiently isolate the effect of the Covid-19 pandemic and its impact on the aforementioned variables. Therefore, multiple linear regression analyses will be performed in order verify the existence of relationship between the health crisis and the chosen response variables.

# Literature Review and Theorical Framework

# 1.1 Determinants of Bid Premiums

One of the most recurring question heard during my academic studies from investment professionals and scholars is whether an M&A transaction and/or process can be considered as an art or a science. From their perspective the answer was straightforward: M&A can only be considered as an art; anyhow, I was never fully satisfied by their conclusion. From their perspective, while studying an investment opportunity or advising a company on their next extraordinary operation, you needed to know the basic theoretical concepts of valuation; nevertheless, in conclusion, it would always been a matter of negotiation and bargaining power. Obviously, one of the most discussed and reviewed topics in the context of M&A is linked to the offering price. While we could have some sort of market consensus on a specific deal value, the offering price often involves intensive analysis and economic forecasts, trying to anticipate the possible value creation that can be derived from the operation.

Considering the scope of this analysis, the main focus will be on how market confidence and overall economic conditions impact offering prices and, consequentially, the bid premiums. Anyhow, it is fundamental to underline the main determinants from a theoretical point of view, mentioning also notorious examples of value destruction M&As and unjustifiable bid premiums. Nevertheless, coherently with what professionals always told me, beside a strong theoretical framework, in order to effectively implement a certain deal, bilateral negotiation will always be crucial.

Starting from a theoretical standpoint, while analyzing a certain transaction, it is fundamental to understand if the acquirer is a *Strategic Buyer* or a *Financial Buyer*. This difference is deemed imperative by investment professional since, on average, Strategic Buyers tend to pay a higher premium for a specific target with respect to a Financial Buyer such as a private equity or a hedge fund (Gorbenko & Malenko, 2014). The main reason behind this difference is linked to the fact that while the former aims at developing long-term synergies with the target, the latter only focuses on the Internal Rate of Return obtainable from a specific exit strategy. Given the fact

that this analysis will only take into consideration transactions performed by strategic buyers, we will analyze the main determinants of the offering price and, thus, of the bid premiums, looking from their perspective.

### 1.1.2 The role of Synergies

Considering the Investment Banking manual written by Rosenbaum and Pearl, synergies represent tangible value to the acquirer in the form of future cash flow and earnings above and beyond what can be achieved by the target on a standalone basis (Rosenbaum & Pearl, 2009). Therefore, synergies are defined as the extra value that the acquirer can achieve because of the business combination.

#### Value (A + B) > Value (A) + Value (B)[1.1]

The above equation [1.1] can be described as the *fundamental synergy equation*, capturing the logic and the importance behind the synergy argument. In fact, the value creation linked to synergies is deemed as one of the most important reference points while computing the theoretical price for the target. De facto, in a context where the acquirer is a strategic bidder, premiums should not be paid if no future synergies are expected from the transaction; if such premiums are instead paid, then we should observe a long-term value destruction for shareholders of the acquiring company since executives overpaid for the business combination (West & Rudnicki, 2020). Obviously, of the first step in the synergy analysis is to compute the intrinsic value of the target on a standalone basis – i.e., the value of target company if no business combination was ever implemented. In this case the traditional methods like the Discounted Cash Flows and Trading Multiples as used in order to come up with an intrinsic value of the target which will represent a starting point going forward.

Afterwards, once we agree on the theoretical value of the target, we will start analyzing possible synergies that could arise from the transaction. It is important to underlined that this extra value generation can be highly volatile and difficult to predict; moreover, synergies sources will constantly vary depending on the sector you are currently analyzing. In general, synergies are often divided in four different categories:

Revenue Synergies
 Cost Synergies
 Tax Synergies
 Financial Synergies

#### 1.1.2.1 Revenue Synergies

Being also defined as *Strategic Synergies*, Revenue Synergies represent the additional amount of cash flows generated from the transaction that will directly affect revenue streams. In this case the analysis will mainly focus on the price and volume increase that could be obtained from sharing tangible and intangible resources. Please note that while analyzing synergies, we aim for an extra value, thus, synergies are present when we are able to obtain a level of revenues which is higher with respect to the simple arithmetical summation between the bidder and the target's proceeds.

Traditional cases in which those synergies are exploited are for example linked to a better usage of the distribution channels of the parties involved -e.g., the acquiring company has enough production capacity to satisfy the demand also in other countries where is not currently present; the target, on the other hand, might present in those countries. Thus, the bidder can exploit the target's distribution channel in order to sell its products in those unexplored markets and increase the overall level of sales. This is a traditional case in which volumes are directly impacted from the transaction. Considering instead how prices can be affected, the target company might own an important brand having a very high brand awareness. The acquiring company, in this case, could leverage on this brand in order to increase the overall level of prices. Even though those results can be predicted from a strategical standpoint, the analysis based on revenue synergies is often deemed complex since its highly linked to the current market conditions and customer preferences (Vulpiani, 2014). Indeed, sophisticated investors tend to ignore those type of synergies in the analysis since they are considered very difficult to predict before the transaction is complete. Also, the source of this extra value highly depends on the ability of the two companies to effectively integrate and establish common strategic approach, deemed as fundamental in order to achieve a long-term value creation for shareholders (O'Dwyer & Lea Doyle, 2019).

#### 1.1.2.2 Cost Synergies

While Revenue Synergies might be overlooked by sophisticated investors, Cost Synergies are always more scrutinized and appreciated. In fact, those type of synergies are linked, for example, to the reduction in the level of Cost of Goods Sold, by achieving a sustained level of economies of scale, reduction in the General and Administrative Expenses, by obtaining a staff consolidation between the two companies and reduction in the level of Capital Expenditures, reducing certain overlaps between the newly merged companies – e.g., combine all the company's activities under one single facility. Investor mainly focus on this category of extra value creation since it's an analysis that can be easily made ex-ante. One traditional example of this analysis is the combination of all the business activities of the parties involved under one single facility and the sale of the remaining ones not anymore employed; assuming that such strategic approach is possible, we can calculate the fair market price of the target's facility, which will represent a tangible, concrete and predictable value that will be created because of the business combination.

As an argument for both the Revenue and the Cost Synergies, it is crucial that beside the actual benefits obtainable from the transaction we take into account the implementation costs derived from implementing such actives. If we take into account just the benefits that could derive from some examples described above without considering the costs, we will overestimate the value of the synergies and, ultimately, pay a premium which is not consistent with the long-term value creation that can be derived from the transaction.

#### 1.1.2.3 Tax Synergies

Another source of extra value that can be retrieved from a business combination is linked to the tax benefits that the acquiring company can exploit. One example of those benefits is related to a company acquiring another counterpart having net operating loss carry forward. In this case, while the latter cannot exploit the tax benefits being a loss-making company, the former can capture those benefits having at dispose a positive taxable income. The value prediction tends to become more complex as we assume that the acquiring company does not have enough income to fully exploit the tax benefits derived from the target's net operating profits. In this case, the benefits will be distributed over several years; anyhow, while computing this calculation, we need to discount the future tax benefits in other to capture the risks that the acquiring company might not be able to produce a sustained income to effectively exploit this extra value.

Finally, another example linked to tax benefits can be derived from depreciation. Once we acquire a company, assuming a full consolidation<sup>1</sup>, we can write up assets within our balance sheet, obtaining depreciation benefits. In this particular case, also goodwill will be positively impacted from the transaction, anyhow, investors tend to overlook this benefit since amortization of goodwill is generally nontax deductible (Damodaran, 2005). Those tax benefits will lower the overall tax burden of the company, leading to a higher level of available cash flows for shareholders and, thus, extra value creation.

#### 1.1.2.4 Financial Synergies

Ultimately, financial synergies are crucial to analyze in order to fully capture the possible sources of extra-value creation. One value source that it's included within this section is linked to the change in risk profile following the transaction. The issue in this case is to analyze how the beta of the acquiring company is affected from the business combination. One important analysis on this topic was implemented by Mandelker and Rhee in 1984 which proposed a relationship between the operating and financial risks and the company's systemic risk, defying the beta with the following formula:

$$\beta(a+b) = \beta u(a+b) * (DOL(a+b)) * (DFL(a+b))$$
[1.2]

 $\beta(a + b) =$  Beta of the combined companies

 $\beta u(a + b)$  = Unlevered beta of the combined companies

DOL(a + b) = Degree of Operating Leverage of the combined companies

<sup>&</sup>lt;sup>1</sup> In the case in which the acquiring company buys more than 50% equity stake of the target, a full consolidation of the financial statements can be made, with the acquiring company writing on its books the whole assets value of the target. This methodology opposes the equity consolidation approach, in which such equity stake is just treated as a financial asset within the acquiring company's balance sheet.

DFL(a + b) = Degree of Financial Leverage of the combined companies

The reasoning behind this approach is to de-leverage the beta of the single entities using the above formula, compute an average of those and then re-leverage the combined un-levered beta with the newly obtained values of DOL and DFL following the business combination (Mandelker & Rhee, 1984). If we observe a reduction is the cost of capital, then we should consider it as a financial synergy directly creating value for shareholder, being the future cashflows discounted with a lower rate. The source of this financial synergy explains why as a control variable within the analysis, we take into consideration the target's level of debt as a portion of total assets. Obviously, if the target is currently experiencing a distressed situation, the argument involving synergies becomes even more complex and, consequentially, premiums tend to be lower<sup>2</sup>.

Ultimately, one important source of extra value in the context of financial synergies derives from the increased debt capacity of the combined entity, without increasing the cost of debt. In fact, a more stable income stream following the transaction will allow lenders to increase their financing (Lewellen, 1971). Moreover, other studies suggest that even if the income stream of the two entities are highly correlated, this will also lead to a positive impact in the debt capacity of the newly formed entity (Stapleton, 1982). Anyhow, all those studies assume that both companies involved in the transaction are at their optimal debt capacity. Anyhow, if a bidder acquires a highly leveraged target, it cannot expect strong financial synergies linked to a higher debt capacity. As a proxy for those sources of extra value, we will include as control variable Debt to Asset Ratio of the target, aimed at capturing the magnitude of debt that the acquiring company needs to absorb. This variable is predicted to have a negative relationship with the bid premium (Robinson & Shane, 1990). Moreover, we will take into account the Total Debt over EBITDA of the acquirer, aimed at capturing the ability of the acquiring company to economically sustain the transaction and effectively develop expected synergies. The relationship between this control variable and the bid premium can be retrieved from Bugeja and Walter (1995), which found that companies

<sup>&</sup>lt;sup>2</sup> As previously stated, one important issue linked to synergies is predictability. A company in a distressed environment tends to be difficult to evaluate given the greater difficulty in predicting both the level of future cash flows and the level of risk involved. Therefore, value will be more heavily discounted.

experiencing good performances in the period prior to the business combination will pay, on average, higher bid premiums (Bugeja & Walter, 1995).

Finally, another important aspect involving synergies pertains the fact that the Acquiring company cannot pay all the calculated long-term value to the target. As stated before, synergies need to be viewed as a result of the combination; therefore, they do not exist because of the target but because of the combination itself. Therefore, it is crucial for the acquiring company to retain part of that value creation in the rationale behind the offering price. If the acquiring company pays all the predicted synergies to the target, the bidder will end up overpaying for the transaction. Anyhow, also in this case, the final outcome will be highly affected by the bargaining power of the parties involved.

Considering those arguments described above, the synergy analysis remains one of the most crucial components in the valuation process, but also one of the most complex, involving an in-depth financial due diligence that aims at capturing the real source of long-term value creation while discarding the short-term momentum. Overall, the involvement of art cannot be neglected.

### 1.1.3 The Control Premium

Another important element that constitutes the offering price is related to the Control Premium. This component is often blended within the premium offered because of synergies exploitation; instead, it is very important that such element is kept separated from the reasoning and arguments involving synergies in order to avoid possible double counting issues. While in most professional practices, analysts tend to assign an arbitrary value for the control premium, looking for example at an average within the analyzed sector, theoretically, the premium actually depends on specific factors; most importantly, to which extent the acquirer can affect the value of the target by changing the way it is managed.

In fact, if the target is poorly managed and the acquiring firm has better expertise within the sector, such that by managing it can enhance its value, than the premium for control can be paid. Therefore, the argument in this case is opposite with respect to the one previously made regarding synergies; indeed, while synergies can be created only if the two companies are combined, the premium for control will only depend on the target company and the way it is managed. Thus, if the target company is very well managed it theoretically makes no sense to pay for this specific premium.

One notorious example of this issue can be found in the 2007 merger between UniCredit and Capitalia. In this context the former paid a premium of 23.5% with respect to the latter's closing price before the transaction leaked within the market. This offering price was mainly linked to a premium for control that UniCredit paid for the transaction. Anyhow, this premium did not have any theoretically basis since Capitalia was perfectly managed; in fact, during the years previous to the transaction, the latter experienced a strong growth with respect to its peers, which ultimately lead to bigger players like UniCredit to attempt a takeover bid. Eventually, UniCredit paid a very high premium and major fees to the target's management; this ultimately led to a longterm value destruction for one of the major Italian banks, which needed to perform multiple rights issues following that transaction in order to fulfil capital requirements imposed by regulators.

Within the analysis we take into account the premium for control as a control variable, differentiating if the transaction involved an acquisition of partial interest or not. Even if it lacks a strong theoretical background, control premiums are usually paid if the acquiring company buys a majority stake of the target; on the other hand, certain discounts might be applied if a minority stake is instead acquired.

### 1.1.4 Non-sensible M&A Reasons

As most extraordinary operations, in order to implement a successful M&A process you need focus your reasoning on real value drivers like synergies. Anyhow, often those operations are justified by reasons which are defined as non-sensible – i.e., not properly focused on long-term value creation for shareholders. It's not clear, in fact, whether those transaction, motivated by non-sensible arguments, could have a positive impact in terms of value for the acquiring company owners.

Concerning those reasons, one of the most popular argument that the management presents to shareholders is linked to diversification. Thus, mangers try to convince shareholders to accept the business combination arguing that it would have an overall positive impact in the level of risk for the acquiring company. Therefore, if the level of risks is reduced, then the value is increased. Theoretically, this approach might be effective if the acquiring company seeks for a revenue stream which is not correlated with its main source of revenues. Anyhow, this creates two main issues: a. the company will end up creating a conglomerate, which is, on average, traded at discount with respect to companies focused on a core business. This derives from the fact that, considering a conglomerate, investors tend to experience a lack of transparency in resources allocation - i.e., they do not clearly know where the company is investing its retained earnings; this ultimately creates a misperception of how the company is creating value and therefore leads to a market discount for those type of organizations. Thus, given the above arguments, diversification motives leading to a conglomerate creation will not enhance value for shareholders. b. The second and most important issue pertains to the logic behind diversification itself: having a positive impact on the level of risks by acquiring a company with uncorrelated stream of revenues. This logic ultimately fails once we account for the transaction costs required to achieve such strategic approach. In fact, shareholders can independently reduce their level of risk by diversifying their own stock portfolio; in doing so, they will be able to decrease their risk exposure with lower transaction costs with respect to the company. Therefore, shareholders should always deny an M&A operation justified only with a risk reduction argument, given that it will ultimately destroy the value of their equity stake. As stated before, the most important reasoning will always be connected to the extra value creation that the combined companies are able to generate in the form of synergies.

Finally, another common justification that its often used for an M&A transaction is linked to an increase in the earnings per share following the business combination. Anyhow, this will just be a standard result from an accounting perspective as a company acquires another firm having a lower P/E ratio. Moreover, this approach will negatively impact the acquiring company, leading to a lower P/E ratio in the long run; thus, the market will discount more heavily future growth opportunities of the firm (Garvey, Milbourn, & Xie, 2013). Consequently, we should not only take into account the increase in the level of EPS, but also, the overall increase in value – i.e., the

EPS reasoning needs to be justified by an increase in the total market value, always following the fundamental synergy equation [1.1].

### 1.1.5 Value Destructive M&As

Considering the periods from 1930 until 1970, M&A transactions generated a positive long-term value for shareholders only in 30% of the analyzed cases. Nowadays, that percentage increased to around 50% (Deloitte & Touche LLP, 2019). Consequentially, this still means that in roughly 50% of the cases, M&A transactions do not generate long-term value for shareholders.

In this context of extraordinary operations, there could be multiple reasons why a given business combination does not generate value, both *ex-ante* and *ex-post*. Considering the *ex-ante* scenario, one of the most recurring issues that ultimately leads to value destruction is overpaying for a certain deal. Thus, calculation errors in the computation of the offering price that ultimately leads the acquiring company to pay for the target a price way above the expected benefits that the company could derive from the transaction. In general, we can categorize the source of this miscalculation in three separate reasons:

#### Ex-ante Reasons

- Common Valuation Errors
- Empire Building Attitude
- Advisors' Conflict of Interest

Concerning the first reason, beside a basic miscalculation of the expected synergies, another common error is to pay all the expected benefits derived from the transaction to the target company. As we stated before while analyzing the role of synergies, it is deemed crucial to retain part of that extra value creation from the offering price, since we will be able to retrieve this enhanced value only by combining the two entities. Moreover, another common mistake is to mix the rationale behind the synergy argument and the control premium. In this case you might risk to double count the two sources of extra value and therefore, overpaying for the transaction. Thus, it is fundamental that those values are analyzed separately. Finally, another common mistake is to consider the wrong discount rate while analyzing the level of synergies. In fact, one standard

scenario is defined as *Risk Transferring;* situation in which you compute the stand-alone value of the target using the acquiring company's cost of capital. Obviously, this is defined as a valuation error since it not consistent to evaluate the theoretical value of the target using a parameter of a third-party entity; therefore, this error could enhance in an unjustifiable manner the offering price for the target company, destroying long term value for the acquiring shareholders.

The second reason takes into account the attitude of the acquiring company's executives. An important paper by Roll (1986) founds those managers having an empire building attitude will destroy value for shareholders in the long run (Roll, 1986). In fact, mangers, in this case, will tend to act in an irrational manner with the sole purpose of acquiring new companies and create a business empire. Anyhow, this approach will lead to value destruction, given the fact that a conglomerate might be create and, more importantly, a given transaction will not be performed because of a rationale based on a synergistic argument but just considering the benefits that executives can derived, both in terms of monetary compensation and prestige. Jaggi and Dorata (2006) considering a sample of 646 mergers found that there is a strong relationship between the level of bid premiums in a certain transaction and the executives' self-interest in maximizing their compensation. In fact, according to their analysis, the level of bid premium is highly influenced by the change in cash compensation of the executives following the business combination (Jaggi & Dorata, 2006). In this particular case, it is crucial to implement appropriate corporate governance control mechanisms such that governance bodies can effectively monitor and approve only valueenhancing actions taken by executives' directors. One mechanism is underlined in the analysis of Levi, Li and Zhang (2013) concerning the role of gender in the Board of Directors and extraordinary decisions. In fact, analyzing more than 1500 US-based companies, the scholar found that not only with the presence of female directors the amount of takeover is reduced but also, for each additional female director, the amount of bid premiums paid is reduced by 15.4% (Levi, LI, & Zhang, 2013).

Irrational motives affecting the bid premiums can be found also in the analysis implemented by Hope, Thomas and Vyas (2010) in which the scholars proved that when a certain transaction involved a matter of national pride or is highly analyzed by the local media, executives tend to pay a higher premium with respect to other types of transactions or combination implemented in developing countries (Hope, Thomas, & Vyas, 2011). One caveat in this case is related to the fact that those transactions might not only be triggered by personal hubris of the executives, but they might involve the overall board of directors, leading to less effective controls at governance level.

Finally, the last reason is linked to a conflict of interests, between the company and the advisors, that could arise while implementing a business combination. In fact, advisors like Investment Banks usually are defined as being advisors of the deal and not of the company (Nuno, 2020). In fact, Investment Banks are often focused on the deal being completed instead of analyzing what could be the best solution for the company from a business perspective. Therefore, a possible solution in order to manage this conflict of interest might be to link part of the compensation for advisors to the creation of long-term value for shareholders.

Considering instead the *Ex-post* Reasons, one of the most important issues is failing to deliver the promised synergies. Thus, the main source of this issue is mostly a problem with the integration between the two entities. Therefore, it is deemed crucial to establish a plan on how those synergies are going to be exploited without considering extra-value that is assumed to be created in a long-term perspective<sup>3</sup>.

