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**M&A and uncertainty:**

**An empirical study on how volatility affects deals  
volume and short-term performance**

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## **Abstract**

Does M&A activity changes during periods of high volatility? The main purpose of this paper is to investigate how turbulent market conditions impact on both M&A volume and value creation around deals announcement.

This paper tracks the volume and examines the short-term performance of a sample of European M&A transactions announced by public listed bidders between 1<sup>st</sup> January 2013 and 16<sup>th</sup> July 2018, by discerning between periods of high and neutral uncertainty. The VSTOXX index has been used as a proxy of uncertainty and value creation has been investigated by computing Cumulative Abnormal Returns around the deal announcement. Evidence suggests that, on average, periods of high uncertainty are not only associated with lower M&A activity, but also with lower announcement return. When uncertainty is high, bidding firms earn a statistically significant -0.87% 5-days Cumulative Average Abnormal Returns (CAAR), vis à vis the non-significant +1.39% 5-days CAAR observed in periods of neutral uncertainty. A multi-variable regression model is then ran to determine whether uncertainty can be considered as one of the key drivers of short-term M&A performance, with result showing that a negative and statistically significant relationship between 5-days CARs and uncertainty exists.

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## Introduction

This research is aimed at investigating whether there is a substantial difference between M&A deals undertaken when market uncertainty is high vis à vis those undertaken when the level of market uncertainty is reasonable.

Existing literature has extensively examined aspects linked to M&A timing and value creation. However, few researchers have focused their attention on understanding how these aspects change in times of higher uncertainty. For this reason, this paper provides a new link between the field of research studying M&A trends and the one studying M&A performance.

Over the last decades, several empirical studies on the most active M&A markets (namely US and UK) have sought to uncover the impact of economic fundamentals on M&A activity. In the attempt to explain M&A cyclicity, uncertainty has attracted the interest of a large number of researchers, as it is seen as one of the key factors determining mergers and acquisitions waves. The bulk of previous studies have analyzed uncertainty under different perspectives, referring to economic, regulatory and/ or technological shocks, as well as to more general macroeconomic conditions (Mitchell and Mulherin, 1996; Maksimovic and Phillips, 2001; Harford, 2005; Ahern and Harford, 2014). By contrast, very little emphasis has been put on value creation during periods of high uncertainty, and on whether market response to M&A deals announcement might differ because of uncertainty. The main limitation of previous research studies is the lack of a single general analysis which explains the impact of market volatility on both firms' appetite for external growth and bidder shareholders' returns around the announcement date. In order to fill this gap and enrich the current literature, this research will specifically focus on uncertainty as a key factor driving (low) deal volume and (poor) M&A performance around the deal announcement.

In light of these considerations, this paper is innovative in proposing a new link between market volatility and merger activity, by predicting that higher uncertainty will decrease both deal activity and bidder shareholders' returns around the announcement date. The main contribution of this paper is in terms of both up-to-date data collection and analysis on a different market. The research questions addressed are: *“How does M&A activity volume change in periods of high uncertainty? How does M&A activity performance change in periods of high uncertainty?”* In order to answer these questions, this paper builds upon the contributions of previous studies from Bhagwat, Dam and Harford (2016) and Chiarella and Gatti (2014). The main objective is to investigate the link between uncertainty and M&A, in order to determine whether the decision of firms to pursue external growth when the market conditions are uncertain brings value creation, in terms of short-term abnormal returns around the announcement date.

With this purpose, a sample of 799 European M&A deals announced and/ or closed between 1<sup>st</sup> January 2003 and 16<sup>th</sup> July 2018 have been analyzed throughout an event study approach and the estimation of OLS regression models. Uncertainty has been proxied with market volatility. Given the focus on the European market, volatility has been measured on the basis of the Euro STOXX 50 Volatility Index (VSTOXX),

designed to track the market expectations of future volatility derived from real-time option prices for European stocks.

First, following the approach proposed by Chiarella and Gatti (2014), a simple OLS regression analysis has been run to detect the relationship between the total number of deals or the aggregate deal value and two alternative measures of volatility. It has been found that a negative and statistically significant relationship between merger activity and uncertainty exists. Similarly, a simple OLS regression analysis has been run to detect the relationship between the percentage change in the number of merger announcements versus prior quarter volatility percentage change (Bhagwat, Dam and Harford, 2016). It has been found that a one standard deviation increase in VSTOXX is associated with a statistically significant drop by 0.50 standard deviations in deal activity in the subsequent quarter. This finding suggests that it might be possible to anticipate a slowdown in M&A activity by monitoring the level of uncertainty on the market.

Second, once the inverse relationship between deal flow and uncertainty has been detected, the analysis focuses on determining the role of uncertainty in value creation. At this point, following the approach proposed by Chiarella and Gatti (2014), the selected sample has been split into subsamples of deals occurred in times of neutral and high uncertainty. The proposed classification based on the level of the VSTOXX index (see “Sample Selection and Sources” for further details) allows to identify 54 transactions announced in uncertain periods. An event study was then applied to test the difference in CARs between the two subsamples, with the analysis showing that on average, M&A announcements in periods of high uncertainty produce a statistically significant -0.87% versus a non-significant +1.39% Cumulative Average Abnormal Return (CAAR) when uncertainty is low. Being this difference substantial, it is worth investigating whether, beyond some well-known deal-specific characteristics, uncertainty can be considered as a possible driver of performance when it comes to M&A value creation. A multivariate regression on firms’ abnormal returns will then be run on five deal-specific variables and on uncertainty, in order to disentangle the main factors which significantly drive CARs at the time of a deal announcement. The deal-specific variables being considered are: method of payment, target listing status, industry relatedness, geographical diversification and relative deal size (in terms of deal value over bidder market capitalization one month prior the announcement). A dummy variable for uncertainty has then been included in order to capture its contribution in explaining abnormal returns.

The dissertation is organized as follows. Section 2 revises past papers that contributed to the literature on M&A intensity and value creation around the announcement date. Section 3 develops the research questions and hypotheses. Section 4 presents the research methodology employed, along with the variables included in the regression models. Moving on, Section 5 describes the data collection activity and provides descriptive statistics of the data sample. The results of the empirical analysis will be disclosed and commented in Section 6. Finally, the last chapter shows conclusive comments to the paper, summing up all the main results obtained and proposing insights for further research.



# Chapter I: Main features of the M&A activity

## 1. Review of the main M&A motives

M&A is one of the most important events in corporate life. There are several reasons why bidding firms may be willing to pursue M&A transactions. The existing literature has broadly investigated on this aspect, in order to identify the main motivations and goals for corporate takeovers.

Certainly, synergies seem to be the driving force behind most deals. There is a vast empirical evidence proving the existence of positive synergy gains in M&As (Devos, Kadapakkam and Krishnamurthy, 2009; Houston, James and Ryngaert, 2001; Hoberg and Phillips, 2010). Nonetheless, it is possible to identify some additional reasons driving M&A decisions. In this regard, a crucial contribution comes from Trautwein (1990), which has classified the main theories of merger motives into seven groups – efficiency, monopoly, valuation, empire-building, process, raider and disturbance theory – further explained in the following sections.

### 1.1. Efficiency theory

The efficiency theory views mergers as being planned and executed to pursue synergy gains. Synergies can be operational, managerial and/or financial (Seth, 1990a,b).

Operational synergies may take form of cost reductions, operational efficiency improvements, revenue enhancements (i.e. cross-selling), and knowledge transfer (Porter, 1985). However, it is important to weight these potential benefits against the cost of combining or transferring assets and skills.

Managerial synergies may stem from combining complementary managerial competences and practices, such as expertise in revenue growth through customer trend identification paired with expertise in cost control and logistics.

Financial synergies are usually associated with tax efficiency, less volatile cash flows, capital structure optimization and cost of capital reduction. The latter can be achieved through unrelated diversification (which may contribute to lower the systematic risk of a company), increased size (which may contribute to give access to cheaper capital) and the creation of an internal capital market (which may contribute to allocate capital across the firm more efficiently).

### 1.2. Monopoly theory

The monopoly theory views mergers as a mean to gain market power. Market power can be attained through both horizontal integration and conglomerate acquisitions, aimed at limiting existing competition and creating deterrents for potential entrants.

The advantages that can be obtained at firm level through conglomerate acquisitions have been referred to as “collusive synergies” (Chatterjee, 1986) or

“competitor interrelationships” (Porter, 1985). However, these collusive synergies cannot be interpreted as efficiency gains at economic level as they produce a wealth transfer from the firm’s customers.

The existing literature provides evidence of the monopoly consequences of mergers, which, most of the time, result in unfavourable event studies (Jensen, 1984; Ravenscraft and Scherer, 1987).

### **1.3. Valuation theory**

According to the valuation theory, mergers are planned and executed by those who have access to privileged information about the target's intrinsic value (Steiner, 1975; Holderness and Sheehan, 1985; Ravenscraft and Scherer, 1987). Bidders’ managers may have unique private information that enables them to both detect undervalued targets and anticipate the potential benefits of a business combination.

It is worth to note that the valuation theory seems to conflict with the efficient market hypothesis (“EMH” by Fama, 1970). However, Wensley (1982) states that, if the bidder had private information about the target intrinsic value, his bid would reveal it. Consequently, the stock price would climb to immediately incorporate the new information, thus leaving the bidder in a winner’s-curse situation. In this sense, the EMH does not preclude the existence of undervalued target firms, but only the opportunity to capitalize on revealed private information.

### **1.4. Empire-building theory**

The empire-building theory states that managers may undertake acquisitions to maximise their own interest, rather than the interest of shareholders. This theory stems from the widely analysed agency theory that finds its roots in the study by Berle and Means (1933) on the separation of ownership and control in modern US corporations.

Agency costs arise each time shareholders (principals) delegate to managers (agents) the authority to run the business on their behalf (Jensen & Meckling, 1976; Ross, 1973). In these situations, as Fama and Jensen (1983), pointed out, although managers are the decision-makers who define the firm strategic and financial goals, they do not bear any wealth effects of their choices. As a result, managers have the incentives to act in their own interest, rather than pursuing shareholders’ value maximization.

In light of these considerations, managers might be motivated to pursue M&A deals to merely extract private benefits, such as higher compensation, perks and professional prestige. Particularly, if their compensation is linked to firm size, there is a high probability that they will grow the firm ever larger and use the available excess cash to finance value-destroying acquisitions, instead of returning it to shareholders (Jensen, 1986). Secondly, it is far more prestigious to run a larger firm, which explains widely spread empire building aspirations. Thus, managers who maximise their own utility could pursue acquisitions even if the deal is detrimental to firm value.

### **1.5. Process theory**

The Process theory interprets mergers as strategic decisions which result from specific decision process, organisational routine and political power, and not from comprehensive rational choices.

In this context, the so-called “hubris”, first introduced by Roll (1986), plays a crucial role. Roll states that, if the market is efficient, there are no gains to be made from M&A activity since the stock market values firms efficiently. However, due to managerial overconfidence, executives tend to overestimate their own value-creation abilities, thus being too optimistic in the valuation of synergies. Empirical evidence suggests that when managers are affected by hubris, they are more likely to pursue value-destroying deals (Malmendier and Tate, 2008). Also, successful M&A track record makes managers overconfident about their skills and ability, and push them to continue engaging in deals, which usually underperform acquisitions performed by non-overconfident acquirers (Doukas and Petmezas, 2007; Billett and Qian, 2008).

### **1.6. Raider theory**

The Raider theory views merger as the cause of the wealth transfers from the stockholders of the target company (Holderness and Sheehan, 1985). These wealth transfers include greenmail or excessive compensation following a successful takeover. However, one of the main problems associated with the raider theory is the unfavourable empirical evidence. Holderness and Sheehan (1985) analysed a set of 69 mergers promoted by some raiders and found that targets’ shareholders gain in all cases, which confirm the more general findings on targets’ shareholders’ positive gains from M&A activity.

### **1.7. Disturbance theory**

The Disturbance theory, which finds its roots in Gort’s article (1969), views economic disturbances as one of the primary causes of merger waves. Economic disturbances (i.e. deregulation, emergence of new technologies or substitute products and services) generate discrepancies in valuation and widespread uncertainty, which are decisive in determining merger waves. However, Ravenscraft and Scherer (1987) point out that this theory is not completely consistent with empirical evidence.

## **2. M&A Process**

As previously mentioned, M&A is one of the most important events in corporate life. The sale of a company entails a long process (“auction”) that typically spans from three to six months and is characterized by some defined steps. “*An auction is a staged process whereby a target is marketed to multiple prospective buyers*” (Rosenbaum, J. and Pearl, J., 2013). On one side, the auction usually contributes to signal the inherent value of the firm, which might be further supported by a fairness opinion (if required). On the other side, the auction might have some drawbacks, such as information leakage, worsening employee morale, potential collusion among bidders, reduced negotiating power once the “winner” is selected and “taint” if the auction fails. A successful auction requires the deployment of a significant amount of resources, as well as extensive experience and expertise. For this reason, sellers hire investment

banks (“sell-side advisor”) who are in charge of driving the M&A process, suggesting financial and strategic options (i.e. spin-off, recapitalization, IPO, minority sale), guaranteeing speed of execution and extract the maximum value from the transaction. During the auction, the role of the sell-side advisor is crucial: he is expected to run a smooth process and to create a competitive environment in order to ensure substantial value creation for the target both in terms of price and conditions. As a first step, sell-side advisors have to prepare ad-hoc marketing materials, detect potential deal issues, train management and select a group of potential buyers to contact. Then, once the auction starts, the sell-side advisor is expected to run and coordinate all the phases of the process, ease due diligence through management presentations, site visits, data room population and responses to specific buyer inquiries, and effectively manage bids through the direct negotiation with interested counterparties.

## **2.1. Auctions: Type and Structure**

It is possible to identify two main types of auctions: broad and targeted.

A Broad Auction is an auction that maximizes the universe of potential buyers, involving both strategic buyers and financial sponsors. This kind of auction creates a highly competitive environment, which is instrumental to reduce bidders’ negotiation power and increase the chance of finding the best possible offer. A broad auction requires more preliminary organization and marketing due to the broad number of buyer to be contacted in the early stages of the process. At the same time, the risk of information leakages to the public (i.e. customers, suppliers and competitors) is higher due to the difficulty in maintaining confidentiality. Particularly, some opportunistic competitors might participate in the auction just to gain sensitive information on the target and its business strategy. As a consequence, information leakages might increase the risk of business disruption. Similarly, if the auction has an unsuccessful outcome, the target will appear as undesirable asset (“taint”).

A Targeted Auction is a more focused auction that rigorously select potential buyers based on strategic fit and financial soundness. This kind of auction allows the seller to maintain a higher level of confidentiality, thus minimizing the risk of business disruption. Similarly, the likelihood of failure is smaller because when bidders are thoroughly selected the target seems more willing to find a “partner” that can better sustain its future growth. However, the main risk associated with a targeted auction is represented by the exclusion of non-obvious bidders that might actually be interested and willing to pay a higher price (“leaving money on the table”), as well as agree on more favourable conditions. At the same time, given the lower competitive pressure, bidders have more negotiation power.

With regard to the structure, the traditional auction is characterized by a two-round bidding process that starts from the decision to sell and terminates with the signing of a definitive purchase/sale agreement (“definitive agreement”) with the winning bidder. Following the signing, the timing for the closing (or “post-signing”) may vary depending on a variety of factors which are not specific to an auction (i.e. regulatory approval, third-party consents, financing, etc.).



## 2.2. Preparation Phase

The Preparation phase usually takes two to four weeks. In this phase, the seller defines its objectives and works jointly with its advisor to identify the right sale process to put in place, perform a preliminary valuation analysis, develop and prepare selling materials and set up the confidentiality agreement.

Objectives	Steps	Description
<b>Preparation and warm-up phase</b> <ul style="list-style-type: none"> <li>Definition of marketing strategy and transaction structure</li> <li>Preparation of sales materials</li> <li>Streamlining of universe of potential bidders to enter the process</li> </ul>	<b>Plan Selling Strategy</b>	<ul style="list-style-type: none"> <li>Define the strategy for the process:               <ul style="list-style-type: none"> <li>Transaction structure and scope</li> <li>Key objectives of the process</li> <li>Team responsibilities</li> <li>Transaction structure</li> </ul> </li> <li>Definition of a universe of potential buyers</li> <li>Assist in the selection of legal advisor and DD advisers</li> <li>Elaboration of the strategy of the company and a business plan</li> </ul>
	<b>Finalize Selling Materials and Conduct bidder Warm-up</b>	<ul style="list-style-type: none"> <li>Prepare Process Letters, NDA</li> <li>Prepare CIM (summary description, on a no-name basis) and IM (detailed information on the company)</li> <li>Prepare Data Room</li> <li>Organize meeting with potential bidders to accelerate their education on the business and raise their appetite</li> </ul>
	<b>Prepare Vendor Due Diligence report(s)</b>	<ul style="list-style-type: none"> <li>Indicative scope: review operations, financial performance, accounting and tax review, etc.</li> <li>To be distributed later in the process</li> </ul>
	<b>Pre-marketing warm-up</b>	<ul style="list-style-type: none"> <li>Discussions regarding the opportunity with potential acquirers on a no-name basis</li> <li>Circulate CIM to key interested parties</li> <li>In case of interest, sign NDA</li> </ul>

One of the key decisions that must be taken at this stage is the number and the type of buyers to approach, which is tightly linked to sellers' priorities. Usually, advisors take into consideration a mix of strategic buyers and financial sponsors.

