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Essays on Acquisition Outcomes

Doctor of Philosophy Dissertation by:

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Declaration

I Narmin Nahidi declare that this dissertation is my own, unaided work. It has been submitted for the Ph.D. in Management with concentration in Finance at Ca' Foscari University of Venice, Venice, Italy. This dissertation has not been submitted before for any degree or examination at any other University.

Narmin Nahidi

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Abstract

This thesis consists of three empirical papers in corporate finance that explore the role of information in due diligence and investor decision making through various facets of takeover transactions. In the first chapter of my thesis, I systematically review the literature on the role of the media coverage in finance in general, and on the relationship between media coverage and various aspects of mergers and acquisitions and provides directions for future research. The findings of this study suggest that there is a clear consensus in the literature on the role of media coverage and a firm's financial performance in the acquisition process. In the second chapter of the thesis which is my job market paper and titled "No News is Good News! Media Coverage and Corporate Takeover Characteristics", we study the importance of media coverage as a source of information, especially when they are in the decision-making process. We find that media coverage is negatively associated with the takeover premium. This holds for both positive and negative media coverage. No news is thus good news in terms of achieving a higher takeover premium. The method of payment demonstrates an ambiguous relationship with media coverage. The paper's results imply that media coverage as a source of information has constructive and destructive interference in the acquisition process. In the third chapter, we study the digital rights management (DRM) system at the target level impacts on mergers and acquisitions' (M&A) due diligence which in turn has a financial impact on various types of performances in the takeovers. We interpret this effect as a protective mechanism through which the digital right management increases the validity of target's cyber-protection models. The findings of this study reveal that target firms with digital rights management as a form of digital M&A have a lower market-to-book ratio, higher returns on assets, higher legal activities, and higher technological approach. Target firms with digital rights management as a form of M&A patent have a higher return on assets, higher legal activities, and lower digital activities. A digital rights management system at the levels of both digital M&A and patent M&A does not have an effect on environmental due diligence.

Overall, I see my Ph.D. dissertation as the starting point for my long-term research goal of expanding the literature in corporate finance and more specifically, in the areas of my interest.

Introduction

The widely held view among practitioners and consultants involved in mergers and acquisitions (M&A, henceforth) is that information has an important role to play in decisions-making process in corporate transactions. There are several determinants that influence on M&A and information asymmetry is one of the key factors that creates agency problem between acquirer and target and conflict the process of acquisition (Dionne et al., 2009; M. Jensen, 1986). The purpose of this doctoral dissertation is to study, from an empirical standpoint, some of the mechanism through which financial outcomes in takeover transaction jointly channels financial and actual economic cycles. In this dissertation, I analyze three different economic channel of information asymmetry (Gao et al., 2016). This channel provides insight into the media coverage implications on target pre-merger, interim and post-merger. Furthermore, information asymmetry is a result of a protection tool such as digital rights management system (DRM, henceforth) which be drivers of target performance in due diligence.

In the first chapter, I systematically review and synthesize 66 published peer-reviewed academic papers on the topic of the role of the media coverage and various aspects M&A transaction. This extensive literature review identifies that media can play a significant role in affecting various aspects of the takeover transaction (Carapeto et al., 2010; Shao, 2010; Tienari et al., 2003; Vaara & Monin, 2010). This systematic review contributes to the media and M&A deal literature in the following ways. First, the SLR identifies widely accepted research perspectives in the fields of media and M&As (Y. Chen et al., 2020; Y. Chung & Kim, 2019; Liao et al., 2021; Vaara & Monin, 2010). Second, this paper highlights the relationship between media and takeover content from different perspectives (Evens & Donders, 2015; Greco, 1996; Jeziorski, 2012; Mehrotra & Sahay, 2018). Using bibliometric analysis, this review investigates the role of media coverage in acquisition and through three dimensions of takeover (i.e., pre-acquisition, interim, and post-merger phase); and identifying three main distinctions emerging from M&A literature (Method of payment, premium and time of completion); this research analyzes the direct and indirect influence of media through these dimensions.

In the second chapter, we (joint work with Stefan Hirth), analyze the relationship between a target firm's media coverage (measured by level of media coverage, and positive and negative media coverage), and various takeover characteristics. A prominent view in the corporate finance literature suggest that media coverage mitigates the information asymmetry and affect various aspects of relevant markets, such as investment funds, pricing and stock returns (Fang & Peress, 2009; Tetlock, 2010, 2011). This supports the notion that the media is a relevant tool on which investors can base their financial decisions. Asymmetric information also alleviates the doubtful and unclear thoughts of both acquirer and target if the information disseminated by the media is positive, and whereas negative news would have different consequences for the takeover and might lead the method of payment to be other than cash, prolong the time of completion or lead to a higher premium. Drawing from agency theory, this paper argues that the neutral, positive, and negative information that an acquirer receives from the media coverage of the target affects different levels of the acquisition. We find that media coverage is negatively associated with the takeover premium. This holds for both positive and negative media coverage. No news is thus good news in terms of achieving a higher takeover premium. The method of payment demonstrates an ambiguous relationship with media coverage. All three measures of media coverage have a positive effect on the time of completion.

The third chapter focuses on digital information that is transmitted during due diligence process in takeover transaction. Due diligence is an essential activity in mergers and acquisitions (M&A) transactions that allows the parties of the deal to investigate about each other by looking into different types of information from contracts to finances activities. Once the due diligence is implemented, the acquirer and target may share various information, and the legitimacy of this shared information need to be controlled by digital rights management (DRM). We begin to identify DRM in takeover transactions by looking at digital information transmitted in the due diligence process. This approach is consistent with the construction of digital units, intellectual property, and the integration of technology with finance (see, e.g., Benitez et al., 2018; Hanelt et al., 2020; Robins, 2008). In this study, we recognize two forms of digital products based on DRM in the digital content of M&A, and DRM in the patent content of M&A. We focus on information that the acquirer access from the target directly in this paper, we show that a target firm's performance varies substantially across due diligence process, particularly when DRM is involved. Our findings reveal that target firms with digital rights management as a form of digital M&A

have a lower market-to-book ratio, higher returns on assets, higher legal activities, and higher technological approach. Target firms with digital rights management as a form of M&A patent have a higher return on assets, higher legal activities, and lower digital activities. A digital rights management system at the levels of both digital M&A and patent M&A does not influence environmental due diligence.

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CHAPTER I.

Media Coverage and Corporate Takeover:
A Systematic Literature Review and Directions for Future Research

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Media Coverage of Corporate Takeovers:
A Systematic Literature Review and Directions for Future Research

Abstract

Research on media and finance has recently gained momentum due to the importance of information in the pricing process. This study systematically reviews and synthesize the extensive but rather fragmented research on the topic of the role of the media coverage and various aspects of mergers and acquisitions (M&A). Based on a review of 66 published peer-reviewed academic papers, this study highlights the significant role of the media in different themes identified in the literature review of takeover transactions. The findings of this study suggest that the impact of media coverage on corporate takeover varies significantly across various dimensions of merger. Examining the relationships in the conceptual framework model, this study identifies three thematic domains (method of payment, premium and time of completion) on which the paper draws to develop an agenda for future studies. Building on integrated conceptual framework, this study recommends an attempt to help researchers for better understanding the relationship between media coverage and takeover transactions, and to suggest directions for future research.

Keywords: mergers and acquisitions; media coverage; systematic literature review; pre-interim acquisition; post-merger.

JEL Classifications: G34, L82

1. Introduction

A growing literature explores the role of media coverage[1] as a powerful economic agent with a significant effect on business and financial markets (Orr, 1987). Media plays a vital role in collecting and disseminating information related to businesses (Deephouse, 2000). A stream of research investigating the media as an anticipatory and complementary source of information concerning mergers which affects and steers the deal process towards different types performance in takeover (Dyck & Zingales, 2002; Dyck, Volchkova, & Zingales, 2008; Vega, 2006). Many studies highlight the importance of media coverage in a corporates' success (Kolb, 2017; Sinha et al., 2015; Stahl et al., 2013). In another study, Liao, Wang, and Wu (2019) investigated news events for 170,000 firms and find the evidence of media sentiment playing a critical role in the success of mergers and acquisitions (M&A)[2] transactions. Faff et al., (2019) suggest that M&A is considered a risky process, and a puzzling proxy such as media coverage can affects the way managers make corporate decisions. Particularly, Martynova and Renneboog (2008) showed that managers use information from various sources in their decisions to acquire a firm. While information seems to have a clear effect on the acquisition process, information asymmetry can result in the failure of deals, which highlights the important role of the media in the M&A process (Parvinen & Tikkanen, 2007).