One famous example of value-destruction M&As is the HP acquisition of Autonomy completed in 2011. The former, leveraging on the high margins guaranteed in the software industry, wanted to innovate its business model which was just based on the production of computers hardware, from which they obtained comparatively lower margins. HP paid for Autonomy a bid premium of over 88% with respect to its market value at deal announcement. While initially the company justified this offering price arguing that most of the premium was based on the rationale that the company was not well managed and traded at discount, the argument immediately felt as Autonomy of increasing their revenues by 15%, which was still not enough to justify an 88% bid premium. Besides the multiple lawsuits that followed the transaction, HP ultimately needed to write-off 8.8 billion from its balance sheet, severely damaging its own shareholders.

<sup>&</sup>lt;sup>3</sup> In analyzing the level of synergies, predictability plays an important role. This is the reason why professional investors tend to prefer cost synergies to revenue synergies. Following the same logic based on predictability, I will usually not take into account synergies that are expected to be crated five years from the deal conclusion.

### 1.1.6 M&A process and impact on offering price

While analyzing the main determinants of the offering price and thus, of the bid premiums paid by the acquirer, it's important to focus our attention also on the process in which the two companies might be involved. In fact, if the acquiring is involved in two-stage auction process in which multiples companies bid for the same target, the final offering price that can be obtain might be higher with respect to the one initially computed focusing on a synergistic argument. In fact, from a sell-side perspective, in order to maximize the obtainable offering price of the most effective solution is to initiate a competitive process in which multiples bidders are interest in the same company. On the other hand, a simple bilateral negotiation, if the target has low bargaining power, will allow the acquiring company to obtain an optimal price paid and retain most of the synergies involved in the combination.

Finally, another crucial consideration to be made in this context is linked to the preemptive bids. Dimopoulos and Sacchetto (2014) argued that one of the two main sources that leads to higher bid premiums is linked to preemptive bids. In this case, the acquiring company will skip all the auction process for the target, offering a final binding proposal that, if accepted, will require the target to fulfill a bilateral negotiation just with that single entity. Those bids are, on average, higher with respect to the ones obtained in a regular process since the acquiring company will need to offer a price which the target can immediately accept without reservations. The risk in this case is linked to an asymmetrical information issue. Within an auction process, the target will select the bidders that are allowed to access more privileged information in order to establish a correct offering price; anyhow, in the context of a preemptive bid, the acquiring company will elude this process, leading to an offer that might be made without all the proper information available (Dimopoulos & Sacchetto, 2014). The second source underlined by the authors is the target resistance. Obviously, if targets resist a given takeover bid, this will lead to higher premiums in order to convince the management of the target company or in the context of a tender offer.

### 1.1.7 Contested M&As

Common valuation error might often occur valuing the standalone value of the target company and/or the expected synergies that can be derived from the transaction. Anyhow, in a contested M&A scenario, this possibility increases exponentially.

In general, business combinations can be divided in two subdivisions: *Friendly or Contested M&As.* Consider the first category, managers of the acquiring have the possibility to cooperate with the managers of the counterparty; therefore, having access to privileged information that could influence the final offering price. In this case, the acquiring company will be able to scrutinize the target and arrive to a final offering price that could effectively capture the extra value creation expected from the transaction. In most business combinations, a full transparency will be achieved once the two companies enter in the final negotiation process and no more contenders are involved.

The situation is diametrically opposite in a scenario of contested M&A. In this particular situation we won't have a collaboration between the management of the acquiring company and the target company; therefore, the acquiring company, in order to bypass the approval of the target company's board, will need to issue a tender offer directly to the target's shareholders, without implementing a proper due diligence of the company. Obviously, this lack of transparency and information asymmetry will not allow the acquiring company to implement a proper analysis of the target. Therefore, the acquiring company, on average, will pay higher bid premiums and will increase the possibilities of a value-destructive combination (Chen, 2002).

In this analysis we will take into account this difference as a control variable. Anyhow, we will not rely on a sample containing multiple contested M&As, given the fact that, in most cases analyzed, those tender offer are then abandoned given the high premiums required by such strategic approach<sup>4</sup>. Besides, a company might still decide to implement this strategy if the target company is deemed crucial from a strategic perspective.

### 1.1.8 M&A as a strategy for growth

Considering the analysis, it is important to mention the case in which corporation growth through strategic acquisitions. Companies implementing this corporate venturing approach often have an in-house division that coordinates those business transactions, avoiding excessive advisory

<sup>&</sup>lt;sup>4</sup> In the context of a Tender Offer, the acquiring company often imposes that the offer will be valid if at least 50% plus 1 shareholder accepts such offer. Anyhow, if prices increase with respect to the initial offer, the target's shareholder might not be incentivized to accept such offer, therefore, if the acquiring company il willing to complete the transaction, it will need to increase the premium in its offering price, which, in most cases, is enhanced to unsustainable levels and therefore, the offer is abandoned.

fees. In this analysis, we will take into account the experience that companies have accumulated throughout multiple transactions by considering as a control variable the number of business combination previously implemented. The theoretical background behind this logic is based on the fact that those companies, accumulating experience, are more capable of understanding the real value of a target and, therefore, paying an offering price, which will not ultimately impact, in a negative way, the long-term value of the acquiring shareholders. Companies growing through strategic acquisitions are defined as "mountain climbers" and applying always the same approach by gaining experience in every transaction performed, they will be more able to create value and pay a price consistent with the real theoretical value of the target and not paying excessive premium (Deloitte & Touche LLP, 2012).

One famous example of effective corporate venturing is Cisco, which, over the years, has been able to acquire and successfully integrate more than 200 companies (Romanski, 2017) and more than 120 in the last 10 years. Leveraging on this approach, the company has achieved a dominant position in the communication and information technology industry. Besides focusing on its core business, Cisco often acquires companies which are not fully correlated with its core business but possess emerging technologies and innovative business models that could ultimately generate a positive spillover effect on the overall company and revenues. In fact, in the last years, Cisco has invested in companies like Mindmeld and AppDynamics, which develop advanced AI technologies.

Another example, even more prominent, is LVMH group. The Paris-based luxury company established an ad-hoc M&A division in order to effectively manage the business combinations. Anyhow, while Cisco mostly implements medium tier operations, LVMH often performs deals involving multiple billions of euros. In fact, one of the last completed operations involves the acquisition of the US-based Tiffany & Co. for 15.8 billion dollars, after receiving a discount of roughly 500 million dollars following the exercise of the MAC clause within the Sale and Purchase agreement. Obviously, the purposes of the two companies are different; in fact, while the focus for Cisco is to innovate and maintain a strong influence within the market, LVMH aims at implementing a massive market consolidation within the luxury sector and sustain its dominant position. Nevertheless, both companies experienced a strong growth in the past 20 years both in

terms of revenues and in terms of market value, creating sustained long-term value for their shareholders.

### 1.1.9 Business Culture and the importance of Integration

In general, companies establish a specific culture in their working environment, consistent with their long-term objectives. Thus, in each company we will often find different cultures and beliefs, which will directly affect the day-by-day business. Anyhow, this will ultimately create issues once we take into account a possible integration between two entities; lack of planning for integration is deemed as one of the predominant reasons that ultimately leads to a failing M&A transaction (Damodaran, 2005). In fact, the cultural match or mismatch between the parties in a business combination shape their ability to successfully integrate and share resources, which in turn affects the ability to realize synergies (Brock, 2005).

In this context, it is crucial to prepare an ex-ante strategy that the acquiring company can implement once the transaction is fully completed in order to process the integration in a way in which the predicted synergies can be exploited. Anyhow, even though it has been proven that a strategy is crucial to avoid possible drawbacks within the process, PWC in a 2020 survey found out that only 62% of executives has an integration plan already established before the deal is actually completed (Cook & Nahass, 2020).

This topic is important to analyze since no matter how effective and precise an analysis on synergies and premium for control might be and even if we are able to obtain an effective offering price, if we are not able to deliver those promised benefits, the transaction will not create value for shareholders, even considering a short-term perspective.

Finally, concerning the culture of the single entities, Gomes and Marsat (2019) found that target involved in Corporate Social Responsibility practices will bear a higher premium with respect to their counterparties. Anyhow, while positive environmental practices involve a higher offering prices, virtuous social performances tend to be appreciated only in the context of cross-border transactions (Gomes & Marsat, 2019).

## 1.1.10 The Macroeconomic Impact on Transactions and Motive of the Analysis

Until now we have considered the main determinants of the bid premium focusing on the two companies involved in the transaction and the future extra value that can be generated from the combination. Besides, as we have observed in the previous paragraphs, the nature of the premium can be different according to the analyzed context.

In fact, Laamanen (2007) implemented a study on the bid premiums considering the industry characteristics of the companies involved in the business combination, discovering that in discriminating considering the growing potentials of the single industries we could retrieved important differences in the level of bid premiums. In fact, in considering growing businesses, acquirers will pay on average higher premiums with respect to industries having a lower growth potential (Laamanen, 2007). Considering the scope of this analysis, the transactions will be divided according to the *Industry Classification Benchmark* and will be divided in growing industry and non-growing industries, referencing the US Bureau of Labor Statistics, which indicates that the fastest growing industries are Health Care and Technology (U.S. Bureau Of Labor Statistics, 2020).

Moreover, beside looking at the main determinants involving the single transactions, it is important to understand if the macroeconomic context in which M&A deals are performed can eventually impact the overall level of bid premiums. In general, Xie et al. (2017) find that institutional and regulatory framework, tax provisions, economic performance, financial markets development, investor protection, geographical setting and cultural factors have differential effects on the inward and outward capital flows. Further, they find that institutional dichotomous issues like the ruling political party influence, government intervention, higher levels of corruption, and erratic behavior of bureaucracy have detrimental effects on the completion likelihood of publicly announced acquisition transactions (Xie, Reddy, & Liang, 2017).

Concerning the analysis on bid premiums, Rossi and Volpin (2004) found for example that US-based transactions experience, on average, higher premiums with respect to non-US transactions. The scholars explain that those premiums cannot be fully justified by a synergistic argument, therefore, other factors need to be taken into account in order to explain this difference. The final outcome of the study is linked to investor protection; in fact, given that in the US

shareholders experience a higher degree of investor protection, this will positively influence their bargaining power, which will ultimately allow them to obtain more favorable terms within a deal negotiation. In this dissertation we will consider within the sample target companies from the US, Canada and EU-zone countries which, overall, considering their regulatory framework, experience a high degree of investor protection.

Moreover, Sovbetov (2015), studying cross-border M&As, found that macroeconomics factors are closely analyzed from acquiring companies while selecting a certain target and can ultimately affect the premiums involved. In fact, studying a sample of more than 5000 companies, Sovbetov found that acquiring firms tend to select their targets taking into account factors like the GDP per capita and inflation rates (Sovbetov, 2015). Always considering cross-border M&As, the scholar proved that target companies are usually located in countries in which the market capitalization is relatively smaller with respect to the acquiring company home country, leading also to lower premiums with respect to local transactions. Moreover, in the context of cross-border transactions, Rossi and Volpin (2004) found that companies implementing a business combination in another country will pay a higher premium with respect to M&A deals locally implemented. Finally, considering cross-border deals, bidders will in general target companies with a closer geographical proximity and common language, given the issue liked to the liability of foreigners<sup>5</sup>.

An important conclusion in this context has been achieved by Nam H. Nguyen and Hieu V. Phan (2017) in which they found, considering a sample of 9673 unique firms, that policy uncertainty has in fact a negative impact on the bid premiums and in general, in the number of M&A transactions performed (Phan & Nguyen, 2017).

Given the abovementioned theoretical framework and literature review we can confidentially argue that macroeconomics condition ultimately impacts the number of M&A operations and the offering prices involved. In 2020, the macroeconomics context has been profoundly impacted by the Covid-19 pandemic which is currently disrupting the business environment on a worldwide scale and, consequentially, possible business combinations.

<sup>&</sup>lt;sup>5</sup> In managerial practices, liability of foreigners is described as a disadvantage that foreign companies experience while implementing business in a foreign country. Anyhow, given the strong effect of globalization, it has been proved that this negative impact will likely diminish in the long run.

Leveraging on the main determinants of the bid premiums above-mentioned, we will define the main control variables for the study; nevertheless, the aim of this dissertation is to capture how deals have been impacted by external social and economic conditions, like a once in a century global pandemic.

### 1.2 Cumulative Abnormal Returns

In computing the analysis based on the bid premium our aim is to understand the business combination more in detail by verifying the nature of the offering prices and how those have been impacted by the current health crisis. Thus, the final objective is to derive a model that could explain if the willingness to pay for a certain target has been affected by the Covid-19 pandemic.

On the other hand, by analyzing the Cumulative Abnormal Returns, we are implementing an analysis which is solemnly focused on the market reactions following the transaction announcement. Thus, with respect to the analysis on the bid premiums, the study of the CAR looks at the macro perspective of an M&A operation, trying to understand how the market viewed and reacted to those combinations. In fact, the initial analysis tries to understand the acquiring company's thought process in deciding the offering price for the target, while the second analysis will try to understand the market's thought process, and if investors reacted differently once we account for the current health crisis.

Please note that following the study of Armitage (1995), we have computed the short-term Cumulative Abnormal Returns obtaining highly significant results: in fact, for certain transactions, our model derived an R-Squared of almost 0.99 and only in few cases we have derived values below the threshold of 0.4.

Considering the control variables used within the analysis of the cumulative abnormal returns, we leverage on the factors previously defined for the analysis of the bid premium. The reason for which we apply this is linked to the fact that, even though part of the market reaction will ultimately depend on investor's irrational behavior, agents within the market will evaluate if the transaction could create long term value for the newly combined entity and will react consequentially. Indeed, even though in this case the literature is not so extensive, the retrieved evidence is consistent, in term of impact on the response variables, with the previously defined

arguments regarding the bid premium. An important difference can be noticed if we take into account the *Contested Bid* dummy variable, for which, consistently with the asymmetrical information argument previously explained, will have a negative impact on the cumulative abnormal returns. Indeed, in the case of a hostile takeover, investors know that the acquiring company is implementing an offer without being able to perform a proper due diligence of the target; therefore, as underlined by Wansley & Lane (1983), the agents reactions will always be negative. Moreover, considering the number of M&A operations previusly implemented, while an higher number of previous transactions can reduce the overall premiums, markets tend to react posivitely to those growing strategies, especially if we considering industries having an high growth perspective. Finally, the only control variable for which we were not able to retrive significant information is the *Majority Interest* dummy variable, for which we would have the possibility to observe a possible relationship witthin the following analysis.

Overall, considering the conclusions derived from the above literature, the following control variables were considered within the analysis.

~ .			-	
Control	Impact on Bid	Main Theoretical	Impact on	Main Theoretical
Variables	Premium <sup>6</sup>	Background	CAR	Background
Debt to Asset Ratio Target (One Year Before Announcement)	Negative	(Walkling & Edmister, 1985), (Robinson & Shane, 1990), (Damodaran, NYU Stern, 2010), (Lyle, 2017)	Negative	(Moeller, 2004) (Loderer & Martin, 1990) (Garvey & Hanka, 2002)
Total Debt/ EBITDA Acquirer	Negative	(Bugeja & Walter, 1995), (Hayward & Hambrick, 1997)	Negative	(Garvey & Hanka, 2002) (Masulis, Wang, & Xie, 2007)
Contested Bid	Positive	(Chen, 2002), (Damodaran, The Value of Synergy, 2005), (Chamberlain, 2016)	Negative	(Damodaran, The Value of Synergy, 2005) (Wansley & Lane, 1983)
Majority Interest	Positive	(Hayward & Hambrick, 1997), (Vulpiani, 2014), (Xin-qing, 2010)		Missing Evidence
Number of M&A Transactions previously implemented (Acquirer)	Negative	(Langford & Brown, 2004), (Deloitte & Touche LLP, 2012)	Positive	(Ma, Pagán, & Chu, 2009)
Growing Industry	Positive	(Laamanen, 2007), (PwC, 2021)	Positive	(Laamanen, 2007) (Ma, Pagán, & Chu, 2009)
Cross Border Transaction	Positive	(Sovbetov, 2015), (Rossi & Volpin, 2004)	Positive	(Morck & Yeung, 1992)

In conclusion, before proceeding with the overall analysis, it's important to understand the below table in order to perfectly comprehend the scope of the following dissertation.

Understanding the Pandemic's Impact		
Micro Analysis	Macro Analysis	
Bid Premium Regression Model	CAR Regression Model	

<sup>&</sup>lt;sup>6</sup> Given an increase in the value of the control variables, the bid premiums will be impacted according to the information provided in *Figure 1*. The same reasoning applies in the case of the cumulative abnormal returns.

# Research Question and Methodology

## 2.1 Research Question

Considering the above premises, the main hypothesis of this dissertation is that bid premiums and short term Cumulative Abnormal Returns (CAR) have been negatively impacted by the current health crisis, which in turn exacerbated in a robust economic crunch characterized by a lack of predictable cash flows and low market confidence. In fact, the study is articulated considering the following research question and ancillary analysis:

# "To which extent Bid Premiums and CAR have been impacted because of the COVID-19 Pandemic?"

### Ancillary Analysis:

- Did the *severity* of the breakout affect those measures?
- How does measure vary across industries?

### 2.2 Research Method

The methodology of this study is based on a secondary data analysis in which financial information was derived from data providers like *Refinitiv* and *Yahoo Finance*. Given the comprehensive amount of information within the Refinitiv database, the second source was used only in limited instances. Concerning instead the data retrieved for the computation of the Covid Severity index, all the information were gathered from the national official websites of each country involved in the analysis. Moreover, the hospitalization data was retrieved from the website *Our World in Data*. Subsequently, the data analysis has been performed leveraging on the statistical software *Stata*.

## 2.3 Research Design

To understand if a given relationship exists between the bid premiums and the Covid-19 spread, we will leverage on a linear regression model following this below equation:

$$BP = \alpha 0 + (\alpha 1)After 2020 + (\alpha 2)CovidSeverityIndex + Control Variables$$
[2.1]

 $\alpha 1$  = Dummy Variable capturing if the transaction was announced from 2020 onwards.

#### $\alpha 2$ = Covid Severity Index

The response variables used will be the Bid Premiums computed considering the closing market price one day, seven days and thirty days before the announcement of the transaction. It is paramount to take into account not only the closing price one day before the information becomes public but also consider the closing market price in the previous trading days in order to mitigate the possibility that the market price can be affected by a leak of private information. In fact, given the multiple empirical studies performed, academics mostly find out that even before the announcement of the transaction, stock prices often experience abnormal returns; therefore, using a closing price several days before the announcement we are able to avoid the price being inflated to abnormal levels (Adnan & Hossain, 2016) and record a realistic measure of the premium offered.

The first explanatory variable will be a dummy variable in which a value of 1 will correspond to the announcement day being in 2020 and 2021. On the other hand, a value equal to 0 will indicate that the announcement of the transaction was made before 2020. Levering on this variable we aim at observing possible differences in the bid premiums caused by the current health crisis.

Moreover, the second explanatory variable aims at capturing the severity of the Covid-19 pandemic in the weeks before the announcement of the transaction. The index was computed for each analyzed country and was applied for the single transaction considering the nation in which the acquiring company operates. In fact, for each country we gathered information of new daily cases, new daily deaths and number of hospitalized patients. Subsequently, those values were adjusted per 100'000 inhabitants, which experts defined as a fundamental measure to assess the severity of the breakout and, moreover, the three categories were weighted considering the following values:

Daily Index Computation =  $\left(\frac{1}{9}\right) *$  New Daily Cases +  $\left(\frac{4}{9}\right) *$  New Daily Deaths +  $\left(\frac{4}{9}\right) *$ Current Hospitalized Patients [2.2] The principle behind those weights is to capture the severity of the health crisis taking into account as most important factors the New Daily Deaths and the Current number of hospitalized patients in each country. Therefore, considering those three values, we have assigned arbitrary weights that could capture more efficiently the severity of the pandemic. Anyhow, it would not make much sense to consider the index value on the day in which the transaction announcement is made since the final offering price is established weeks, if not months, before the actual announcement. Therefore, considering this logic, we have computed the value of the Covid Severity Index through a weighted average of the 21 daily indices preceding the announcement date, posing most weights on the 21st day and less on the index value immediately preceding the announcement day. Within the Appendix, further details on the Index computation will be provided.

Finally, unobservable variables in the error term will always be present, anyhow we are able to mitigate this issue finding those omitted variables and including them within the regression. In fact, this is the principle behind the use of control variables which we have previously underlined within the literature review and summarized in *Figure 1*. Leveraging on the theoretical background behind the determination of the bid premium, we tried the capture the main factors that are correlated with the response variable trying to enhance the efficacy of the overall analysis.