*“Strategic bidders are usually companies in a related type of business, such as competitors, suppliers, or custom”* (Gorbenko and Malenko, 2014). Therefore, strategic buyers look for targets that have overlapping and complementary resources,

which contribute to generate long-term operational synergies once the target is integrated into their business. On the other side, financial bidders (i.e. private equity firms) tend to look for undervalued targets that are able to generate high cash flows once reorganization is completed.

Generally, as Thompson and O'Brien (2005) underline, *“Strategic buyers have traditionally had the advantage over private equity funds, particularly in auctions, because strategic buyers could pay more because of synergies generated from the acquisition that would not be enjoyed by a fund”*. As a consequence, strategic buyers are usually able to pay a higher price than a sponsor because of synergies, empire-building aspirations of management and lower cost of capital.

In an auction process, bidders are evaluated on a wide range of criteria which enable the advisor to detect their likelihood and ability to acquire the target at the desired value. As far as strategic buyers are concerned, the first criteria that is taken into consideration is the strategic fit and the potential synergies that might arise from the combination of target and acquiring firms. The second criteria to be taken into consideration is whether the buyer has enough financial capacity (“ability to pay”), which typically depends on its size, current leverage, access to financing, and risk appetite. Also, there are other relevant factors that drive selection, such as cultural fit, M&A track record and expertise, relative and combined market share (which should be weighed against antitrust concerns) and impact on existing customer and supplier relationships. As far as financial sponsors are concerned, the first criteria that is taken into consideration is strategic positioning and focus, sector expertise, size and available sources to invest, track record, fit within current investment portfolio, fund life cycle and access to financing. The fit with existing portfolio is evaluated based on whether the fund has already invested in similar companies which may represent an attractive combination candidate for the target.

Moreover, during the preparation phase, it is very important to define a clear timeline and roadmap, setting dates for key milestones of the process, such as launch, receipt of indicative and binding offers, signing and deal closing. To gain a broad knowledge of the company and prepare effective marketing materials, sell-side advisors must perform an extensive due-diligence with their client, which consists in in-depth session with the target management. Following the due-diligence, sell-side advisors can:

- Validate key investment highlights and agree optimal business positioning
- Refine business plan forecasts / model, reflecting latest market outlook
- Determine a valuation range benchmark based on valuation methodologies (i.e. comparable multiples, precedent transaction multiples, DCF analysis, LBO analysis) that buyers are going to use in their valuation
- Confirm optimal process scope and timing
- Finalize list of potential buyers

At this stage, based on the information gathered during the due diligence, drafting of marketing materials takes place. Sell-side advisors prepare documents that provide

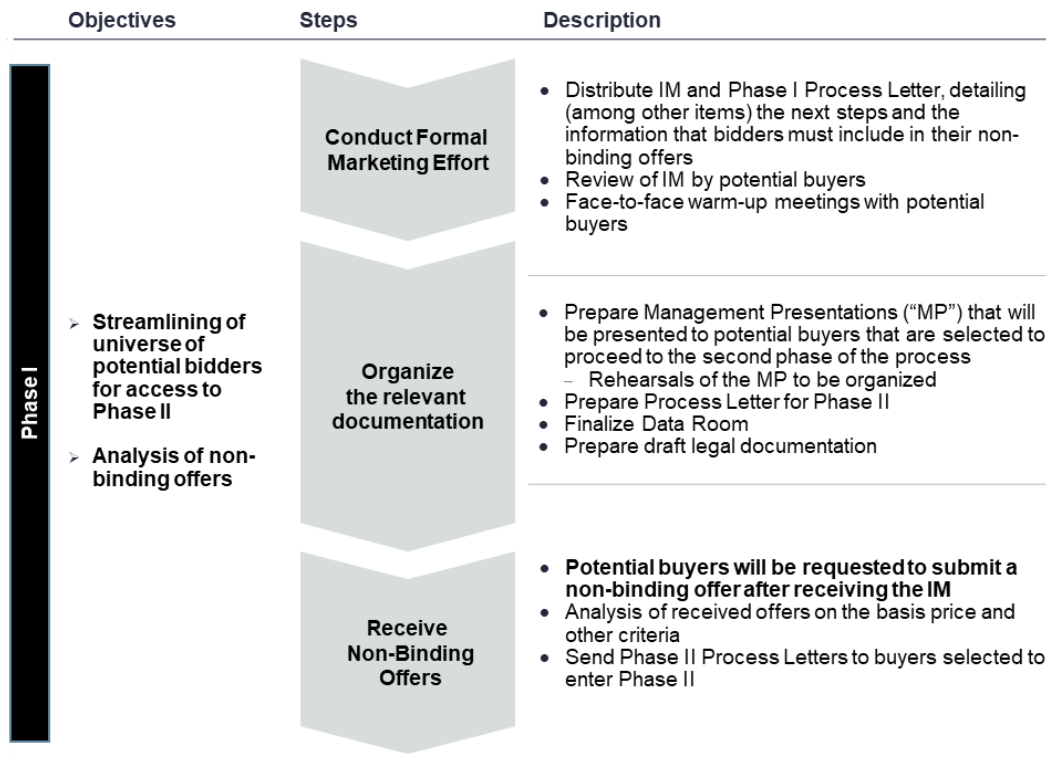
a first overview of the seller (basic operational, financial and management information), which is crucial to spark buyer interest.

The two main documents presented in the first round of the auction process are the teaser and the confidential information memorandum (CIM). The teaser is a one or two-page document that is presented to potential buyers to provide them some preliminary and general information and the key investment highlights which can support the preparation of their first non-binding bid. Conversely, the CIM is a longer document (usually more than 50 pages) that provides a more detailed description of the target, with information on the sector, customers and suppliers, operations, facilities, management, and employees. Particularly, the CIM contains a detailed financial section which provides key historical and projected financial information that will be used as a basis for the potential buyers' preliminary valuation analysis. Sometimes, the sell-side advisor tries to provide additional information on forecasted financials (e.g. potential external growth opportunities) in order to help buyers to develop some upside / downside scenarios.

An additional key document that is provided during the process is the confidentiality agreement (CA), a legally binding contract between the target and potential buyers that oversees the sharing of confidential information. Typically, the CA includes clauses that regulate: (i) Use of confidential information, (ii) Term (time horizon during which the confidentiality restrictions are effective), (iii) Permitted disclosures, (iv) Return of confidential information, (v) Non-solicitation/no hire (to prevent potential buyers from solicit/hire target employees for a designated time period, (vi) Standstill agreement (only for public targets, to prevent potential buyers from making unsolicited offers or purchases of the target's shares, or trying to control/influence the target's management, Board of Directors, or policies; (vii) Restrictions on clubbing (to avoid any potential collaboration among buyers).

### **2.3. Phase I**

The purpose of the first round is to solicit competitive indicative offers from, the potential buyers. Therefore, the main steps involved are: contact potential buyers, negotiate and execute confidentiality agreements, distribute Confidential Information Memorandum and Initial Bid Procedures Letter, prepare the Management Presentation, set up the Data Room, receive initial bids and select those buyers that can proceed to the Second Round.



The first round begins with the formal launch of the auction process, that consists in contacting the potential buyers identified through a scripted phone call by a senior member of the sell-side advisory team, usually followed by the delivery of the teaser and CA. The sell-side advisor keeps a detailed record of the interactions with potential buyers (“contact log”), in order to monitor the level of buyers’ activity and keep a record of the process. Then, after the execution of the CA, the sell-side advisor is legally able to circulate the CIM and initial bid procedures letter (that states the date and time by which the written, non-binding preliminary offers should be submitted) to the potential buyer. Potential buyers typically have several weeks to review the CIM, analyses the target and its industry in order to perform a preliminary financial analysis and submit their initial non-binding offers. During these period, the sell-side advisor keeps interacting with the potential buyers, providing additional guidance, clarifications and materials, on a case-by-case basis. Depending on their level of interest, potential buyers may also hire their own buy-side advisors and consultants. On one side, buy-side advisors have a key role in helping their client, by assessing the target from a valuation perspective and help determine a competitive initial bid price. On the other side, consultants provide insights on market opportunities and threat, as well as business strengths and weaknesses.

Moreover, during the first round, the sell side advisor is in charge of preparing the Management Presentation, a document that includes all the relevant inputs received from the target management, and of setting up the data room. The data room is the hub for the buyer due diligence that takes place in the second round of the process. It contains detailed information and documents about the target, such as customer and supplier lists, labor contracts, purchase contracts, details on the outstanding debt, lease

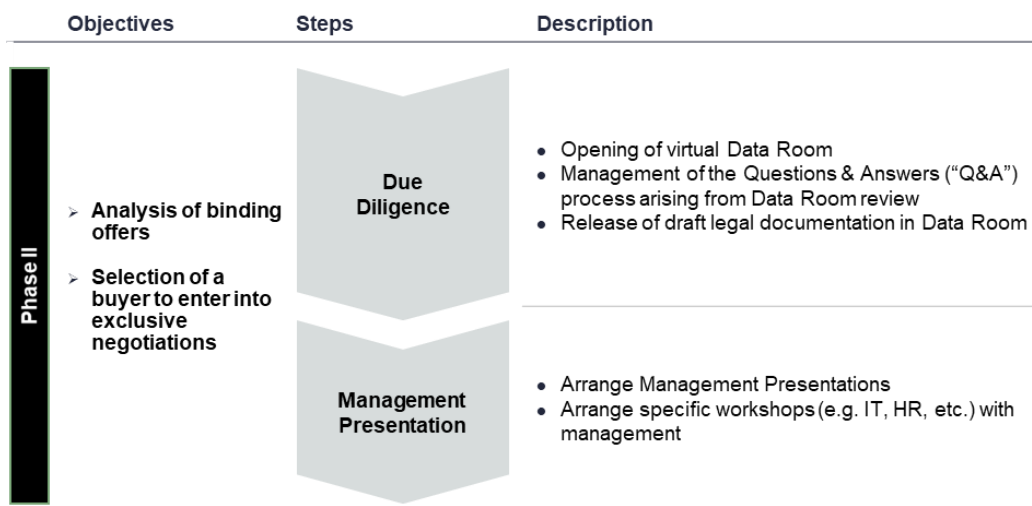


and pension contracts and environmental compliance certification. The data room also allows the buyer to perform more detailed confirmatory due diligence before closing the transaction.

On the first round bid date, the sell-side advisor receives the initial indications of interest from potential buyers. Then, the sell-side advisors, perform a deep analysis of the bids received in order to assess the indicative purchase price and understand the offer key terms. The key purpose of this analysis is to identify “real” bids, which are less likely to be re-traded). Once this analysis is completed, the bid information is summarized and discussed with the seller, which must make the final decision regarding which buyers should advance.

## 2.4. Phase II

The purpose of the second round is to organize management meetings and perform due diligence. Therefore, the main steps involved are: conduct Management Presentations, plan Site Visits, provide access to the Data Room, distribute Final Bid Procedures Letter and draft Definitive Agreement, and receive final bids.



The due diligence process needs to be exhaustive and typically spans several weeks. The length and nature of the diligence process differs on a case-by-case basis. At this stage, the sell-side advisor must organize both management presentations and site visits, monitor the data room and ensure there is a constant dialogue with potential buyers. Potential buyers are given enough time to finalize their due diligence, secure financing and prepare their final bid, in terms of both price and structure. It is very important that, during the due diligence phase, the sell-side advisor maintains a competitive atmosphere and ensures bidders that the process is respecting the established schedule.

The second round officially starts with the management presentation. The management presentation marks the moment where the target’s management team (CEO, CFO and key division heads or other operational executives) meets each potential buyer and provides an exhaustive overview of the company (business

overview, industry, market trends and positioning, financial information and projections, future strategy, growth opportunities, potential synergies). The presentation is meant to be interactive with a final Q&A session expected. The presentation is also a chance for potential buyers to understand the level of “fit” between themselves and management. Also, site visits are meant to provide buyers with a first view of the target’s operations. Usually, site visits are structured as a guided tour of a key target facility, led by the local manager of the facility, together with a sub-set of senior management and a member of the sell-side advisory team. They tend to be highly interactive: as buyer representative and its advisors and consultants have the chance to ask detailed questions about the target’s operations.

In combination with management presentation and site visits, potential buyers are provided access to the data room. Data Room allows prospective buyers to spot key aspects on which they require a follow-up. The sell-side advisor is In charge of tracking all follow-up due diligence requests and send them to those who can provide an exhaustive and timely response.

Another important step of the second round consists in the distribution of the final bid procedures letter (that outlines the date and the guidelines for submitting the final and legally binding bid offer) and the definitive agreement to the remaining potential buyers. Prospective buyers usually submit a mark-up of the draft definitive agreement and a cover letter detailing their offer, in order to clarify all the items outlined in the final bid procedures letter.

In the final bid, potential buyers are expected to provide, among others:



- Purchase price details, outlining the exact value of the offer and the method of payment (e.g., cash and/or stocks)
- Mark-up of the draft definitive agreement
- Indication of committed financing and information on available financing sources
- Confirmation that the offer is binding and the period of time it will remain open
- Specification of the required regulatory approvals and a first timeline for completion
- Evidence of the Board of Directors approvals
- Estimated time to sign and close the transaction

The final stage of the second round consists in the submission of potential buyers’ final bids. These bids are expected to be final, except for some conditionality, or “outs”, such as the need for further confirmatory due diligence, or the confirmation of financing commitments.

## **2.5. Negotiations and Closing**

The purpose of the negotiation phase is to evaluate the final bids received, identify and negotiate with preferred buyer(s), select the winning bidder, receive Board of Directors approval (post fairness opinion, if required) and execute the definitive

agreement. The following step is the closing of the transaction, that requires, among others, the approval of regulatory authorities and shareholder.

	Objectives	Steps	Description
<b>Finalization of Negotiations</b>	<ul style="list-style-type: none"> <li>&gt; Negotiate financial and legal terms</li> <li>&gt; Maximize value for the selling shareholders</li> </ul>		<ul style="list-style-type: none"> <li>• Potential buyers are expected to submit their binding offer and a marked up SPA at the end of the due-diligence process, on a determined date</li> <li>• Analysis of binding offers</li> <li>• Selection of the most attractive offer(s) and entry into exclusive or non-exclusive discussions</li> <li>• Negotiate governance, definitive agreements (financial and legal terms)</li> </ul>
	<ul style="list-style-type: none"> <li>&gt; Obtain required approvals</li> </ul>		<ul style="list-style-type: none"> <li>• Signing and announcement</li> <li>• Closing of the transaction</li> </ul>

Once final, binding bids are received, the sell-side advisor must carefully evaluate the offer price, the proposed structure and any clauses of the final bids.

In order to evaluate the purchase price, the sell side advisor refers to both non-binding offers received in the first round and the target’s recent financial performance. In addition to the price of the offer, the advisor must also evaluate the conditions included in the bid. Indeed, a higher offer price paired with significant conditionality is usually considered weaker than a lower price, but less constrained bid. At this stage, the seller negotiates with selected parties, with the intention to improve significantly the bid terms. Moreover, the advisor is meant to work intensely with the bidders in order to eliminate any remaining confirmatory diligence items and confirm key terms in the definitive agreement (including price). At this stage, the “winner” is selected and both the sell-side advisor and legal counsel define the final definitive agreement, which is then presented to the target’s board of directors for approval.

A peculiarity that characterizes the sale process is the fairness opinion. The fairness opinion may be requested by the Board of Directors of public firms depending on the size and scope of the business being sold. Under certain conditions, the Board of Directors may also require a fairness opinion, especially if there is a large number of shareholders involved in the firm ownership.

The main objective of the fairness opinion is to evaluate whether the received offer is fair (i.e. reflect the intrinsic value of the business) or not. The opinion letter is backed by a detailed analysis and an extensive documentation that provides an overview of the sale process and, most importantly, an objective valuation of the target, based on “main” and “control” techniques (e.g. DCF, LBO, trading comps, transaction comps, etc.). Before the discussion of the fairness opinion with the Board of Directors, the sell-side advisory team has to receive the approval from its internal fairness opinion committee. Based on the recommendation of the fairness opinion, the Board can make

the decision with regard to whether it is worth to accept the offer and execute the definitive agreement or not.

Once the seller's Board of Directors approves the deal, the definitive agreement is executed by the buyer and seller.

Once the transaction is approved by the Board of Directors of the seller and announced to the market, the closing date differs on a case-by-case basis. In fact, after the signing, the parties involved should obtain the necessary approvals by regulators (e.g. Antitrust) and shareholders. Similarly, the buyer should ensure it has access to the necessary capital to fund and close the transaction. However, the timing of the financing process may range widely, depending on the level of liquidity of the buyer and its relationship with banks, the kind of instrument employed (bank loan, bond and/or equity financing).