Many scholars have studied the role of the information from media in corporate financial performance in recent years (e.g., Ahern & Sosyura, 2014; Gao et al., 2009; Tetlock, 2016; Yang et al., 2019). Similarly, various research suggest that a firm's information environment affects different aspects of the merger process (Diamond & Verrecchia, 1991; Easley & Hara, 2004; Merton, 1987). There are many corroborative pieces of evidence that show how media coverage affects a firm's financial performance. The information provided by the media reduces information asymmetry between stakeholders and corporate insiders, which leads to sustainable economic

[1] The definition of "media" and "media coverage" is the same throughout the paper. The media include all types of media that might influence the process of acquisitions. such as print media, broadcast media, outdoor media, and cyber media. Several studies measure the media coverage of good and bad news in the market (Niederhoffer, 1971).

[2] There are three types of M&As in this study, and I won't differentiate between them; I also use the general meaning of M&A. The three types are: (1) horizontal, which is a deal between competitors, (2) vertical, which is when the parties are or could become buyer-sellers, and (3) conglomerate, which is every other case.

performance (Gao et al., 2009; Naumer & Yurtoglu, 2019). This information is available to managers and investors, leading to more transparency, which in turn helps managers legitimize their M&A decisions. For example, on firm level, Hawn (2020) notes that media coverage of corporate social irresponsibility is important for managers making takeover decisions.

Examining the role of the media in finance from an agency perspective may further strengthen the view that has a significant effect on businesses. Agency theory suggests that there is information asymmetry between managers and shareholders (Dierickx & Koza, 1991). Similarly, institutional theory has commonly been used in studies regarding media and organizational practices (Cook, 1998; Jamieson, 2000; Schudson, 2002). Agency and institutional theories have different and sometimes competing assumptions, but these two theories are relevant to the research setting. The research questions are based on general assertions of agency and institutional theories concerning the role of the media in disseminating information (reducing the agency problem) among stakeholders about possible mergers and providing support for post-merger success (providing legitimacy). This investigation considers agency and institutional theory perspectives to analyze the role of media coverage as regards to three stages of pre-merger, interim and post-merger.

This study highlights the media's effects during different periods of a takeover, from pre-acquisition to the interim period, and post-merger. The synthesis provides a nuanced understanding of the role of media coverage in the process of important economic activity. Using an internet search and taking a bibliometric approach, this study collects the scholarly literature and uses 66 peer-reviewed articles published in various management and finance journals from 1996 to 2022. Following suggestion by prior literature, this study uses the systematic review as a framework to investigate complex phenomenon of multidimensional studies by examining them using surveys (Degbey & Pelto, 2021; Kano et al., 2020[3]). Systematic literature review is suggested to minimize the bias in the research, synthesis the literature and improve transparency in the literature review (Fan et al., 2022).This research benefits from systematic literature review (SLR) method and

[3] Kano et al. (2020) apply a comparative framework for guiding literature reviews, and systematically categorize and analyze the selected papers in their studies.

traditional literature reviews to achieve more definable and complete results from each paper covered in my research (Benlemlih, 2017; Gervasi et al., 2021; Ipsmiller & Dikova, 2021; Massaro et al., 2016).

The objective of this literature review is to investigate existing research and develop a conceptual framework to identify characteristics of information through media and find directions for future research. This study highlights the significant role of the media in different aspects of takeover transactions. Furthermore, I use these academic papers as a dataset that covers all constituents of M&A from pre-merger to interim and post-merger. In testing the research questions, I categorize the dataset (research papers) into three categorization of Dezi et al., (2018) as qualitative desk research, empirical quantitative research and empirical qualitative research. In addition to various classifications (e.g. journals, ranking, sources) that I use a set of explicit method in this research, I apply quality assessment criteria (Ain et al., 2019) to measure the quality of the academic papers.

This paper makes several contributions to the literature by providing a systematic assessment of theoretical considerations regarding how information disseminated from media coverage can affect various facets of M&A. First, findings of this research illustrate the importance of the media in the M&A process, as identified by the growing number of relevant publications. Secondly, I reveal the lack of cohesive literature regarding the relationship between the media and acquisition process in general which can be addressed by future researchers. Thirdly, this synthesis shows that most of the studies about media coverage argue that the media has an effect on the financial behavior of a firm, such as on the cost of debt (Gao et al., 2016), corporate governance (Liu & McConnell, 2013; Teng & Yang, 2021), the financial market (Raimondo, 2019), initial public offer (IPO) (Xiong & Zhao, 2021) and stock price (Scheufele et al., 2011). It is still necessary to conduct more studies regarding how media coverage may impact on different levels of M&A process. Fourthly, while a large proportion of the related literature uses the textual analytical technique to determine the role of the media (Hellgren et al., 2002; Kuronen et al., 2005; Raimondo, 2019; Vaara & Monin, 2010), it is evident that there are few examinations of media characteristics studied in the literature. Finally, to the extent that researchers ought to re-evaluate the different methodological approaches, this research advocates a more in-depth analysis of the role of the media by using a qualitative approach to determine how the media directly affects the M&A decisions.

The remainder of this paper proceeds as follows. Section 2 discusses the conceptual framework and develops the research questions. Section 3 details the SLR methodology. Section 4 presents the appraisal of the status quo. Section 5 offers some concluding remarks, notes the implications of the main findings, and suggests future research directions.

2. Conceptual framework

2.1. Macro Level: The relevance of media coverage to M&A

Acquisition is one of the most important ways to expand a firm's capacity to create value (Cartwright & Schoenberg, 2006). It is also one of the principal channels by which firms expand their capacity to create value for their shareholders by acquiring new firms. The value creation depends on the success of the M&A process (Dezi et al., 2018). As such, any source of information on which the acquirer and target shape their expectations may plausibly be linked to the M&A process. Nevertheless, several studies suggest that the media can ease the decision-making process for managers by sufficiently informing the acquirer, as well as target firms, to help to align their interests and facilitate the deal (Dyck & Zingales, 2002; Farrell & Whidbee, 2002; Joe, Louis, Robinson, et al., 2009).

As a tool to assist shareholders, media plays diverse role in dissimilating important financial information. Furthermore, media act as instrument to control the level of information. Many authors posit that media coverage reduce the information asymmetry between parties of the deal (Bushee et al., 2010; Dyck & Zingales, 2003). As a result, media predicts the trading value and stock return value (Tetlock et al., 2008), influences the cost of debt (Gao et al., 2009) and impacts on efficiency of the stock market (Peress, 2014). As a result, there is economic rationale for mergers to be affected by media.

Using SLR, this research explores the role of the media in corporate finance, and its effect on M&A transaction operations, and in particular, investigates literatures that study methods of payment, premiums, time of completion, in three levels of pre-merger, interim and post-merger success. Using systematic literature framework to study the media's role in the M&A process helps us understand the mechanism of information in takeover. From a financial perspective, this research has selected methods of payment, premiums, and time of completion which have a direct impact from information disseminated from media (Adra & Barbopoulos, 2019; Wangerin, 2019; Zhu & Jog, 2009). In accordance with the information asymmetry proposed by Meyer & Majluf,

(1984), I choose media as a proxy of information to reduce asymmetric information and uncertainty. Furthermore, I recognize three periods of mergers and acquisitions (Aktas et al., 2019) which have spread through takeover as pre-merger, interim and post-merger. This categorization helps to identify better how and when the information is affected into acquisition process.

Many previous literature reviews provide some insights into the topic of media or M&A individually and through their research, they tend to be descriptive, focus on some specific aspect of media or takeover; although, the current media/M&A literature lacks comprehensive review on both subject. Thus, there is a need to create a deeper analysis and work towards an integrated conceptual framework of media coverage and M&A. To fill this research gap, this study aims to propose an integrated conceptual framework building on previous literature (Bhagwat et al., 2016; Kumar, 2009; Parvinen & Tikkanen, 2007). The conceptual framework developed incorporates three major levels of the selected literature review and narrows the literature review to particular media coverage and M&A topic. Figure 1 describes the conceptual framework and selection process, building on the different themes that are identified in previous sections. This model provides a basis for understanding the potential causal factors behind the findings and results. The model stipulates that there are three levels of analyses to this study. We have media coverage and M&A in macro level. The meso level in M&A involves three stages: pre-merger, interim, and post-merger. As the pre-merger and interim stages are very close together and I identify them as one unit of pre-interim stage and analyze method of payment, premium and time of completion in this stage. At the post-merger stage, I check the selected papers include the planning, integration, and execution of the post-merger stage of M&A. In addition, in meso level of media, we have news, telecommunication, newswires etc. At micro level, the focus would be on general information that is disseminated by media in mergers and acquisitions.

[Insert Figure 1.]