Please note that, in order to effectively answer to the question on whether we had an impact linked to the current health crisis and if the severity of the pandemic had a significant effect on the retrieved premiums, we need to disentangle the two effect and implement two different regression analysis. In fact, we will implement our analysis considering two different samples: the first sample of transactions will include all the data set and we will investigate the role of the covid-19 pandemic reasoning on the *After2020* dummy variable, without considering the Covid Severity Index. Afterwards, we will study the impact of the severity breakout by reducing the sample to the transactions performed from 2020 onwards and including the *Covid Severity Index* as explanatory variable without taking into account the above-mentioned dummy variable.

Additionally, considering instead a macro perspective, we are interested in discovering if the current pandemic had a considerable impact also on the Cumulative Abnormal Returns considering

an event window of -1 and +1 with respect to the announcement date. Similarly, in this context we will take into account a linear regression model considering the following equation:

 $CAR = \alpha 0 + (\alpha 1)After 2020 + (\alpha 2)CovidSeverityIndex + Control Variables [2.3]$ 

The cumulative abnormal returns were computed considering a one factor model in which we took into account as independent variable the index of the country in which the acquiring company operates. Therefore, an event study was performed, for every single transaction within the sample, following the below phases:

- 1. Regression analysis between the stock price returns of the acquiring company and the market index returns before the event window
- Computation of the expected returns during the event window (-1;+1) considering the parameters previously computed within the regression
- 3. Calculation of the difference between the actual returns of the company during the event window and the expected returns retrieved from the one-factor model
- Sum of those differences considering the 3-days event windows in order to compute the Cumulative Abnormal Returns

Finally, as previously underlined within the literature review, the same control variables will be included within this second regression model. The logic behind this decision is linked to the fact that market participants will not only react in an irrational manner during the announcement date, but also considering to which extent this business combination could be successful in the long run and the associated level of complexity in the case of a cross-border transaction. Therefore, those parameters previously underlined in *Figure 1*, besides proven to be significant in order to determine the bid premiums are also crucial to understand if a given transaction can create sustained value for shareholders and consequentially, how market participants will ultimately react to the deal announcement.

Finally, also in this case we will apply the same reasoning previously mentioned while investigating the results of the bid premiums. In fact, disentangle the impact and the severity issues by studying the two effects in two separate regression equations.

# Statistical and Empirical Analysis

# 3.1 Sample and Variables Description

The sample chosen for this analysis entails 174 M&A operations having a deal size greater then 50 million US dollars. The reason of the cut-off established at 50 million US dollars transactions size is linked to the fact that for transactions having a lower deal size, most of the basic information was missing – e.g., form of the transaction and/or price per share paid by the acquiring company. Thus, by considering business combinations having a deal size above 50 million US dollars we have insured a completeness of the provided data.

Announced M&A Transactions Worldwide from 01/01/2019	128487
Less: Uncompleted Deals	38826
Less: Deals below 50 million US dollars	79776
Less: Deals outside the pre-determined countries	4848
Less: Non-Public Acquirers and Targets	4667
Less: Financial Buyers	74
Less: Buybacks and Acquisition of remaining interest	122
Final Sample	174

#### Figure 2. Sample Selection Process

The selected companies are *Non-Financials Public Companies* which announced a business combination from the first of January 2019 until March 2021. Obviously, only listed companies were included within the sample in order to derive more efficiently the data needed for the analysis and to compute the CAR of the share prices during the considered event window. Finally, the cluster of countries taken into account for the analysis are the United States, Canada, United Kingdom, Italy, Germany, Spain, Netherlands, France and Switzerland, having more developed and efficient financial markets with respect to other countries.

Considering more in depth the sample description, we start by analyzing the size of the deals considered within the sample and their distribution.
	Percentiles	Smallest		
1%	59.94	55.2		
5%	85.16	59.94		
10%	112.23	63	Obs	174
25%	330.84	64.74	Sum of wgt.	174
50%	1236.105		Mean	5239.364
		Largest	Std. dev.	13221.66
75%	3961	54210.61		
90%	12222.73	83859.34	Variance	1.75e+08
95%	19798.99	89794.16	Skewness	5.007377
99%	89794.16	93444.83	Kurtosis	30.29311

Deal Size (M USD)

# Figure 3. Deals Size Summary

As we can see from the above table, the smaller transaction within the sample is the merger between the German company Purplebricks Group PLC and the UK-based company Axel Springer SE for a total transaction value of 55.2 million US dollars. On the other hand, the most lucrative transaction included within the sample is merger between the two US-based companies Bristol-Myers Squibb Co and Celgene Corp, for a total deal size of more than 93 billion US dollars. One important aspect that we should underline is that both transactions were performed in 2019. Considering the transaction value, we can observe a level of positive skewness of 5.007, suggesting that the majority of the deals performed during the time span of the sample falls below the mean value of 5.23 billion US dollars.

Concerning the industries involved, the sample includes 52 different sectors of which the majority is represented by the pharmaceutical sectors, with 23 transactions, Oil and Gas (20) and Metals and Mining (15). Moreover, considering the countries in which the acquiring companies operate we have retrieved the following distribution:

Acquirer Nation	Freq.	Percent	Cum.
Canada	24	13.79	13.79
France	12	6.90	20.69
Germany	4	2.30	22.99
Italy	6	3.45	26.44
Netherlands	1	0.57	27.01
Switzerland	3	1.72	28.74
United Kingdom	15	8.62	37.36
United States	109	62.64	100.00
Total	174	100.00	

#### Figure 4. Acquirer Nation Summary

Therefore, one conclusion that can be retrieved analyzing the above summary is that the majority of the transactions performed during the time span from January 2019 until March 2021 has been executed by firms operating in North American countries, while considering the EU-zone countries, only 41 transactions were performed.

Finally, looking more specifically at the announcement dates distribution we can clearly see that the amount of non-financial business combinations announced in 2020 is significantly lower compared with 2019. From this analysis we will investigate whether and for which variables the current pandemic had a significant impact on the M&A context. Anyhow, considering the below graph, we can anticipate that, overall, the current social-economic crisis had a negative impact on the number of transactions executed. Considering significant examples of deals which have been discarded following the Covid-19 pandemic we can mention the 34 billion dollars offer dropped by Xerox to buy HP or the withdrawn of Softbank in the 3 billion dollars offer to buy additional WeWork shares. Those issues arise because of the impact that the current health crisis trigger concerning a standard M&A process. In fact, besides a lack a predictability in the level of cash flows caused by the robust economic downturn, the overall value chain linked to a business combination experienced significant inefficiencies – e.g., longer negotiations and due-diligence processes. Anyhow, the fact of not being able to confidentially predict the outlook within a given sector halted most companies in their business combination plans. While businesses like Amazon

experienced an enormous growth during the pandemic<sup>7</sup>, other sectors heavily suffered restrictions established at national level, damaging the possibility of forecasting a reliable outlook for those specific industries. Obviously, WeWork business model, based on sharing office spaces among professionals, was not the ideal environment that could attract customers during a global pandemic. Therefore, those type of industries experienced an outflow of capital besides a robust decrease in the level of revenues. Anyhow, in certain business combinations, instead of completely withdrawing from the transaction, some acquiring companies triggered the Material Adverse Changes clause within the Sales and Purchase Agreement in order to obtain a deduction on the initial offering price. The clause is generally included in all types of M&A contracts in order to avoid that between the announcement of the transaction, in which the offering price is agreed and the actual closing of the deal, after the approval from shareholders and authorities, the target company value could be highly impacted by external and unpredictable factors. This clause is usually included as a termination right within the SPA; anyhow, as we stated before, the two companies involved often reach an agreement on the offering price, decreasing the premium initially established. In this specific context we can mention the renegotiation between Tiffany and LVMH, which allowed the latter to obtain a robust discount on the initial offering price, given the unfavorable outlook within the luxury sector.



Figure 5. Announcement Dates Distribution

<sup>&</sup>lt;sup>7</sup> The US-based giant is considered one of companies which most effectively navigated the global crisis caused by the pandemic, experiencing in the first quarter of 2021 e net profit of more than three times the one gained in the previous year.

It is important to remark that the above transactions involve listed companies, both considering the bidder and the target. Therefore, those business combinations are often deemed as being more complex to execute with respect to private transaction given also the enormous pressure derived from the market. In fact, if we consider the Private Equity environment, besides the economic crisis caused by the pandemic, both the number of operations and the multiples paid in 2020 and the first quarter of 2021 were consistent with the values of 2019. Paradoxically, the multiples paid in 2020 have reached levels yet to be obtained within the private transaction environment.

Overall, considering the research design previously defined, the following continuous and dummy variables, together with their main statistical characteristics, have been considered within the analysis:

Variable	Obs	Mean	Std. dev.	Min	Max
BP1	174	.331092	.5433172	98	4.09
BP7	174	.4067816	.5777352	98	3.62
BP30	174	.5052874	.7699438	98	4.92
CovidSever~x	174	1.988975	3.910612	0	21.18087
Debt0verAs~t	174	.2810701	.2262641	0	.9773583
Debt0verEB~A	174	2.086667	1.85203	0	8.4
Number0fTr~s	174	51.64368	131.2652	0	1182
CAR	174	1518025	1.397568	-18.03225	.4221118

Figure 6. Statistical Summary Continuous Variables

Transaction Period	Freq.	Percent	Cum.
Before2020 After2020	103 71	59.20 40.80	59.20 100.00
Total	174	100.00	

Figure 7. Transaction Periods Summary

Deal Nature	Freq.	Percent	Cum.
Friendly	169	97.13	97.13
Contested	5	2.87	100.00
Total	174	100.00	

Figure 8. Deal Nature Summary	Figure	8.	Deal	Nature	Summary
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	Interest	Freq.	Percent	Cum.
Minority Majority	Interest Interest	16 158	9.20 90.80	9.20 100.00
	Total	174	100.00	

Figure 9. Interest Summary	
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GI	Freq.	Percent	Cum.
Non-Growing Industries Growing Industries	122 52	70.11 29.89	70.11 100.00
Total	174	100.00	

Figure 10. Growing Industries Summary

СВ	Freq.	Percent	Cum.
Local Transactions	132	75.86	75.86
Cross-Border Transactions	42	24.14	100.00
Total	174	100.00	

Figure 11. Cross-Border Transactions Summary

# 3.2 Bid Premiums Regression Model

Referencing equation [2.1] underlined within the research design paragraph we will study the effects of the current pandemic on the bid premiums within our sample.

As we previously mentioned, when we compute the bid premium of the business combination as a response variable, it is crucial not only to compute the premium on the offering amount considering the price of the target one day before the announcement but also consider the stock price in additional time frames like seven and thirty days before. In fact, those additional prices are often taken into account in order to mitigate the possibility that the premium one day before the announcement could be negatively impacted by the abnormal returns that the target company often experiences before going public with the transaction information. This issue is usually linked to the fact that, before the official announcement, we often observe leaks of privileged information or rumors that will ultimately affect the target's stock price even before the publication of all the transaction details. This is particularly true if we consider public companies which are scrutinized the most with respect to their private counterparts; in fact, in a context of a private transaction, most of the information tends to remain privileged until the day of the official market announcement. Therefore, we will account for this issue by considering the aforementioned prices, from which we will retrieve a bid premium measure less affected by market dynamics linked to the transaction, especially in the case of premium computed on the closing price thirty days before the announcement.

As a starting point for the analysis, we will look at the distribution of the three response variables previously mentioned.



Figure 12. Bid Premium (-1) Distribution

As we can conclude from the above graphical representation of the Bid Premiums one day before the announcement date, the histogram appears to be normally distributed with some outliers capturing a bid premium value of over 300% and 400%. Moreover, the distribution appears to be highly concentrated around the mean value of 33%, consistent with a kurtosis measure equal to 19.65. Empirically, the retrieved mean value of the bid premium is consistent with the major M&A literature which places the average offering price within a given transaction in the range of a 30%/40% premium with respect to the market price one day before the announcement. As we explained in the above paragraphs, we also need to analyze the bid premiums computed seven days and thirty days before the market announcement. In fact, by analyzing the distribution of those variables, we obtained the following results:



Figure 13. Bid Premium (-7) Distribution



Figure 14. Bid Premium (-30) Distribution

Considering the above graphical representations, we can clearly see that the theorical background previously underlined is consistent with the empirical analysis. In fact, the mean value of the three distributions analyzed experience an upward trend starting from the premium computed with the price one day before the announcement. This unequivocally proves that premiums are negatively impacted as we approach the announcement date, proving also that a given analysis made on a premium computed weeks before the public announcement could allow for a more consistent analysis of the offering price without suffering from biases derived from irrational market participants – i.e., it will allow for a more effective investigation on the deal price, which could more realistically capture the premium offered from the acquiring company. Obviously, if we take into account a bid premium highly affected by ex-ante leaks of privileged information all the literature arguments previously stated will not hold since retrieved value will be a measure completely affected by external market agents and not constructed the acquiring company considering a synergistic argument.

Besides having a higher premium with respect to the first distribution, the bid premiums computed on the price seven and thirty days before the announcement exhibit a kurtosis measure lower with respect to the first response variable considered<sup>8</sup>, thus, the premium values will be less concentrated around the mean and more dispersed, capturing the randomness of a measure that should be independent from market dynamics. As we can see from the below graphical representation, consistently with the arguments previously made, on average the mean value of the Bid Premium computed thirty days before the announcement is higher with respect to the other two factors given the lack of market dynamics impacting the trade volumes<sup>9</sup> and consequentially, the stock price of the target.



Figure 15. Mean Values of Response Variables

Concerning instead the continuous explanatory variables involved, we need to analyze the distribution of the Covid Severity Index. From the below graph we can see that most values considered within the sample fall below the mean value of 1.98, exhibiting a positive skewness of 2.46. Thus, considering the fact that we have included the index values just for the days in which market announcements have been made and given the fact that most value are positively skewed,

<sup>&</sup>lt;sup>8</sup> While the Bid Premium (-1) distribution exhibit a distribution with a kurtosis measure of 19.65, the Bid Premiums (-7) and (-30) exhibit a kurtosis measure of 10.89 and 14.68 respectively.

<sup>&</sup>lt;sup>9</sup> A business combination will always lead to a massive increase in trade volumes that will ultimately affect the stock price. Among the retrieved sample we could mention BioSpecifics Technologies Corp, which experienced an increase in trade volumes from 18026 up to 1624556 on the day of the announcement.

we could assume that those transaction were made public in a time frame in which the covid severity index value was relatively low.



Figure 16. Covid Severity Index Distribution

In order to prove the above assumption, we have implemented a logistic regression modifying the initial sample by just considering the transactions executed by acquiring companies based in the United States and the respective Covid Severity Index at announcement date. From the below table we can analyze the derived results.

Logistic regression	Number	of obs	= 4	09			
	LR chi2	( <b>1</b> )	= 1.	67			
	Prob >	chi2	= 0.19	68			
Log likelihood = <b>-103</b>	Pseudo	R2	= 0.00	80			
T1	Coefficient	Std. err.	z	P> z	[95%	k conf.	interval]
COVIDSeverityIndexUS	0385344	.0311162	-1.24	0.216	09	99521	.0224521
_cons	-2.262188	.2995144	-7.55	0.000	-2.84	19226	-1.675151

Figure 17. Logistic Regression Covid Severity Index

Even though the above regression analysis is statistically significant only at 22% level, we can observe a negative relationship between the binary outcome, as response variable<sup>10</sup>, and the

<sup>&</sup>lt;sup>10</sup> In this analysis the response variable assumed a value of 1 if, on that day, a business combination was announced and a value of 0 otherwise. Moreover, the period taken into account for this sub-analysis starts from 28 January

level of Covid Severity Index experienced during the considered time frame. Overall, this is highly consistent with our initial hypothesis that the current health crisis had a significant impact on the business and economic environment and also in choosing the period in which those transactions are actually announced within the market.

Considering instead the distributions of the control variables identified within the sample, we will start by analyzing the level of debt to asset ratio of the target company, computed considering the values at the end of the yearly period before the transaction announcement. As we can see from the below graphical representation of the variable distribution, the Debt to Asset ratio experience a degree of normal distribution, even though, also in this case, we have retrieved a positive skewness value of 0.72. Therefore, within the analyzed sample, most target companies experienced a relatively low Debt to Asset ratio in the year before the transaction announcement. This result is consistent also considering the literature previously explained. In fact, when we defined the main determinants of the bid premium, we have also specified that one important element that is consider is the possible advantage, in term of debt exposure, that the acquiring company can derive from the business combination. Thus, a target company having lower debt exposure will be more attractive for a possible M&A operation. This reasoning is particularly true if we take into account a transaction made from financial buyers, which are not considered within the sample of the following analysis. In this particular case, financial buyers, not involved in distressed transactions, will implement an LBO operation<sup>11</sup> in order to perform the transaction; therefore, in this context, having a target with low debt exposure is not only an advantage but a prerequisite.

<sup>2020,</sup> date in which the Covid Severity Index starts to increase in value, until 11 March 2021, date of the last recorded transaction within the sample.

<sup>&</sup>lt;sup>11</sup> The acronym LBO stands for Leverage Buyout and its one of the main financial transaction methods used from financial buyers. The principle behind this operation is to finance the offering price mostly with debt, injecting only a small percentage of equity, usually around 40% or 30%.



Figure 18. Debt to Asset Ratio Distribution

The above argument can be replicated if we consider the Total Debt over EBITDA ratio of the acquiring company. In fact, also in this case we have retrieved a distribution which exhibits minor bell-shaped characteristics with respect to the previous control variable, having a positive skewness of 0.98. Anyhow, it is important to take into account that this kind of distribution was expected from a theoretical standpoint. In fact, bidders will usually bear the risks of a business combination only if they are sure that, considering their current economic status, they will be able to fully sustain this extraordinary operation. Anyhow, the above argument will not apply for all the business combinations, in fact, we are able to observe also acquiring companies that exhibit a higher level of debt exposure still performing those type of operations. One example in this context is the 25 billion dollars transaction announced in May 2019 between Global Payments Inc and Total System Services Inc. The former, considering the 2018 results, experienced a Total Debt over EBITDA of 4.14; anyhow, this did not disincentives the company in implement this business combination due to strong advantages that the company could have exploited, in the long run, in terms of increased revenues and technological capabilities. Therefore, this ratio could allow us to understand which companies might be better positioned to successfully implement an M&A operation; anyhow, different motives might be involved that could ultimately encourage a company to trigger such operation for the expected benefits that it could retrieve.



Figure 19. Total Debt to EBITDA Distribution

Ultimately, considering the last continuous control variable within the sample, we need to analyze the distribution of the number of M&A transactions previously implemented by the acquiring company.



Figure 20. Acquirer's M&A Transactions Distribution

Even though, while implementing the above graphical representation we did not consider four transactions involving acquiring companies having an M&A track record of more than 500 business combinations, the distribution does not exhibit bell-shaped characteristics and most values will fall below the mean number of 52 transactions per companies. As we previously stated within the literature review, some companies perform multiple business combinations during the years as a growing strategy. Anyhow, they still represent a minority within the sample. In fact, we shall notice that business combinations usually involve tremendous effort by the acquiring company that could ultimately damage its core business having all its management focused on the extraordinary operation. Thus, given those complexities and all the costs involved in implementing those type of transaction, only companies fully equipped will be able to perfectly sustain multiple operations in one single financial year – e.g., Cisco and LVMH.

Once we account for the above description, we continue our analysis focusing on the correlation among the variables involved within the model.

# 3.2.2 Correlation Analysis

Considering all the arguments previously stated we know that this regression model, based on the bid premium analysis, is consistent from a theoretical standpoint. Anyhow, one crucial step before implementing a regression analysis is to understand the level of correlation between the response and explanatory variables; moreover, the correlation matrix will allow us to understand if a certain degree of multicollinearity exists among the factors taken into account.