## Chapter II: Relationship between uncertainty and M&A

### 1. M&A intensity and underlying economic fundamentals

It is well-known that M&A activity is cyclical and occurs in waves. For this reason, several empirical studies have sought to uncover the impact of economic fundamentals on M&A volume.

Notably, the existing literature has mainly focused on efficiency, agency and behavioral M&A motives to explain the link between merger activity and aggregate economic environment, as well as stock market valuations. Golubov, Petmezas and Travlos (2013) suggest that the main theories that explain why M&A occurs in waves are the neoclassical and the behavioral theories. On one side, according to the neoclassical theory, merger waves are triggered by firms' reaction to economic shocks in specific industries (such as deregulation, new technologies, new products and services), which explains also the reason why merger activity clusters by industries (Gort, 1969; Mitchell and Mulherin, 1996; Harford, 2005). On the other side, the behavioral theory, which observes the existence of a correlation between stock market performance and merger activity, posits that merger waves are triggered by market valuation. Notably, when valuation deviates from fundamentals, managers have the incentive to exploit overvalued stock to buy assets of undervalued (or less overvalued) firms (Shleifer and Vishny, 2003; Rhodes-Kropf and Viswanathan, 2004).

From a more general perspective, over the last decades, uncertainty has received extensive attention by researchers and practitioners, being perceived as one of the key factors determining mergers and acquisitions cyclicity.

Recently, Hogan Lovell has carried out a comprehensive survey, interviewing a large number of top managers worldwide in order to gather information on their main concerns related to transformational investments (i.e. M&A). The survey shows that c. 90% of the executives involved consider economic uncertainty as a key barrier to investment and 62% perceive political uncertainty (particularly in the Eurozone) as one of the key barriers to the implementation of growth strategies. As a consequence, the lower level of confidence with respect to the use of M&A as an external growth opportunity leads executives to focus more on organic growth or restructuring. Particularly, organic growth is perceived as a less risky strategy: when investments are made internally, top management is able to better monitor the growth process. Moreover, the survey indicates that, notwithstanding management concerns triggered by uncertainty and the cyclicity of M&A activity, it is still possible to observe a substantial interest in growing by merger or acquisition. In fact, nearly 60 per cent of the firms interviewed foresee entry into new geographical markets through M&A, while 56 per cent are evaluating acquisition opportunities in domestic markets.

Turning to empirical literature on the relationship between M&A and uncertainty, an important contribution has been provided by Chiarella and Gatti (2014) who have examined both deal volume and quality during uncertain periods. In their study, they have investigated a sample of 2,620 completed deals by US public acquirers from 1990

to 2010, of which 572 were announced in uncertain periods. Generally, when the market is exposed to higher volatility, cost of capital reaches its historically low level, while cash balances are at record highs due to low interest rates and low levels of corporate investments. However, despite these factors create favorable terms for M&A activity, their results show that, on average, a weak macro environment negatively impacts deal activity, resulting in significantly lower M&A intensity, referred to as both the number and the aggregate value of acquisitions announced. In periods of high uncertainty, coefficients on the indicator variable for deal count and value are negative and strongly statistically significant, at the 1% level. Possible explanations for the reduced number of active buyers during turbulent times are both the lower level of management confidence and risk appetite and the increased shareholders and regulation authorities' scrutiny. In such context, firms are more cautious about investing in external growth.

Another important contribution to the field of research studying the link between M&A activity and uncertainty has been provided by Bhagwat, Dam and Harford (2016). In their research, they have come up with a new link between market conditions and merger intensity. Specifically, they show that, especially for public target, increases in market volatility tend to result in decreases of subsequent deal activity. By investigating a sample of mergers from 1990 to 2013, and using the VIX index as a proxy for uncertainty, they found that a one standard deviation increase in volatility is associated with a 6% drop in deal activity in the subsequent month. This effect is found to be statistically significant, and corresponds to a monthly decrease in deals of almost \$4 billion. Overall, Bhagwat, Dam and Harford (2016) claim that changes in uncertainty alone do not create M&A waves, but they might have a first-order effect on M&A activity.

## 2. Value Creation in M&A Deals

The second aspect on which Chiarella and Gatti (2014) focus their attention on is value creation in M&A. Particularly, they have investigated whether bidder shareholders' returns differ substantially during market turmoil, thus providing an innovative link between underlying economic fundamentals and value creation measured on the basis of M&A announcement returns.

Notably, value creation is one of the most interesting aspects regarding M&A. For this reason, it has been extensively analysed in several previous studies, which have focused mainly on the most active M&A markets, namely US and UK. The effect of an M&A event is so intense that it reaches multiple economic agents, including advisors, creditors, suppliers, customers, employees, communities, governments, and so on (Bruner, 2003). Certainly, the main parties involved in a transaction are the buyer and the seller of the target company, and, if the firm is listed, deal activity directly affects the share price. However, market reaction to deal announcements cannot be anticipated, and it varies depending on a large set of factors which ultimately determine the perception of the value generated by M&A transactions.

The article by Martynova and Renneboog (2008) offers a comprehensive review of the main empirical studies across merger waves. The empirical literature, agrees on the fact that target firm shareholders enjoy significantly positive abnormal returns at acquisition announcements, mainly driven by the substantial premiums offered by acquirers (Dodd and Ruback, 1977; Franks, Harris and Titman, 1991; Song and Walkling, 1993; Bauguess, Moeller, Schlingemann and Zutter, 2009). On the contrary, the debate over acquirer's gains at deal announcement is still open, and such extensive dispersion of findings around acquirers' return proves that M&A activity should be undertaken with caution. As Franks, Harris and Titman (1991) state, on one side, advocates of M&A benefits show evidence of considerable value creation at the time deals are announced, while, on the other side, critics affirm that positive announcement returns merely reflect the market optimistic expectations around M&A deals that, usually, fail to be met over the long term. Generally, most empirical studies have demonstrated that, when a deal is announced to the market, bidding firms, compared to targets, earn close to zero returns. In some cases, it has been demonstrated that negative abnormal share price returns for the acquirer are explained by overpayments and overestimations of synergies and economic benefits, which might not be fully realized in the post-merger phase (Andrade, et al., 2001).

Interestingly, empirical evidence suggests that large variations in bidder abnormal return around the announcement of M&A transactions are explained by deal-specific characteristics. In the next paragraph, some of the most popular return determinants which create remarkable exceptions in bidder returns are described. Finally, in light of the results obtained by Chiarella and Gatti (2014), uncertainty will be presented as an additional bidder return determinant.

### 3. Deal-specific Determinants of Bidder Announcement Returns

The five major deal-specific characteristics which may influence M&A performance are (i) the organizational form of the target company (Fuller, Netter and Stegemoller, 2002), (ii) the method of payment (Travlos, 1987), (iii) firm size (Asquith, Bruner and Mullins, 1983; Moeller, Schlingemann and Stulz, 2004) (iv) whether an acquisition is industrially diversifying or not (Morck, Shleifer and Vishny, 1990), (v) whether an acquisition is internationally diversifying or not (Moeller and Schlingemann, 2005).

#### 3.1.1. Target firm listing status

Several studies have demonstrated that the organizational form of the target (public, private or subsidiary firm) is a crucial determinant of M&A performance. Specifically, zero-to-negative bidder returns are usually associated with listed targets, while positive bidder returns are usually observed when the target is non-listed.

Fuller, Netter and Stegemoller (2002) analysed a sample of US listed bidders that successfully acquired five or more targets within a three-year period from 1990 to 2000 and found that CAAR is significantly negative (-1.00 percent) for public targets, significantly positive (+2.08 percent) for private targets, and significantly positive

(+2.75 percent) for subsidiaries. Consistently, Faccio, McConnell and Stolin (2006), who instead focused on Western Europe, found that acquirers of listed targets earn an insignificant CAAR of  $-0.38$  percent, while acquirers of unlisted targets earn a significant CAAR of 1.48 percent. A possible explanation of these findings is that, in a competitive market for corporate control, the acquirers of public firms should only break even (i.e. zero NPV investment). Conversely, acquirers that pursue non-listed targets might be capturing an illiquidity discount, since competition is more limited. In this respect, Officer (2007) has shown that acquisitions of non-listed firms usually involve a discount on transaction multiples ranging between 15% and 30%.

Also, when the acquisition of private targets is stock financed, returns to bidding firms are even larger. For example, Chang (1998) found no significant abnormal returns for a two-day window  $[-1; +1]$  for bidders who acquire private targets with cash, and significant +2.64 percent return with stock. In their article, Golubov, Petmezas and Travlos (2013) provide two possible explanations for this finding. First, according to the information hypothesis, acceptance of a stock offer by private targets' shareholders, who are supposed to have received private information on the bidder, allows the market to infer that the bidder's shares are not overvalued. Second, according to the monitoring hypothesis, introduced by Chang (1998), ownership in private targets is typically concentrated and stock offers might create block holders who tend to strictly monitor managers. This monitoring power is well appreciated by the market, which reacts accordingly.

### **3.1.2. Method of payment**

The general findings about the method of payment (i.e. medium of exchange) is that stock payments generate lower returns than cash payments.

Travlos (1987) has been the first to document the difference between common stock exchanges and cash offers. Its sample, consisting of 167 observations between 1972 and 1981, provides empirical evidence on the fact that, on average, the announcement of a stock financed acquisition yields negative returns, while cash financed acquisitions yield normal returns to bidder's shareholders. In their research study, Andrade, Mitchell, and Stafford (2001) found that acquiring firms that use some stock to finance their acquisitions, report negative three-day average abnormal returns of -1.5 percent. Conversely, acquirers that do not use any equity financing in their acquisitions, report non-significant CAAR of +0.4 percent. These findings are consistent with the adverse selection framework proposed by Myers and Majluf (1984). Managers have unique, undisclosed information on the value of the firm under their control, thus having the incentive to issue equity when they believe it is overvalued by the market. However, this decision conveys a negative information to investors, which respond accordingly and bid down the acquirer stock price ("signalling" hypothesis). Also, the study conducted by Chemmanur, Paeglis and Simonyan (2009) observe that overvalued acquirers, whose stock price is significantly higher than the firm intrinsic value estimated by accounting earning-based valuation



models, tend to use equity as means of payment, and that the degree of their overvaluation produces a negative impact on bidder returns.

### **3.1.3. Relative Firm Size**

Bidding and target firm size is another crucial factor in determining bidder returns around the deal announcement. As a general statement, relative size seems to be positively correlated with bidder returns, with relatively large bidders gaining less than small bidders.

Fuller, Netter and Stegemoller (2002) suggest some methods to measure bidding and target firm size. Specifically, bidder and public target size is defined as the bidding firm undisturbed market capitalization measured one month prior to the bid announcement, while the size of non-listed targets can be approximated with the announced deal value.

First, Asquith, Bruner, and Mullins (1983) have demonstrated that the relationship between the bidding firm's cumulative excess return and the relative size of the target firm's equity is positive and statistically significant. Specifically, they found that *"on average, a bid for a target firm half the bidding firm's size produces a cumulative excess return 1.8% greater than a bid for a target one-tenth the bidder's size"*. Usually, the larger the target is relative to the bidder, the stronger its bargain power to be able to extract the maximum value from the transaction, thus making the overall deal value-accretive for shareholders (Fuller, Netter and Stegemoller, 2002).

Second, Moeller, Schlingemann and Stulz (2004) provide evidence that bidder announcement returns are negatively related to bidder size. They have studied a sample of 12,023 US acquisitions between 1980 and 2001 and have shown that, regardless the target firm organizational form and the method of payment employed, small acquirers earn about 2% higher returns than large acquirers. A possible explanation for this finding is that larger bidders have higher agency costs (Jensen and Meckling, 1976; Ross, 1973). Also, smaller firms tend to have higher ownership concentration, which result in management subject to closer monitoring from shareholders (Demsetz and Lehn, 1985). On the contrary, managers of larger firms might be more prone to hubris (Roll, 1986).

### **3.1.4. Industry Relatedness**

Industry relatedness is another determining factor which affects acquisition returns. In general, diversifying acquisitions enjoy lower returns than focused acquisitions around the deal announcement date.

In the study conducted by Morck, Shleifer and Vishny (1990), diversifying acquisitions are classified as those in which target and acquirer primary 4-digit US SIC code does not match. The result of their research represents the main contribution in demonstrating that returns to bidding shareholders are lower when their firm diversifies. Their finding is consistent with those suggested by several previous researchers which have investigated the main motives behind management decision to pursue unrelated diversification, even if it hurts shareholders' wealth. First, if

managers themselves are not enough diversified, they may decide to diversify their firm to reduce the risk to their human capital (Amihud and Lev, 1981). Second, managers would enter new lines of business in order to guarantee business survival and continuity, regardless whether shareholder value maximization requires shrinkage or liquidation (Donaldson and Lorsch, 1985). Third, when poor performance in a certain business threatens managers' job, they are pushed to enter new businesses at which they might do better (Shleifer and Vishny, 1990). In any of the aforementioned cases, it is very likely that managers pursue their own interest and overpay for unrelated diversification, thus reducing the wealth of their shareholders.

### **3.1.5. Cross-Border Status of the Deal**

Generally, cross-border deals generate lower returns than domestic acquisitions.

In their article, Moeller and Schlingemann (2005) show that for a sample of 4,430 acquisitions between 1985 and 1995, US firms that engage in cross-border deals experience significantly lower announcement stock returns of approximately 1% compared to those that acquire domestic targets. The same effect has been verified by Conn et al. (2005) for a sample of UK acquirers. Moreover, analysing the impact of the level of shareholder protection, John et al. (2010) found that, within cross-border and public target firm deals, acquirer returns are positive when the target country has low shareholder protection, while acquirer returns are negative when the target firm country has high shareholder protection. Similarly, they show that acquirer returns are positively correlated with accounting standards quality, but negatively correlated with creditor protection in the target firm nation.

## **4. Uncertainty as a Short-Term Performance Driver**

In addition to the above-mentioned deal-specific determinants, bidder returns might be impacted by some macroeconomic factors. In this context, Chiarella and Gatti (2014), through an event study approach and a multivariate OLS regression model, have tried to understand whether and how overall uncertainty on the market might affect the performance of mergers and acquisitions. Particularly, they have noticed that the short-term market response to deals initiated in periods of high volatility is usually worse compared to the response observed in periods characterized by lower uncertainty. In fact, by using an event study approach, they found that, in periods of high uncertainty, bidders earn substantially lower announcement returns in both the 3- and 5-days interval, with an overall -1.2% CAAR, vis à vis the -0.5% 3-days and -0.6% 5-days CAARs observed during neutral periods.

The soundness of this evidence is then further assessed through a multivariate OLS regressions of short-run abnormal returns on a dummy variable representing uncertainty, along with some variables designed to capture deal-specific characteristics that may influence post-acquisition performance, such as method of payment, target listing status, and industry relatedness. In light of the results obtained, it is possible to confirm the existence of a link between deal performance and uncertainty at the time of the announcement, which is robust to the inclusion of

additional variables. In fact, the coefficient on the dummy variable indicating whether the deal occurred in times of high uncertainty or not is negative at -0.01 and statistically significant.

Nonetheless, Chiarella and Gatti (2014) have also proven that, despite the skeptical short-term market reaction to deal announcements, deals initiated in period of high volatility record both higher long-term stock returns and better operating performance (*“Overall, performance results show that while deal announced in periods of high uncertainty realize significantly lower announcement return than do deals announced in neutral times, their long run stock and operating performances are significantly better”*). This finding is consistent with the view that, even if uncertainty seems to de-incentivize acquirers from engaging in M&As, it also creates great opportunities. Possible explanations are analyzed more in depth in the following paragraph.

## 5. Possible Explanations on how M&A Value Creation Changes in Uncertain Periods

Chiarella and Gatti (2014) provided some possible explanations that confirm the difference between M&A performance during more challenging and neutral times.

First, past successes are not replicable during uncertain times. In fact, under uncertain conditions, successful M&A track record is not always replicable, due to the changed and more challenging context. In such context, managers of bidding firms, aware of the difficulties in replicating successful transactions, tend to be less prone to overconfidence, thus selecting targets more carefully and negotiating the terms of the transaction more cautiously. Moreover, in uncertain times, it seems that the interest of managers and shareholders is better aligned, which retains managers from engaging in bad M&A transactions to their private benefit (Jensen, 1986). Consistently, greater management discipline and lower “hubris” (Roll, 1986) can help explain the overall better long-term performance of deals announced in periods of higher uncertainty.

Second, uncertainty impacts valuation. In fact, in challenging times, there is increased uncertainty about the future expected value of the target’s cash flows and performance, which makes valuation less straightforward. Particularly, it is difficult to both value the target firm on a standalone basis and to forecast the expected value of synergies. Overall, it is more difficult for acquiring firms to set a rational level of premium to be recognized to the target firm.

Third, a changed and less clear business environment might make it more difficult for the buyer to implement a smooth post integration process, originally envisaged.

Similarly, under uncertain conditions, there are a number of favorable factors that might encourage bidding firms to engage in high quality M&A activity. This is the reason why Chiarella and Gatti (2014) believe that both crisis and volatility can also create massive opportunities in the M&A landscape.