2.2. Meso Level: The media in the pre-merger, interim, and post-merger

M&A transactions have become common way for a company's decision-makers acquire firms to expand their business. Research into this process shows that media coverage significantly affects various aspects of takeover transactions (Liao et al., 2021). There are many advantages with regards to media coverage and its impact on various facets of takeover from pre-merger to interim and post-merger. For instance, media assist both sides of the acquisition to have positive

outcome and collaboration in post-merger phase which shows a successful post-merger survival for both firms. Similarly, an assurance that a merger will be covered positively by the media may increase its chances of success (Chung & Kim, 2019). Numerous studies demonstrate the important role of the media an essential role in affecting financial performance (Mitchell & Mulherin, 1994; Neuhierl et al., 2013; Solomon et al., 2014; Tetlock, 2016), the way it affects specific aspects of M&A has not yet been established in the literature. In addition, so far there has not been a systematic literature review that comprehensively demonstrates the role of the media in multiple aspects of the M&A process. The objective of this study is to fill the above void and identify, analyze, and interpret all the existed evidence related to the media across three dimensions of M&A transactions.

The synthesis of the literature on media coverage and M&As offers two main insights. First, of the scant evidence from the literature show that the direct relationships between media coverage and payment methods, the premium, and completion time is an under-researched area. Scholars have recently paid some attention to the role of the media in the M&A process (Ghosh et al., 2019; Mazboudi & Khalil, 2017), however, its role in affecting various aspects of the M&A process is still a black box. The synthesis of the literature in Table 5 shows research papers that have used quantitative approach to examine the relationship between media and M&A. One obvious implication of these findings is that media coverage has been recognized as an important source of information in M&A, however, there is a need to conduct more studies in this field. Second, theoretically, the literature has acknowledged that the media affects M&As (Gamache & McNamara, 2017), however, there is little empirical research available to claim a direct and/or causal effect of media coverage on aspects of the pre-merger and interim stage of M&A.

The post-merger period is considered to involve a multifaceted, dynamic process through which the acquirer and acquired firm are combined to form a new organization (Graebner, Heimeriks, Huy, & Vaara, 2017). Various studies have explored different interactions and integrations in the merger process (Ahammad et al., 2017; Graebner et al., 2017). Integration comprises multiple sub-processes in which information can have a significant effect on each of these processes (Epstein, 2005). These integration efforts may lead to a merger's success or failure depending upon the quality of the integration strategies. According to the literature, planning, integrating, and executing are the three main dimensions at the post-merger level (Parvinen &

Tikkanen, 2007). Some factors, such as the irrationality of the goals in major M&As, can cause damage and destroy the deal in the merger process (Peltier, 2009).

Emphasizing the unique individual character of each period in a takeover transaction demonstrates a strong link between these dimensions. While the creation of the deal occurs in the pre-merger and interim dimension, the consequences of any action in these dimensions have a significant effect on post-merger performance. The mutual synergy between these two phases helps finalize a deal and leads to successful acquisitions. In what follows, I separately analyze each element of the takeover transaction. My framework suggests that media coverage plays an important role at different levels of M&A.

2.3. Meso Level (Pre-Interim): The role of methods of payment in M&A

Generally, the degree to which the media affects the methods of payments in M&A depends on the information being diffused. For professional investors who are interested in M&As, media coverage arguably plays a significant role in firm performance (Fang et al., 2014). Reliable and accurate information disclosure is highly valued in the process of financial decision making in a market with information friction (Yuexin Li et al., 2018). Information derived from the media can facilitate the decision-making process, and help managers choose the most suitable payment methods for their firms. (Dyck & Zingales, 2002; Farrell & Whidbee, 2002; Joe, Louis, & Robinson, 2009). Information from the media may result in different incentives for managers to choose a particular payment method (MOP) in the transaction between target and acquirer.

The M&A literature has paid considerable attention to the choice of methods of payment (MOP) in corporate takeovers (Faccio & Masulis, 2005a; Martin, 1996; Martynova & Renneboog, 2008). In order to take into account the type of MOP, this paper follows previous studies and considers three methods of payment: cash, stock, and the combination of cash and stock (Blankespoor et al., 2013; B. Eckbo et al., 1990; Hansen, 1987; Yang Zhao & Renneboog, 2014). Several studies provide evidence that acquirers decide how to proceed with their payment based on the available information (Travlos, 1987). Reducing information asymmetry about the target's financial performance, means that the bidder is expected to better estimate the target's value. There would thus be less needed to offer a stock payment, and it may instead be possible to pay by cash, which can lower the risk for both the target and bidder firms. The investigation of payment methods in corporate acquisition is intriguing, since it is well-known that there is an adverse price

reaction to the acquirer's stock in stock-financed acquisitions (Martin, 1996), and that conversely paying by cash gives a positive signal to the market about the valuation of the acquired company (D. T. Brown & Ryngaert, 1991b; Travlos, 1987).

Media coverage is deemed to decrease information asymmetry and affect markets. There are several studies on the effect of media coverage in finance. For instance, Dyck and Zingales (2005) investigate the effect of media coverage on investment funds. Fang and Peress (2009) study the effect of media coverage on stock returns. The recent literature also provides increasing evidence that the media coverage of individual stocks can affect the trading behavior of individual investors. Gao et al. (2018) find that media coverage is negatively associated with a firm's cost of debt. According to the conceptual framework, the degree of conflict between the media and M&As is positively related to MOP. Although there is no direct proof of this claim in the literature, the question of how information asymmetry can affect payment methods remains unanswered. This study examines all choices of payment (cash, stock, and the combination of both) in the selected papers, but none considers the effect of media coverage on MOP, except where some mention payments in M&A in general.

2.4. Meso Level (Pre-Interim): The role of premium paid in M&A

The media's role is to collect, select and certify the information that is transmitted between acquirers and target (Dyck & Zingales, 2005). Target's acceptance of the deal is more likely to depend on the premium offered by the acquirer (Luypaert & Van Caneghem, 2014). There is a strong relationship between information derived from the media and acquisition premiums in emerging market firms, and it is thus expected that media coverage has a significant effect on the premium in the acquisition process (Yang, Sun, et al., 2019). Valuable information from the media can have various implications on M&A premiums. An acquisition premium can be measured only as the difference between the price paid and market value over market value for specific period. This price can be affected by information asymmetry in the deal acquisition between acquirer and target. The lower the information asymmetry of the target firm, the better the acquirer can assess the target's true value, and therefore more information would lead to a lower premium (Dionne et al., 2015). It is expected that positive media coverage makes investors optimistic about a firm, hence lowering the deal's premium. This phenomenon leads an optimistic acquirer to pay a fair and low premium to the target. The information disseminated from the media offers the acquirer different notions about the target and vice versa. This idea suggests two aspects of premium paid.

The first explains that the more information asymmetry the less the acquirer will pay, as the information helps the acquirer to know more about the target (Dionne et al., 2015; Jory et al., 2016). The second explains the opposite idea, that the acquirer aims to pay more to the target when there is more information asymmetry about the target (Cheng et al., 2016; Milgrom & Weber, 1982).

2.5. Meso Level (Pre-Interim): The role of completion time in M&A

It is already known that information derived from the media influences the decision-making process, which affects the time of completion for an acquisition deal. Only a few studies focus on the pre-completion levels of M&A and describe the importance of negotiation time in the M&A deal. Ahern and Sosyura (2014), and Luypaert and De Maeseneire (2015) claim that information asymmetry has a significant effect on the completion time in takeover transactions and the length of completion for a deal runs from the announcement date until the end of the acquisition. This period can be reduced by low information asymmetry (Baccarani & Bonfanti, 2016; Offenberg & Pirinsky, 2015). The effect of information in completion time is important, as a prolonged deal is costly and delays the realization of synergy gains (Luypaert & De Maeseneire, 2015). Prospective deal makers pay more attention to the fact that a prolonged deal can be more expensive and costly, and therefore that paying attention to the timing of the deal can avoid acquirers competing in bidding contests that might lead to no deal at all (Luo, 2005).

2.6. Meso Level (Post-Merger): The role of post-merger success/ failure in M&A

Anecdotal evidence shows that the media's depiction of successful integration in the post-merger phase increases the probability of acquisition success (Chung & Kim, 2019). According to Graebner, Heimeriks, Huy and Vaara (2017), the post-merger period is defined as a multifaceted, dynamic process through which the acquirer and acquired firm or their components are combined to form a new organization. There are numerous papers about different interactions and integrations, after a merger deal (Ahammad et al., 2017; Graebner et al., 2017). Integration comprises multiple sub-processes in which information can have a significant effect on each of these processes. Some of these integrations lead to success and some to failure. The papers that are selected for this study, investigate the success of a merger and are the result of a series of effective and accurate integrations in the system. Prior studies suggest two dimensions of post-merger, planning for the post-M&A process and integration, and executing the integration plan

(Parvinen & Tikkanen, 2007). This paper categorized the post-mergers only as integration phase of the merger and address the success or failure of post-merger in general.