	551	After	COVID Severity	Debt Over	Debt Over	Contested	Majority	Number of	CD.	CI.
	BPI	2020	Index	Asset	EBIIDA	Bid	Interest	Transactions	CB	GI
BP1	1									
After 2020	0.010	1								
COVID Severity Index	0.055	0.614	1							
Debt Over Asset	-0.046	-0.029	0.063	1						
Debt Over EBITDA	0.020	0.175	0.042	0.153	1					
Contested Bid	-0.049	-0.073	-0.054	-0.016	-0.111	1				
Majority Interest	-0.049	-0.140	-0.097	0.043	-0.106	-0.421	1			
Number of Transactions	-0.019	0.026	0.061	0.048	0.121	-0.008	-0.256	1		
СВ	0.096	0.024	-0.103	0.039	0.007	-0.097	-0.099	0.040	1	
GI	0.223	-0.031	0.009	-0.222	-0.169	-0.112	0.077	-0.089	0.013	1

Figure 21. Correlation Matrix Bid Premium (-1)

			COVID		Debt					
	007	After	Severity	Debt Over	Over	Contested	Majority	Number of	CD	CI
	BP/	2020	Index	Asset	EBIIDA	Bid	Interest	<i>I</i> ransactions	CB	GI
BP7	1									
After 2020	0.043	1								
COVID Severity Index	0.063	0.614	1							
Debt Over Asset	-0.050	-0.029	0.063	1						
Debt Over EBITDA	0.004	0.175	0.042	0.153	1					
Contested Bid	-0.036	-0.073	-0.054	-0.016	-0.111	1				
Majority Interest	0.010	-0.140	-0.097	0.043	-0.106	-0.421	1			
Number of Transactions	-0.031	0.026	0.061	0.048	0.121	-0.008	-0.256	1		
СВ	0.115	0.024	-0.103	0.039	0.007	-0.097	-0.099	0.040	1	
GI	0.257	-0.031	0.009	-0.222	-0.169	-0.112	0.077	-0.089	0.013	1

Figure 22. Correlation Matrix Bid Premium (-7)

	BP30	After 2020	COVID Severity Index	Debt Over Asset	Debt Over EBITDA	Contested Bid	Majority Interest	Number of Transactions	СВ	GI
BP30	1									
After 2020 COVID Severity	0.089	1								
Index Debt Over	0.186	0.614	1							
Asset Debt Over	-0.052	-0.029	0.063	1						
EBITDA	-0.041	0.175	0.042	0.153	1					
Contested Bid Majority	-0.031	-0.073	-0.054	-0.016	-0.111	1				
Interest Number of	-0.026	-0.140	-0.097	0.043	-0.106	-0.421	1			
Transactions	-0.039	0.026	0.061	0.048	0.121	-0.008	-0.256	1		
СВ	0.080	0.024	-0.103	0.039	0.007	-0.097	-0.099	0.040	1	
GI	0.227	-0.031	0.009	-0.222	-0.169	-0.112	0.077	-0.089	0.013	1

Figure 23. Correlation Matrix Bid Premium (-30)

As we initially specified, the most important response variable that we need to consider in this context is the bid premium computed considering the closing price thirty days before the transaction announcement, given the fact that we aim at obtaining the most realistic value that could more effectively capture the bid premium offered by the acquiring company. Anyhow, even if we take into account the above-mentioned response variable, the result obtained within the correlation matrix captured in *Figure 21* seems inconsistent with our initial hypothesis. In fact, both the dummy variable 'After 2020' and the Covid Severity Index appear to have a positive correlation with the Bid Premium paid by the acquiring company. This is counterintuitive from a theoretical standpoint since we would have expected that bidders, given the high level of uncertainty within the market, would have paid lower premiums with respect to a bullish year like 2019. Anyhow, even though we observe a positive correlation among those variables, the magnitude of the retrieved results is relatively lower, suggesting that relationship is not highly significant. The same argument is applied if we take into account the other explanatory variables. In fact, according to our sample, the level of bid premium seemed to be negatively correlated with the transaction being contested and for companies seeking a majority interest, which is highly inconsistent with the literature previously underlined. On the other hand, the result concerning Debt Over Asset of the target company seems to be consistent with the theoretical framework previously defined, given the negative relationship with the level of bid premiums. Overall, given the above results, we do not expect the regression analysis, incorporating the full sample, to be highly statistically significant, given also the lack of theoretical basis behind the obtained results.

Finally, considering multicollinearity issues, the explanatory variables exhibiting a relatively higher correlation between each other are the 'After 2020' and the Covid Severity Index and also the Contested Bid and the Majority Interest. The first pair of variables was highly expected since before 2020 the level of Covid Severity Index was 0. Therefore, as we approach the time frame in which the current health crisis starts, both variables will increase in value, with the former assuming a value of 1, given the start of the year 2020, and the latter increasing from a value of 0 given the pandemic breakthrough. The second pair of explanatory variables experience instead a negative correlation from which we could assume that usually, as a company acquires a majority interest in another entity usually those type of business combinations tend not to be contested bids. Theoretically speaking this can be true, especially if we consider the case of Market for Corporate

Control in which we have financial investors seeking, in a contested way, the minority interest of a given target in order to affect its business and financial strategy so to increase the value of their participation. Anyhow, in the context of this analysis, we will remain conservative regarding possible conclusions on this argument, given also the fact that those type of transaction involving a financial buyer are not taken into account within the chosen sample.

#### 3.2.3 Regression Analysis

In this section we will analyze one of the key components of our investigation: the linear regression analysis. Considering the primary part of the investigation and all the theorical arguments previously defined, we will implement the analysis following the below regression equation:

 $Bid Premiums = \alpha 0 + (a1)After 2020 + (a2)DebtOverAsset + (a3)DebtOverEBITDA + (a4)ContestedBID + (a5)MajorityInterest + (a6)NumberOfTransactions + (a7)GrowingIndustry + (a8)CrossBorderTransactions [3.1]$ 

Please notice that the last seven variables are included as controls while the actual results that we want to retrieve is linked to the first variables. In fact, consistently with our initially hypothesis, we need to study if the level of bid premiums offered within the market has been negatively impacted by the current pandemic and if we are able to observe significant differences among the time frames taken into account.

As a starting point, we will implement the linear regression analysis considering just the response variable and the explanatory variable for which we want to observe if a relation exists. Thus, by running this first one-variable linear regression analysis we have obtained the following results:

Source	SS	df	MS	Number of obs	5 =	174
<u>n</u>				- F(1, 172)	=	1.37
Model	.809982318	1	.809982318	B Prob > F	=	0.2436
Residual	101.746756	172	.591550904	R-squared	=	0.0079
				- Adj R-squared	d =	0.0021
Total	102.556738	173	.592813514	Root MSE	=	.76912
BP30	Coefficient	Std. err.	t	P> t  [95% d	conf.	interval]
After2020	.138824	.1186377	1.17	0.24409534	194	.3729974
_cons	.4486408	.075784	5.92	0.000 .29905	544	.5982272

Figure 24. Regression Table Bid Premium Analysis Total Sample (No Controls)

From the above regression analysis, we can see that the retrieved model is not highly significant in terms of R-Squared and Adjusted R-Squared and exhibits an inconsistent result concerning the coefficient of the dummy variable *After 2020*, given the positive relationship obtained. Afterwards, we tried to add the controls within our model. Running the regression on the statistical analysis software Stata, we have obtained the following results:

Source	5	SS d	f MS	Num	per of obs	=	1	74
Model Residual	6.9827 95.574	73496 10029 16	8 .87284187 5 .57923638	– F(8) 1 Prol 1 R–so	, 165) o > F quared	= = =	0.15 0.06	51 83 81
Total	102.55	6738 17	3 .59281351	– Adj 4 Root	R-squared MSE	= =	0.022 .761	29 08
<u></u>	BP30	Coefficient	Std. err.	t	P> t	[95%	conf.	interval]
Aft	er2020	. 145393	.1213483	1.20	0.233	0942	2026	.3849885
Debt0ve	rAsset	.0153468	.2657701	0.06	0.954	5094	4018	.5400955
Debt0ver	EBITDA	0093264	.0331104	-0.28	0.779	074	4701	.0560482
Contes	tedBID	0470324	.400589	-0.12	0.907	8379	9735	.7439087
MajorityIn	terest	0992328	.2390812	-0.42	0.679	5712	2857	.3728201
Number0fTransa	ctions	0001816	.0004633	-0.39	0.696	001	0964	.0007333
	GI	.3772006	.1321239	2.85	0.005	.1163	3291	.6380721
	СВ	.1275323	.1373882	0.93	0.355	143	7332	.3987979
	_cons	.418434	.2822032	1.48	0.140	138	7609	.9756288

Figure 25. Regression Table Bid Premium Analysis Total Sample

As we have previously anticipated by analyzing the correlation matrix among the different variables involved and first regression model in *Figure 24*, the linear regression analysis is not significant and exhibits multiple inconsistencies with respect to the theoretical framework previously discussed. Anyhow, in order to enhance the quality of the model we can apply a

backward variable selection procedure. Thus, we will exclude from the regression analysis, one by one, the variables having the highest P-Value and implement once again the regression until we arrive at a model in which all the variables exhibit a P-value under a predetermined cut-off, which in this case we will place at 20% level. Applying this methodology, we ultimately obtain the following regression analysis having just the *After 2020* and *Growing Industry* dummy variables as explanatory variable.

Source	SS	df	MS	Numb	er of ob	s =	174
Model	6.21730493	2	3.10865246	F(2, Prob	171) > F	=	5.52 0.0048
Residuat	90.3394329	1/1	. 505566497	– Adj∣	R-square	- d	0.0496
Total	102.556738	173	.592813514	Root	MSE	=	.75059
<u></u> ,							
BP30	Coefficient	Std. err.	t	P> t	[95%	conf.	interval]
After2020	.1499935	.1158354	1.29	0.197	0786	579	.378645
GI	.3852961	.1243677	3.10	0.002	.1398	026	.6307897
_cons	.3289371	.0834429	3.94	0.000	.1642	263	.493648

Figure 26. Regression Table Bid Premium Analysis Total Sample BVSP Application

Considering the above study, we have finally obtained a regression model in which the explanatory variables are significantly different from zero. Besides the fact that the model exhibits a relatively low R-Squared even for a context of social-economic studies, the retrieved analysis captures a coefficient which is positively related with the bid premium offered within the transaction. Thus, the result is counterintuitive from a theoretical standpoint and consistent with the analysis previously implemented while studying the correlation matrix. On the other hand, the analysis shows that the growing industry dummy variables appears to be highly significant and positively correlated with the level of bid premium offered. This last result appears to be consistent with the literature review previously defined.

As we have noticed, all the above regressions have been performed considering the bid premium computed on the closing price thirty days before the announcement given the unbiased nature of this particular variable. Anyhow, for consistency purposes, we have conducted the same analysis on the other two response variables initially identified; anyhow, the obtained results are consistent with the ones obtained above and the additional models exhibits a lower R-Squared with respect to the above regression table picturing even more inconsistencies with respect to the previous regression analysis. In the appendix section further details regarding those other analysis will be included.

Subsequently, as previously defined within the research design paragraph, we need to verify the impact of health crisis severity on the analyzed premiums. Therefore, the reference regression equation for this section will be the following:

Bid Premiums = α0 + (a1)CovidSeverityIndex + (a2)DebtOverAsset + (a3)DebtOverEBITDA + (a4)ContestedBID + (a5)MajorityInterest + (a6)NumberOfTransactions + (a7)GrowingIndustry + (a8)CrossBorderTransactions [3.2]

Please note that in this case we want to investigate whether the impact severity of the pandemic had an impact on the level of bid premiums offered within a business combination. Therefore, we won't use the sample as in the previous regression analysis, but we will take into account just the transactions performed from 2020 onwards. Consistently with the previous approach, we will start our analysis by running a regression of the aforementioned analysis without considering the control variables.

Source	SS	df	MS	Number	of obs	=	71	
Model Residual	2.8262774 48.904667	2 1 8 69	2.82627742.708763302	F(1, 6 Prob > R-squa	9) F red	= = =	3.99 0.0498 0.0546	
Total	51.730945	3 70	.739013504	Adj R-squared Root MSE		=	0.0409 .84188	
	BP30_2020	Coefficient	Std. err.	t	P> t	1	[95% conf.	interval]
CovidSeverity]	Index_2020 _cons	.0414238 .3857238	.020744 .1421503	2.00 2.71	0.050 0.008	-794 -	.0000406 .1021416	.082807 .669306

Figure 27. Regression Table Bid Premium Analysis 2020 Sample (No Controls)

Even though the above regression exhibits a highly significant explanatory variables at 5% level, the derived regression model still shows a relatively low value for R-Squared, meaning that the model is not able to fully account for the variations in the response variable. Afterwards, consistently with our previous approach we have included the controls within the regression model deriving the following result:

Source	SS	df	MS	Number	of obs	=	71	
Model Residual	4.3221957 47.408749	1 2 5 68	2.16109785 .697187493	Prob > R-squa	F F red	= = =	0.0515 0.0836	
Total	51.730945	3 70	.739013504	Root M	SE	=	.83498	
	BP30_2020	Coefficient	Std. err.	t	P> t	I	95% conf.	interval]
CovidSeverity	Index_2020 GI_2020 _cons	.0397138 .3232072 .3030149	.020607 .220649 .1518713	1.93 1.46 2.00	0.058 0.148 0.050	  	0014069 1170909 0000397	.0808345 .7635054 .6060694

Figure 28. Regression Table Bid Premium Analysis 2020 Sample BVSP Application

Again, once we apply the backward variable selection procedure with a cut-off of 20%, we ultimately obtain a regression model having only the growing industry as significant control variable. Consistently with the previous analysis, the Covid Severity Index exhibits a positive relationship with the level of bid premiums offered during the pandemic breakthrough. Anyhow, even if we have managed to increase the level of R-Squared, the model still exhibits a value which is relatively low even for a socio-economic study.

In analyzing the pitfalls and the possible ways in which we could effectively adjust and enhance our analysis we need to remember that within our sample we have included a bundle of different transactions performed by companies operating in different countries. Anyhow, a possible way in which we could adjust our model is to consider a sub-sample of the retrieved deals by taking into account only the transactions performed by acquiring companies operating in the United States. Following this approach, we have obtained the following regression model:

Source	SS	df	MS	Number of ob	s =	109
Model	.819446166	1	.819446166	Prob > F	=	0.1132
Total	35.2012422	108	.325937428	- Adj R-square Root MSE	ed = =	0.0142
BP30_US	Coefficient	Std. err.	t	P> t  [95%	conf.	interval]
After2020_US _cons	.1798949 .4098551	.11265 .0682414	1.60 6.01	0.1130434 0.000 .2745	205 745	.4032104 .5451357

Figure 29. Regression Table Bid Premium Analysis US Sample (No Controls)

Even if the above model exhibits even lower explanatory powers with respect to the previous analysis, the situation changes once we account for the significant control variables:

Source	5	S	df	MS	N	umber of obs	=	3	L09
Model Residual	4.8172 30.383	27849 89637	4 104	1.2043196 .29215349	– F 2 P 7 R:	(4, 104) rob > F -squared di R-squared	= = =	4. 0.00 0.13	39 368 37
Total	35.201	.2422	108	.32593742	8 R	oot MSE	=	.540	951
BP30	ø_us	Coefficient	Std	. err.	t	P> t	[95%	conf.	interval]
After2020 Debt0verEBITDA MajorityInteres1 G1	0_US A_US t_US I_US cons	.1723937 .0432641 .3391263 .3645712 1288165	.109 .023 .233 .110 .253	91881 89714 12559 02133 17788	1.58 1.49 1.47 3.31 -0.51	0.117 0.138 0.146 0.001 0.610	0441 0141 1194 .1460 6281	L305 L873 H628 H141 L034	.3889179 .1007156 .7977154 .5831284 .3704703

Figure 30. Regression Table Bid Premium Analysis US Sample BVSP Application

Considering the above regression analysis, we were able to obtain more consistent and significant results. In fact, the regression table in *Figure 30* pictures a scenario which is more consistent with the theoretical background previously defined. Indeed, even though we still observe a positive relationship between the level of bid premiums and the pandemic period, the explanatory variable involved are highly consistent with the theoretical arguments previously defined.

Following the same procedure previously applied we now restrict the sample considering just the transaction performed from 2020 onwards in the United States in order to observe if the

severity of the Covid-19 pandemic had a significant impact on the level of bid premiums. Thus, we initially analyzed those relationship starting from a regression model having just the *Covid Severity Index* as explanatory variable.

Source	SS	df	MS	Number of	obs :	=	40	
Model Residual	3.41288598 13.0849837	1 38	3.41288598 .344341676	F(1, 38) Prob > F R-squared	:	= 9. = 0.00 = 0.20	91 32 69	
Total	16.4978697	39	.423022299	Adj R-squa Root MSE	ared :	= 0.18 = .586	60 81	
	BP30_2020US	Coefficie	nt Std. err.	t	P> t	[95%	conf.	interval]
CovidSeverity]	Index_2020US _cons	.0552	1 .0175368 5 .146428	3.15 1.59	0.003 0.119	.0197 0629	085 394	.0907115 .5299165

Figure 31. Regression Table Bid Premium Analysis US 2020 Sample (No Controls)

Considering the above analysis, we can see that the coefficient results are consistent with the ones previously obtained. Indeed, we continue to observe a positive relationship between the health crisis and the level of bid premiums. Moreover, we were able to increase the statistical significance of the model by obtaining a level of R-Squared of 20.69%. As we add the control variables, we obtain the following results:

Source	SS	df	MS	Number of	obs	=	40	
Model Residual	6.90393294 9.59393672	3 36	2.30131098 .266498242	F(3, 36) Prob > F R-squared Adj R-squa	ared	= = =	8.64 0.0002 0.4185 0.3700	
Total	16.4978697	39	.423022299	Root MSE		=	.51623	
	BP30_2020US	Coefficier	nt Std. err.	t	P> t		[95% conf.	interval]
CovidSeverity: DebtOverE	Index_2020US BITDA_2020US GI_2020US _cons	.0636612 .0769882 .5287397 2048833	2 .0157681 2 .0420394 7 .1688681 1 .1902724	4.04 1.83 3.13 -1.08	0.000 0.075 0.003 0.289		.031682 0082717 .1862593 5907735	.0956403 .1622481 .87122 .1810073

Figure 32. Regression Table Bid Premium Analysis US 2020 Sample BVSP Application

Considering the above regression model, we were able to retrieve robust and significant statistical analysis that still exhibits the same outcomes previously retrieved. Given all the retrieved results and the various samples taken into account, please find below a summary table of the developed analysis.

Bid Premium Analysis	Ν	R-Squared	Adj R-Squared	Root MSE
Total Sample				
Figure 24 - Covid-19 Impact Significance (No Controls)	174	0.008	0.002	0.76
Figure 26 - Covid-19 Impact Significance	174	0.06	0.05	0.75
Figure 27 - Covid-19 Severity Significance (No Controls)	71	0.05	0.04	0.84
Figure 28 - Covid-19 Severity Significance	71	0.08	0.06	0.83
US Sample				
Figure 29 - Covid-19 Impact Significance (No Controls)	109	0.02	0.01	0.56
Figure 30 - Covid-19 Impact Significance	109	0.14	0.1	0.54
Figure 31 - Covid-19 Severity Significance (No Controls)	40	0.21	0.19	0.58
Figure 32 - Covid-19 Severity Significance	40	0.42	0.37	0.51

Figure 33.	Result Summary	Bid Premium	Regression	Analysis
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### 3.2.4 Cross-Industry Consideration

While describing the sample data we have specified that we have retrieved 52 different sectors according to the criteria established by Refinitiv, from which the main transaction information was derived. Anyhow, having a cluster of 52 different sectors will not allow us to effectively implement a proper cross-industry analysis, given also the fact that in some categories, only one transaction is present. Therefore, to better implement this analysis considering possible differences across different sectors, we needed a guideline in order to reorganize the transactions within the sample. Referencing the Dow Jones and the FTSE Russell, the sample was reorganized considering the Industry Classification Benchmark (ICB) which provided us with a robust theoretical framework in order to reorganize the transactions in macro areas, allowing us to implement a more effective analysis, like the identification of the growing industries within the sample. In fact, in applying the new criteria, we ultimately obtain the following classification:

Industry Classification Benchmark	Freq.	Percent	Cum.
Basic Materials	22	12.64	12.64
Consumer Discretionary	24	13.79	26.44
Consumer Staples	7	4.02	30.46
Energy	22	12.64	43.10
Financials	15	8.62	51.72
Health Care	35	20.11	71.84
Industrials	14	8.05	79.89
Real Estate	11	6.32	86.21
Technology	17	9.77	95.98
Telecommunications	4	2.30	98.28
Utilities	3	1.72	100.00
Total	174	100.00	

Figure 34. Industry Classification Benchmark

As we can see from the above arrangement, we were able to reduce the number of sectors from 52 to 11, allowing us to better perform a data analysis and retrieve more consistent and clear results. Please notice that the cluster 'Financials' does not include financial buyers but brokerage or insurance companies implementing a transaction in their respective sector.