First, in uncertain times, only the best buyers are able to successfully pursue external growth strategies, resulting in a larger number of value-accretive deals. Best buyers can benefit from uncertainty mainly for two reasons. On one side, they are in the position of using their cash more easily because they tend to be financially sound, have low leverage and availability of cash resources and / or unexploited credit lines which they can use to make acquisitions. On the other side, best buyers have an advantage with regard to the choice of the mean of payment, since they can decide to pay in stock rather than cash, given that they might succeed in convincing sellers to accept a less “transparent” method of payment.

Second, in periods of higher uncertainty, buyers can also leverage on their stronger bargaining position towards the sellers during negotiation.

Third, during uncertain times, it is more easy for buyers to “cherry-pick” targets. In fact, in uncertain circumstances, best buyers can choose among sellers and they due to both reduced competitiveness in the process to acquire the target company and their greater resources.

Overall, Chiarella and Gatti (2014) provided empirical evidence showing that superior long-term performance in uncertain times can be explained mainly by a more meticulous planning and execution of the M&A deal and by the ability of the acquirer to negotiate from a better bargaining position.

## Chapter III: Relationship between uncertainty and M&A

### 1. Research Hypotheses

M&A volume and performance differs considerably across periods. Particularly, it is common wisdom to believe that uncertainty plays a crucial role in determining the timing and value creation around M&A deals. Indeed, when the market becomes less predictable, acquirers find it more difficult to engage in value-accretive deals. First of all, their past M&A track record might not be replicable in turbulent times. In addition, it is not easy to set a fair level of premium since the valuation of the target firm, as well as the estimation of the expected synergies, are less straightforward. Finally, post-integration phase becomes more challenging, resulting in a higher risk to fail to meet originally planned objectives. In turbulent times, top management feels less confident about future market developments and it is usually more cautious about investing in inorganic growth, due to the potential unfavorable changes that might arise once the deal is closed. As a consequence, uncertainty about underlying economic fundamentals can affect the level of M&A activity, both in terms of volume and value (Chiarella and Gatti, 2014).

In light of these considerations, a first hypothesis is that:

*H.1. In periods of high uncertainty, M&A activity is low.*

Also, unpredictable market conditions and volatile economic fundamentals might influence short-term M&A performance. Chiarella and Gatti (2014), have noticed a persistent skeptical short-term market response to deals initiated in periods of high volatility compared to the response observed in periods characterized by lower uncertainty. As a result, the second hypothesis is the following:

*H.2. Transactions announced during periods of uncertainty are fundamentally different in terms of short-term performance from those undertaken in more quiet periods.*

These two research hypotheses allow to investigate both the links between M&A activity and fundamental economic conditions and M&A short-term performance for key shareholders.

### 2. Methodology

The research hypotheses have been tested through both an event study approach and simple and multivariate OLS regression models.

#### 2.1.Event Study: Cumulative Abnormal Returns

To measure value creation from M&A activity, it is possible to use multiple techniques, such as event studies, accounting studies, surveys of executives and clinical studies (Bruner, 2001). The event study approach is the most common

technique and has been extensively used in previous empirical works to assess the degree of market reactions around major corporate events. This methodology has been first introduced by Fama et al. (1969), and has received remarkable contributions from Brown and Warner (1980 and 1985).

In general, the event study approach is a widely appreciated empirical method due to its ability to provide a direct measure of the value created for investors, and to incorporate expectations on future cash flows.

However, when using the event study approach, some relevant assumptions should be made. The most important one is market efficiency. The efficient market hypothesis (“EMH” by Fama, 1970) states that, in efficient markets, asset prices fully reflect all available information. Therefore, stock prices will immediately incorporate any new information that becomes available to all market participants. Hence, acquisition announcements should be accompanied by abnormal increases in stock prices when the transaction is value-creative, and by abnormal decline when it is value-destroying. Moreover, measuring M&A value creation through event studies require two additional assumptions, namely, the absence of “anticipation” (the bid is not anticipated) and “contamination” (the bid announcement is not contaminated by other information on the stand-alone value of the firms involved) effects (Golubov, Petmezas and Travlos, 2013).

This paper investigates the market response of listed bidding firms in the period surrounding the announcement of a transaction, with a particular focus on stock price abnormal daily returns, which are considered a good indicator of the performance for merging companies.

Abnormal returns are computed using the expression below:

$$AR_{it} = Rit - E(Rit) \quad (1)$$

where  $AR_{it}$  is the abnormal return for security  $i$  on day  $t$ ;  $Rit$  is the effective, observed return for security  $i$  on day  $t$ , and  $E(Rit)$  is the expected return for security  $i$  on day  $t$ .

First of all, to compute  $Rit$ , daily share prices have been transformed into returns with the following formula:

$$R_t = \ln (P_t / P_{t-1}) \quad (2)$$

where  $\ln$  is the natural logarithm,  $P_t$  is closing price at time  $t$  and  $P_{t-1}$  is the closing price of the previous trading day.

The expected return  $E(Rit)$  represents a benchmark of what investors required on a particular day. In this paper, the expected return has been computed using the market model approach suggested by Brown and Warner (1985). They have also demonstrated that, usually, the results obtained with the market model are consistent with those of more sophisticated approaches (i.e. adjusted market model). The expected return is obtained applying the following formula:

$$E(R_{i,t}) = \alpha_i + \beta_i * R_{mt} \quad (3)$$

where  $\alpha$  is the regression intercept for security  $i$ ,  $\beta$  is the slope coefficient for security  $i$ , and  $R_{mt}$  is the market index return (proxied with the EURO STOXX 50, the European stock market index that covers 50 stocks from 11 Eurozone countries).

The estimation period used to compute the parameters of the market model, i.e.  $\alpha$  and  $\beta$ , is [-250, -10] day interval. As a robustness test, 200-trading day and 150-trading day estimation periods have also been considered to compute the CARs, and the original findings are not altered by shortening the estimation period. As a further remark, it is worth to highlight that the estimation period does not include any of the days selected within the event period [-2;+2] to avoid any potential contamination effects arising from the deal announcement.

The abnormal returns for a given day and a given firm are then cumulated over the event window so as to arrive at a cumulative abnormal return (CARs):

$$CAR_i = \sum AR_{it} \quad (4)$$

where  $CAR_i$  is the cumulative abnormal return of firm  $i$  in the [-2; +2] event period considered. As a robustness test, a larger event window of 11 days [-5; +5] has been taken into consideration, and the original findings are not altered by enlarging the event period. Particularly, the five days event windows allows to capture potential information leakages in the days immediately before the announcement, and to account for any delays in the stock price reaction in the days immediately after the announcement.

The statistical significance of the resultant CARs is then tested using formal statistical test procedures. Positive, statistically significant CARs represent a favorable response by the market to the announced deal, whilst insignificant or negatively significant CARs will represent the market skepticism towards the transaction.

Finally, CARs have been used as the dependent variables of two multivariate regression analysis presented in the next session.

## 2.2. Regression Models and Description of Variables

### 2.2.1. Hypothesis 1

It is in the scope of this paper to investigate whether uncertainty reduces firms' appetite for external growth. For this reason, in order to verify the first hypothesis, which investigates the link between merger intensity and uncertainty, a simple OLS regression analysis has been performed. The research method presented in this section follows the one implemented by Chiarella and Gatti (2014).

The methodology employed consists in tracking the aggregate merger activity over 99 partially-overlapping 40-business-days windows across the entire sample period. Out of 99 intervals 13 are classified as periods of high uncertainty, based on the level of the VSTOXX index averaged over the previous 40 business days (see "Sample Selection and Sources" for further details on the classification of periods of high versus neutral volatility). For each interval, the corresponding number of deals

and the aggregate deal value have been identified. At this stage, two simple linear regressions have been conducted on a time-series data sample. The two regressions differ in the specification of the dependent variable. Moreover, for each of the dependent variables two different independent variables have been tested.

$$\text{Model (1.a): } DealCount = \beta_0 + \beta_1 (High)$$

$$\text{Model (2.a): } DealCount = \beta_0 + \beta_1 (Level)$$

$$\text{Model (1.b): } DealValue = \beta_0 + \beta_1 (High)$$

$$\text{Model (2.b): } DealValue = \beta_0 + \beta_1 (Level)$$

On one side, with regard to the dependent variable, the first bundle of regressions is characterized by *DealCount* as the dependent variable, while the second set of regressions employs *DealValue* in €bn. Deal count is computed as the total number of deals announced in each 40-business-days window. Deal value is computed as the aggregate value of transactions announced in the same period. On the other side, with regard to the independent variable, *High* is a dummy variable that takes the value of one if the 40- business-days window is classified as a period of high uncertainty (see “Sample Selection and Sources” for further details on the classification of periods of high versus neutral volatility), while *Level* is a continuous variable that measures the average value of the VSTOXX index in the 40-business-days prior to the beginning of the period.

Moreover, Hypothesis 1 has been further tested following the methodology suggested by Bhagwat, Dam and Harford (2016). In their study, they have analyzed the relationship between merger activity and uncertainty (i.e. market expectations of volatility) through a time-series OLS regression where the dependent variable is the percentage change in the number of merger announcements with respect to the prior quarter ( $\% \Delta NumberOfDeals$ ). The independent variable ( $\% \Delta Volatility$ ) is the % change of the VSTOXX index and it is constructed to include the information available before the end of the prior quarter. That is, if the dependent variable is the percent change in merger announcements in the second quarter (April – June), the independent variable is the percent change in the value of the VSTOXX index in the second quarter (January – March).

$$\text{Model (3): } \% \Delta NumberOfDeals = \beta_0 + \beta_1 (\% \Delta Volatility)$$

### 2.2.2. Hypothesis 2

The soundness of the evidences provided by the event study is then further assessed in a framework that controls for some deal characteristics in order to determine whether value creation (proxied with CARs) around the deal announcement date can be explained by some specific factors. Particularly, Hypothesis 2 aims at investigating the impact of uncertainty on bidding firm shareholders’ short-term returns. For this purpose, an ad-hoc multivariate regression analysis has been performed, following the model previously employed by Chiarella and Gatti (2014).



The methodology employed consists in performing a multivariate regression analysis with 5-days CARs as dependent variable. For each announced deal, deal-specific characteristics have been identified and have been used as independent variables. Model (4) is inclusive of some of the primary deal-specific characteristics that past literature proved to have a certain effect on stock returns around the deal announcement. Model (5) also comprise a variable that captures uncertainty, main focus of this research. The inclusion of this variable is meant to improve the quality of the overall study and to determine whether uncertainty has some kind of explanatory power when it comes to Cumulative Abnormal Returns flowing to bidder's shareholders when an M&A deal is announced.

The following regression equations have been estimated:

$$\text{Model (4): } CARs = \beta_0 + \beta_1(ListedTarget) + \beta_2(MixedPayment) + \beta_3(RelativeSize) + \beta_4(IndustryRelatedness) + \beta_5(CrossBorderDeal)$$

$$\text{Model (5): } CARs = \beta_0 + \beta_1(ListedTarget) + \beta_2(MixedPayment) + \beta_3(RelativeSize) + \beta_4(IndustryRelatedness) + \beta_5(CrossBorderDeal) + \beta_6(High)$$

where

*ListedTarget* is a dummy variable that takes the value of one if, at the moment of the deal announcement, the target company is listed on the stock exchange.

*MixedPayment* is a dummy variable that takes the value of one if the method of payment (i.e. medium of exchange) employed involves both cash and stocks.

*RelativeSize* is the variable used to compare target and bidding firm size. Following Fuller, Netter and Stegemoller (2002), the relative size is defined as the deal value divided by the bidding firm undisturbed market capitalization measured one month (i.e. using 21 trading days as the average trading days per month) prior to the bid announcement. Data on undisturbed market capitalization was downloaded from Bloomberg.

*IndustryRelatedness* is a dummy variable that takes the value of one if the target and the bidding firms do not operate in the same industry, which means that their 3-digit US primary SIC code does not match. Data on the 3-digit US primary SIC code were sourced by Zephyr.

*CrossBorderDeal* is a dummy variable that takes the value of one if the target company and the bidder company are not domiciled in the same country.

*High* is a dummy variable that takes the value of one if the 40- business-days window prior to the deal announcement is classified as a period of high uncertainty (see "Sample Selection and Sources" for further details on the classification of periods of high versus neutral volatility).

Once the variables for each deal have been obtained, significance tests were performed in order to define the explanatory power of the parameters and to determine whether the results can be considered statistically significant or not. Basic two-tailed tests of variable irrelevance have been implemented, with the following null and alternative hypotheses:

$$H_0: \beta_i = 0 \quad H_A: \beta_i \neq 0 \quad \text{with } i \in \{ListedTarget, MixedPayment, RelativeSize, IndustryRelatedness, CrossBorderDeal, High\}$$

The individual significance has been tested through the t-statistics, which in this case translate to the t-ratio:  $t\text{-ratio} = \beta_j / \sigma(\beta_j)$ . Standard 1%, 5% and 10% significance levels have been used as robustness tests.

Rejection of the null, i.e.  $\beta_j / \sigma(\beta_j) > \alpha/2$  states that the considered parameter is statistically significantly different from zero, and as such is able to effectively explain the phenomenon of interest. By contrast, a non-rejection of the null hypothesis will imply that the variable of interest is not able to fulfil the expected relationship with the CARs.

## 2.3. Data Collection

### 2.3.1. Sample Selection and Sources

Information on transactions (announcement dates, identity of bidders and targets, payment methods and transactions specific information etc.) was collected from Zephyr (Bureau Van Dijk deal database) and complemented with stock market and accounting data from Bloomberg and Thomson Reuters DataStream.

The starting point of the sample construction entailed the identification of all companies announcing a transaction (acquisition, merger, demerger, JV, minority stake, buy-outs and buy-ins) between 1<sup>st</sup> January 2003 and 16<sup>th</sup> July 2018 in the European Union. At this stage, an initial sample of 965 deal announcements has been obtained. Particularly, an observation was included in the sample if:

1. The bidding firm is listed on a stock exchange;
2. Either the target or the acquiring firm is domiciled in the European Union;
3. The value of the transaction is available and above €100m;
4. The method of payment involves cash and/or shares;
5. Both the target and the acquiring firm do not operate in the public sector.

The 965 observations have been used in Model (1), (2) and (3) in order to track deal volume across the entire sample period. However, in order to analyze the announcement returns and apply Model (4) and (5), the sample has been reduced to 799 observations. In fact, for the purpose of the event study, the sample is only made by those companies for which the stock price is available on the date of the announcement and for at least 250 trading days prior to the announcement date, which

constitutes the estimation period. In this way, it is possible to estimate the parameters of the market model as described in the section on Methodology (Brown and Warner, 1985) and obtain for each security the expected returns,  $E(R_{it})$ , against which the cumulative abnormal returns have been computed.

Once the identification of the sample is completed, it is necessary to split the 799 observations into two subsamples with deals announced in times of high and neutral uncertainty, respectively. At this stage, the definition of high uncertainty is crucial. The classification method employed is the one suggested by Chiarella and Gatti (2014). First of all, uncertainty has been proxied with volatility and it has been measured through the Euro STOXX 50 Volatility Index, namely VSTOXX index. This index was designed to track the market expectations of future volatility derived from real-time option prices for European stocks. The higher the expectations of near term volatility, the higher the level of the index, signaling increased uncertainty. In this research, a deal has been categorized as occurred in a period of high uncertainty if the level of the VSTOXX index averaged over the 40 business days preceding the announcement date lies more than 0.5 standard deviations above its historical mean. According to Chiarella and Gatti (2014), this is equivalent to say that a deal is categorized as occurred in periods of high uncertainty when the VSTOXX index lies above the 75<sup>th</sup> percentile of its historical distribution in at least 10 business days in the month before the deal is announced.

Following this classification criterion, it is possible to identify several intervals of turmoil over the sample period (see Figure 1 in the Appendix):

1. The tech bubble in early 2003;
2. The financial crisis between September 2008 and July 2009;
3. The European debt crisis in 2011-2012;
4. The Brexit in 2016.

As shown in Figure 2 and 3 in the Appendix, mapping deals along these turbulent periods confirms that the proposed classification based on the VSTOXX index seems to reliably track more uncertain periods.

### 2.3.2. Sample Description

Table 1 below presents summary statistics on deal volume and value across the sample period.

Table 1. Summary Statistics: Deal Volume and Value

	<b>Deal Volume</b>	<b>Total Deal Value (€/bn)</b>	<b>Avg Deal Value (€/bn)</b>
<b>2003</b>	40	27.1	0.7
<b>2004</b>	65	53.6	0.8
<b>2005</b>	80	85.6	1.1
<b>2006</b>	61	111.8	1.8
<b>2007</b>	78	164.8	2.1
<b>2008</b>	49	32.9	0.7
<b>2009</b>	32	42.3	1.3
<b>2010</b>	43	57.5	1.3
<b>2011</b>	60	68.8	1.1
<b>2012</b>	43	37.0	0.9
<b>2013</b>	47	48.2	1.0
<b>2014</b>	68	130.0	1.9
<b>2015</b>	106	188.2	1.8
<b>2016</b>	71	89.7	1.3
<b>2017</b>	82	78.8	1.0
<b>2018<sup>1</sup></b>	40	133.2	3.3
<b>Total</b>	<b>965</b>	<b>1,349.5</b>	<b>1.4</b>

<sup>1</sup>Until 16<sup>th</sup> July 2018

The sample for the analysis of M&A intensity covers 965 transactions. Deal value across all observations in our sample is on average €1.4bn and ranges from as little as €250mn to as much as €62bn.