3. Research questions

A thorough review of the literature shows that the role of the media is different in each stage of the M&A process. Several studies suggest the influence of information from media in corporate finance (e.g. the assumption that less information asymmetry leads to a higher probability of the acquirer paying a lower premium to the target (Dionne et al., 2015), more information from media reduces information asymmetry and can help both the target and the acquirer reduce their negotiation time (Luypaert & De Maeseneire, 2015), and encourage the acquirer to pay cash for their acquisition rather than shares (Travlos, 1987). In other strand of the literature, Garzella and Fiorentino (2014) suggest that information has an objective effect on pre-deal decision-making in takeover transactions. Moreover, the information can affect the decision process during pre-acquisition (Cullinan et al., 2004; Zaheer et al., 2013), and therefore it can be assumed that the media as information disseminator can affect the financial performance of target and acquirer firm at pre-acquisition, interim and post-acquisition processes.

From pre-merger to interim phase, information from media creates a valid source for the managers and stakeholders to rely on in decision-making process. In the post-merger phase, media coverage helps managers integrate the newly-acquired firm more quickly, and leads to a less costly and less time-consuming process(Graebner et al., 2017; Parvinen & Tikkanen, 2007). The post-merger integration process consumes a significant number of organizational resources. During this phase, managers need to acquire more financial resources from the financial market in the form of investments (Owers et al., 2003). I already know that information asymmetry causes agency problems, that agency problems are correlated with due diligence, and that less due diligence eventually leads to lower post-merger profitability (Wangerin, 2019).

Valuable information is an important key to alter different outcomes in payment methods in acquisition (Travlos, 1987). Martin (1996) showed that if M&As take place in a more transparent information environment, there is a higher probability of cash payment than payment by stock. Similarly, the literature on premiums in M&As shows that the amount of premium increases with the information asymmetry (Dionne et al., 2015; Jory et al., 2016). Information helps the bidder better understand the financial and non-financial status of their target, and decide

to pay a lower premium if there is a deal (Dionne et al., 2015; Fishman, 1988). The actual M&A deal process can take longer to be completed in opaque information environments, for the target as well as acquirer (Luypaert & De Maeseneire, 2015).

The theoretical literature on M&A addresses the link between asymmetric information and the premium paid in the acquisition process (Dasgupta & Tsui, 2004; Fishman, 1988; Ravid & Spiegel, 1999). Media information leads the bidder to have better insight into the financial and non-financial status of the target and decide on a lower premium in the case of a deal. The actual deal process in M&A may be affected by various incentives, and as the emerging literature indicates that information asymmetry is a significant reason for longer deal times (Luypaert & De Maeseneire, 2015), the result will be that the more information there is from the media, the less time the deal will take at the pre- and interim acquisition stages. This study involves a unique setting in connecting the media with M&A and presents two research questions based on meso level of the conceptual framework and asks how media coverage and its valuable information effects on M&A in pre-merger, interim and post-merger:

RQ1: How is media coverage associated with methods of payment, premium and time of completion in mergers and acquisitions at a pre-interim acquisition level?

RQ2: How is media coverage associated with the success/failure of mergers and acquisitions at the post-merger level?

4. Methodology

4.1. Conducting the systematic literature review

The systematic review analysis emerged from evidence-based medical research, and has since spread across many other disciplines, including management research (Denyer & Neely, 2004; Tranfield et al., 2003). There are several methods for a systematic approach, from evidence-based review (Thorpe et al., 2005) to content analysis (Gaur & Kumar, 2018). Review of previous literature on systematic review is a movement that identifies key scientific contributions in various approaches of studies from evidence-based approach to meta-analysis and narrative approaches (Davies & Crombie, 1998; Tranfield et al., 2003). Following Tranfield et al., (2003) research, this review characterizes and evaluates the literature units to test the research questions and their relationships. The initial literatures gathered are 75 papers. After reading the abstracts and skimming through the manuscripts, 17 papers are excluded. This evaluation applies a conceptual

framework and analyses 66 published articles including research papers from first of January 1996 to March 2022. The starting date of this selection is 1996 due to the rise publication about media in the literature from the second half of 90s. This study uses (PRISMA) method as a reporting method for systematic reviews and meta-analyses. This method is an evidence-based technique for minimum set of units (research papers) to report a systematic literature review (Moher et al., 2009).

As claimed in the literature, the first step in a systematic review is to run iterative rounds of definition, clarification, and refinement (Clarke & Oxman, 2001). A systematic review is conducted in phases. Conducting a review involves identifying relevant research, selecting the studies, and undertaking a quality assessment of the papers, data extraction and analysis. As noted by Dezi et al. (2018), choosing keywords is fundamental to a paper and gives a clear idea of the state of academic study on the topic under systematic review. The first stage is planning the review, and includes identifying the need for a review, preparing the proposal, and developing a review protocol. Table 1 describes the SLR process, and explains the data collection process (Moher et al., 2009)[4]. I use the method created by Vyas et al. (2012) to select keywords from databases, specific subject terms, and related keywords, and produce an initial list of articles for more detailed scrutiny. The terms that are used to find relevant academic papers are mergers*, acquisitions*, media*, M&A*, and finance*. These relatively broad terms are chosen to identify as many potentially relevant research papers as possible within the initial search results. Next, the analysis continues with searching for articles and research papers in Google Scholar, Scopus, Web of Science, Science Direct. The papers are analyzed, and the titles and abstracts of each paper are examined. Titles and abstract are chosen as a method to confirm the suitability of the review (Creevey et al., 2022). After reading the titles and abstracts, suitable papers were collected for this paper from the steam of literature, and eventually analyzed in light of the aim of this research (Thorpe et al., 2005).

[Insert Table 1.]

Next, following the three steps of Durand et al. (2008) to frame the literature search, I check for any kinds of forms, references, and search for citations in the aimed literature (Eduardsen

[4] Data used in this paper can be made available upon request to the corresponding author.

& Marinova, 2020). These papers are at the center of this research, and the collected papers have all cited them. I particularly search for any available literatures on the topic of the role of the media in mergers and acquisitions and identify the four most cited papers as the core of the research. The bibliometrics approach is applied, and bibliographic couplings are found which reduces the number of relevant papers (Kessler, 1963; Osareh, 1996). Align with bibliometrics approach, the citation analysis is applied by identifying four relevant papers (with recent, higher rates of citation and greater relevance to the aim of this paper). Furthermore, parallel with the bibliometric approach (Bahoo et al., 2019, 2020; Chabowski et al., 2013; Naatu & Alon, 2019), I check for bibliographic couplings to retain only papers which cited the core papers (Kessler, 1963; Osareh, 1996). Eventually, the collected papers at the center of this research have all cited the four key papers. Using a clustering approach for topic filtering (Weißer et al., 2020), I create two forms of figures to present the relationship between research papers. Figure 2 presents the present the clustered index in which research paper records are physically reordered to match the index. The order of the demonstration of papers are clockwise starting from earlier papers to the latest in each cluster. The first cluster is related to the paper (Hayward & Hambrick, 1997) with 5 papers in subgroup and represents papers in 90s from 1996 to 1999. The second cluster belongs to (Vaara et al., 2005) with 9 papers in subgroup and represents papers in half of the noughties meaning from 2000 to 2005. The third cluster is related to (Vaara & Monin, 2010) with 11 papers in its subgroup and represents second half of noughties meaning from 2006 to 2010. Another cluster belongs to Ahern & Sosyura, (2014) with 29 papers in subgroup and represents papers from 2011 until 2022. There are 3 papers with one subgroup belong to this group too. Finally, there a fourth group which is miscellaneous and has 5 papers in its subgroup. To make sure that our selected data is robust, I have used method of topic filtering (Weißer et al., 2020) and check if our data is correctly selected. In addition, we add robust cluster to our table to prove that we have accurate data gathered. Figure 3 presents a non-clustered index which is special type of index in which logical order of index does not match physical stored order of the rows on data of systematic literature review. As the figure indicates, the most connected recent paper is Liao et al., (2019) and the earliest date that the clustering started was from 2014. This means that before 2014, the research papers are not connected with each other and the results in not included in the paper.

[Insert Figure 2.]

[Insert Figure 3.]

According to Thorpe, Holt, Macpherson and Pittaway (2005), the analytical stages that describe the methodology of a SLR can be implemented in studies to obtain different outcomes from every stage of the research. I undertake a bibliometric analysis in SLR to identify the various changes in the given topics (Apriliyanti & Alon, 2017), and I use this analysis to assess the data using multiple qualitative and quantitative methodologies. Further filters, these categorizations (below) are used to identify relevant academic journals, their research designs, the methodologies of the papers and the years of publication. Three main methodological approaches emerged from the journals (Baccarani & Bonfanti, 2016), as below:

- Qualitative desk research[5] (Dezi et al., 2018)
- Empirical quantitative research (Survey) (Dezi et al., 2018)
- Empirical qualitative research[6] (Dezi et al., 2018)
- Empirical qualitative and quantitative research

Multilevel analysis is recognized as one of the most important approaches to a literature review (Hutzschenreuter et al., 2020). These levels are defined in Table 2, which describes the research design of the papers by placing the papers in four categories: empirical quantitative research, qualitative desk research, empirical qualitative research, and empirical quantitative and qualitative research. The total number of empirical quantitative research is 44%, desk qualitative research 2%, empirical qualitative research is 48% and the combination of empirical qualitative and quantitative research is 6%. This indicates that most of the papers with focused on media and corporate finance have been studied qualitatively.