Consider the new nomenclature in which we find 11 different categories, we have generated 10 different dummy variables that could capture the differences across those industries. Anyhow, as we introduce those new variables within our regression model in order to account for the industry differences, we still did not retrieve significant results. Moreover, the model was also tested taken into account as explanatory variable only the Covid Severity Index; nevertheless, also in this case the results were not statistically significant. In fact, even though some dummy variables exhibit a relatively low p-value, the majority of them is not statistically different from zero. Please note that, since those dummy variables are all linked among each other we cannot just consider one dummy variable while dropping the non-significant ones. In the appendix it is shown an example of this attempt.

Following the same logic previously applied, a new regression model was run considering a sub-sample of the transactions performed within the health care industry. Health Care in this analysis has been the main reference point since it is the industry which includes most transactions with respect to the other categories, thus, guaranteeing a more reliable statistical analysis. Even though we were able to obtain a statistical model having a R-Squared of 18.61%, the Covid Severity Index variable does not exhibit statistically significant values, leading to the ultimate conclusion that, even if we analyze the sample considering the different industries, the final result is still consistent with the models retrieved in the previous paragraphs.

## 3.3 CAR Regression Model

Previously we took into account the micro perspective of a business combination, trying to understand the factors that affect the decisions on the offering prices and how those were ultimately impacted by the current health crisis. Therefore, in the above regression model, we did not consider the reaction from market agents towards the transaction.

In this section of the analysis, referencing equation [2.3], we would try to understand if the current pandemic had an impact on the short-term market reactions derived from the announcement of a business combination. As previously defined within the research design, the short-term market reactions will be captured considering the level of abnormal returns that the acquiring company's stock price obtained during the event window one day before the transaction announcement until one day after. Again, the level of abnormal returns was retrieved through a one-factor model in which the explanatory variable was defined as the stock market index peculiar to each country according to nation in which the acquiring company is listed and operates.

Consistently with our previous approach, we will analyze the distribution of the response variable, which in this case corresponds to the cumulative abnormal returns<sup>12</sup>.

<sup>&</sup>lt;sup>12</sup> As we previously noted, the response variable is obtained considering the sum of the abnormal returns during the event window, which was defined as starting from one day before the transaction announcement until one day later.



Figure 35. CAR Distribution

Considering the above graphical representation, we can see that the distribution of the response variable exhibits a normal distribution with most of the values distributed around the mean, given also a kurtosis value of 7.87. Please note that for the purpose of this graphical representation we have included within the sample four outliers, which have been proven to be statistically significant while perform the single linear regressions for the CAR computation.

Moreover, it is important to underline that the same control variables included within the previous analysis will be considered in the following study. The reason for which we undertake this unconventional approach is based on the same value creation arguments underlined within the above literature. In fact, most of the variance of the cumulative abnormal returns can be linked to irrational behaviors of market agents which will randomly react during the event window taken into account. Anyhow, while the reaction from retail investors can be highly diversified and depending on the current confidence within the market, professional investors will analyze the value that the transaction can generate in the long run, analyzing the same determinants captured for the bid premium analysis.

#### 3.3.2 Correlation Analysis

Consistently with our process of investigation, before digging within the regression analysis, we need to compute the level of correlation between the response variable, which in this case is the cumulative abnormal return, and the explanatory variables.

	CAR	After 2020	COVID Severity Index	Debt Over Asset	Debt Over EBITDA	Contested Bid	Majority Interest	Number of Transactions	СВ	GI
CAR	1									
After 2020 COVID	-0.157	1								
Severity Index Debt Over	0.004	0.614	1							
Asset	0.081	-0.029	0.063	1						
Debt Over EBITDA	0.056	0.175	0.042	0.153	1					
Contested Bid Majority	0.017	-0.073	-0.054	-0.016	-0.111	1				
Interest Number of	0.195	-0.140	-0.097	0.043	-0.106	-0.421	1			
Transactions	0.023	0.026	0.061	0.048	0.121	-0.008	-0.256	1		
СВ	0.058	0.024	-0.103	0.039	0.007	-0.097	-0.099	0.040	1	
GI	-0.114	-0.031	0.009	-0.222	-0.169	-0.112	0.077	-0.089	0.013	1

Figure 36. Correlation Matrix CAR

Considering the above correlation table, we can comprehend that we have in fact a negative relationship between the cumulative abnormal returns of the acquiring companies considered within the sample and the dummy variable *After 2020*, capturing the different time frame in which transactions are analyzed. According to this preliminary result we can conclude that abnormal returns exhibit a negative downturn if we account for the different time frame – i.e., considering the start of the pandemic breakthrough. Moreover, another negative correlation that we can retrieve from the sample is the one between the CAR and the growing industries. Please remark that within the growing industries we have included the technology and health care businesses. This result is extremely interesting since it can be deemed as an inconsistency with respect to the performances of those two sectors in 2020. In fact, within the midst of the current pandemic, the technological sector experienced an enormous growth, especially in the fields related to cloud, cybersecurity and video conferencing (Sarai, 2020). Moreover, besides a strong internal growth, the technological sector allowed for a massive change in other industries dynamics, affecting the way in which they operate and accelerating the digital transformation. The same reasoning applies for the health care

industry, which experienced a strong growth and digital transformation, mainly driven by the development of the covid-19 vaccine for which the current rollout is allowing a steady recovery of the main global economies. Thus, given those performances, we would have expected a positive relationship between the aforementioned variables.

Another interesting result is related to the correlation between the cumulative abnormal returns and the majority interest. In fact, according to our sample, a positive relationship exists between experiencing abnormal positive returns and seeking for a majority stake within the target company, ultimately suggesting that the bidder could more effectively create value and exploit the business combination if the control is actually acquired. Please note that above relationship is opposite with respect to the arguments previously made with the bid premiums. In fact, while deciding the offering price, the bidder will ultimately pay a higher premium if it acquires a controlling stake of the target company. On the other hand, considering the CAR and the subsequent market reactions, firm can create more effectively long-term value if they acquire a controlling interest in the target company. Still, besides the theoretical arguments that can be made, those correlation coefficients do not strongly capture the relationship among the variables within the sample, given the relatively low values. Anyhow, being a study focused on a macro perspective which aims at analyzing the market reactions, it is common not being able to capture all the factors that could ultimately affect the decision-making process of market agents.

Finally, considering possible multicollinearity issues, the explanatory variables will be equal to the ones included in the previous analysis and will exhibit the same type of correlation among each other. Again, one particular case is related to the strong correlation between the *After 2020* dummy variable and the *Covid Severity Index*, which will not represent an issue given that the two variables will be analyzed in a separate regression, consistently with the previous study on the bid premiums.

### 3.3.3 Regression Analysis

Once we account for the above analysis, we will proceed by developing the linear regression model, trying to understand if a significant result can be retrieved from the following analysis. Consistently with the previous arguments, the equation taken into account within the model will the following:

$$CAR = \alpha 0 + (a1)After 2020 + (a2)DebtOverAsset + (a3)DebtOverEBITDA +$$

$$(a4)ContestedBID + (a5)MajorityInterest + (a6)NumberOfTransactions +$$

$$(a7)GrowingIndustry + (a8)CrossBorderTransactions$$
[3.3]

Moreover, applying the same methodology of the previous study, we will start our regression analysis by running a model in which the only explanatory variable is the dummy variable *After 2020*.

Source	SS	df	MS	Number of obs	=	174
Model	8.36484778	1	8.36484778	- F(1, 172) Prob > F	=	4.25 0.0408 0.0241
Total	346.92978	172	2.00537445	- Adj R-squared Root MSE	=	0.0184
CAR	Coefficient	Std. err.	+	P> t  [95% cc	onf.	intervall
After2020	4461243	.2164131	-2.06	0.041873291 0.69021757	18	0189568
-						

Figure 37. Regression Table CAR Analysis Total Sample (No Controls)

Even though this preliminary model does not exhibit robust statistical significance, given the low values of R-Squared and Adjusted R-Squared, the dummy variable taken into account is statistically different from zero and exhibits a negative relationship with the cumulative abnormal returns. Overall, given the fact that the above model does not represent a meaningful and substantive analysis from which we can derive possible conclusions, we need to add our control variables in order to enhance the model's explanatory powers. In fact, considering the other variables involved in the sample and applying the backward variable selection procedure, we have obtained the following results:

Source		SS	df		MS	Number of	obs	=	174
Model Residual	20	5.4227592 320.50702	4 169	6.60 1.89	568979 649125	Prob > F R-squared	anad	=	0.0092
Total	:	346.92978	173	2.00	537445	Root MSE	ared	=	1.3771
(	CAR	Coefficient	Std.	err.	t	P> t	[95%	conf.	interval]
After20 Debt0verEBI ContestedE MajorityIntere _co	020 TDA BID est ons	3840284 .0910742 1.026803 1.170011 -1.25202	.219 .058 .704 .409 .448	1015 3002 9012 8799 7462	-1.75 1.56 1.46 2.85 -2.79	0.081 0.120 0.147 0.005 0.006	816 024 364 .360 -2.1	5568 0162 7425 8669 3789	.0485 .2061645 2.418349 1.979155 3661499

Figure 38. Regression Table CAR Analysis Total Sample BVSP Application

As we can derive from the above regression table, the inclusion of the control variables is not able to heavily affect the model's R-Squared and Adjusted R-Squared. Anyhow, the regression analysis still exhibits a negative relationship between the CAR and the After 2020 dummy variable and a positive one with the *Majority Interest* dummy variable, consistently with respect to the correlation analysis previously performed. Anyhow, an inconsistency arises is we investigate the role of the *Contested Bid* dummy variable. In this case the result is conflicting with the theoretical framework initially defined. In fact, in the case of a contested bid, the stock price of the acquiring company usually drops, given the fact that those type of transactions will not involve an agreement with the target's management and the offer will be oriented directly towards the target's shareholders. Consequentially, given that an agreement is not reached, the acquiring company will not be able to access to privileged information and data rooms that could help him constructing an optimal offering price. Therefore, in this context, usually the premium offered is higher compared with the expected synergies that the company aims at developing because of the business combination. Inevitably, given the above arguments, the market will never react in positive manner if such operations are involved. Anyhow, we need to consider the fact that the above result might just be a simple coincidence: in fact, we need to remember that among the 174 transaction that we

took into account, only 5 have been clustered as contested. Therefore, we should analyze a greater number of transactions in order to arrive at consistent and significant conclusion. Finally, considering the result retrieved from the explanatory variable Debt Over EBITDA, we would expect the coefficient to be negative, given the fact acquiring companies having a more robust balance sheet are more effectively able to integrate the target and develop synergies, leading to a more positive reaction from market participants.

Once we have analyzed the total sample and the impact of the current pandemic with respect to previous time frames, we will investigate the role of the *Covid Severity Index* and if the severity of the pandemic had a significant impact in the level of abnormal returns during the event window. In fact, the following regression equation will be taken into account:

CAR = α0 + (a1)CovidSeverityIndex + (a2)DebtOverAsset + (a3)DebtOverEBITDA + (a4)ContestedBID + (a5)MajorityInterest + (a6)NumberOfTransactions + (a7)GrowingIndustry + (a8)CrossBorderTransactions

[3.4]

Again, following the above approach, we will run a regression taking into account just the *Covid Severity Index* as explanatory variable.

Source	SS	df	MS	Number F(1 6	of obs 9)	=	71 1 60	
Model Residual	7.5141816 324.92679	57 1 96 69	7.51418167 4.709084	Prob > R-squa	F	=	0.2108	
Total	332.44097	78 70	4.74915683	Root M	SE	=	2.17	
·	CAR_2020	Coefficient	Std. err.	t	P> t	[9	95% conf.	interval]
CovidSeverity	Index_2020 _cons	.0675435 7200684	.0534701 .3664085	1.26 -1.97	0.211 0.053	0 -1	0391264 .451033	.1742134 .0108966

Figure 39. Regression Table CAR Analysis 2020 Sample (No Controls)

Coherently with the previous analysis, the regression model without control variables is not statistically robust, exhibiting an R-Squared of just 2.26%. Moreover, while the *After 2020* dummy variable exhibited a negative relationship with the level of CAR, consistently with our initial hypothesis, the *Covid Severity Index* shows instead a positive relationship which lacks, at this stage of analysis, of statistical significance, given a P-Value of over 20%; thus, the explanatory variable will not be significantly different from zero. Proceeding with our analysis, we will now include the control variables within the regression model applying upfront the backward variable selection procedure.

Source	SS	df	MS	Number of	obs	=	71	
				F(5, 65)		=	2.75	
Model	58.0672462	5	11.6134492	Prob > F		=	0.0257	
Residual	274.373732	65	4.22113433	R-squared		=	0.1747	
				Adj R-squ	ared	=	0.1112	
Total	332.440978	70	4.74915683	Root MSE		=	2.0545	
<u> </u>								
	CAR_2020	Coefficier	nt Std. err.	t	P> t		[95% conf.	interval]
CovidSeveri	tyIndex_2020	.0919678	.0527178	1.74	0.086		013317	. 1972526
Debt0ve	rEBITDA_2020	. 1924578	.1350562	1.43	0.159		077268	.4621836
MajorityIn	nterest_2020	2.49541	.8000533	3.12	0.003		.8975938	4.093227
Number0fTransa	actions_2020	.002434	.00188	1.30	0.200		00132	.0061894
	CB_2020	.8391530	.5877896	1.43	0.158		3347434	2.01305
	_cons	-3.808159	.9582309	-3.97	0.000		-5.721879	-1.89444

Figure 40. Regression Table CAR Analysis 2020 Sample BVSP Application

The above regression model possesses a higher statistical robustness with respect to the previous analysis. In this context, the argument previously made for the *Majority Interest* variable is even more predominant, showing that for transactions seeking a controlling interest in the target, the abnormal returns in the analyzed event window are consistently higher. Concerning instead the *Covid Severity Index*, even though the variable appears to be statistically significant at 10% level, the coefficient seems relatively low with respect to the other explanatory variables, suggesting that the direct effect of the pandemic severity during the announcement period was not significantly impacting the overall confidence within the market.

For consistency purposes, the same analysis on a sub-sample of US based companies will be considered in order to verify if an enhanced regression model can be derived from our sample. Considering the above premises, the following regression was performed. Please note that the regression table without controls will be placed within the Appendix.

Source	SS	df	MS	Number F(4, 1	of obs 04)	=	109 6.17			
Model Residual	63.08644 265.79604	43 4 44 104	15.7716107 2.5557312	F(4, 104) Prob > F R-squared Adi R-squared		Prob > F R-squared Adi R-squared		=	= 0.0002 = 0.1918	
Total	328.88248	37 108	108 3.04520822 Root MSE = 1.5		Adj R-squared Root MSE		1.5987			
	CAR_US	Coefficient	Std. err.	t	P> t	[	95% conf.	interval]		
Afi DebtOver MajorityIn NumberOfTransa	ter2020_US rEBITDA_US nterest_US actions_US _cons	4422565 .1197731 3.323506 .0021125 -3.510328	.3224296 .0847177 .7441526 .0010432 .801182	-1.37 1.41 4.47 2.03 -4.38	0.173 0.160 0.000 0.045 0.000	-1  1 -5	.081647 0482253 .847824 0000439 .099102	.1971335 .2877715 4.799189 .0041811 -1.921554		

Figure 41. Regression Table CAR Analysis US Sample BVSP Application

Coherently with the overall analysis, the US sample seems to better explain the relationship among our variables with respect to a sample in which we include a bundle of different countries. In fact, the above model exhibits a robust statistical significance with respect to the previous ones analyzed, underling even more consistently the negative relationship between the cumulative abnormal returns and the *After 2020* and *Majority Interest* dummy variables. Afterwards, continuing the analysis focusing on the Covid Severity Index we retrieved the following regression model:

Source	SS	df	MS	Number of o	bs =	40	
Model Residual	144.055384 170.471749	4 36 35 4.8	.013846 7062139	F(4, 35) Prob > F R-squared	= = =	7.39 0.0002 0.4580	
Total	314.527133	39 8.0	6479827	Adj R-squar Root MSE	ed = =	0.3961 2.2069	
	CAR_2020US	Coefficient	Std. e	rr. t	P> t	[95% conf	. interval]
CovidSeveri DebtOve NumberOfTransa MajorityI	tyIndex_2020US rEBITDA_2020US actions_2020US nterest_2020US _cons	.0893517 .2857477 .0066173 7.401739 -8.924741	.068210 .19037 .0023 1.4900 1.583	09       1.31         59       1.50         71       2.79         33       4.97         55       -5.64	0.199 0.142 0.008 0.000 0.000	0491238 100736 .001804 4.376811 -12.13952	.2278273 .6722313 .0114306 10.42667 -5.709963

Figure 42. Regression Table CAR Analysis US 2020 Sample BVSP Application

Finally, the above model, leveraging on its highly statistical significance, pictures a consistent result with respect to the analysis previously implemented while considering the entire sample. In fact, we still retrieve a strongly significant value for the *Majority Interest* dummy variable, and we still lack strong evidence that the *Covid Severity Index* has a consequential impact on the level of cumulative abnormal returns. Overall, the analysis can be summarized within the following table:

CAR Analysis	Ν	R-Squared	Adj R-Squared	Root MSE
Total Sample				
Figure 37 - Covid-19 Impact Significance (No Controls)	174	0.02	0.02	1.40
Figure 38 - Covid-19 Impact Significance	174	0.08	0.05	1.37
Figure 39 - Covid-19 Severity Significance (No Controls)	71	0.02	0.008	2.17
Figure 40 - Covid-19 Severity Significance	71	0.17	0.11	2.05
US Sample				
Appendix 4 - Covid-19 Impact Significance (No Controls)	109	0.03	0.02	1.72
Figure 41 - Covid-19 Impact Significance	109	0.20	0.16	1.59
Appendix 5 - Covid-19 Severity Significance (No Controls)	40	0.04	0.01	2.80
Figure 42 - Covid-19 Severity Significance	40	0.45	0.40	2.20

Figure 43. Result Summary CAR Regression Analysis
#### 3.3.4 Cross-Industry Consideration

Considering possible arguments that could be made on the difference in the market reactions, discriminating considering different sectors, we could preliminarily conclude that we did not retrieved a significant difference in the impact of the Covid-19 pandemic across different industries. In fact, considering the control variable Growing Industries, we can see that in the above regression models the dummy variable is not included: indeed, it is deemed never significant according to our sample. Therefore, according to this argument, we will not retrieve significant differences across the various industries involved. Anyhow, a further analysis was implemented consistently with the approach applied in the previous analysis. In fact, a linear regression analysis was performed taking into account all the dummy variables representing the industries divided according to the industry classification benchmark. Again, even though the regression exhibits a R-Squared value of 25%, most of the variables involved are not significant, leading to the only possible conclusion that we do not have cross-industry differences as we consider short-term market reactions within the event window taken into account in the above analysis. The above regression model can be found within the Appendix. Overall, consistently with the same argument made for the significance of the *Contested Bid* dummy variable, we should analyze a sample having more transactions per industry category in order to verify the above argument is more concrete and statistically significant way.

### 4.1 Robustness Analysis

Finally, we need to verify the main assumptions behind the linear regression models in order to prove their statistical efficiency and consistency. In general, in the context of a linear regression model, it is important to verify if certain values like the R-Squared and the Adjusted R-Squared are relatively high in order for the model to be statistically valuable. Anyhow, besides those measurements, it is important to understand if the following four assumptions hold. In the specific, the first assumption that we will investigate is the linearity assumption. Thus, we need to verify if a linear relationship exists between the response variable and the explanatory variables.

Considering the model in *Figure 25* and analyzing the relationship between the Bid Premiums and the continuous explanatory variables involved we have obtained the following scatter plots:



Figure 44. Scatter Plot BP30 - Debt Over Asset



Figure 45. Scatter Plot BP30 - Debt Over EBITDA

Considering the above graphical representation, we can see that both the Debt over Asset and Debt over EBITDA variables tend to have a linear relationship with the Bid Premium computed with the closing price thirty days before the transaction announcement. Even though those variables exhibit a linear relationship with respect to the response variable, the link does not have a significant impact in terms of statistical analysis given that the correlation among the aforementioned variables is not enough robust. In fact, this outcome is consistent if we take into account the results obtained in *Figure 26*. Indeed, as we apply the backward variable selection procedure, those two variables will not be considered since they are not statically significant. Additionally, following the same path of the previous analysis, we need to examine the relationship between the response variable and the explanatory variables considering the sub-sample of transactions announced from 2020 onwards. In fact, we have retrieved the following scatter plot picturing the relationship between the bid premiums and the Covid Severity Index.