Data analysis indicated how European M&As are unevenly distributed across the years. Specifically, it is possible to identify a slowdown in the number of announced deals in 2003, 2008, 2009, 2012 and 2016. The decrease of M&A intensity can be associated with an increase in uncertainty in the market, which makes external growth less attractive. Accordingly, in those years it is possible to observe a decrease in overall and average deal value. In accordance with the prediction made in Hypothesis 1, M&A activity during more turbulent times tends to experience a significant drop compared to periods of neutral uncertainty, thus reflecting the greater risk perceived by firms' executives.

It is possible to confirm this statement by looking at the quarterly trend in deal volume and value in Table 2 and 3.

Table 2. Summary Statistics: Quarterly Deal-Value (€/bn)

	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Total</b>
<b>2003</b>	9.7	3.6	7.2	6.6	27.1
<b>2004</b>	15.7	11.6	16.5	9.8	53.6
<b>2005</b>	17.4	21.6	27.0	19.5	85.6
<b>2006</b>	6.5	43.2	15.8	46.3	111.8
<b>2007</b>	45.2	93.4	13.3	12.9	164.8
<b>2008</b>	7.3	9.6	7.5	8.4	32.9
<b>2009</b>	17.9	5.7	13.7	4.9	42.3
<b>2010</b>	14.5	7.2	18.4	17.4	57.5
<b>2011</b>	21.7	30.7	6.7	9.7	68.8
<b>2012</b>	4.3	12.8	8.8	11.1	37.0
<b>2013</b>	12.8	6.4	18.2	10.8	48.2
<b>2014</b>	6.2	70.0	32.4	21.4	130.0
<b>2015</b>	35.1	21.2	90.3	41.6	188.2
<b>2016</b>	13.1	24.2	14.2	38.2	89.7
<b>2017</b>	17.5	21.2	30.4	9.7	78.8
<b>2018<sup>1</sup></b>	47.4	85.8	-	-	133.2

Table 3. Summary Statistics: Quarterly Deal-Volume

	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Total</b>
<b>2003</b>	12	6	12	10	40
<b>2004</b>	18	15	17	15	65
<b>2005</b>	14	29	20	17	80
<b>2006</b>	10	16	10	25	61
<b>2007</b>	24	21	14	19	78
<b>2008</b>	9	19	11	10	49
<b>2009</b>	5	5	12	10	32
<b>2010</b>	12	8	6	17	43
<b>2011</b>	16	22	12	10	60
<b>2012</b>	5	16	9	13	43
<b>2013</b>	14	6	11	16	47
<b>2014</b>	11	20	21	16	68
<b>2015</b>	23	24	29	30	106
<b>2016</b>	14	18	10	29	71
<b>2017</b>	23	19	23	17	82
<b>2018<sup>1</sup></b>	19	21	-	-	40

<sup>1</sup>Until 16<sup>th</sup> July 2018

The high uncertainty periods identified in this paper comprise four distinct intervals of significant turmoil: the tech bubble in early 2003, the financial crisis between September 2008 and July 2009, the European debt crisis in 2011-2012 and the Brexit in 2016. Consistent with the view that M&A activity in volatile markets is risky, data analysis highlights a significant drop in M&A activity both in terms of overall transaction count and value following an increase in the level of uncertainty. Figure 2 and 3 in the Appendix illustrate, for each quarter in our sample period, the aggregate value and volume of M&A transactions and the corresponding level of the volatility index (VSTOXX). The four periods of market turmoil discussed above are marked with grey boxes. Peaks in the VSTOXX Index seem to capture the periods of market turmoil and the corresponding slowdown of M&A activity.

As previously illustrated, in order to perform the analysis on the short-term performance of M&A deals across different periods, the sample was restricted to 799 transactions. Out of 799, 54 transactions were announced in uncertain periods according to the proposed classification (see “Sample Selection and Sources” for further details). Deal-specific characteristics are presented in Table 4.

Table 4. Summary Statistics: Deal-Specific Characteristics

	100% Stake Acquisition	Minority Stake Acquisition	Cross-Border	Public Target	Stock Only	Cash Only	Non Industry-Related <sup>1</sup>
2003	13	14	20	5	1	23	15
2004	27	23	38	14	2	39	16
2005	33	20	43	14	2	42	19
2006	31	14	30	10	4	32	24
2007	31	23	37	17	8	36	24
2008	17	15	33	12	2	31	22
2009	18	6	20	3	2	12	13
2010	25	7	25	8	2	18	11
2011	35	10	38	9	1	33	16
2012	18	13	33	4	0	23	13
2013	24	9	27	4	3	15	12
2014	41	6	49	3	6	23	18
2015	62	11	64	8	6	39	26
2016	36	6	40	5	3	27	14
2017	36	15	55	13	4	35	16
2018 <sup>2</sup>	17	4	22	8	4	10	8
<b>Total</b>	<b>464</b>	<b>196</b>	<b>574</b>	<b>137</b>	<b>50</b>	<b>438</b>	<b>267</b>

<sup>1</sup>Classification based on Primary 3-digit US SIC code

<sup>2</sup>Until 16<sup>th</sup> July 2018

In more than half of our observations (464), the bidder secures full ownership (i.e. 100% stake) in the target, with a peak in 2015 (62 full ownership acquisitions). Residual observations include, among others, 196 acquisitions of a minority stake (i.e. <50%) in the target. Across the sample period, a large number of transactions (574) are cross-border, and the data analysis suggests that there has been an upward trend of non-domestic M&As since 2014. All acquirer firms are public firms, while a relatively restricted number of deals (137) involve a listed target. Also, different methods of payment are illustrated, with cash bids resulting the privileged mean of payment and accounting for more than half of our observations (438). For what concerns industry relatedness, 267 transactions in the sample are classified as diversifying acquisitions, based on the primary 3-digit US SIC code. Interestingly, it is possible to notice that the diversification trend has been hit by the financial crisis, which has almost halved the number of non-industry related deals.

Finally, Table 5 below shows the breakdown of the firms according to the industry in which they operate.

Table 5. Summary Statistics: Acquirer Industry Group<sup>1</sup>

	Agriculture, Forestry and Fishing	Mining	Construction	Manufacturing	Transportation, Communications, Electric, Gas and Sanitary Service	Wholesale Trade	Retail Trade	Finance, Insurance and Real Estate	Services
2003	-	4	4	6	10	-	-	9	-
2004	1	2	-	24	10	1	4	13	1
2005	-	2	2	21	19	1	2	15	4
2006	1	1	5	21	5	-	2	13	5
2007	-	2	3	15	12	-	-	23	5
2008	-	4	-	12	5	1	4	15	2
2009	-	4	1	10	5	1	-	3	3
2010	-	3	1	16	5	1	2	8	1
2011	-	4	-	23	3	1	1	11	7
2012	-	3	-	19	4	2	1	8	3
2013	-	2	1	11	7	-	3	12	6
2014	-	3	1	20	8	1	1	11	11
2015	-	1	2	35	13	1	2	13	20
2016	-	-	-	19	14	1	-	11	11
2017	-	4	1	26	13	2	2	8	9
2018 <sup>2</sup>	-	1	1	15	3	-	-	3	5
<b>Tot</b>	<b>2</b>	<b>40</b>	<b>22</b>	<b>293</b>	<b>136</b>	<b>13</b>	<b>24</b>	<b>176</b>	<b>93</b>

<sup>1</sup>Classification based on Primary 3-digit US SIC code

<sup>2</sup>Until 16<sup>th</sup> July 2018

The manufacturing sector is the most prominent counting standalone 293 announcements. The second most active sector is Finance, Insurance and Real Estate, counting standalone 176 announcements. This industry group includes, among others, deals initiated by private equity firms. Within this industry group, it is possible to notice a significant drop in M&A activity following the financial crisis, with only 3 deals announced in 2009 compared to an average of 15 yearly announcements in the pre-crisis years. Finally, with 136 and 93 deal announcements respectively, Transportation, Communications, Electric, Gas and Sanitary Service and Services rank third and fourth.

## 2.4. Empirical Results

### 2.4.1. M&A Volume in Periods of High Uncertainty

In order to test the Hypothesis 1, the approach suggested by Chiarella and Gatti (2014) has been followed. Two different regression analyses have been performed, using two different dependent variables.

Table 6 shows the output of the regression analysis for Model (1.a/b) and (2.a/b) performed using the full sample of M&As on a 40-business-days basis with the purpose to assess whether there is a link between uncertainty and M&A intensity.

Table 6. Regression results - Model (1.a), (1.b), (2.a) and (2.b)

	Deal Count		Deal Value	
	<u>1.a</u>	<u>1.b</u>	<u>2.a</u>	<u>2.b</u>
High	-4.48*** (-3.38)		-6.03 (-1.31)	
Level		-0.21*** (-4.03)		-0.43** (-2.31)
N	99	99	99	99
R <sup>2</sup>	0.11	0.14	0.02	0.05

The superscripts \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

In Model (1.a), the coefficient on the deal count variable for periods of high uncertainty is negative and strongly statistically significant, at 1% level. Furthermore, the overall level of uncertainty is associated with fewer deals and lower deal values as well. The coefficients on the average level of the VSTOXX index in the 40 business days prior to the beginning of the period are negative and strongly statistically significant at the 1% level. As expected – except for Model (2.a) – deal count and deal value are negatively correlated with uncertainty, thus confirming Hypothesis 1. In general, when uncertainty is high, firms are more cautious about investing in external growth. The lower appetite for external growth among buyers might be due to the lower level of management confidence and risk appetite among executives, as well as to the increased scrutiny by shareholders and regulation authorities (Chiarella, Della Ragione and Gatti, 2013).

The soundness of the results obtained with the previous models has been tested with Model (3), which follows the methodology suggested by Bhagwat, Dam and Harford (2016). Table 7 present regression results for Model (3).

Table 7. Regression results - Model (3)

<b>%ΔNumberOfDeals</b>	<b>Coef.</b>	<b>Standard Error</b>	<b>t-stat</b>	<b>Number of observations</b>	<b>R<sup>2</sup></b>
%ΔVolatility	-0.50*	(0.30)	-1.69	60	0.05

The superscripts \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

The coefficient on the indicator variable is negative and significant at the 10% level, thus predicting that the quarterly percentage change in the number of merger announcements is negatively correlated with the percentage change of the VSTOXX index in the quarter before the announcement date.

Summing up, evidence from the sample of 965 deals is consistent with Hypothesis 1, demonstrating that periods of higher uncertainty are usually associated with less intense M&A activity.



### 2.4.2. M&A Short-term Performance in Periods of high Uncertainty

The analysis of announcement returns allows to assess whether the level of value creation in M&A varies across periods of neutral and high uncertainty. Following Brown and Warner (1985), daily abnormal returns are estimated and then cumulated for a 5-day event window, i.e. [-2;+2], around the announcement date. Table 8 reports summary statistics for the 5-days Cumulative Average Abnormal Returns.

Table 8. Event Study Results: [-2;+2] event window

Uncertainty	5-days CAAR			
	N	Mean	Median	sd
All	799	1.236%	0.486%	0.064
Neutral	745	1.388%	0.518%	0.062
High	54	-0.874%	0.288%	0.088

Overall, announcement returns to the acquirer are slightly positive (1.24%) and statistically significant at the 0.01 level in the 5-days interval.

However, when taking into consideration uncertainty, a substantial difference in CAARs emerge. In fact, the market seems to react less favorably upon acquisition announcements in periods of high uncertainty. Cumulative Average Abnormal Returns in period of high uncertainty are negative and not statistically significantly different from 0. The average CAR is -0.87% in more turbulent periods vis à vis 1.39% (statistically significant) CAAR in neutral periods.

Thus, evidence suggests that, overall, deals undertaken during the four intervals of turmoil which have characterized the European market over the sample period (i.e. the tech bubble in early 2003, the financial crisis between September 2008 and July 2009, the European debt crisis in 2011-2012 and the Brexit in 2016), have generated negative announcement returns. Therefore, from the perspective of the bidding firm shareholders, M&A activity in periods of uncertainty is not value-accretive.

As shown in Table 9, the difference between the two subsample persists if the event period is extended to 11 days, i.e. [-5;+5] event window. Cumulative Average Abnormal Returns in period of high uncertainty are close to zero and are not statistically significant. The average CAR is +0.01% in more turbulent periods vis à vis 1.26% (statistically significant) CAAR in neutral periods.

Table 9. Event Study Results: [-5;+5] event window

Uncertainty	11-days CAAR			
	N	Mean	Median	sd
All	799	1.173%	0.693%	0.075
Neutral	745	1.258%	0.726%	0.072
High	54	0.005%	0.510%	0.108

In general, this proves that acquirers in periods of high uncertainty are usually worse performers in both the 5-days and 11-days window around the announcement.

In the attempt to detect the factors driving value creation around the announcement of M&A and with the purpose to understand whether uncertainty is one of the key performance drivers, regression models (4) and (5) have been employed.

Previous empirical literature that identifies the five major deal characteristics which may influence M&A performance are (i) the organizational form of the target company (Fuller, Netter and Stegemoller, 2002), (ii) the method of payment (Travlos, 1987), (iii) firm size (Asquith, Bruner, and Mullins, 1983; Moeller, Schlingemann and Stulz, 2004) (iv) whether an acquisition is industrially diversifying or not (Morck, Shleifer and Vishny, 1990), (v) whether an acquisition is internationally diversifying or not (Moeller and Schlingemann, 2005). Model (4) regresses the 5-days CARs against these 5 factors. Results are shown in Table 10.

Table 10. Regression results - Model (4)

	Coef.	Standard Error	t stat	N	R <sup>2</sup>	Adj. R <sup>2</sup>
Listed Target	-0.002	0.006	-0.272			
Mixed Payment***	-0.021	0.006	-3.421			
Relative Size***	0.003	0.001	3.713			
Industry Relatedness	-0.008	0.005	-1.548			
Cross-Border Deal	-0.010	0.006	-1.643			
				799	0.044	0.038

*The superscripts \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.*

Results based on the 799 observations examined are consistent with previous literature in detecting the relationship between abnormal returns and deal-specific characteristics. Consistent with prior literature, the market looks more favourably at transactions for private targets, non-stock offers, similar size transactions, non-diversifying offers and domestic transactions.

The first important result to be underlined concerns the choice of the method of payment. As it can be read by the table, there is a negative relationship between mixed payment and 5-days CARs. This relationship is significant at the 0.01 level and implies that the use of both cash and shares as medium of exchange in a deal decreases overall bidder returns at the announcement of an M&A transaction. This statement validates previous studies that documented the difference between common stock exchanges and cash offers. Andrade, Mitchell, and Stafford (2001) found that 3-day average abnormal returns are negative (-1.5%) when some stock is used to finance an acquisition, while they are close to zero (0.4%) when the transactions does not involve any form of equity financing. These findings are consistent with the “signalling” hypothesis, which states that the decision to employ stocks as method of payment conveys a negative information to investors, who suspect a potential overvaluation and respond accordingly, bidding down the acquirer stock price.

Also, the firm relative size significantly and substantially affects the degree of underpricing. Relative size is the ratio between the deal value and the bidder

undisturbed market capitalization measured one month prior to the bid announcement (Fuller, Netter and Stegemoller, 2002). When the ratio is around 1, it means that bidding and target firms have approximately the same size. The regression detects a positive relationship between relative size and the 5-days CARs. This finding follows Asquith, Bruner, and Mullins (1983) that found that “on average, a bid for a target firm half the bidding firm’s size produces a cumulative excess return 1.8% greater than a bid for a target one-tenth the bidder’s size”. In fact, usually, the larger the target is relative to the bidder, the stronger its bargain power to extract the maximum value from the transaction, thus making the overall deal value-accretive for shareholders.

The main focus of this paper is to investigate whether, on top of deal-specific characteristics, uncertainty plays a crucial role in determining bidder returns and firms’ M&A appetite. In general, the event study has proven that acquirers in period of high uncertainty are worse performers in the 5- and 11-days window around the announcement. In the attempt to assess whether uncertainty (i.e. volatility), in addition to the aforementioned deal-specific factors, can be considered a key driver of announcement returns, the regression model (5) has been performed. The results of the regression are presented in Table 11.