[Insert Table 2.]

Furthermore, the distribution technique by Pisani et al., (2017) study is used to present the paper ranking by journals in **Appendix A,** by the number of citation of the papers in each journal and the percentage of the papers in total. The number of citations is until 03 March 2022 from google scholar. According to **Appendix A**, the journals that published the most relevant papers

[5] Theoretical Papers and Literature Papers are included.
[6] Case studies and Multiple case studies are included.

are *Journal of Finance, Academy of Management Review, Asia-Pacific Journal of Financial Studies, British Journal of Management, Journal of Management Studies, Journal of Media Economics, Strategic Management Journal, Federal Communication Law Journal*, and *Organization Science.*

[Insert Table 3.]

Table 3 shows the distribution of media coverage throughout the selected papers. The distribution of types of media in the selected research articles are sorted as "Multi-Media", "Television Channels", "Publication", "Broadcasting Media", "Media Firms", "Magazine", "Social Media" "Newspapers" and "Telecommunication". Moreover, the sample period of each research article has been identified in the table as well.

[Insert Table 4.]

Table 4 indicates the publication distribution of papers from 1996 till 2022. Publication table refers to the number of publications categorized by the subjects and sorted by the date of publication. The categorization includes papers with explicitly refer to M&As and Media, implicitly refer to M&As and Media, explicitly refer to Media, explicitly refer to M&As, implicitly refer to post-Merger, implicitly refer to method of payment (MOP), implicitly refer to Premium and papers that implicitly refer to time of completion (TOC). The highest number of papers with subject of media and M&A belongs to year 2019, 2017 with 6 publications each and 2010, 2017 and 2020 with 5 each are the top published papers.

Table 5 gives an overview of 26 research papers out of 66 with a quantitative research methodology. The table is sorted by sample period, sample size, dependent variable(s), key independent variable and data sources (Barkema & Schijven, 2008; Gervasi et al., 2021; Martynova & Renneboog, 2008; Slangen & Hennart, 2007). Most of the papers were conducted using the qualitative method, but those with a quantitative methodology were collected here to examine the specifics of each corporate takeover. Three papers out of 18 focus on media and finance. There are nine papers with media coverage as the dependent variable and eight papers with media as the independent variable.

[Insert Table 5.]

4.2. Quality assessment criteria (QAC)

In this section, I assess 66 papers by focusing on the quality of their studies. Quality assessment is used to evaluate the findings of gathered literatures and see how the quality of these papers could affect the general concept of this study. I developed the quality assessment criteria below to evaluate the selected papers:

- Q1: Does the research topic addressed pertain to mergers and acquisitions?
- Q2: Does the research adequately describe the methodology? (Ain et al., 2019). The methodology used in a study ought to be described with enough detail to permit replication. The study must thus include the database, item search, keywords, and theories.
- Q3: Is the research question/hypothesis clearly stated? The research question or hypothesis should be clearly explained and the literature on which they are based must also be first described. [The research question does not need to follow the PICOC (Ogilvie et al., 2005) format approach: Population, Interventions, Comparisons, Outcome and Context].
- Q4: Was selection bias avoided (Heckman, 1979)?
- Q5: Is the stated conclusion supported by the data?

The conclusion drawn by the authors should support the analyses and data in the SR. The rating for this study and the assessment of the quality are characterized as "High" if the criteria are satisfactory, "Medium" if the criteria are partially satisfactory and "Low" if the criteria in the study are unsatisfactory. Five criteria were chosen for rating in this study, with the highest rate of 1 and lowest rate as 0. In this coding system "High" means >3, "Medium means equal to or <3 and >1, and "Low" equal to or < 1 for the rate (Ain et al., 2019; Ogilvie et al., 2005). The results of the quality assessment criteria (QAC) for 66 papers are below, which indicated 43 papers with rates of more than 3.5 and higher, 16 papers <3 and >1, and three <1. The results show that there are total number of 39 research papers have high quality, medium quality of 16 and 3 for low quality research papers.

[Insert Table 6.]

5. *Appraisal of the status quo*

This study demonstrates the status quo[7] in the assessment of the literature and tries to elucidate the link between media coverage and M&A outcomes. It synthesizes the current body of research on the media in M&A by presenting the results of the systematic reviews, with a focus on the role of the media and how this role affects the field of finance, in general, and M&As. As explained in Section 3, the SLR approach allows journals and publications to be sampled in a systematic way (Dezi et al., 2018). It also helps to achieve the goals of replicable, scientific and transparent research (Cook, Mulrow, Haynes, & Mcmaster, 1997). I first focus on the three aspects of M&As (method of payment, premiums, and time of completion) and analyze the effect of the media on these aspects and in the next phase, I analyze the effect that media coverage on the success of M&As at the pre-merger, interim, and post-merger stages. This table demonstrates the names of author/s and year of publication, the type of research paper (whether is empirical qualitative, quantitative, or multiple case study), identify which paper is included inro 4 categories of MOP, premium, TOC and post-merger, and associated examination of each paper by quoting the findings of the research paper from its abstract.

[Insert Table 7.]

6. *Conclusion, limitations, and future research*

6.1. Conclusion

In recent years M&As have become a phenomenon through which managers can diversify and expand their businesses. This extensive literature review identifies that media can play a significant role in affecting various aspects of the takeover transaction (Carapeto et al., 2010; Shao, 2010; Tienari et al., 2003; Vaara & Monin, 2010). Although some insider information disclosed by the media may negatively affect the success of M&A transactions, media coverage often facilitates M&A transactions by providing important input for an informed acquisition decision. This systematic review contributes to the media and M&A deal literature in the following ways. First, the SLR identifies widely accepted research perspectives in the fields of media and M&As

[7] Appraising the status quo defines as examining a social phenomenon (i.e., existing state of affairs) regarding the relationship between media coverage and a takeover in a specific context.

(Y. Chen et al., 2020; Y. Chung & Kim, 2019; Liao et al., 2021; Vaara & Monin, 2010). Second, this paper highlights the relationship between media and takeover content from different perspectives (Evens & Donders, 2015; Greco, 1996; Jeziorski, 2012; Mehrotra & Sahay, 2018). Using bibliometric analysis, this review investigates the role of media coverage in acquisition and through three dimensions of takeover (i.e., pre-acquisition, interim, and post-merger phase); and identifying three main distinctions emerging from M&A literature (Method of payment, premium and time of completion); this research analyzes the direct and indirect influence of media through these dimensions.

Especially, this review focuses on two main questions: (i) The effect of media coverage on method of payment, premium and time of completion in pre-interim phase of meso level of our conceptual framework; (ii) the effect of media coverage on success/failure in post-merger of meso level of aforementioned framework. Furthermore, it has been noted that these questions can be addressed by simultaneously considering all three dimensions of acquisitions and not one per time. The general conclusion from looking media in takeover content shows that despite an extensive body of literature, this study has but scratched the surface of this problem domain. There are various aspects that media coverage affects to, however, the findings of this review only support the ones which specifically focus on media in merger content. The findings encourage future researchers to test theoretical assertions empirically. The effect the media has on the success of M&A remains an open question. Future research should direct its attention to this research question. This systematic literature review is a first attempt to lead future research towards a consensus about the role of the media in corporate takeover.

6.2. Limitations

This study adopts a rigorous protocol in the selection of papers, this research presents some limitations. Although it is a comprehensive attempt to define a systematic review on information disseminated from media, this review does not investigate the information asymmetry in depth. The reason would be that since looking through information asymmetry requires different type of investigation; merging two perspectives on same idea (information asymmetry) seems obstructive. That is to say, the current research only implicitly studies some aspects of information asymmetry in the whole merger process. Another obvious limitation of this research is that the data is perceptual and subjective at the level of the media. The use of different words and phrases in each paper also creates different meanings, and eventually outcomes. I have tried to find the best

possible definition for all words and relate them to the research question. All things considered, this current investigation studies the general perception of the media, and does not interpret the reliability or unreliability, truth or dishonesty, or accuracy or inaccuracy of the media itself. In such circumstances, the outcome of the research may differ from the current results.

6.3. The agenda for future research

This investigation sheds light on the significant role played by the media in various aspects of takeover transactions, where it synthesizes findings from different research in M&A, finance, and related fields in the pre-acquisition, interim and post-merger periods. The future research agenda suggested by this paper will improve the literature on mergers and acquisitions and determine the factors that can affect takeover transactions. It is especially important to study the interrelationships between the different types of media coverage and the methods of payment, premium and time of completion. The causal relationships between the media and caproate takeover phases could also be examined. Once the connection between the media and various facets of takeover is discovered, the dynamics between these two factors shall be studies more in-depth. The current findings have important implications for practitioners, scholars, and the owners of the companies and I particularly believe that valuable contributions might come from an investigation of specific types of media coverage in various aspects of M&A transactions.