Figure 46. Scatter Plot BP30\_2020 - CSI\_2020

Considering the above scatter plot, we can see that the retrieved result is consistent with the previous analysis implemented within the regression table in *Figure 28*. Indeed, even though the relationship appears to be linear, the result is rather confused, with no consistent and significant relationship derived. Overall, considering the arguments and the results previously defined, we can confirm the linearity assumption for the overall model.

Consistently with our previous analysis it is important to verify also the linearity assumption concerning the sub-sample of transactions implemented in the United States. In fact, in implementing the scatter plot between the bid premiums and the Covid Severity Index, referencing *Figure 32*, we obtained the following result.



Figure 47. Scatter Plot BP30\_2020US - CSI\_2020US

In this case we can see that the linear relationship between those two variables is not so predominant, especially if we take into account the previous graphical representations. Anyhow, those results with a moderate level of dispersions are mainly due to the fact that the number transactions within the US sample is lower with respect to the previous analysis; in fact, this sample is composed of only 40 observations with respect to the initial sample, composed of 174 transactions. Thus, in order to better analyze this relationship in the context of the United States it will be better to increase the overall number of observations. Anyhow, the scatter plot still exhibits linearity characteristics that will allow us to fulfill the linear relationship assumption.

Subsequently, the same robustness analysis, taking into account the linearity assumption, needs to be implemented studying the CAR regression model. Coherently with the bid premium analysis, also in this case the most of the response variable's variance is captured by dummy variables which are the most statistically significant components in the overall models. Anyhow, referencing *Figure 38*, we can still reason on the only significant continuous variable within the model: Debt over EBITDA.



Figure 48. Scatter Plot CAR - Debt Over EBITDA

The above relationship is linear, anyhow, as pictured also from the regression model, the explanatory variable in *Figure 48* is not able to strongly explain the differences in the level of abnormal returns, given also a regression coefficient of only 0.09. In fact, as we stated in the above paragraph, the variables that are able to capture more efficiently the variance of the cumulative abnormal returns are the *After 2020, Contested BID and Majority Interest* dummy variables. Following the same logic as the above analysis we will take into prove the linearity assumption taking into account the sub-sample of transactions announced after 2020 onward.



Figure 49. Scatter Plot CAR\_2020 - CSI\_2020

The above graphical representation clearly defines a linear relationship between the two variables and the given result is also consistent with the regression analysis previously performed, which does not retrieve a significant and robust coefficient explaining the link between the level of cumulative abnormal returns and the severity of the pandemic breakthrough. Besides, another good indicator of linearity is the R-Squared value itself, for which we are able to obtain a relatively higher value if we take into account the models using the US sample instead of the standard one. Indeed, for consistency purposes, we can also verify the linearity in our US based sample considering the CAR and the *Covid Severity Index*, for which we retrieved the following result which pictures a moderate upward linear relationship, consistent with the results obtained within the regression model.



Figure 50. Scatter Plot CAR\_US2020 - CSI\_US2020

Overall, given the above arguments and graphical representations, we can confirm that the linearity assumptions within the models holds. As we account for the linearity assumption, the next phase of the analysis requires a check to verify if the error terms are normally dispersed, aiming at obtaining a distribution in which the mean of the error term is zero. To verify this second assumption regarding the normal distribution of the error terms we will leverage on the Q-Q Plot; thus, if we visualize a 45-degree straight line, we can confirm that the residuals within the model are normally distributed. Taking into account our previous analysis, we will generate four plots for the assumption assessment.



Figure 51. Q-Q Plot Ref. Figure 26



Figure 52. Q-Q Plot Ref. Figure 28



Figure 53. Q-Q Plot Ref. Figure 38



Figure 54. Q-Q Plot Ref. Figure 40

Considering the above graphs, we can see that the assumption tends to hold in a more effective way if we take into account the first models on the bid premiums with respect to the ones analyzing the cumulative abnormal returns. Moreover, consistently with the results within the regression models, the US-based samples exhibit more significant results with respect to the overall sample. In fact, as we apply the same approach, we obtain the following result:



Figure 55. Q-Q Plot Ref. Figure 32

Indeed, the above graphical representation confirms that the US sample is able to retrieve more significant results with respect to the overall sample. The additional graphs will be included within the Appendix. Overall, given the fact that no Q-Q Plot exhibits a path different from a straight line, we can confirm also the normality assumption. Subsequently, we need to verify if the residuals are independent among each other; thus, if there is evidence of autocorrelation.



Figure 56. Time Residual Plot Ref. Figure 26



Figure 57. Time Residual Plot Ref. Figure 28



Figure 58. Time Residual Plot Ref. Figure 38



Figure 59. Time Residual Plot Ref. Figure 40

Considering the above graphs, we can clearly see that most of the residuals are randomly dispersed, confirming our third assumption linked to the independence of the residuals. Finally, as for the Q-Q Plots, also the Time Residuals Plots linked to the US-based sample will be included within the Appendix. Finally, the fourth assumption is linked to the absence of heteroskedasticity. Indeed, applying the Ordinary Least Squares as a method to retrieve the above relationships, one of the intrinsic assumptions is that all the residuals are drawn from a population that has a constant variance – i.e., homoskedasticity. Thus, we aim at obtaining a constant variance of the residuals in order to fulfill our fourth assumption. In order to check if our models exhibit a certain degree of heteroskedasticity, we will leverage on the Breusch-Pagan test; the logic behind the model is to regress the squared residuals with all the significance of this second model. Indeed, if joint significance is obtained that it would mean that the explanatory variables have an effect on the error terms, thus a degree of heteroskedasticity is present. The aforementioned test has been applied for every model taken into account within this analysis in order to confirm the last assumption needed in order to assess the statistical robustness of our models.

	Ν	X	F(N, X)	P-Value
Model 1 Ref. Figure 26	174	2	0.51	0.60
Model 2 Ref. Figure 28	71	2	0.34	0.71
Model 3 Ref. Figure 30	109	4	0.79	0.53
Model 4 Ref. Figure 32	40	3	2.56	0.07
Model 5 Ref. Figure 38	174	4	0.76	0.55
Model 6 Ref. Figure 40	71	5	0.23	0.94
Model 7 Ref. Figure 41	109	4	1.72	0.15
Model 8 Ref. Figure 42	40	4	0.17	0.95

Figure 60. Breusch-Pagan Tests

Even if the analysis performed on the regression model in *Figure 32* exhibits a P-Value of 0.07, we can still confirm that no evidence of heteroskedasticity is present within the models, given that none of the above regressions is jointly significant at a P-Value lower then 1%<sup>13</sup>. Therefore, we can finally confirm that also the fourth assumption for which we needed to ensure homoskedasticity within the model can be confirmed, ensuring a strong statistical robustness in the overall performed analysis.

<sup>&</sup>lt;sup>13</sup> In general, a P-Value lower then 1% in this specific test represents a cut-off for which we can confirm that the variance of the residuals is not constant. Indeed, given the obtained results, we can confirm that no evidence of heteroskedasticity is present within our models.

### Conclusion

As we approach the conclusion of the overall analysis, it is important to specify once again what we wanted to obtain from the dissertation and which questions we wanted to answer. As previously specified, even though multiple academic studies underlined the importance of macroeconomic factors on business combinations, none of those analysis had the possibility to study a global dramatic event like the Covid-19 pandemic and its impact on the overall financial environment. Besides the fact that multiple studies will emerge in the following years, the above analysis aims at covering the current gap within the literature and analyze which type of relationships can be derived between the current health crisis and the M&A context. Focusing within the context of this dissertation, we have tried to answer to our main research question, investigating whether the bid premiums and the cumulative abnormal returns have been considerably impacted by the current pandemic. Moreover, we also wanted to verify if the severity of the outbreak and industries differences could have an impact on those measures. Obviously, being two separate variables, we will disentangle the two component and argue our finding considering first the impact on the level of bid premiums – representing the micro perspective of the analysis - and afterwards, on cumulative abnormal returns - representing the macro perspective.

### 5.1 Conclusion 1: Impact on Bid Premiums

Contrary to our initial hypothesis, the obtained relationship between the bid premium and current health crisis is positive.

As we initially specified within the literature review, the level of bid premium can be affected by multiple factors that could vary according to the specific context in which the transaction is performed. Moreover, in the above paragraphs, we emphasized the bid premium study as a micro analysis, given the fact that the offering price is ultimately established by the acquiring company and not derived from market dynamics like in the case of the cumulative abnormal returns. Therefore, bid premium dynamics are deemed as highly volatile, depending on the analyzed perspective. Considering our own investigation, the first interesting result is the one

obtained within the regression model in Figure 26, which, diametrically opposed with respect to our initial theoretical arguments, picturing a scenario in which the overall level of bid premiums offered from 2020 onwards is higher with respect to the one offered in 2019. One possible explanation of this apparent inconsistency can be linked to fact that target shareholders, during periods of high market volatility and downward pressure in revenues do not adjust their price expectations and are willing to implement a business combination only at a price which they consider appropriate and that usually corresponds to pre-crisis evaluation, fearing that they could obtain a sub-optimal offering price (The Boston Consulting Group, 2009). Thus, even though the stock price might decrease because of the general uncertainty within the market, the standard offering price remains the same, leading to an increase in the overall premium. From this argument we can also derive another explanation for the lower number of transactions; in fact, only companies willing to indulge target's shareholders and willing to pay the accurate price were able to ultimately perform those business combinations. Anyhow, a possible counterargument to the above analysis can be to simply discarding the model because of its relatively low statistical significance. Anyhow, even if we perform the same analysis considering the US-based sample<sup>14</sup>, which has been proved to be more statistically consistent, we still obtain a positive relationship between the bid premium and the After 2020 dummy variable. By analyzing more in-depth the retrieved sample of deals announced in 2020, we can observe multiple transactions which involved very high bid premiums; one of the most important examples is the 17 billion US dollars merger between Teladoc Health Inc and Livongo Health Inc, which involved a bid premium, computed thirty days before the transaction announcement, of 103%. The premium was paid considering also the fact that the two companies are involved in a very high growing sector which gained even more importance during the pandemic: virtual health care, combining two of the most growing industries within the period - i.e., health care and technology. The same reasoning can be applied in the 4.5 billion US dollars acquisition of Forty-Seven Inc by Gilead Sciences Inc, involving a premium of 145%. This transaction is even more interesting to mention since it has been announced on the second of March 2020; thus, in the mists of the current pandemic.

Until now we have taken into account the first part of the research question, thus, if the current health crisis had a significant impact on the level of bid premiums. Additionally, we aimed

<sup>&</sup>lt;sup>14</sup> Reference *Figure 30* 

at analyzing if the severity of the pandemic breakthrough could have significantly impacted our analyzed response variable. In this case, even if we take into account the US-based sample, the result is consistent with respect to the one previously obtained considering the *After 2020* dummy variable: the *Covid Severity Index* seems to have a positive relationship with the level of bid premiums. Anyhow, in this particular case, we need to underline that the retrieved coefficient for the aforementioned explanatory variable, even if highly significant, is still of  $0.03^{15}$ , suggesting that, even though a relationship could exist, it is not solid enough to guarantee a highly significant impact. Considering the other explanatory variables involved, the analysis strongly confirms the research of Laamanen (2007), underlying that in growing industries like health care and technology the bid premiums are consistely higher in both the pre-pandemic and post-pandemic scenarios. Anyhow, as previsuly explained, in terms of different impact among industries, the analysis does not retreived any significant result, suggesting that, considering the analyzed sample, we should not descriminate the Covid-19 effect considering the different industries involved.

### 5.2 Conclusion 2: Impact on CAR

Consistently with our initial hypothesis, the level of cumulative abnormal returns has been negatively impacted by the current health crisis.

In antithesis with the bid premium analysis, considering the cumulative abnormal returns, we were able to obtain a result consistent both with our initial hypothesis and the analyzed theoretical framework. As we previously explained, the CAR analysis involves a macro perspective; therefore, the nature of this response variable will not depend on the arbitrary decision of the acquiring company but will depend on the current market dynamics and how market agents react to a certain transaction announcement. As underlined in *Figure 38* and remarked even more in *Figure 41*, which takes into account the US-based sample, cumulative abnormal returns have been highly negatively impacted by the current health crisis. The main reason for which we observe this result is linked to a paramount concept that we have previously underlined within the theoretical framework: synergies exploitation. The fundamental reason that triggers a business combination is connected to the additional value creation that the companies expect to create

<sup>&</sup>lt;sup>15</sup> Reference *Figure* 28

following the transaction; therefore, if market agents expect a certain business combination to be highly accretive, in a synergistic perspective, then the reaction will be on average highly positive, given that investors will be incentivized to capture the additional value creation that the two combined entities might generate. Anyhow, the above logic will be fallacious in the moment in which we account for the current health crisis. Indeed, when the overall confidence within the markets is damaged because of certain events, it will be more difficult for market agents to predict a favorable outlook of the economic environment, and thus, possible synergies generation, given the high level of volatility and business disruption. Therefore, as confirmed also within our analysis, the lack of predictability and low market confidence, caused in this case by a once in a century global pandemic, will ultimately affect how agents react to deals announcement, leading to lower cumulative abnormal returns with respect to an ordinary scenario. The results in the aforementioned models underlines also the robust role of the Majority Interest dummy variable and its positive effect on the cumulative abnormal returns. Besides the impact of macroeconomic factors that the above dissertation wants to clearly define, this above relationship regarding the *Majority Interest* also represents a gap within the literature, given the fact that we do not find any strong evidence of its impact on the cumulative abnormal returns. As previously underlined, the main explanation for this result can be also link to an argument based on synergies exploitation. Indeed, if a company acquires a controlling interest within another entity can more effectively, and without any burdens, apply the actions needed to exploit such synergies. On the other hand, considering a company seeking for a minority interest like in the case of activist shareholder, the process usually involves extensive bargain with the current management in order to implement certain changes, which will ultimately not guarantee an increased value for shareholders.

Considering instead the *Covid Severity Index*, referencing *Figure 40* and *Figure 42*, the retrieved results do not strongly support the hypothesis that the level of cumulative abnormal returns are impacted by the severity of the pandemic breakthrough. Indeed, even though we obtained a statistically significant explanatory variable within the model, the retrieved coefficient is positive and with a value for both models of 0.09, suggesting a relatively modest relationship between the response variable and the *Covid Severity Index*. More importantly, the above result opposes the previous conclusion regarding the *After 2020* dummy variable, which has been proved to be highly significant. Moreover, consistently with the study of Morck & Yeung (1992), the

model underlines a positive relationship between cross-border transactions and cumulative abnormal returns. On the other hand, inconsistenty with the studies of Moeller (2004) and Loderer & Martin (1990), the model pictures a positve relationship between the cumulative abnormal returns and the level of Debt over Assets of the target company. A possible explanation of this discrepancy might be linked to the fact that those values were computed considering the targets' balance sheet one year before the transaction, thus, not being a current measure with respect to the announcement period, the retrived results might be baised. Additionally, taking into account the industry differences, also in this case we did not retreived any statistically significant value. Indeed, contrary to the previous results obtained and to the studies of Laamanen (2007) and Ma, Pagán, & Chu (2009), we did not found any type of relationship for what concerns *Growring Industries*, ultimately suggesting that, according to our sample, no statistically significant difference had been observed across different industries.

Overall, taking into account the retrieved results and the above arguments, the following summary table was developed, capturing the main consequences derived from the dissertation.

	Impact Significance	Severity Significance	Industries Differences
Impact on Bid Premium	Positive	Positive	No Relationship
Impact on CAR	Negative	Ambiguous	No Relationship

Figure 61. Analysis' Results Summary

### 5.3 Main Implications

Overall, the above dissertation confirms that the coronavirus health crisis had in fact a considerable impact considering the response variables identified within the sample. Anyhow, according to our analysis, even though we have retrieved a significant difference between the prepandemic and the post-pandemic periods, a modest relation was obtained considering the severity impact, suggesting that no robust link exists between the outbreak severity in a specific moment in time and both the bid premium and the cumulative abnormal returns. Overall, the main implication of this analysis is that listed acquiring companies, in the context of high market volatility and high uncertainty, while implementing a business combination, will probably pay a higher premium with respect to the current value of the target since both the counterpart's management and shareholders will always reference a value for their entity considering a pre-crisis period. Moreover, market agents, given the overall uncertainty within the business environment, will react negatively to the transaction announcement, which could ultimately lead to negative consequence in the fulfillment of the deal itself and overall performances of the acquiring company. Therefore, in order to avoid a negative impact that could ultimately destroy value in the long run for the acquiring shareholders, the bidder will need to negotiate a sales and purchase agreement with the target that contemplates a realistic evaluation, accounting also for the current macroeconomics issues and uncertain outlook. The company, not overpaying for the business combination, will be able to adjust market's expectations and possibly retrieve a positive reaction.

### Adjustments and Further Research

One of the first issues that could be underlined within the above dissertation is linked to the sample size. As previously defined within the sample section process, the total number of business combinations was ultimately obtained taken into account specific characteristics of the firms involved like their public status and region in which the transaction was performed. Anyhow, in order to increase the statistical power of the model, a straightforward approach might be to expand the sample and take into account also uncompleted deals or deals involving non-public entities.

Moreover, considering the above regression models, we have constantly found that the subsample of US-based transaction is able to deliver more statistically significant results with respect to the overall sample in which multiple countries are taken into account. Therefore, a future reasonable approach will be to take into account only deals performed in the United States, obviously changing also the sample characteristics in order increase the number of deals taken into account. Indeed, being the United States, a market-oriented country having mostly dispersed ownership within their local companies, the financial market will be consequentially more efficient with respect to their European counterparts<sup>16</sup>, allowing for a more effective analysis especially in the case of cumulative abnormal returns.

Finally, we need to underline the limitations of the *Covid Severity Index* which could have caused, at least partially, the ambiguous results retrieved within the analysis. Indeed, world economies were all caught by surprise from the current health crisis and so their data collection systems. In fact, most of the available data on Covid-19 does not fully capture the negative market sentiment of the period, especially if we take into account the initial stage of the outbreak. Indeed, in countries like Italy, considering the time frame from February 2020 to April 2020, the effective number of deaths have been assumed to be at least twice as high with respect to the reported numbers (Agenzia Italia, 2020). On the other hand, in the subsequent periods, as testing began to increase exponentially, countries were able to report more effectively all the relevant statistics, capturing more efficiently the severity of the coronavirus pandemic. Therefore, considering the above argument, the construction of an index based on those data will inevitably suffer from biases, leading to lower numbers in the initial stage and more realistic ones in the subsequent time frame taken into account within the sample. Considering this perspective, a possible solution to more efficiently capture the severity of the pandemic might be to leverage on a market sentiment index, which is generally computed considering movements within the market instead of external factors for which data, as previously stated, might be missing or not adequate to capture the authentic market agent's sentiment.

<sup>&</sup>lt;sup>16</sup> Most European countries exhibit a bank-oriented system in which the main source of capital will be the banking system and the ownership structures will mostly be concentrated. Opposite reasoning is made if the take into account the United States, which exhibit a market-oriented system in which the primary source of capital is the financial market.

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## Appendix

#### Covid Index Computation

For each country taken into account, number of new cases, new deaths and hospitalized patients were retrieved for a period consistent with the analyzed sample. Afterwards, those values were converted considering a rate *per 100'000*, and afterwards, the daily index was computed taking into account the weights previously defined. Subsequently, in order to obtain the measure considered within the analysis we implemented another weighted average considering each daily indexes 21 days before the transaction announcement. For the above formulation, the following excel formula was applied:

 $=H40^{*}(0.15)+H39^{*}(0.05)+H38^{*}(0.05)+H37^{*}(0.05)+H36^{*}(0.05)+H35^{*}(0.05)+H34^{*}(0.05)+H33^{*}(0.05)+H32^{*}(0.05)+H31^{*}(0.05)+H30^{*}(0.05)+H29^{*}(0.05)+H28^{*}(0.05)+H27^{*}(0.05)+H26^{*}(0.05)+H26^{*}(0.05)+H26^{*}(0.05)+H26^{*}(0.05)+H26^{*}(0.05)+H26^{*}(0.025)+H26^{*}$ 

Considering the above approach, we can see that we have assigned a heavier weight to the last value instead of daily index computed in the day of the announcement in order to better capture the overall pandemic severity within the analyzed period, given also the fact that measurement that the bid premium will not be affected by the daily health statistics in the days in which the transaction is announced.