Table 11. Regression results - Model (5)

	Coef.	Standard Error	t stat	N	R <sup>2</sup>	Adj. R <sup>2</sup>
Listed Target	-0.001	0.006	-0.157			
Mixed Payment***	-0.020	0.006	-3.345			
Relative Size***	0.003	0.001	3.719			
Industry Relatedness	-0.007	0.005	-1.422			
Cross Border Deal*	-0.011	0.006	-1.759			
<b>H**</b>	<b>-0.021</b>	<b>0.009</b>	<b>-2.324</b>			
				799	0.051	0.044

The superscripts \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

As expected, the dummy variable identifying the deals undertaken during periods of uncertainty is statistically significant (at 0.05 level) and negatively correlated with 5-days CARs, thus confirming the Hypothesis 2. This result is consistent with the one obtained by Chiarella and Gatti (2014). They have found that the coefficient on the indicator variable for deals in times of high uncertainty is negative at -0.01 and statistically significant at the 10 percent level for announcement return, thus confirming the negative relationship between CARs and uncertainty. This means that the degree of value creation around the announcement of a deal differs substantially depending on whether the announcement occurs in turbulent market conditions or not.

In addition, when the dummy variable for uncertainty is added, the dummy variable tracking cross-border deals becomes significant at the 10% level. The coefficient is negative at -0.01, in line with previous literature findings. Moeller and Schlingemann (2005) show that US firms that engage in cross-border deals experience

significantly lower announcement stock returns of approximately 1% compared to those that acquire domestic targets. The same effect has been verified by Conn et al. (2005) for a sample of UK acquirers. Possible explanations for the observed cross-border effect are the cost of geographical diversification, the increase in the level of diversification (which is usually associated with a discount) and country-specific factors (such as the level of shareholder and creditor protection and the accounting standards quality).

To conclude, Model (5) seems to have a higher explanatory power than Model (4). In fact, Model (5) present an increased Adjusted R-Squared with a value of 4.4% compared to the 3.8% of Model (4). Nevertheless, this value is still extremely low due to the large number of variables affecting announcement returns that have not been taken into consideration in this study. These omitted variables do not allow the regression model to reach a good explanatory power. Besides this issue, Model (5) proves that uncertainty can be considered a determinant of shareholders returns.

## Conclusion

The aim of this research is to understand whether the level of uncertainty in the market influences Merger and Acquisition activity, in terms of volume and short-term performance.

This paper originates from the necessity to fill a gap in the past literature concerning M&A and uncertainty. Existing literature has extensively examined aspects linked to the timing and the value creation around M&A deals announcement. However, there is very few studies focusing on uncertainty as a key factor driving (low) deal volume and (poor) performance around the announcement date of an M&A deal. As such, there is no strong evidence so far regarding the questions “*How does M&A activity volume change in periods of high uncertainty? How does M&A activity performance change in periods of high uncertainty?*”. In order to answer these questions, this paper builds upon the contributions of a previous study by Chiarella and Gatti (2014), and is innovative in proposing a new link between the field of research studying M&A trends and the one studying M&A performance. Overall, this study finds that higher uncertainty will decrease both deal activity and bidder returns around the announcement date.

The sample used for the study comprises of 799 European M&A deals announced between 1<sup>st</sup> January 2003 and 16<sup>th</sup> July 2018. The VSTOXX index has been used as a proxy of uncertainty. As such, the main contribution of this paper is in terms of both up-to-date data collection and analysis on a different market.

First of all, analysis at the aggregate level shows that, in periods of uncertainty, fewer transactions are announced and their value tends to be smaller. Following the approach proposed by Chiarella and Gatti (2014), a simple OLS regression analysis has been run to detect the relationship between the total number of deals or the aggregate deal value and two alternative measures of volatility. The result obtained shows that, both deal count and deal value are statistically significant at the 1% level and negatively correlated with uncertainty, thus confirming the first hypothesis. Similarly, following the approach proposed by Bhagwat, Dam and Harford (2016), it has been found that a one standard deviation increase in VSTOXX is associated with a statistically significant drop by 0.50 standard deviations in deal activity in the subsequent quarter. It makes sense that, when markets are under pressure and there is negative momentum, M&A intensity is significantly lower, in terms of both the number and the aggregate value of acquisitions announced. Specifically, based on the level of the VSTOXX index, four intervals of turmoil and reduced M&A intensity on the European market have been identified:

- The tech bubble in early 2003;
- The financial crisis between September 2008 and July 2009;
- The European debt crisis in 2011-2012;
- The Brexit in 2016.

Accordingly, it is possible to observe a slowdown in the number and value of announced deals in each of these uncertain periods. Indeed, when the market becomes less predictable, acquirers perceive M&A activity more risky. Their past M&A track record might not be replicable in turbulent times; it is hard to set a fair level of premium since the valuation of the target firm, as well as the estimation of the expected synergies, are less straightforward; post-integration phase becomes more challenging, resulting in higher likelihood to fail to meet originally planned objectives.

Second, moving to the effects of M&A decision on bidder shareholders' returns around the M&A announcement, the average CARs around the announcement date, using a 5-day event period, is 1.24%, which is statistically significantly different from 0 at the 0.01 level. When taking into consideration uncertainty, a substantial difference in CAARs emerges. In fact, evidence shows that the market seems to react less favorably upon acquisition announcements in periods of high uncertainty. In fact, the average CAR in more turbulent periods is not statistically significant and equal to -0.87% vis à vis 1.39% (statistically significant) CAAR in neutral periods. Thus, this study provides empirical evidence that no significant short-term gains originate from M&A activity in period of high uncertainty.

Being the difference between periods of high and neutral uncertainty substantial, this paper has investigated whether, beyond some well-known deal-specific characteristics, uncertainty can be considered as a possible driver of performance when it comes to M&A short-term value creation. In terms of drivers for the whole model regression, method of payment, relative size, cross-border deal status and uncertainty are the statistically significant variables. Consistent with prior literature, regression analysis indicates that the market looks more favourably at transactions for private targets, non-stock offers, similar size transactions, non-diversifying offers and domestic transactions, which generally contribute to higher bidding firm's Cumulative Abnormal Return. More interestingly, uncertainty is found to be a highly relevant factor driving M&A performance. The regression estimates that Cumulative Average Abnormal Returns for deals undertaken in turbulent periods are 2.1% lower than deals undertaken in neutral uncertainty periods. This finding is consistent with Hypothesis 2 and proves the overall market skepticism towards M&A in uncertain market conditions.

Overall, the general trends in M&A across periods of high and neutral volatility have been confirmed by this paper.

## Suggestion for Future Research

The focus of this paper is M&A value creation in the short term. For future studies, a research on long-term gains and performance drivers following M&A transactions announced in periods of high volatility is strongly encouraged.

As a first analysis, Figure 5 in the Appendix suggests that, if we look at median excess returns after 90, 180 and 270 trading days, deals undertaken during highly uncertain periods tend to deliver higher median excess returns. In light of this

observation, a long-term performance analysis would help determining whether uncertainty, which seems to de-incentivize acquirers from engaging in M&As, creates opportunities in the long-run.

Chiarella and Gatti (2014) have found that, despite the skeptical short-term market reaction to deal announcements, deals initiated in period of high volatility record both higher long-term stock returns and better operating performance. One of the possible explanations for this finding is that, during periods of high uncertainty, only the best buyers are able to successfully pursue external growth strategies, resulting in a larger number of value-accretive deals. Similarly, they show that acquirers in periods of higher uncertainty tend to benefit from a more disciplined planning and execution of the deal, and they can also leverage on their stronger bargaining position during negotiation.

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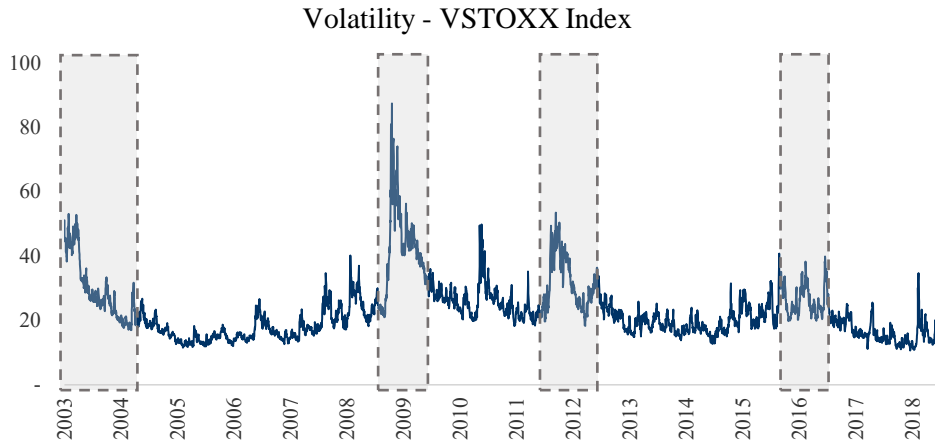


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Appendix

Figure 1. VSTOXX Indexe in Europe 2003-2018



Source: Bloomberg

Figure 2. Volatility and Deal Value (€/bn)

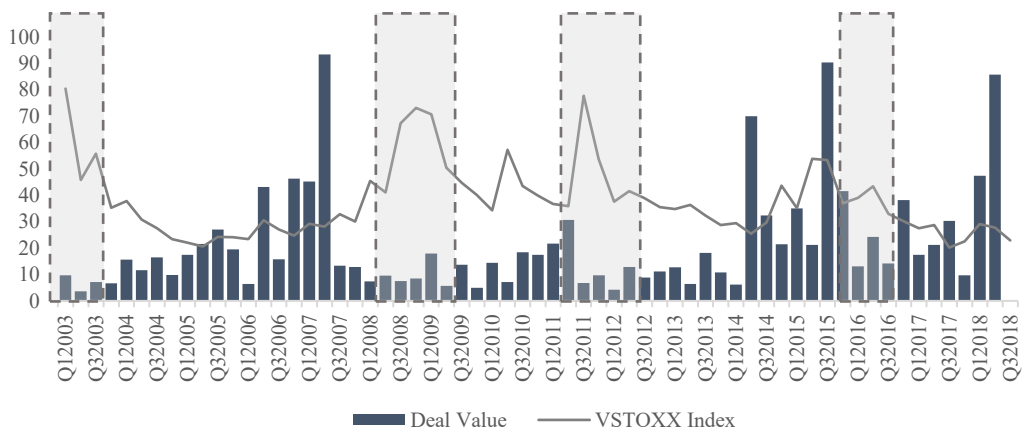


Figure 3. Volatility and Deal Count

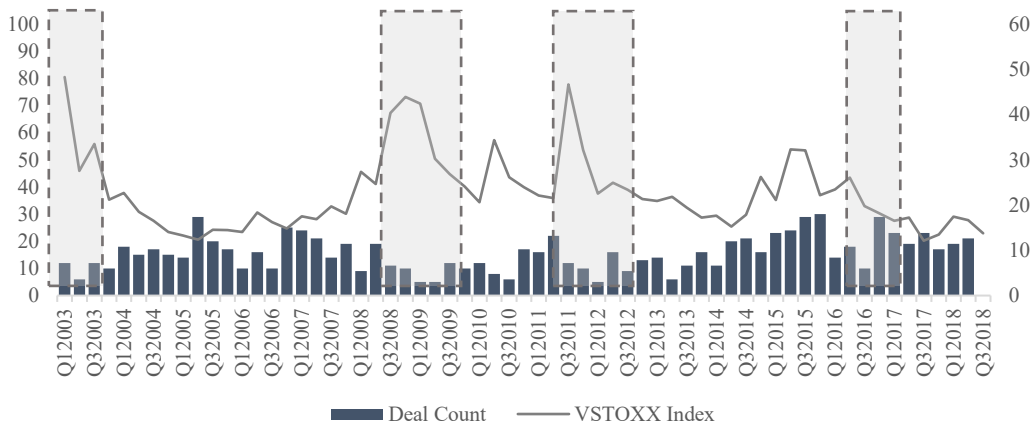


Figure 4. 5-days CARs – High Versus Neutral Uncertainty

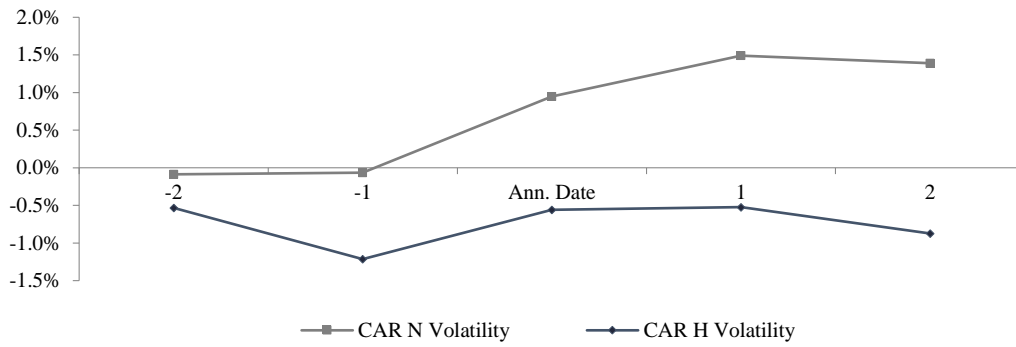
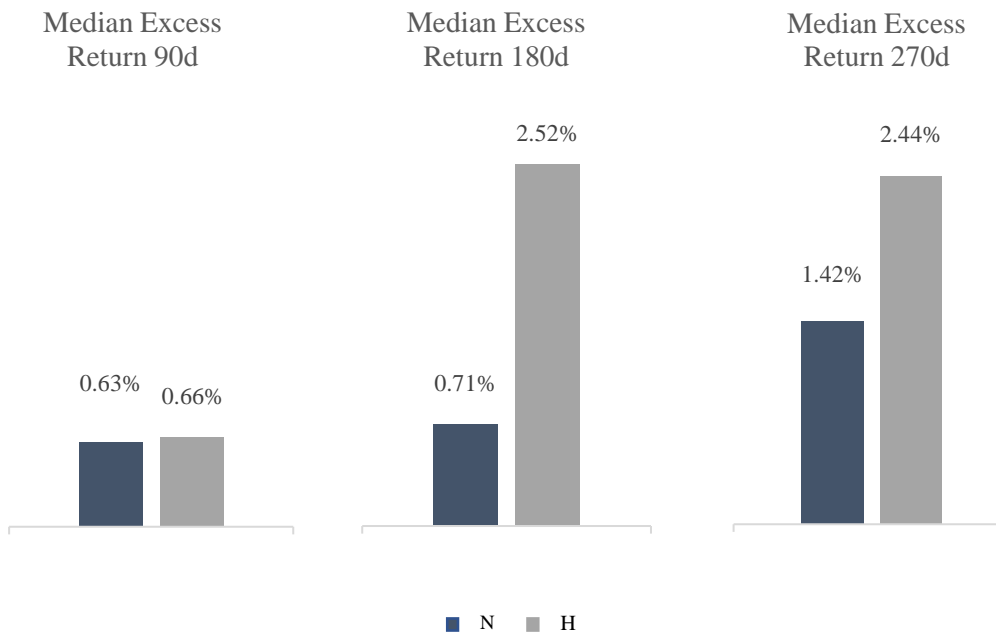


Figure 5. Long-term median excess returns – High Versus Neutral Uncertainty



**M&A and uncertainty:  
An empirical study on how volatility affects deals  
volume and short-term performance**

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## Introduction

Does M&A activity changes during periods of high volatility? The main purpose of this paper is to investigate how turbulent market conditions impact on both M&A volume and value creation around deals announcement.

Existing literature has extensively examined aspects linked to M&A timing and value creation. However, few researchers have focused their attention on understanding how these aspects change in times of higher uncertainty. For this reason, this paper is innovative in proposing a new link between the field of research studying M&A trends and the one studying M&A performance. In order to fill this gap and enrich the current literature, this research will specifically focus on uncertainty as a key factor driving (low) deal volume and (poor) M&A performance around the deal announcement.

The main contribution of this paper is in terms of both up-to-date data collection and analysis focused on a different market environment, notably European Union. The research questions addressed are: “*How does M&A activity volume change in periods of high uncertainty? How does M&A activity performance change in periods of high uncertainty?*” In order to answer these questions, this paper builds upon the contributions of previous studies from Bhagwat, Dam and Harford (2016) and Chiarella and Gatti (2014). The main objective is to determine whether the decision of firms to pursue external growth when the market conditions are uncertain brings value creation to their shareholders, in terms of short-term abnormal returns around the announcement date.

The paper tracks the volume and examines the short-term performance of a sample of European M&A transactions announced by public listed bidders between 1<sup>st</sup> January 2013 and 16<sup>th</sup> July 2018. A sample of 799 European M&A deals has been analyzed throughout an event study approach and the estimation of OLS regression models. Uncertainty has been proxied with market volatility and, given the focus on the European market, it is measured on the basis of the Euro STOXX 50 Volatility Index (VSTOXX). Value creation has been investigated by computing Cumulative Abnormal Returns in the 5-days and 10-days event window around the deal announcement. Evidence suggests that, on average, periods of high uncertainty are not only associated with lower M&A activity, but also with lower announcement returns. When uncertainty is high, bidding firms earn a statistically significant -0.87% 5-days Cumulative Average Abnormal Returns (CAAR), vis à vis the non-significant +1.39% 5-days CAAR observed in periods of neutral uncertainty. A multi-variable regression model has then been ran to determine whether uncertainty can be considered as one of the key drivers of short-term M&A performance, with result showing that a negative and statistically significant relationship between 5-days CARs and uncertainty exists.