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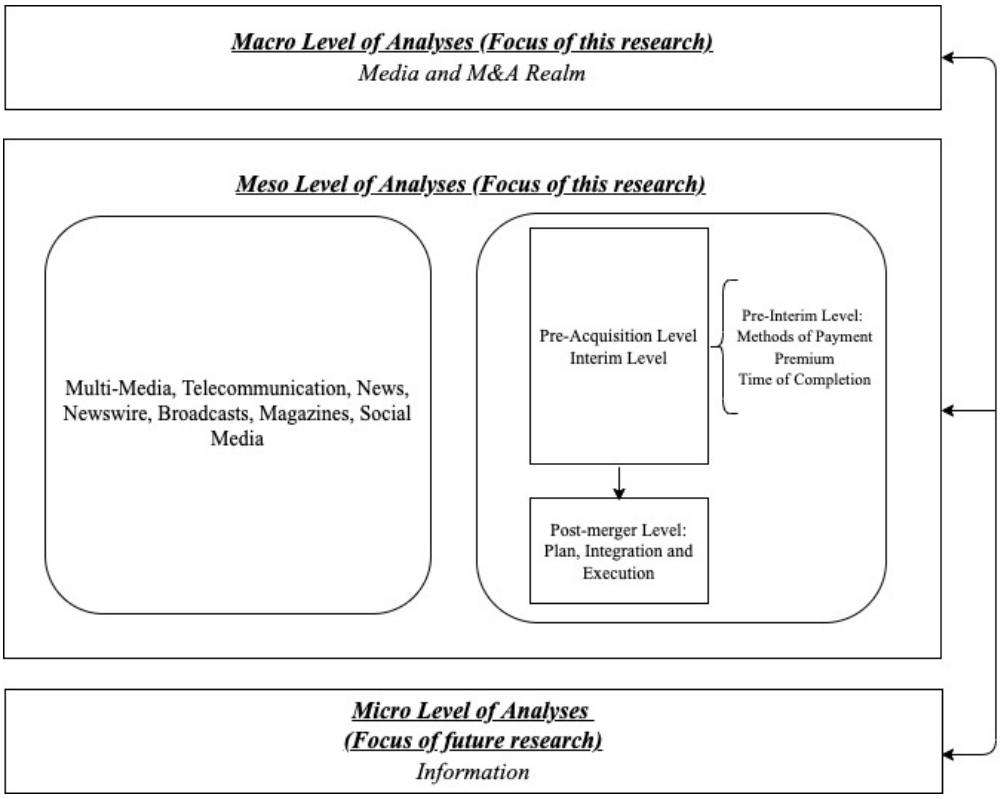
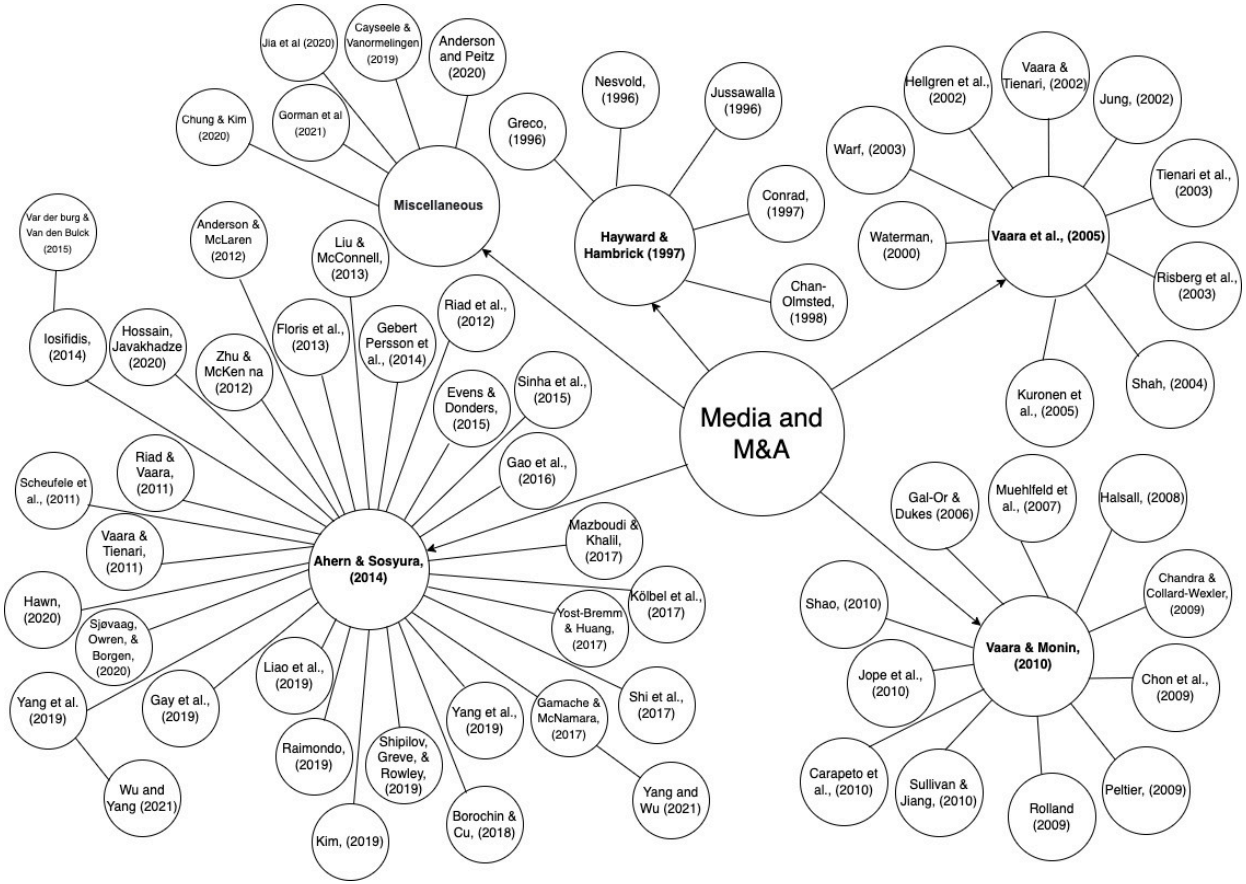
Figures

Figure 1. Conceptual framework



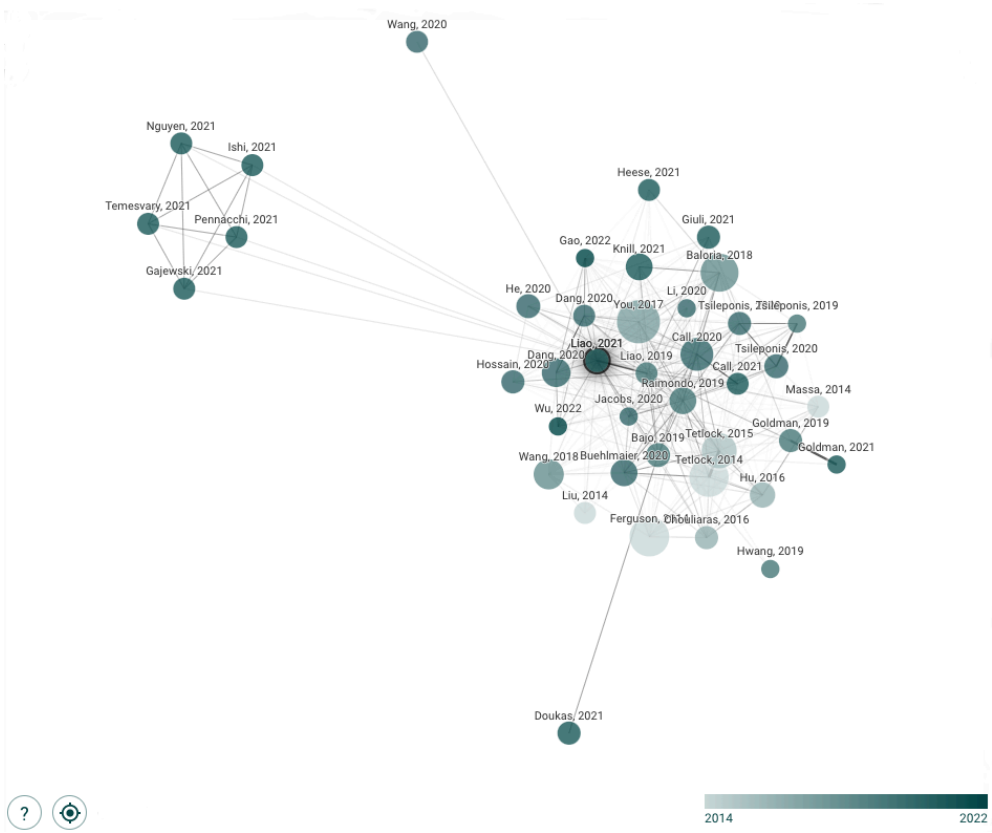
Note: Figure 1 presents conceptual framework selection process building on different themes that are identified in previous sections. This model provides a basis for the understanding of the potential causal factors underpinning the findings and results regarding the media and M&A analytics in the literature. The figure is included three levels of macro, meso and micro of this research. The macro level of analyses is divided in to two realms of media and M&A. The meso level in M&A reveal three levels of M&A including pre, interim and post-merger. As both pre and interim levels are too close to each other, I identify them as one level of pre-interim level. At post-merger, I check if the selected papers have one of the plan, integration, and execution of post-merger level of M&A. In meso level of media, I name various sources that are disseminating information. The micro level for both realms include information as symmetric and asymmetric information in the deal have impact in the outcome of merger deal.