Source	SS		df MS			Number of obs		=	1	74
						F(8,	165)	=	1.4	45
Model	3.3652	23994	8	.42065499	3	Prot	) > F	=	0.17	75
Residual	47.703	32538	165	.28911062	29	R-sc	quared	=	0.06	59
					-	Adj	R-squared	=	0.02	06
Total	51.068	84937	173	.29519366	95	Root	t MSE	=	. 537	69
<u>0</u>	BP1	Coefficie	ent S	td. err.		t	P> t	[95%	conf.	interval
Aft	er2020	007617	72	.085731	-0	. 09	0.929	1768	3884	. 1616539
DebtOve	erAsset	005248	86 .:	1877631	-0	.03	0.978	3759	766	.3654795
DebtOver	EBITDA	.014495	53	. 023392	0	. 62	0.536	031	691	.0606816
Contes	tedBID	14209	92 .:	2830108	-0	.50	0.616	7008	8815	.4166976
MajorityIn	terest	151154	47 .:	1689078	-0	. 89	0.372	4846	5538	.1823445
Number0fTransa	actions	000117	77 .0	0003273	-0	.36	0.720	0007	7641	.0005286
	GI	.269201	19 .0	0933438	2	. 88	0.004	.0848	8996	.4535042
	СВ	. 10264	49	.097063	1	.06	0.292	0889	9966	.2942946
	_cons	.347618	85 .:	1993728	1	.74	0.083	0460	324	.7412693
		1								

Appendix 1. Regression Table Bid Premium Analysis Total Sample (BP1)

Source	1	55	df	MS	Nu	mber of ob	s =	1	74
Model	4.787	50378	8	5984504	— F( 72 Pr	8, 165) ob > F	=	1.	86 88 20
Total	57.74	35969	173	. 3337780	— Ad 17 Ro	j R-squared ot MSE	= d = =	0.03	84 52
	BP7	Coefficie	ent Sto	d. err.	t	P> t	[95%	conf.	interval]
Aft	er2020	. 052999	91 .09	03278	0.59	0.558	1253	3481	.2313464
Debt0ve	rAsset	002222	.19	78308	-0.01	0.991	3928	3286	.3883836
Debt0ver	EBITDA	.014193	78 .02	246463	0.58	0.565	0344	1649	.0628606
Contes	tedBID	.067550	.29	81856	0.23	0.821	5212	2011	.6563014
MajorityIn	terest	.034863	.17	79644	0.20	0.845	3165	5171	.386245
Number0fTransa	ctions	00000	56 .00	03449	-0.19	0.848	000	3747	.000615
	GI	.33200	73 .09	83488	3.38	0.001	.1378	3229	.5261917
	СВ	.153169	.10	22674	1.50	0.136	0487	522	.3550907
	_cons	. 189770	98 .2	210063	0.90	0.368	2249	872	.6045288

Appendix 2. Regression Table Bid Premium Analysis Total Sample (BP7)

S df	MS	Number of obs F(11, 162)		= 174 = 1.99		4
						6
9238 11	1.09699307	Prob > F		=	0.035	1
9814 162	.558579099	R-squared		=	0.117	7
		Adj R-squ	ared	=	0.057	7
6738 173	.592813514	Root MSE		=	.7473	B
Coefficient	Std. err.	t P>	t	[95%	conf.	interval]
.0405266	.0150855	2.69 0.0	08	.010	9737	.0703162
.5308958	.2309356	2.30 0.0	23	.0748	8636	.9869279
0506133	.2503583	-0.20 0.8	40	5449	9997	.4437731
.1270407	.342188	0.37 0.7	11	5486	6832	.8027647
.017703	.2508843	0.07 0.9	44	4777	7221	.5131281
.0713198	.2779535	0.26 0.7	98	477	5594	.6201991
0196439	.2972305	-0.07 0.9	47	6065	5897	.5673019
.1399712	.4728292	0.30 0.7	68	7937	7321	1.073674
.3873756	.2472875	1.57 0.1	19	1009	9469	.875698
.335313	.2657908	1.26 0.2	09	1895	5484	.8601743
.0714302	.4206177	0.17 0.8	65	7593	1703	.9020307
.2221984	.1953995	1.14 0.2	57	1636	5601	.6080568
	S df 9238 11 19814 162 6738 173 Coefficient .0405266 .5308958 0506133 .1270407 .017703 .0713198 0196439 .1399712 .3873756 .335313 .0714302 .2221984	S         df         MS           19238         11         1.09699307           19814         162         .558579099           16738         173         .592813514           Coefficient         Std. err.           .0405266         .0150855           .5308958         .2309356          0506133         .2503883           .0713198         .2779535          0196439         .2972305           .1399712         .4728292           .3873756         .2472875           .35313         .2657908           .0714302         .4206177           .2221984         .1953995	S         df         MS         Number of F(11, 162           19238         11         1.09699307         F(11, 162           19814         162         .558579099         Adj R-squ R-squared           6738         173         .592813514         Root MSE           Coefficient Std. err.         t         P>            .0405266         .0150855         2.69         0.0           .5308958         .2309356         2.30         0.0          0506133         .2503883         -0.20         0.8           .1270407         .342188         0.37         0.7           .017703         .2508843         0.07         0.9           .01399712         .4728292         0.30         0.7           .3373756         .2472875         1.57         0.1           .335313         .2657988         1.26         0.2           .0714302         .4260177         0.17         0.8           .2221984         .1953995         1.14         0.2	S     df     MS     Number of obs       19238     11     1.09699307     Prob > F       19814     162     .558579099     R-squared       6738     173     .592813514     Root MSE       Coefficient Std. err.     t       0405266     .0150855     2.69     0.008       .5308958     .2309356     2.30     0.023      0506133     .2508383     -0.20     0.840       .1270407     .342188     0.37     0.711       .017703     .2588843     0.07     0.941       .017703     .2588843     0.07     0.947       .1399712     .4728292     0.30     0.768       .3873756     .2472875     1.57     0.119       .335313     .2657988     1.26     0.209       .0714302     .4206177     0.17     0.865       .2221984     .1953995     1.14     0.257	S         df         MS         Number of obs         =           9938         11         1.09699307         Prob > F         =           99314         162         .558579099         R-squared         =           6738         173         .592813514         Root MSE         =           66738         173         .592813514         Root MSE         =           Coefficient         Std. err.         t         P> t          [95%           .0405266         .0150855         2.69         0.008         .010           .5308958         .2309356         2.30         0.623         .6744          0506133         .2503583         -0.20         0.840        5448           .01703         .2508843         0.07         0.944        4477           .01399712         .4728292         0.30         0.768        7933           .3873756         .2472875         1.57         0.119        1006           .335313         .2657908         1.26         0.209        189           .0714302         .4206177         0.17         0.865        7593           .2221984         .1953995         1.14         0.257         -	SS       df       MS       Number of obs       =       17.4         19238       11       1.09699307       Prob > F       =       0.035         19814       162       .558579099       R-squared       =       0.117         16738       173       .592813514       Root MSE       =       .74733         174007       .592813514       Root MSE       =       .74733         17508       .2309356       2.30       0.023       .0746636        0506133       .2503583       -0.20       0.840      5449997         .1270407       .342188       0.37       0.711      5486832         .017703       .2508843       0.07       0.944      4777521         .0713198       .2779535       0.26       0.798      4775594        0196439       .2972305       -0

Appendix 3. Regression Table Bid Premium Analysis Cross-Industry Consideration

Source	SS	df	MS	Number of ob	s =	109
				- F(1, 107)	=	2.99
Model	8.93923583	1	8.93923583	Prob > F	=	0.0867
Residual	319.943252	107	2.99012385	R-squared	=	0.0272
				- Adj R-square	d =	0.0181
Total	328.882487	108	3.04520822	Root MSE	=	1.7292
CAR_US	Coefficient	Std. err.	t	P> t  [95%	conf.	interval]
After2020_US _cons	5941675 .0680956	.3436397 .2081709	-1.73 0.33	0.087 -1.275 0.744344	393 579	.0870581 .4807701

Appendix 4. Regression Table CAR Analysis US Sample (No Controls)

Source	SS	df	MS	Number of	obs	=	40	
Model Residual	11.9813668 302.545766	1 38	11.9813668 7.96173068	Prob > F R-squared Adj R-squa	ared	=	0.2275 0.0381 0.0128	
Total	314.527133	39	8.06479827	Root MSE		=	2.8217	
	CAR_2020US	Coefficien	t Std. err.	t	P> t		[95% conf.	interval]
CovidSeverity:	Index_2020US _cons	.1034451 -1.205966	.0843258	1.23 -1.71	0.227 0.095		0672636 -2.631338	.2741538 .2194053

Appendix 5. Regression Table CAR Analysis US 2020 Sample (No Controls)

Source	SS	5	df	MS	Numb	Number of obs		17	4
					F(16, 157)		=	1.2	3
Model	38.5921	1789	16	2.41201118	Prob	> F	=	0.252	2
Residual	308.337	7601	157	1.96393376	R-sq	uared	=	0.111	2
				1111-11-11-11-11-11-11-11-11-11-11-11-1	Adj	R-squared	=	0.020	7
Total	346.92	2978	173	2.00537445	Root	MSE	=	1.401	4
s	CAR	Coefficie	ent	Std. err.	t	P> t	[95%	conf.	interval]
Af	ter2020	4164	82	.2404863	-1.73	0.085	89	1488	.0585239
Debtov	erAsset	.28861	19	5150933	0.56	0.576	728	7919	1.306022
Debtove	FEBITDA	.08871	74	.0628129	1.41	0.160	0353	3501	.2127848
Conte	stedBID	1,1528	12	.7750927	1.49	0.139	378	1431	2.683766
MajorityI	nterest	1.2714	92	.4447256	2.86	0.005	. 393(	743	2.149909
NumberOfTrans	actions	.00068	92	.000977	0.70	0.487	0012	2495	.00261
hea	lthcare	5283	11	.4905911	-1.08	0.283	-1.49	7321	.4406992
basicma	terials	.0940	58	.5340171	0.18	0.860	960	7169	1.148853
consumer	staples	30372	26	.6881225	-0.44	0.660	-1.662	2895	1.05545
	energy	07238	79	.536609	-0.13	0.893	-1.132	2292	.9875164
indu	strials	2792	25	.5704068	-0.49	0.625	-1.40	5886	.8474364
rea	lestate	31992	67	.6059372	-0.53	0.598	-1.510	5767	.8769138
ut	ilities	35065	16	.9487196	-0.37	0.712	-2.224	1552	1.523249
consumerdiscre	tionarv	24707	79	.5205712	-0.47	0.636	-1.27	5305	.7811487
tec	hnology	10067	78	.5578364	-0.18	0.857	-1.20	251	1.001155
telecommuni	cations	.53850	91	.8218442	0.66	0.513	-1.084	1798	2.161798
	_cons	-1.2498	59	.6428657	-1.94	0.054	-2.519	9641	.0199219

Appendix 6. Regression Table CAR Analysis Cross-Industry Consideration



Appendix 7. Q-Q Plot Ref. Figure 30



Appendix 8. Q-Q Plot Ref. Figure 41



Appendix 9. Q-Q Plot Ref. Figure 42



Appendix 10. Time Residual Plot Ref. Figure 30



Appendix 11. Time Residual Plot Ref. Figure 32



Appendix 12. Time Residual Plot Ref. Figure 41



Appendix 13. Time Residual Plot Ref. Figure 42

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### Department Of Corporate Finance

### DDIM Double Degree Program

Chair of Financial Statement Analysis

# SUMMARY

# Bid Premiums and Cumulative Abnormal Returns: An Empirical Analysis on the consequences of the Covid-19 Pandemic

投标溢价和累计超额收益率:对 Covid-19 大流行后果的实证分析

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### Introduction

The financial environment has always offered enormous opportunities to investors, seeking to efficiently allocate their resources, and to companies, seeking to raise capital and expand their growth horizon. Besides the importance of a predominant and efficient local financial market in order to positively impact the overall economic growth, those markets are often impacted by robust and durable crisis that could lead to dreadful consequences, impacting the global economy as a whole, even if originated in just one single country. Indeed, starting from January 2020, global markets started to experience the negative impact caused by the Covid-19 virus, which gradually affected all the major global players, starting from China and arriving to the United States and awfully impacting emerging and highly populated economies like India and Brazil. One of the most important issues that generally arises in this context is the loss of market confidence which triggers a self-fulfilling mechanism that ultimately leads to a worsening of the overall economic condition. Obviously, the M&A context, deemed as one of the most important areas within the financial environment, has been highly impacted by the current health crisis and loss in market confidence.

Considering the following dissertation, the purpose of the analysis is to understand whether the Covid-19 pandemic had a significant impact in the context of business combinations, studying the effects of the health crisis on a micro level, considering the bid premium paid by the acquiring company, and on a macro level, considering the short-term cumulative abnormal returns obtained during the announcement of the transaction within the market. The study will not only verify if the current pandemic had an impact with respect to the previous financial year but will also test if, during the crisis period, the severity of the outbreak itself had a significant impact on those measures. Moreover, will we try to understand if we could retrieve significant differences across the sectors involved within the analysis. Taking into account the analyzed literature, we retrieved multiple academic studies underlying the main determinants of the bid premium computation and the factor the affect the short-term market reactions following the announcement of a business combination. In fact, the initial part of the literature review and theoretical framework aims at underlying the main determinants of the response variables, starting from the *fundamental synergy equation*, thus analyzing relevant studies from Damodaran (2005) and Vulpiani (2014) and arryving at Gomes & Marsat (2019), leveraging on their study on the importance of corporate social responsibility and its impact on bid

premiums. Therefore, as we will better explain below, seveal factors will ultimately affect our response variables, depeding also on the context in which those transactions are performed.

Anyhow, we did not retrieve any analysis which underlines the role of the Covid-19 virus and how the crisis impacted the aforementioned variables. Therefore, the aim of the analysis is to fill this gap within the literature and understand if the virus triggered a statistically significant impact, within the context of a business combinations, compared with the previous financial year. Moreover, besides the Covid-19 virus itself, the dissertation will also allow us to understand if the analyzed response variables – the bid premium and the cumulative abnormal returns – are significantly impacted by the macro environment. Indeed, as described below within the literature review, the macro economic effects on business combinations tend to be difficult to capture and could be volatile depending on the single deal analyzed. In the specific, Xie, Reddy, & Liang (2017) underlined the effects of the local regulatory and bureocratic envinronment and its detrimnetal effect on potential business combinations. Moreover, Rossi & Volpin (2004) focused instead on financial market efficiency, arguing that higher investor protection could ultimately lead to higher premiums paid and, finally, Phan & Nguyen (2017) argued that policy uncertainty have a negative effect on the bid premium and transaction volumes. Anyhow, none of those important academic papaers underlines the detrimental effects that an health crisis could have in the context of a business combination. Therefore, levereging on this analysis, we could better understand if external factors, undermining market confidence like a global pandemic, could have a significant impact wihtin the M&A environment.

As previously specified, the dissertation will underline the main factors affecting the level of bid premiums and the cumulative abnormal returns in order to define control variables that could allow us to efficiently isolate the effect of the Covid-19 pandemic and its impact on the aforementioned variables. Therefore, multiple linear regression analyses will be performed in order verify the existence of relationship between the health crisis and the chosen response variables.

### Literature Review and Theorical Framework

#### **Determinants of Bid Premiums**

Considering the scope of the analysis, we will leverage on the literature review in order to establish a coherent theoretical framework so to underline the main control variables that could allow us to successfully investigate the consequences of the coronavirus pandemic on our predetermined response variables. Indeed, the first part of the literature review will entirely focus on the factors that affect the first response variable analyzed within our dissertation: the bid premium. Consequentially, one of the first arguments that has been highlighted is linked to the importance of synergies and how they affect the final offering price. Considering the Investment Banking manual written by Rosenbaum and Pearl (2009), synergies represent tangible value to the acquirer in the form of future cash flow and earnings above and beyond what can be achieved by the target on a standalone basis. Therefore, synergies are defined as the extra value that the acquirer can achieve because of the business combination.

$$Value (A + B) > Value (A) + Value (B)$$
[1.1]

The above equation [1.1] can be described as the *fundamental synergy equation*, capturing the logic and the importance behind the synergy argument. In fact, the bid premium will positively depend on the amount of synergies that the acquiring company is expected to generate because of the business combination. Indeed, considering a purely theoretical argument, if no synergies are expected to be created from the transaction, the acquiring company should not pay any premiums with respect to the current market price of the target. In the case in which premiums are instead paid, even though no further value is expected to be created, the transaction will ultimately destroy value for shareholders in the long run. Therefore, within the overall theoretical framework, we always underline the importance of synergies as the core guidance in order to implement a successful and value accretive transaction, avoiding value-destructive behaviors like the one described by Roll (1986) related to the empire building attitudes of executives, that could perform certain business combinations without taking into account future value creation but with the sole purpose of enlarging their scope and power. Following the aforementioned synergistic argument, we have underlined the first two control variables involved within the study – i.e., Debt over Asset of the target and Debt over EBITDA of the bidder.
Considering the former, the synergistic argument is mainly linked to an increased debt capacity that the acquiring company can exploit, without increasing its costs of debt. In fact, if a bidder acquires a highly leveraged target, it cannot expect strong financial synergies linked to a higher debt capacity. Therefore, Debt to Asset ratio is included as a proxy for this source of extra value, aimed at capturing the magnitude of debt that the acquiring company needs to absorb and the level of additional value that theoretically it could create. Moreover, we will take into account the Total Debt over EBITDA of the bidder, aimed at capturing the ability of the acquiring company to economically sustain the transaction and effectively develop expected synergies. The relationship between this control variable and the bid premium can be retrieved from Bugeja and Walter (1995), which found that companies experiencing good performances in the period prior to the business combination will pay, on average, higher bid premiums. Another important element that constitutes the offering price is related to the Control Premium. Within the analysis we take into account the premium for control as a control variable, differentiating if the transaction involved an acquisition of partial interest or not. Even if it lacks a strong theoretical background<sup>1</sup>, control premiums are usually paid if the acquiring company buys a majority stake of the target; on the other hand, certain discounts might be applied if a minority stake is instead acquired.

Furthermore, considering how the transaction process can influence the bid premium, we need to mention the scenario of a business combinations performed in a hostile environment. Indeed, as remarked by Chen (2002), acquirers, in the case of a contested bid, will ultimately pay an higher premium with respect to friendly transaction. The main problem for which companies pay higher premiums in this scenario is related to an asymmetric information problem. Indeed, in context of an hostile bid, we won't have a collaboration between the management of the companies involved in the transaction and, thus, the bidder will try to negotiate directly with the target's shareholders. Therefore, the acquiring company, in order to bypass the approval of the target company's board, will need to issue a tender offer directly to the target's shareholders, without the possibility to implement a proper due diligence of the company. Obviously, this lack of transparency and information asymmetry will not allow the acquiring company to implement a proper analysis of the target and, consequentially, of the possible value driven factors. Therefore, the acquiring company, on average, will pay higher bid premiums in contested bids and will increase the possibility of a value-destructive combination.

<sup>&</sup>lt;sup>1</sup> Considering a purely theoretical argument, control premiums should be paid only if the acquiring company, by just changing the way in which the target its managed, its able to increase its standalone value; thus, without taking into account any synergy exploitation arguments.

Additionally, it is important to mention the case in which corporation growth through strategic acquisitions. Companies implementing this corporate venturing approach often have an in-house division that coordinates those business transactions, avoiding excessive advisory fees. In this analysis, we will take into account the experience that companies have accumulated throughout multiple transactions by considering as a control variable the number of business combination previously implemented. The theoretical background behind this logic is based on the fact that those companies, accumulating experience, are more capable of understanding the real value of a target and, therefore, paying an offering price, which will not ultimately impact, in a negative way, the long-term value of the acquiring shareholders. Companies growing through strategic acquisitions are defined as "mountain climbers" and applying always the same approach by gaining experience in every transaction performed, they will be more able to create value and pay a price consistent with the real theoretical value of the target and not paying excessive premium (Deloitte & Touche LLP, 2012).

Until now we have considered the main determinants of the bid premium focusing on the two companies involved in the transaction and the future extra value that can be generated from the combination. Besides, as we have observed in the previous paragraphs, the nature of the premium can be different according to the analyzed context. In fact, Laamanen (2007) implemented a study on the bid premiums considering the industry characteristics of the companies involved in the business combination, discovering that, in discriminating considering the growing potentials of the single industries, we could retrieve important differences in the level of bid premiums. In fact, in considering growing businesses, acquirers will pay on average higher premiums with respect to industries having a lower growth potential. Considering the scope of this analysis, the transactions will be divided according to the Industry Classification Benchmark and will be divided in growing industry and nongrowing industries, referencing the US Bureau of Labor Statistics, which indicates that the fastest growing industries are Health Care and Technology. The above discriminant will be included as a control dummy variable for the analysis. Finally, considering the last control variable involved within the model, we divided our transactions taking into account whether those business combinations were performed by companies operating in different countries. Indeed, considering cross-border transactions, Rossi and Volpin (2004) found that companies implementing a business combination in another country will pay a higher premium with respect to M&A deals locally implemented.