## Chapter I: Main Features of the M&A Activity

First of all, M&A is one of the most important events in corporate life. There are several reasons why bidding firms may be willing to pursue M&A transactions. Certainly, synergies seem to be the driving force behind most deals. There is a vast empirical evidence proving the existence of positive synergy gains in M&As (Devos, Kadapakkam and Krishnamurthy, 2009; Houston, James and Ryngaert, 2001; Hoberg and Phillips, 2010). Nonetheless, it is possible to identify some additional reasons driving M&A decisions. In this regard, a crucial contribution comes from Trautwein (1990), which has classified the main theories of merger motives into seven groups – efficiency, monopoly, valuation, empire-building, process, raider and disturbance theory. Moreover, the sale of a company entails a long process (“auction”) that typically spans from three to six months and is characterized by some defined steps, shown below (Rosenbaum, J. and Pearl, J., 2013).



## Chapter II: Relationship between uncertainty and M&A

### 1. Impact of Uncertainty on M&A intensity

Moreover, it is well-known that M&A activity is cyclical and occurs in waves. For this reason, several empirical studies have sought to uncover the impact of economic fundamentals on M&A volume. Over the last decades, uncertainty has received extensive attention by researchers and practitioners, being perceived as one of the key factors determining mergers and acquisitions cyclicity. A recent survey by Hogan Lovell, involving a large number of top managers worldwide, shows that c. 90% of the executives interviewed consider economic uncertainty as a key barrier to investment and 62% perceive political uncertainty (particularly in the Eurozone) as one of the key barriers to the implementation of growth strategies.

Generally, when the market is exposed to higher volatility, cost of capital reaches its historically low level, while cash balances are at record highs due to low interest rates and low levels of corporate investments. However, despite these

factors create favorable terms for M&A activity, on average, a weak macro environment negatively impacts deal activity, resulting in significantly lower M&A intensity, referred to as both the number and the aggregate value of acquisitions announced. Possible explanations for the reduced number of active buyers during turbulent times are both the lower level of management confidence and risk appetite and the increased shareholders and regulation authorities' scrutiny.

Overall, it is possible to claim that, in tough times, firms are more cautious about investing in external growth and managers show substantial concerns related to transformational investments (i.e. M&A). Even if changes in uncertainty alone do not create M&A waves, they might have a first-order effect on M&A activity.

## 2. Impact of Uncertainty on M&A Value Creation

Notably, value creation is one of the most interesting aspects regarding M&A. The effect of an M&A event is so intense that it reaches multiple economic agents, including advisors, creditors, suppliers, customers, employees, communities, governments, and so on (Bruner, 2003).

In light of these considerations, the second aspect on which this paper focuses on is value creation in M&A.

Particularly, if the firm is listed, deal activity directly affects the share price and it is interesting to understand how bidder shareholders' returns change during market turmoil.

Generally, most empirical studies have demonstrated that, when a deal is announced to the market, bidding firms, compared to targets, earn close to zero returns. However, the debate over acquirer's gains at deal announcement is still open, and empirical evidence suggests that large variations in bidder abnormal return around the announcement of M&A transactions are explained by deal-specific characteristics. The five major deal-specific characteristics which may influence M&A performance are (i) the organizational form of the target company (Fuller, Netter and Stegemoller, 2002), (ii) the method of payment (Travlos, 1987), (iii) firm size (Asquith, Bruner and Mullins, 1983; Moeller, Schlingemann and Stulz, 2004) (iv) whether an acquisition is industrially diversifying or not (Morck, Shleifer and Vishny, 1990), (v) whether an acquisition is internationally diversifying or not (Moeller and Schlingemann, 2005).

In addition to the above-mentioned deal-specific determinants, bidder returns might be impacted by some macroeconomic factors. In this context, Chiarella and Gatti (2014) have noticed that the short-term market response to deals initiated in periods of high volatility is usually worse compared to the response observed in periods characterized by lower uncertainty. In fact, through an event study approach, they found that, in periods of high uncertainty, bidders earn substantially lower announcement returns in both the 3- and 5-days interval, with an overall -1.2% CAAR, vis à vis the -0.5% 3-days and -0.6% 5-days CAARs observed during neutral periods. The soundness of this result is proven by the results of their

multivariate OLS regressions of short-run abnormal returns which confirms the existence of a link between deal performance and uncertainty at the time of the announcement.

Nonetheless, Chiarella and Gatti (2014) have also proven that, despite the skeptical short-term market reaction to deal announcements, deals initiated in period of high volatility record both higher long-term stock returns and better operating performance (*“Overall, performance results show that while deal announced in periods of high uncertainty realize significantly lower announcement return than do deals announced in neutral times, their long run stock and operating performances are significantly better”*). This finding is consistent with the view that, even if uncertainty seems to de-incentivize acquirers from engaging in M&As, it also creates great opportunities. Under uncertain conditions, there are a number of favorable factors that might encourage bidding firms to engage in high quality M&A transactions. In fact, only the best buyers are able to successfully pursue external growth strategies, resulting in a larger number of value-accretive deals. Buyers can also leverage on their stronger bargaining position towards the sellers during negotiation and it is more easy for buyers to “cherry-pick” targets. Overall, Chiarella and Gatti (2014) provided empirical evidence showing that superior long-term performance in uncertain times can be explained mainly by a more meticulous planning and execution of the M&A deal and by the ability of the acquirer to negotiate from a better bargaining position.

## **Chapter III: Empirical Analysis**

### **1. Research Hypotheses and Methodology**

As aforementioned, uncertainty about underlying economic fundamentals can affect the level of M&A activity, both in terms of volume and value. In light of these considerations, a first hypothesis is that:

*H.1. In periods of high uncertainty, M&A activity is low.*

Also, unpredictable market conditions and volatile economic fundamentals might influence short-term M&A performance. As a result, the second hypothesis is the following:

*H.2. Transactions announced during periods of uncertainty are fundamentally different in terms of short-term performance from those undertaken in more quiet periods.*

These two research hypotheses allow to investigate the links between M&A activity and both fundamental economic conditions and M&A short-term performance for key shareholders.

## 2. Event Study: Cumulative Abnormal Returns

The share price reaction to the deal announcement is measured by observing stock price abnormal daily returns, which are considered a good indicator of the performance for merging companies.

Abnormal returns are computed using the expression below:

$$AR_{it} = R_{it} - E(R_{it}) \quad (1)$$

where  $AR_{it}$  is the abnormal return for security  $i$  on day  $t$ .

$R_{it}$  is the effective, observed return for security  $i$  on day  $t$ , computed as:

$$R_t = \ln (P_t / P_{t-1}) \quad (2)$$

where  $\ln$  is the natural logarithm,  $P_t$  is closing price at time  $t$  and  $P_{t-1}$  is the closing price of the previous trading day.

$E(R_{it})$  is the expected return for security  $i$  on day  $t$  and represents a benchmark of what investors required on a particular day. In this paper, the expected return has been computed using the market model approach suggested by Brown and Warner (1985), applying the following formula:

$$E(R_{i,t}) = \alpha_i + \beta_i * R_{mt} \quad (3)$$

where  $\alpha$  is the regression intercept for security  $i$ ,  $\beta$  is the slope coefficient for security  $i$ , and  $R_{mt}$  is the market index return (proxied with the EURO STOXX 50, the European stock market index that covers 50 stocks from 11 Eurozone countries). The estimation period used to compute the parameters of the market model, i.e.  $\alpha$  and  $\beta$ , is [-250, -10] day interval. As a robustness test, 200-trading day and 150-trading day estimation periods have also been considered to compute the CARs, and the original findings are not altered by shortening the estimation period. As a further remark, it is worth to highlight that the estimation period does not include any of the days selected within the event period [-2;+2] to avoid any potential contamination effects arising from the deal announcement.

The abnormal returns for a given day and a given firm are then cumulated over the event window so as to arrive at a cumulative abnormal return (CARs):

$$CAR_i = \sum AR_{it} \quad (4)$$

where  $CAR_i$  is the cumulative abnormal return of firm  $i$  in the [-2; +2] event period considered. As a robustness test, a larger event window of 11 days [-5; +5] has been taken into consideration, and the original findings are not altered by enlarging the event period. Particularly, the five days event windows allows to capture potential information leakages in the days immediately before the announcement, and to account for any delays in the stock price reaction in the days immediately after the announcement.

The statistical significance of the resultant CARs is then tested using formal statistical test procedures. Positive, statistically significant CARs represent a

favorable response by the market to the announced deal, whilst insignificant or negatively significant CARs will represent the market skepticism towards the transaction.

### 3. Regression Models and Description of Variables

#### 3.1. Hypothesis 1

Hypothesis 1 investigates the link between merger intensity and uncertainty and has been tested through a simple OLS regression analysis, following the research method presented in this section follows the one implemented by Chiarella and Gatti (2014).

The methodology employed consists in tracking the aggregate merger activity over 99 partially-overlapping 40-business-days windows across the entire sample period. Out of 99 intervals 13 are classified as periods of high uncertainty, based on the level of the VSTOXX index averaged over the previous 40 business days (see “Sample Selection and Description” for further details on the classification of periods of high versus neutral volatility). For each interval, the corresponding number of deals and the aggregate deal value have been identified. At this stage, two simple linear regressions have been conducted on a time-series data sample. The two regressions differ in the specification of the dependent variable. Moreover, for each of the dependent variables two different independent variables have been tested.

$$\text{Model (1.a): } DealCount = \beta_0 + \beta_1 (High)$$

$$\text{Model (2.a): } DealCount = \beta_0 + \beta_1 (Level)$$

$$\text{Model (1.b): } DealValue = \beta_0 + \beta_1 (High)$$

$$\text{Model (2.b): } DealValue = \beta_0 + \beta_1 (Level)$$

On one side, with regard to the dependent variable, the first bundle of regressions is characterized by *DealCount* as the dependent variable, while the second set of regressions employs *DealValue* in €bn. Deal count is computed as the total number of deals announced in each 40-business-days window. Deal value is computed as the aggregate value of transactions announced in the same period. On the other side, with regard to the independent variable, *High* is a dummy variable that takes the value of one if the 40- business-days window is classified as a period of high uncertainty (see “Sample Selection and Description” for further details on the classification of periods of high versus neutral volatility), while *Level* is a continuous variable that measures the average value of the VSTOXX index in the 40-business-days prior to the beginning of the period.

Moreover, Hypothesis 1 has been further tested following the methodology suggested by Bhagwat, Dam and Harford (2016), who have analyzed the relationship between merger activity and uncertainty through a time-series OLS regression where the dependent variable is the percentage change in the number of

merger announcements with respect to the prior quarter ( $\% \Delta \text{NumberOfDeals}$ ). The independent variable ( $\% \Delta \text{Volatility}$ ) is the % change of the VSTOXX index and it is constructed to include the information available before the end of the prior quarter. That is, if the dependent variable is the percent change in merger announcements in the second quarter (April – June), the independent variable is the percent change in the value of the VSTOXX index in the second quarter (January – March).

$$\text{Model (3): } \% \Delta \text{NumberOfDeals} = \beta_0 + \beta_1 (\% \Delta \text{Volatility})$$

### 3.2. Hypothesis 2

Hypothesis 2 aims at investigating the impact of uncertainty on bidding firm shareholders' short-term returns. For this purpose, an ad-hoc multivariate regression analysis has been performed, following the model previously employed by Chiarella and Gatti (2014).

The methodology employed consists in performing a multivariate regression analysis with 5-days CARs as dependent variable. For each announced deal, deal-specific characteristics have been identified and have been used as independent variables. Model (4) is inclusive of some of the primary deal-specific characteristics that past literature proved to have a certain effect on stock returns around the deal announcement. Model (5) also comprise a variable that captures uncertainty, main focus of this research. The inclusion of this variable is meant to improve the quality of the overall study and to determine whether uncertainty has some kind of explanatory power when it comes to Cumulative Abnormal Returns flowing to bidder's shareholders when an M&A deal is announced.

The following regression equations have been estimated:

$$\text{Model (4): } \text{CARs} = \beta_0 + \beta_1(\text{ListedTarget}) + \beta_2(\text{MixedPayment}) + \beta_3(\text{RelativeSize}) + \beta_4(\text{IndustryRelatedness}) + \beta_5(\text{CrossBorderDeal})$$

$$\text{Model (5): } \text{CARs} = \beta_0 + \beta_1(\text{ListedTarget}) + \beta_2(\text{MixedPayment}) + \beta_3(\text{RelativeSize}) + \beta_4(\text{IndustryRelatedness}) + \beta_5(\text{CrossBorderDeal}) + \beta_6(\text{High})$$

where

*ListedTarget* is a dummy variable that takes the value of one if, at the moment of the deal announcement, the target company is listed on the stock exchange.

*MixedPayment* is a dummy variable that takes the value of one if the method of payment (i.e. medium of exchange) employed involves both cash and stocks.

*RelativeSize* is the variable used to compare target and bidding firm size. Following Fuller, Netter and Stegemoller (2002), the relative size is defined as the deal value divided by the bidding firm undisturbed market capitalization measured one month (i.e. using 21 trading days as the average trading days per month) prior

to the bid announcement. Data on undisturbed market capitalization was downloaded from Bloomberg.

*IndustryRelatedness* is a dummy variable that takes the value of one if the target and the bidding firms do not operate in the same industry, which means that their 3-digit US primary SIC code does not match. Data on the 3-digit US primary SIC code were sourced by Zephyr.

*CrossBorderDeal* is a dummy variable that takes the value of one if the target company and the bidder company are not domiciled in the same country.

*High* is a dummy variable that takes the value of one if the 40- business-days window prior to the deal announcement is classified as a period of high uncertainty (see “Sample Selection and Description” for further details on the classification of periods of high versus neutral volatility).

Once the variables for each deal have been obtained, significance tests were performed in order to define the explanatory power of the parameters and to determine whether the results can be considered statistically significant or not. Basic two-tailed tests of variable irrelevance have been implemented, with the following null and alternative hypotheses:

$$H_0: \beta_i = 0 \quad H_A: \beta_i \neq 0 \quad \text{with } i \in \{ListedTarget, MixedPayment, \\ RelativeSize, IndustryRelatedness, \\ CrossBorderDeal, High\}$$

The individual significance has been tested through the t-statistics, which in this case translate to the t-ratio:  $t\text{-ratio} = \beta_j / \sigma(\beta_j)$ . Standard 1%, 5% and 10% significance levels have been used as robustness tests.

Rejection of the null, i.e.  $\beta_j / \sigma(\beta_j) > \alpha/2$  states that the considered parameter is statistically significantly different from zero, and as such is able to effectively explain the phenomenon of interest. By contrast, a non-rejection of the null hypothesis will imply that the variable of interest is not able to fulfil the expected relationship with the CARs.

## 4. Data Collection

### 4.1. Sample Selection and Description

Information on transactions (announcement dates, identity of bidders and targets, payment methods and transactions specific information etc.) was collected from Zephyr (Bureau Van Dijk deal database) and complemented with stock market and accounting data from Bloomberg and Thomson Reuters DataStream.

The starting point of the sample construction entailed the identification of all companies announcing a transaction (acquisition, merger, demerger, JV, minority stake, buy-outs and buy-ins) between 1<sup>st</sup> January 2003 and 16<sup>th</sup> July 2018 in the

European Union. At this stage, an initial sample of 965 deal announcements has been obtained.

The 965 observations have been used in Model (1), (2) and (3) in order to track deal volume across the entire sample period. The sample covers 965 transactions. Deal value across all observations in our sample is on average €1.4bn and ranges from as little as €250mn to as much as €62bn. Data analysis indicates how European M&As are unevenly distributed across the years, confirming Hypothesis 1. Specifically, it is possible to identify a slowdown in the number of announced deals in 2003, 2008, 2009, 2012 and 2016.

In order to analyze the announcement returns and apply Model (4) and (5), the sample has been reduced to 799 observations. In fact, for the purpose of the event study, the sample is only made by those companies for which the stock price is available on the date of the announcement and for at least 250 trading days prior to the announcement date, which constitutes the estimation period. In this way, it is possible to estimate the parameters of the market model as described in the section on Methodology (Brown and Warner, 1985) and obtain for each security the expected returns,  $E(R_{it})$ , against which the cumulative abnormal returns have been computed.

Once the identification of the sample is completed, it is necessary to split the 799 observations into two subsamples with deals announced in times of high and neutral uncertainty, respectively. At this stage, the definition of high uncertainty is crucial. The classification method employed is the one suggested by Chiarella and Gatti (2014). First of all, uncertainty has been proxied with volatility and it has been measured through the Euro STOXX 50 Volatility Index, namely VSTOXX index. This index was designed to track the market expectations of future volatility derived from real-time option prices for European stocks. The higher the expectations of near term volatility, the higher the level of the index, signaling increased uncertainty. In this research, a deal has been categorized as occurred in a period of high uncertainty if the level of the VSTOXX index averaged over the 40 business days preceding the announcement date lies more than 0.5 standard deviations above its historical mean.