Figure 2. Clustered index



Note: Figure 2 presents the present the clustered index in which research paper records are physically reordered to match the index. The order of the demonstration of papers are clockwise starting from earlier papers to the latest in each cluster. The first cluster is related to the paper Hayward & Hambrick, (1997) with 5 papers in subgroup and represents papers in 90s from 1996 to 1999. The second cluster belongs to Vaara et al., (2005) with 9 papers in subgroup and represents papers in half of the noughties meaning from 2000 to 2005. The third cluster is related to Vaara & Monin, (2010) with 11 papers in its subgroup and represents second half of noughties meaning from 2006 to 2010. Another cluster belongs to Ahern & Sosyura, (2014) with 29 papers in subgroup and represents papers from 2011 until 2022. There are 3 papers with one subgroup belong to this group too. Finally, there a fourth group which is miscellaneous and has 5 papers in its subgroup.

Figure 3. Non-Clustered index



Note: Figure 3 presents a special type of index in which logical order of index does not match physical stored order of the rows on data of systematic literature review. As the figure indicates, the most connected recent paper is Liao et al. 2021 and the earliest date that the clustering started was from 2014. This means that before 2014, the research papers are not connected with each other and the results in not included in the paper. https://www.connectedpapers.com/

Tables

Table 1. Systematic literature review of this study

PLACE FOR SEARCH	***DETAILS AND CHECKLIST***
SELECTION OF DOCUMENT TYPES	Academic journals with open access to download
SELECTION OF DATABASES	Google Scholars, Scopus, Web of Science, Science Direct
KEYWORDS	The keywords included in title and abstracts of the articles are *"mergers and acquisitions and media", "media coverage and M&As", "M&As and Media", "Media and Acquisitions", "Media and methods of payment in M&As", "Media and premium in M&As", "Media and time of completion in M&As", "Media coverage and time of negotiation in M&As", "Media in corporate takeover" , "Media coverage and post-merger", "Media and post-merger", "Media and pre-acquisitions"*
TITLE	Identify papers as for systematic review
ABSTRACT	Structured summary and study appraisal and synthesis methods and systematic review
CATEGORIES FOR RESEARCH	Journals, Research designs and methodology, years of publication.
OUTCOMES OF RESEARCH	Selection 68 journals from 1996 to 2022 (03 March)- Identification of the M&As and media/ identification of theoretical implications

Table 2: Research design with expletory method

RESEARCH DESIGN	***No. of papers***	***(%)***
EMPIRICAL QUANTITATIVE RESEARCH	29	44%
DESK QUALITATIVE RESEARCH	1	2%
EMPIRICAL QUALITATIVE RESEARCH	32	48%
EMPIRICAL QUALITATIVE AND QUANTITATIVE RESEARCH	4	6%
TOTAL	66	100%

Table 3. Distribution of the media from Jan 1996-March 2022

NAME OF PAPER	TYPE OF MEDIA COVERAGE	PERIOD
GRECO (1996)	Multi-Media	1990-1995
NESVOLD (1996)	Multi-Media	1995
JUSSAWALLA (1996)	Television Channels	1993-1996
HAYWARD & HAMBRICK (1997)	Publications	1989-1992
CONRAD (1997)	Broadcasting Media	1992-1996
CHAN-OLMSTED, (1998)	Multi-Media	1991-1996
WATERMAN (2000)	Broadcasting Media	1999
HELLGREN ET AL. (2002)	Newspaper	1995-2000
VAARA & TIENARI (2002)	Newspaper, Magazine	1996-1997
JUNG (2002)	Multi-Media	Various
TIENARI, VAARA, & BJÖRKMAN (2003)	Newspapers/Magazines	1980-2000
WARF (2003)	Telecommunications	1999
RISBERG, TIENARI, & VAARA (2003)	Newspaper	1997
SHAH (2004)	Multi-Media	1997-2004
VAARA, TIENARI, PIEKKARI, & SÄNTTI (2005)	Newspapers/Magazines	1997-2002
GAL-OR & DUKES (2006)	Multi-Media	1996-2000
KURONEN, TIENARI, & VAARA (2005)	Newspaper, Magazine	Various
MUEHLFELD ET AL., (2007)	Newspaper	1981-2000
HALSALL (2008)	Newspapers/Magazines	2000
CHANDRA & COLLARD-WEXLER (2009)	Newspaper	1990
CHON, CHOI, BARNETT, DANOWSKI, & JOO (2009)	Multi-Media	1996
PELTIER (2009)	Media firms	1998-1999
ROLLAND (2009)	Multi-Media	Various
SULLIVAN & JIANG (2010)	Media firms	Various
VAARA & MONIN (2010)	Multi-Media	Various
CARAPETO ET AL. (2010)	Multi-Media	1984-2009
JOPE ET AL. (2010)	Multi-Media	1980-2006
SHAO (2010)	Media firms	2000-2007
VAARA & TIENARI (2011)	Media Materials	1999-2001
SCHEUFELE ET AL. (2011)	Newspapers/Magazines	2005
RIAD & VAARA (2011)	Newspaper	Various
RIAD, VAARA, & ZHANG (2012)	Newspaper	Various
ZHU & MCKENNA (2012)	Newspaper	2002-2006
ANDERSON & MCLAREN (2012)	Multi-Media	Various
JEZIORSKI (2012)	Radio	1996-2006
FLORIS, GRANT, & CUTCHER (2013)	Newspaper	2007-2008

NAME OF PAPER	TYPE OF MEDIA COVERAGE	PERIOD
LIU & MCCONNELL (2013)	Newspaper	1990-2010
AHERN & SOSYURA (2014)	Newspaper	2000-2008
GEBERT PERSSON, LUNDBERG, & ELBE (2014)	Newspaper	Various
IOSIFIDIS (2014)	Multi-Media	Various
VAR DER BURG & VAN DEN BULCK (2015)	Newspaper	1993-2013
EVENS & DONDERS (2015)	Telecommunications	Various
SINHA, DAELLENBACH, & BEDNAREK (2015)	Newspaper	2001
MAZBOUDI & KHALIL, (2017)	Social Media	2009
KÖLBEL ET AL. (2017)	Newspaper	2008-2013
YOST-BREMM & HUANG (2017)	Newspaper	2011-2013
GAMACHE & MCNAMARA (2017)	Newspapers/Magazines	2006-2011
(BOROCHIN & CU, 2018)	Newspaper	2000-2012
YANG ET AL. (2018)	Newspaper	2000-2015
CAYSEELE AND VANORMELINGEN (2019)	Newspaper	1994-2005
SHIPILOV ET AL. (2019)	Newspaper	2004-2009
KIM (2019)	Newspaper	2000-2014
RAIMONDO (2019)	Multi-Media	Various
GAY, KE, QIU, & QU (2019)	Social Media	2012
ANDERSON AND PEITZ (2020)	Newspaper, Magazine	Various
SJØVAAG, OWREN, & BORGEN, (2020)	Newspaper	2019
HAWN, (2020)	Newspaper	1990-2011
HOSSAIN, JAVAKHADZE (2020)	Media & Entertainment, Books, Radio, TV	2000-2016
JIA ET AL (2020)	Newswires, Multi-media	2009-2014
CHUNG & KIM (2020)	Social Media	Various
YANG AND WU (2021)	Newspaper	2008-2018
IVALDI AND ZHANG (2021)	Television	2008-2010
BUEHLMAIER AND ZECHNER (2021)	Press or newswire article	1999-2009
WU AND YANG (2021)	Newspaper	2008-2018
GORMAN ET AL (2021)	Newspaper	1996-2004
LIAO, WANG, & WU (2019)	Newspaper	2000-2015

Table 4. Publication distribution from 1996-2022 [9]

Years	*1996*	*1997*	*1998*	*2000*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*
Articles that explicitly study M&As/MC	2	2	1	1	4	3	1	2	1	1	1	4	5	3	4	2	4	3	0	5	1	6	5	4
Articles that implicitly study M&As/MC	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	1	2	1	1	2	1	1	2	0
Articles that explicitly study MC	0	0	0	0	1	0	0	1	0	0	0	1	1	0	0	1	1	0	1	0	2	1	1	0
Articles that explicitly study M&As	1	0	0	0	1	0	0	0	0	1	0	0	3	1	1	1	1	1	0	0	0	0	0	0
Articles that implicitly study post-Merger	0	0	0	0	0	0	0	1	0	1	1	1	1	1	0	1	0	1	0	3	0	0	0	0
Articles that implicitly study MOP	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	1	0	1	1
Articles that implicitly study Premium	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
Articles that implicitly study TOC	1	1	0	0	0	0	0	0	1	0	0	1	1	0	1	0	1	0	0	1	0	0	0	0

[9] Publication table refers to the number of publications categorized by the subjects of each paper and sorted by the date of publication.