In 2020, the macroeconomic context has been profoundly impacted by the Covid-19 pandemic which is currently disrupting the business environment on a worldwide scale and, consequentially,

possible business combinations. Leveraging on the main determinants of the bid premiums, we will define the main control variables for the analysis, accounting for the main factors affecting our response variable and trying to capture how deals have been impacted by external social and economic conditions, like a once in a century global pandemic.

#### Determinants of Cumulative Abnormal Returns

In computing the analysis based on the bid premium our aim is to understand the business combination more in detail by verifying the nature of the offering prices and how those have been impacted by the current health crisis. Thus, the final objective is to derive a model that could explain if the willingness to pay for a certain target has been affected by the Covid-19 pandemic. On the other hand, by analyzing the Cumulative Abnormal Returns, we are implementing an analysis which is solemnly focused on the market reactions following the transaction announcement. Thus, with respect to the analysis on the bid premiums, the study of the CAR looks at the macro perspective of an M&A operation, trying to understand how the market viewed and reacted to those combinations. In fact, the initial analysis tries to understand the acquiring company's thought process in deciding the offering price for the target, while the second analysis will try to understand the market's thought process, and if investors reacted differently once we account for the current health crisis.

Please note that, following the study of Armitage (1995), we have computed the short-term Cumulative Abnormal Returns obtaining highly significant results: in fact, for certain transactions, our model derived an R-Squared of almost 0.99 and only in few cases we have derived values below the threshold of 0.4.

Considering the control variables used within the analysis of the cumulative abnormal returns, we leverage on the factors previously defined for the analysis of the bid premium. The reason for which we apply this logic is linked to the fact that, even though part of the market reaction will ultimately depend on investor's irrational behavior, agents within the market will evaluate if the transaction could create long term value for the newly combined entity and will react consequentially. Indeed, even though in this case the literature is not so extensive, the retrieved evidence is consistent, in term of impact on the response variables, with the previously defined arguments regarding the bid premium. An important difference can be noticed if we take into account the *Contested Bid* dummy variable, for which, consistently with the asymmetrical information argument previously explained, will have a negative impact on the cumulative abnormal returns. Indeed, in the case of a hostile takeover, investors

know that the acquiring company is implementing an offer without being able to perform a proper due diligence of the target; therefore, as underlined by Wansley & Lane (1983), the agents reactions will always be negative. Moreover, considering the number of M&A operations previusly implemented, while an higher number of previous transactions can reduce the overall premiums, markets tend to react posivitely to those growing strategies, especially if we considering industries having an high growth perspective. Finally, the only control variable for which we were not able to retrive significant information is the *Majority Interest* dummy variable, for which we would have the possibility to observe a possible relationship within the following analysis.

Overall, considering the conclusions derived from the above literature, the following control variables were considered within the analysis.

Control	Impact on Bid	Main Theoretical		Main Theoretical
Variables	Premium <sup>2</sup>	Background	Impact on CAR	Background
Debt to Asset Ratio Target (One Year Before Announcement)	Negative	(Walkling & Edmister, 1985), (Robinson & Shane, 1990), (Damodaran, NYU Stern, 2010), (Lyle, 2017)	Negative	(Moeller, 2004) (Loderer & Martin, 1990) (Garvey & Hanka, 2002)
Total Debt/ EBITDA Acquirer	Negative	(Bugeja & Walter, 1995), (Hayward & Hambrick, 1997)	Negative	(Garvey & Hanka, 2002) (Masulis, Wang, & Xie, 2007)
Contested Bid	Positive	(Chen, 2002), (Damodaran, The Value of Synergy, 2005), (Chamberlain, 2016)	Negative	(Damodaran, The Value of Synergy, 2005) (Wansley & Lane, 1983)
Majority Interest	Positive	(Hayward & Hambrick, 1997), (Vulpiani, 2014), (Xin-qing, 2010)		Missing Evidence
Number of M&A Transactions	Negative	(Langford & Brown, 2004), (Deloitte & Touche LLP, 2012)	Positive	(Ma, Pagán, & Chu, 2009)
Growing Industry	Positive	(Laamanen, 2007), (PwC, 2021)	Positive	(Laamanen, 2007) (Ma, Pagán, & Chu, 2009)
Cross Border Transaction	Positive	(Sovbetov, 2015), (Rossi & Volpin, 2004)	Positive	(Morck & Yeung, 1992)

Figure 1. Control Variables Summary

 $<sup>^{2}</sup>$  Given an increase in the value of the control variables, the bid premiums will be impacted according to the information provided in *Figure 1*. The same reasoning applies in the case of the cumulative abnormal returns.

# Research Question and Methodology

# **Research Question**

Considering the above premises, the main hypothesis of this dissertation is that bid premiums and short term Cumulative Abnormal Returns (CAR) have been negatively impacted by the current health crisis, which in turn exacerbated in a robust economic crunch characterized by a lack of predictable cash flows and low market confidence. In fact, the study is articulated considering the following research question and ancillary analysis:

# "To which extent Bid Premiums and CAR have been impacted because of the COVID-19 Pandemic?"

#### Ancillary Analysis:

- Did the *severity* of the breakout affect those measures?
- How does measure vary across industries?

#### Research Design

To understand if a given relationship exists between the aforementioned response variables and the Covid-19 pandemic, we will leverage on a linear regression model following the below equations:

$$BP = \alpha 0 + (\alpha 1)After 2020 + (\alpha 2)CovidSeverityIndex + Control Variables$$
[2.1]

$$CAR = \alpha 0 + (\alpha 1)After 2020 + (\alpha 2)CovidSeverityIndex + Control Variables$$
[2.3]

 $\alpha 1$  = Dummy Variable capturing if the transaction was announced from 2020 onwards.

#### $\alpha 2$ = Covid Severity Index

Please note that, in order to effectively answer to the question on whether we had an impact linked to the current health crisis and if the severity of the pandemic had a significant effect on the retrieved premiums and cumulative returns, we need to disentangle the two effect and implement two different regression analysis. Indeed, we will implement our analysis considering two different samples: the first sample of transactions will include all the data set and we will investigate the role of the covid-19 pandemic reasoning on the *After2020* dummy variable, without considering the Covid

Severity Index. Afterwards, we will study the impact of the severity outbreak by reducing the sample to the transactions performed from 2020 onwards and including the *Covid Severity Index* as explanatory variable without taking into account the above-mentioned dummy variable. Therefore, we will first investigate whether we could retrieve a significant difference between a pre-pandemic and post-pandemic scenario and, afterwards, if severity of the pandemic had a considerable impact on our response variables, considering the first ancillary question.

## Sample Description

The sample chosen for this analysis entails 174 M&A operations having a deal size greater then 50 million US dollars. The reason of the cut-off established at 50 million US dollars transactions size is linked to the fact that for transactions having a lower deal size, most of the basic information was missing – e.g., form of the transaction and/or price per share paid by the acquiring company. Thus, by considering business combinations having a deal size above 50 million US dollars we have insured a completeness of the provided data.

Announced M&A Transactions Worldwide from 01/01/2019	128487
Less: Uncompleted Deals	38826
Less: Deals below 50 million US dollars	79776
Less: Deals outside the pre-determined countries	4848
Less: Non-Public Acquirers and Targets	4667
Less: Financial Buyers	74
Less: Buybacks and Acquisition of remaining interest	122
Final Sample	174

#### Figure 2. Sample Selection Process

The selected companies are *Non-Financials Public Companies* which announced a business combination from the first of January 2019 until March 2021. Obviously, only listed companies were included within the sample in order to derive more efficiently the data needed for the analysis and to compute the CAR of the share prices during the considered event window. Finally, the cluster of countries taken into account for the analysis are the United States, Canada, United Kingdom, Italy, Germany, Spain, Netherlands, France and Switzerland, having more developed and efficient financial markets with respect to other countries.

# Statistical and Empirical Analysis

# **Bid Premium Regression Analysis**

Considering the first part of the analysis, concerning the micro perspective and the acquiring company's decision, the main focus will be on the bid premium and how this response variable has been affected by the current health crisis. Please notice that besides investing those relationships considering the overall sample, we have retrieved the most statistically significant results considering the transaction in which the acquiring company was a US-based entity. Therefore, within the context of this summary, we will underline the results obtained considering the above-mentioned sub-sample; nevertheless, the retrieved outcome is consistent with the overall analysis.

Source		SS	df	MS	N	umber of ob:	5 =		109
					F	(4, 104)	=	4	. 12
Model	4.81	727849	4	1.204319	62 P	rob > F	=	0.0	039
Residual	30.3	839637	104	.2921534	97 R-	-squared	=	0.1	368
					A (	dj R-square	= b	0.1	037
Total	35.20	012422	108	.3259374	28 R	oot MSE	=	.54	051
BP	30_US	Coeffici	ent St	d. err.	t	P> t	[95%	conf.	interval]
After20	20_US	.17239	37.1	091881	1.58	0.117	044	1305	.3889179
<b>DebtOverEBIT</b>	DA_US	.04326	41 .0	289714	1.49	0.138	014	1873	.1007156
MajorityIntere	st_US	.33912	63 .2	312559	1.47	0.146	1194	4628	.7977154
	GI_US	.36457	12 .1	102133	3.31	0.001	.146	0141	.5831284
	_cons	12881	65.2	517788	-0.51	0.610	628	1034	.3704703

Figure 3. Regression Table Bid Premium Analysis US Sample BVSP Application

Source	SS	df	MS	Number of	obs	=	40	
Model Residual	6.90393294 9.59393672	32 36.	.30131098 266498242	F(3, 36) Prob > F R-squared	L.	= = =	8.64 0.0002 0.4185	
Total	16.4978697	39.	423022299	Adj R-squared Root MSE		=	0.3700 .51623	
<u></u>	BP30_2020US	Coefficient	Std. err.	t	P> t		[95% conf.	interval
CovidSeverityI	ndex_2020US	.0636612	.0157681	4.04	0.000		.031682	.095640
Debt0verEB	ITDA_2020US	.0769882	.0420394	1.83	0.075		0082717	.162248
	GI_2020US	.5287397	.1688681	3.13	0.003		.1862593	.8712
	_cons	2048831	.1902724	-1.08	0.289		5907735	.181007

Figure 4. Regression Table Bid Premium Analysis US 2020 Sample BVSP Application

Taking into account the above models, it is important to understand that a Backward Variable Selection Procedure was applied in other to remove the non-significant variables having a p-value higher then 20%. Thus, considering the significant variables, we can see that the retrieved results is

consistent with the theoretical framework for what concerns the Majority Interest and Growing Industries dummy variables. On the other hand, considering the impact of the health crisis on bid premiums, the outcome is inconsistent with respect to our initial hypothesis.

## CAR Regression Analysis

Considering instead the second part of our analysis, concerning the macro perspective and how market agents reacted to those transaction announcements, the focus will be on the short term cumulative abnormal returns. Please notice that also in this case, considering the purposes of this summary, only the sub-sample of US-based entities will be taken into account.

Source	SS	df MS		Number of obs		df MS Number of obs   4 15.7716107 Prob > F   104 2.5557312 R-squared   Adj R-squared Adj R-squared		s = 1		9
Model Residual	63.08644 265.79604	3 4 4 104	15.7716107 2.5557312	=	0.0002					
Total	328.88248	7 108	3.04520822	=	0.1607 1.5987					
	CAR_US	Coefficient	Std. err.	t	P> t	1	95% conf.	interval]		
Aft Debt0ver MajorityIr Number0fTransa	er2020_US EBITDA_US iterest_US ictions_US _cons	4422565 .1197731 3.323506 .0021125 -3.510328	.3224296 .0847177 .7441526 .0010432 .801182	-1.37 1.41 4.47 2.03 -4.38	0.173 0.160 0.000 0.045 0.000	-1  1	.081647 0482253 .847824 0000439 .099102	.1971335 .2877715 4.799189 .0041811 -1.921554		

Figure 5. Regression Table CAR Analysis US Sample BVSP Application

Source	SS	df	MS	Number of obs	5 =	40	
Model Residual	144.055384 170.471749	4 36 35 4.8	.013846 7062139	F(4, 35) Prob > F R-squared	= = =	7.39 0.0002 0.4580	
Total	314.527133	39 8.0	6479827	Adj R-squared Root MSE	1 =	0.3961 2.2069	
	CAR_2020US	Coefficient	Std. er	r. t I	P> t	[95% conf.	interval]
CovidSeverit DebtOver NumberOfTransa MajorityIr	tyIndex_2020US FEBITDA_2020US actions_2020US hterest_2020US _cons	.0893517 .2857477 .0066173 7.401739 -8.924741	.0682109 .1903759 .002377 1.490033 1.58359	9 1.31 ( 9 1.50 ( 1 2.79 ( 3 4.97 ( 5 -5.64 (	0.199 0.142 0.008 0.000 0.000	0491238 100736 .001804 4.376811 -12.13952	.2278273 .6722313 .0114306 10.42667 -5.709963

Figure 6. Regression Table CAR Analysis US 2020 Sample BVSP Application

From the above regression models, we can see that the retrieved results are highly consistent with our initial hypothesis, given the fact that the CAR are strongly impacted, in a negative manner, by the current health crisis. Moreover, an important result was obtained considering the majority interest dummy variable, for which a robust positive relationship with the CAR was retrieved.

# Conclusion

## **Conclusion 1: Impact on Bid Premiums**

Contrary to our initial hypothesis, the obtained relationship between the bid premium and current health crisis is positive.

As we initially specified within the literature review, the level of bid premium can be affected by multiple factors that could vary according to the specific context in which the transaction is performed. Moreover, in the above paragraphs, we emphasized the bid premium study as a micro analysis, given the fact that the offering price is ultimately established by the acquiring company and not derived from market dynamics like in the case of the cumulative abnormal returns. Considering the above analysis, the first outcomes diametrically oppose our initial theoretical arguments and hypothesis, picturing a scenario in which the overall level of bid premiums offered from 2020 onwards is higher with respect to the one offered in 2019. One possible explanation of this apparent inconsistency can be linked to fact that target shareholders, during periods of high market volatility and downward pressure in revenues do not adjust their price expectations and are willing to implement a business combination only at a price which they consider appropriate and that usually corresponds to pre-crisis evaluation, fearing that they could obtain a sub-optimal offering price. Thus, even though the stock price might decrease because of the general uncertainty within the market, the standard offering price remains the same, leading to an increase in the overall premium.

Until now we have taken into account the first part of the research question, thus, if the current health crisis had a significant impact on the level of bid premiums. Additionally, we aimed at analyzing if the severity of the pandemic breakthrough could have significantly impacted our analyzed response variable. In this case, even if we take into account the US-based sample, the result is consistent with respect to the one previously obtained considering the *After 2020* dummy variable: the *Covid Severity Index* seems to have a positive relationship with the level of bid premiums. Anyhow, in this particular case, we need to underline that the retrieved coefficient for the aforementioned explanatory variable, even if highly significant, is still of 0.06, suggesting that, even though a relationship could exist, it is not solid enough to guarantee a highly significant impact. Considering the other explanatory variables involved, the analysis strongly confirms the research of Laamanen (2007), underlying that in growing

industries, like health care and technology, the bid premiums are consistely higher in both the prepandemic and post-pandemic scenarios. Anyhow, in terms of different impact among industries, the analysis does not retreived any significant result, suggesting that, considering the analyzed sample, we should not descriminate the Covid-19 effect considering the different industries involved.

#### Conclusion 2: Impact on CAR

Consistently with our initial hypothesis, the level of cumulative abnormal returns has been negatively impacted by the current health crisis.

In antithesis with the bid premium analysis, considering the cumulative abnormal returns, we were able to obtain a result consistent both with our initial hypothesis and the analyzed theoretical framework. As we previously explained, the CAR analysis involves a macro perspective; therefore, the nature of this response variable will not depend on the arbitrary decision of the acquiring company but will depend on the current market dynamics and how market agents react to a certain transaction announcement. The main reason for which we observe this result is linked to a paramount concept that we have previously underlined within the theoretical framework: synergies exploitation. The fundamental reason that triggers a business combination is connected to the additional value creation that the companies expect to create following the transaction; therefore, if market agents expect a certain business combination to be highly accretive, in a synergistic perspective, then the reaction will be on average highly positive, given that investors will be incentivized to capture the additional value creation that the two combined entities might generate. Anyhow, the above logic will be fallacious in the moment in which we account for the current health crisis. Indeed, when the overall confidence within the markets is damaged because of certain events, it will be more difficult for market agents to predict a favorable outlook of the economic environment, and thus, possible synergies generation, given the high level of volatility and business disruption. Therefore, as confirmed also within our analysis, the lack of predictability and low market confidence, caused in this case by a once in a century global pandemic, will ultimately affect how agents react to deals announcement, leading to lower cumulative abnormal returns with respect to an ordinary scenario. The result in the aforementioned models underlines also the robust role of the *Majority Interest* dummy variable and its positive effect on the cumulative abnormal returns. Besides the impact of macroeconomic factors that the above dissertation wants to clearly define, this above relationship regarding the *Majority Interest* also represents a gap within the literature, given the fact that we do not find any strong evidence of its impact on the cumulative abnormal returns. As previously underlined, the main explanation for this result can be also link to an argument based on synergies exploitation. Indeed, if a company acquires a controlling interest within another entity can more effectively, and without any burdens, apply the actions needed to exploit such synergies. On the other hand, considering a company seeking for a minority interest like in the case of activist shareholder, the process usually involves extensive bargain with the current management in order to implement certain changes, which will ultimately not guarantee an increased value for shareholders. Considering instead the Covid Severity Index, the retrieved results do not strongly support the hypothesis that the level of cumulative abnormal returns are impacted by the severity of the pandemic breakthrough. Indeed, even though we obtained a statistically significant explanatory variable within the model, the retrieved coefficient is positive and with a value for both models of 0.09, suggesting a relatively modest relationship between the response variable and the *Covid* Severity Index. More importantly, the above result opposes the previous conclusion regarding the After 2020 dummy variable, which has been proved to be highly significant. Moreover, consistently with the study of Morck & Yeung (1992), the model underlines a positive relationship between cross-border transactions and cumulative abnormal returns. On the other hand, inconsistenty with the studies of Moeller (2004) and Loderer & Martin (1990), the model pictures a positve relationship between the cumulative abnormal returns and the level of Debt over Assets of the target company. A possible explanation of this discrepancy might be linked to the fact that those values were computed considering the targets' balance sheet one year before the transaction, thus, not being a current measure with respect to the announcement period, the retrived results might be baised. Additionally, taking into account the industry differences, also in this case we did not retreived any statistically significant value. Indeed, contrary to the previous results obtained and to the studies of Laamanen (2007) and Ma, Pagán, & Chu (2009), we did not found any type of relationship for what concerns Growring Industries, ultimately suggesting that, according to our sample, no statistically significant difference had been observed across different industries.

Overall, taking into account the retrieved results and the above arguments, the following summary table was developed, capturing the main consequences derived from the dissertation.

	Impact Significance	Severity Significance	Industries Differences
Impact on Bid Premium	Positive	Positive	No Relationship
Impact on CAR	Negative	Ambiguous	No Relationship

Figure 7. Analysis' Results Summary

# Main Implications

Overall, the above dissertation confirms that the coronavirus health crisis had in fact a considerable impact considering the response variables identified within the sample. Anyhow, according to our analysis, even though we have retrieved a significant difference between the prepandemic and the post-pandemic periods, a modest relation was obtained considering the severity impact, suggesting that no robust link exists between the outbreak severity in a specific moment in time and both the bid premium and the cumulative abnormal returns. Overall, the main implication of this analysis is that listed acquiring companies, in the context of high market volatility and high uncertainty, while implementing a business combination, will probably pay a higher premium with respect to the current value of the target since both the counterpart's management and shareholders will always reference a value for their entity considering a pre-crisis period. Moreover, market agents, given the overall uncertainty within the business environment, will react negatively to the transaction announcement, which could ultimately lead to negative consequence in the fulfillment of the deal itself and overall performances of the acquiring company. Therefore, in order to avoid a negative impact that could ultimately destroy value in the long run for the acquiring shareholders, the bidder will need to negotiate a sales and purchase agreement with the target that contemplates a realistic evaluation, accounting also for the current macroeconomics issues and uncertain outlook. The company, not overpaying for the business combination, will be able to adjust market's expectations and possibly retrieve a positive reaction.