Following this classification criterion, it is possible to identify several intervals of turmoil over the sample period:

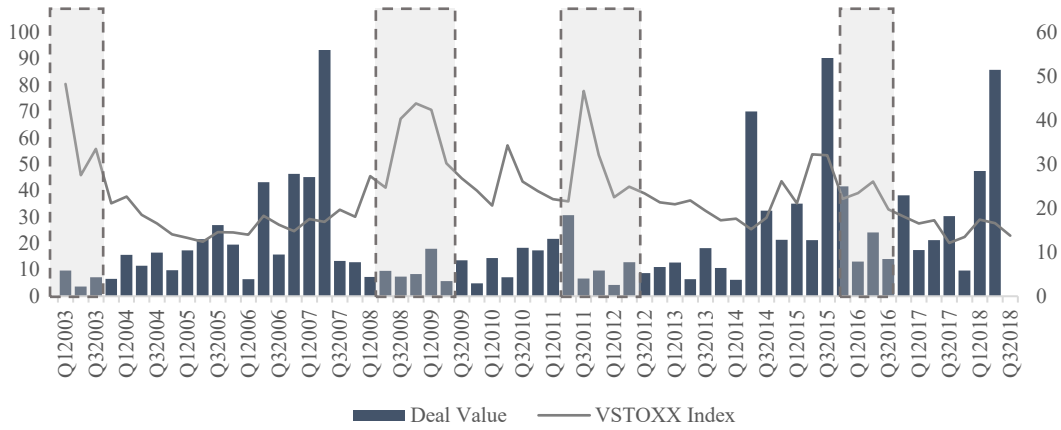
5. The tech bubble in early 2003;
6. The financial crisis between September 2008 and July 2009;
7. The European debt crisis in 2011-2012;
8. The Brexit in 2016.

Out of 799, 54 transactions were announced in uncertain periods according to the proposed classification.

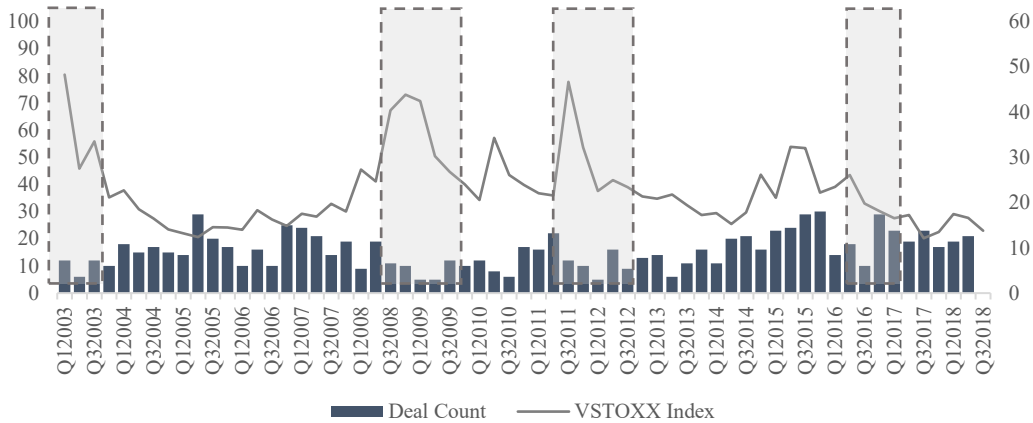


As shown in Figure 1 and 2, mapping deals along these turbulent periods confirms that the proposed classification based on the VSTOXX index seems to reliably track more uncertain periods.

**Figure 1. Volatility and Deal Value (€/bn)**



**Figure 2. Volatility and Deal Count**



## 5. Empirical Results

### 5.1. M&A Volume in Periods of High Uncertainty

Table 2 shows the output of the regression analysis for Model (1.a/b) and (2.a/b) performed using the full sample of M&As on a 40-business-days basis with the purpose to assess whether there is a link between uncertainty and M&A intensity.

**Table 2. Regression results - Model (1.a), (1.b), (2.a) and (2.b)**

	Deal Count		Deal Value	
	<u>1.a</u>	<u>1.b</u>	<u>2.a</u>	<u>2.b</u>
High	-4.48*** (-3.38)		-6.03 (-1.31)	
Level		-0.21*** (-4.03)		-0.43** (-2.31)
N	99	99	99	99
R <sup>2</sup>	0.11	0.14	0.02	0.05

The superscripts \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

In Model (1.a), the coefficient on the deal count variable for periods of high uncertainty is negative and strongly statistically significant, at 1% level. Furthermore, the overall level of uncertainty is associated with fewer deals and lower deal values as well. The coefficients on the average level of the VSTOXX index in the 40 business days prior to the beginning of the period are negative and strongly statistically significant at the 1% level. As expected – except for Model (2.a) – deal count and deal value are negatively correlated with uncertainty, thus confirming Hypothesis 1. In general, when uncertainty is high, firms are more cautious about investing in external growth. The lower appetite for external growth among buyers might be due to the lower level of management confidence and risk appetite among executives, as well as to the increased scrutiny by shareholders and regulation authorities (Chiarella, Della Ragione and Gatti, 2013).

The soundness of the results obtained with the previous models has been tested with Model (3), which follows the methodology suggested by Bhagwat, Dam and Harford (2016). Table 3 present regression results for Model (3).

**Table 3. Regression results - Model (3)**

<u>%ΔNumberOfDeals</u>	<u>Coef.</u>	<u>Standard Error</u>	<u>t-stat</u>	<u>Number of observations</u>	<u>R<sup>2</sup></u>
%ΔVolatility	-0.50*	(0.30)	-1.69	60	0.05

The superscripts \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

The coefficient on the indicator variable is negative and significant at the 10% level, thus predicting that the quarterly percentage change in the number of merger announcements is negatively correlated with the percentage change of the VSTOXX index in the quarter before the announcement date.

Summing up, evidence from the sample of 965 deals is consistent with Hypothesis 1, demonstrating that periods of higher uncertainty are usually associated with less intense M&A activity.

## 5.2.M&A Short-term Performance in Periods of high Uncertainty

Following Brown and Warner (1985), daily abnormal returns are estimated and then cumulated for a 5-day event window, i.e. [-2;+2], around the announcement

date. Table 4 reports summary statistics for the 5-days Cumulative Average Abnormal Returns.

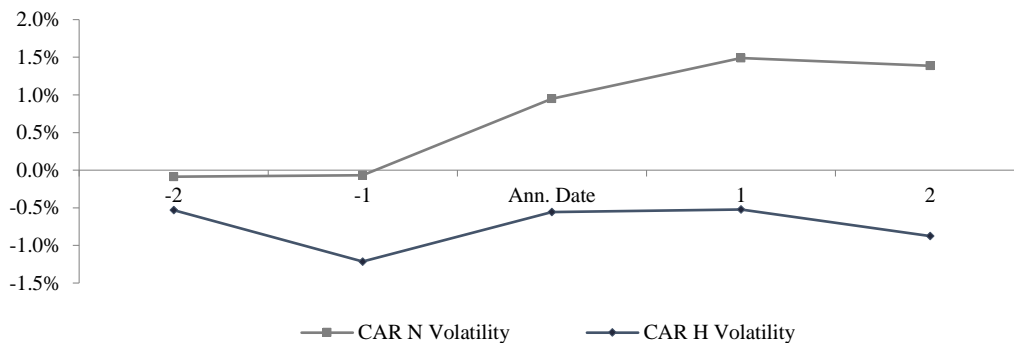
**Table 4. Event Study Results: [-2;+2] event window**

Uncertainty	5-days CAAR				
	N	Mean	Median	sd	
All	799	1.236%	0.486%	0.064	
Neutral	745	1.388%	0.518%	0.062	
High	54	-0.874%	0.288%	0.088	

Overall, announcement returns to the acquirer are slightly positive (1.24%) and statistically significant at the 0.01 level in the 5-days interval.

However, as shown in Figure 3, when taking into consideration uncertainty, a substantial difference in CAARs emerge. In fact, the market seems to react less favorably upon acquisition announcements in periods of high uncertainty. Cumulative Average Abnormal Returns in period of high uncertainty are negative and not statistically significantly different from 0. The average CAR is -0.87% in more turbulent periods vis à vis 1.39% (statistically significant) CAAR in neutral periods.

**Figure 3. 5-days CARs – High Versus Neutral Uncertainty**



Evidence suggests that, overall, deals undertaken during the four intervals of turmoil which have characterized the European market over the sample period (i.e. the tech bubble in early 2003, the financial crisis between September 2008 and July 2009, the European debt crisis in 2011-2012 and the Brexit in 2016), have generated negative announcement returns.

As shown in Table 5, the difference between the two subsample persists if the event period is extended to 11 days, i.e. [-5;+5] event window.

**Table 5. Event Study Results: [-5;+5] event window**

Uncertainty	11-days CAAR			
	N	Mean	Median	sd
All	799	1.173%	0.693%	0.075
Neutral	745	1.258%	0.726%	0.072
High	54	0.005%	0.510%	0.108

In general, this proves that acquirers in periods of high uncertainty are usually worse performers in both the 5-days and 11-days window around the announcement. Therefore, from the perspective of the bidding firm shareholders, M&A activity in periods of uncertainty is not value-accretive.

In the attempt to detect the factors driving value creation around the announcement of M&A and with the purpose to understand whether uncertainty is one of the key performance drivers, regression models (4) and (5) have been employed. Model (4) regresses the 5-days CARs against these 5 selected deal-specific factors.

**Table 6. Regression results - Model (4)**

	Coef.	Standard Error	t stat	N	R <sup>2</sup>	Adj. R <sup>2</sup>
Listed Target	-0.002	0.006	-0.272			
Mixed Payment***	-0.021	0.006	-3.421			
Relative Size***	0.003	0.001	3.713			
Industry Relatedness	-0.008	0.005	-1.548			
Cross-Border Deal	-0.010	0.006	-1.643			
				799	0.044	0.038

*The superscripts \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.*

Results based on the 799 observations examined are consistent with previous literature in detecting the relationship between abnormal returns and deal-specific characteristics. Consistent with prior literature, the market looks more favourably at transactions for private targets, non-stock offers, similar size transactions, non-diversifying offers and domestic transactions.

The first important result to be underlined concerns the choice of the method of payment. As it can be read by the table, there is a negative relationship between mixed payment and 5-days CARs. These findings are consistent with the “signalling” hypothesis, which states that the decision to employ stocks as method of payment conveys a negative information to investors, who suspect a potential overvaluation and respond accordingly, bidding down the acquirer stock price.

Also, the firm relative size significantly and substantially affects the degree of underpricing. This finding follows Asquith, Bruner, and Mullins (1983) that found that “*on average, a bid for a target firm half the bidding firm’s size produces a cumulative excess return 1.8% greater than a bid for a target one-tenth the bidder’s size*”.

The main focus of this paper is to investigate whether, on top of deal-specific characteristics, uncertainty plays a crucial role in determining bidder returns and firms’ M&A appetite. In the attempt to assess whether uncertainty (i.e. volatility), in addition to the aforementioned deal-specific factors, can be considered a key driver of announcement returns, the regression model (5) has been performed.

**Table 7. Regression results - Model (5)**

	Coef.	Standard Error	t stat	N	R <sup>2</sup>	Adj. R <sup>2</sup>
Listed Target	-0.001	0.006	-0.157			
Mixed Payment***	-0.020	0.006	-3.345			
Relative Size***	0.003	0.001	3.719			
Industry Relatedness	-0.007	0.005	-1.422			
Cross Border Deal*	-0.011	0.006	-1.759			
H**	<b>-0.021</b>	<b>0.009</b>	<b>-2.324</b>			
				799	0.051	0.044

The superscripts \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

As expected, the dummy variable identifying the deals undertaken during periods of uncertainty is statistically significant (at 0.05 level) and negatively correlated with 5-days CARs, thus confirming the Hypothesis 2. This result is consistent with the one obtained by Chiarella and Gatti (2014). They have found that the coefficient on the indicator variable for deals in times of high uncertainty is negative at -0.01 and statistically significant at the 10 percent level for announcement return, thus confirming the negative relationship between CARs and uncertainty. This means that the degree of value creation around the announcement of a deal differs substantially depending on whether the announcement occurs in turbulent market conditions or not.

In addition, when the dummy variable for uncertainty is added, the dummy variable tracking cross-border deals becomes significant at the 10% level. The coefficient is negative at -0.01, in line with previous literature findings. Possible explanations for the observed cross-border effect are the cost of geographical diversification, the increase in the level of diversification (which is usually associated with a discount) and country-specific factors (such as the level of shareholder and creditor protection and the accounting standards quality).

To conclude, Model (5) seems to have a higher explanatory power than Model (4). In fact, Model (5) present an increased Adjusted R-Squared with a value of 4.4% compared to the 3.8% of Model (4). Nevertheless, this value is still extremely low due to the large number of variables affecting announcement returns that have not been taken into consideration in this study. Besides this issue, Model (5) proves that uncertainty can be considered a determinant of shareholders returns.

## Conclusion

Overall, this study finds that higher uncertainty will decrease both deal activity and bidder returns around the announcement date.

First of all, analysis at the aggregate level shows that, in periods of uncertainty, fewer transactions are announced and their value tends to be smaller. The result obtained shows that, both deal count and deal value are statistically significant at the 1% level and negatively correlated with uncertainty, thus confirming the first hypothesis. Similarly, it has been found that a one standard deviation increase in VSTOXX is associated with a statistically significant drop by 0.50 standard

deviations in deal activity in the subsequent quarter. It makes sense that, when markets are under pressure and there is negative momentum, M&A intensity is significantly lower. Indeed, when the market becomes less predictable, acquirers perceive M&A activity as more risky.

Second, moving to the effects of M&A decision on short-term bidder shareholders' returns, the average CARs in the 5-day event window is 1.24%, which is statistically significantly different from 0 at the 0.01 level. When taking into consideration uncertainty, a substantial difference in CAARs emerges. In fact, evidence shows that the market seems to react less favorably upon acquisition announcements in periods of high uncertainty. In fact, the average CAR in more turbulent periods is not statistically significant and equal to -0.87% vis à vis 1.39% (statistically significant) CAAR in neutral periods.

Being the difference between periods of high and neutral uncertainty substantial, it has been shown that uncertainty can be considered as a possible driver of performance when it comes to M&A short-term value creation. Consistent with prior literature, regression analysis indicates that the market looks more favourably at transactions for private targets, non-stock offers, similar size transactions, non-diversifying offers and domestic transactions. More interestingly, uncertainty is found to be a highly relevant factor driving M&A performance. The regression estimates that Cumulative Average Abnormal Returns for deals undertaken in turbulent periods are 2.1% lower than deals undertaken in neutral uncertainty periods. This finding is consistent with Hypothesis 2 and proves the overall market skepticism towards M&A in uncertain market conditions.

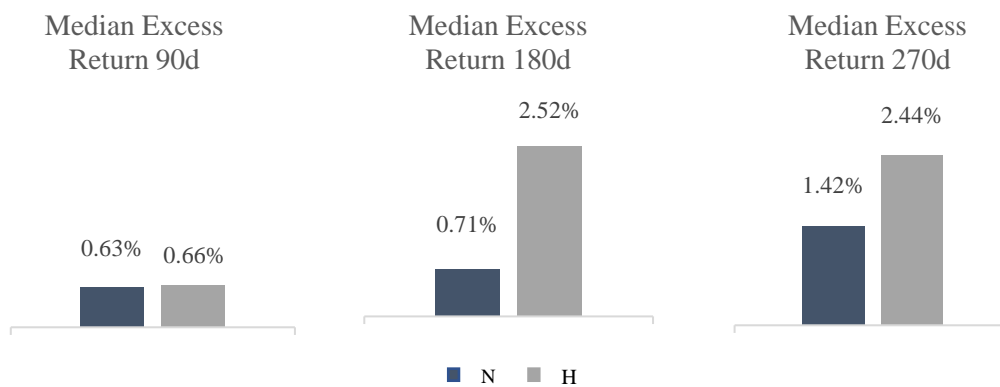
Overall, the general trends in M&A across periods of high and neutral volatility have been confirmed by this paper.

## Suggestion for Future Research

The focus of this paper is M&A value creation in the short term. For future studies, a research on long-term gains and performance drivers following M&A transactions announced in periods of high volatility is strongly encouraged.

As a first analysis, Figure 4 suggests that, if we look at median excess returns after 90, 180 and 270 trading days, deals undertaken during highly uncertain periods tend to deliver higher median excess returns. In light of this observation, a long-term performance analysis would help determining whether uncertainty, which seems to de-incentivize acquirers from engaging in M&As, creates opportunities in the long-run.

**Figure 4. Long-term median excess returns – High Versus Neutral Uncertainty**



Chiarella and Gatti (2014) have found that deals initiated in period of high volatility record both higher long-term stock returns and better operating performance. In fact, under uncertain conditions, only the best buyers are able to successfully pursue external growth strategies. Those best buyers can leverage on their stronger bargaining position towards the sellers during negotiation and can “cherry-pick” targets.