Table 5. Summary of quantitative papers

STUDY	SAMPLE PERIOD	SAMPLE SIZE	DV	KEY IV (S)	DATA SOURCE
HAYWARD & HAMBRICK (1997)	1989-1992	53	Acquisition premiums, Firm Performance	Recent acquiror performance, Media praise for the CEO	Securities Data Corporation's Mergers and Acquisitions database/ The Center for Research on Security Prices (CRSP) database/ Lexis/Nexis and ABI Inform databases.
JUNG (2002)	1984-1987-1990-1993	675	Media	Magazine	Time Inc.
CHANDRA & COLLARD-WEXLER, (2009)	1995-1996-1998-1999 & 2002	101	Newspapers	Number of newspapers from 1995	Editor & Publisher Magazine.
SHAO (2010)	2000-2007	292	Strategic choice made by the media firm	Product extension	Mergent Online/ Compustat/ Lexis/Nexis.
SCHEUFELE ET AL. (2011)	1.July to 31.Aug.2005	1.736	Media (Web, TV, Papers)	Stock price and trading values	FrankfurterAllgemeine Zeitungand Sueddeutsche Zeitung (Germany's four national quality papers)/ Onvista and Finanztreff (Germany's most frequently visited financial Web sites).
JEZIORSKI (2012)	1996-2006	1.449	Price Condition on Merger	Market Characteristics, Media Coverage	BIA Financial Network Inc.
AHERN & SOSYURA (2014)	2000-2008	1.000	Media Coverage	Stock Price	SDC database, SEC filing.
KÖLBEL ET AL. (2015)	2008-2013	969	Media Coverage	CSR Coverage	Swiss company RepRisk AG.
VAR DER BURG & VAN DEN BULCK (2015)	1993-2013	1.048	Justification, Actor & Sponsor	Media Merger	Flemish and Dutch NCAs, (online) newspapers, excluding books and magazines, and audio-visual media.
MAZBOUDI & KHALIL (2017)	2009	274	Twitter	Size, Hightech	Thomson One database/ S&P 1500.

GAMACHE & MCNAMARA (2017)	2006-2011	747	Negative Media Reactions	Subsequent Acquisition Spending	Compustat and the Compustat Segments / SDC Mergers and Acquisitions / Buckmaster/ Mergent / ABI/Inform/ Google/ Eventus/ Center for Research in Securities Pricing (CRSP)/ Factiva.
BOROCHIN & CU (2018)	2000-2012	797	Negative Media Tone	Negativity stock	SDC Platinum Merger and Acquisition Database/ Shanghai and Shenzhen Stock Exchanges/ Accounting Research (CSMAR) database/ Sina and Sohu microblogs.
YOST-BREMM & HUANG (2018)	2011-2013	1331	Merger	Financial Media	CRSP-Compustat/ Bloomberg covered.
CAYSEELE & VANORMELINGE N (2019)	1994-2005	100.325	Reader Demand, Ad Demand	Cover Price	Belgian Newspaper Publishers (BVDU).
YANG ET AL. (2019)	2000-2015	288	Media Coverage Media Pessimism	Takeover announcement/ premium	SDC Mergers & Acquisitions/ Dow Jones' Factiva / CRSP / Compustat.
SHIPILOV ET AL. (2019)	2004-2006 & 2007-2009	62	Firm adoption of governance practices/ Logic of board reform	Media coverage	Clarkson Centre's Board Shareholder Confidence Index/ Compustat/ Thomson One Banker/ and Bloomberg/ Globe and Mail and National Post newspapers from Canada.
KIM (2019)	2000-2014	1.207	Prob (Abandonment)	Level of societal trust, the magnitude of concern for shareholder maximization, and the status of local media freedom	Thomson OneBanker/ Factiva.
GAY ET AL. (2019)	2012	47	Big five personality factors (Extravert, Conscientious, Neurotism, Agree, Open)	Merger, Merger type, CAR	Securities Data Company's (SDC) Mergers and Acquisitions database/ Twitter/ Weibo.
HAWN (2020)	1990-2011	4	Completion and Duration of deal	Media coverage	S&P Capital IQ/ Compustat, Lexis-Nexis, Zephyr, RepRisk, Thomson Reuters Asset4.

HOSSAIN, JAVAKHADZE (2020)	2000-2016	937	Announcement Return, Premium, Post-merger Operating Performance	Media coverage	SDC Mergers & Acquisitions database/ Boardex data for director networks and employment data/ CRSP/ Compustat.
JIA ET AL (2020)	2009-2014	590	Tweet-Rumor	Asset,MTB, R&D	RavenPack News Analytics (Dow Jones Edition and Web Edition)
YANG & WU (2021)	2008-2018	1.321	Non-SOE acquirers	Positive Stock, State Positive Stock, Market Positive Stock	Zephyr Database, China Stock Market and Accounting Research (CSMAR) Database
BUEHLMAIER & ZECHNER (2021)	1999-2009	1.107	Merger Arbitrage Returns	Merger Completion	SDC Mergers & Acquisitions database/ Factiva/ CRSP/ Compustat.
WU AND YANG (2021)	2008-2018	1.487	CAR, Announced M&A Deal	Media coverage	Shanghai Stock Exchange (SHSE), Shenzhen Stock Exchange (SZSE), Bureau Van Dijk (Zephyr), China Stock Market & Accounting Research Database (CSMAR)
GORMAN ET AL (2021)	1996-2004	350	DailyTradingVolume, Media Coverage	Target Size, MTB	
LIAO ET AL. (2021)	2000-2015	174.179	Deal Premium, cross border, D acquirer	Media Sentiment (Non-MA), MTB, ROA, Leverage	Security Data Corporation's (SDC) Mergers and Corporate Transactions

Table 6. Quality Assessment Criteria

PAPER	QC1	QC2	QC3	QC4	QC5	TOTAL	RESULTS
P1	1	0	0	0,5	1	2,5	Medium
P2	1	1	0,5	1	0,5	4	High
P3	1	0	0	0	0	1	Low
P4	1	1	1	0,5	0,5	4	High
P5	1	1	0,5	1	1	4,5	High
P6	1	1	0	1	1	4	High
P7	1	1	0,5	1	0,5	4	High
P8	1	1	0	0,5	1	3,5	High
P9	0	1	1	0	1	3	Medium
P10	1	0,5	0,5	0,5	1	3,5	High
P11	1	0	0	0	0	1	Low
P12	0	1	0,5	0,5	0,5	2,5	Medium
P13	1	1	1	0.5	1	4	High
P14	1	1	0,5	0,5	1	4	High
P15	1	1	1	1	1	5	High
P16	0	1	1	0,5	1	3,5	High
P17	1	1	0,5	0,5	0,5	3,5	High
P18	0	1	0,5	0,5	1	3	Medium
P19	0	1	0,5	1	1	3,5	High
P20	1	1	1	1	1	5	High
P21	1	0,5	1	0	0,5	3	Medium
P22	1	1	1	0,5	0,5	4	High
P23	1	1	1	0,5	1	4,5	High
P24	1	1	0,5	0,5	1	4	High
P25	1	1	1	0	0,5	3,5	High
P26	0	1	1	1	1	4	High
P27	1	1	0,5	0,5	1	4	High
P28	0	1	1	0	1	3	Medium
P29	1	1	1	0	1	4	High
P30	0	1	0,5	0,5	1	3	Medium
P31	1	1	0,5	0	1	3,5	High
P32	1	1	1	0,5	1	4,5	High
P33	1	0,5	1	0	0,5	3	Medium
P34	0	1	0.5	0,5	1	2,5	Medium
P35	1	1	1	1	1	5	High

PAPER	QC1	QC2	QC3	QC4	QC5	TOTAL	RESULTS
P36	1	1	1	0,5	1	4,5	High
P37	1	1	1	0	1	4	High
P38	1	1	1	0,5	1	4,5	High
P39	0	1	0,5	0,5	1	3	Medium
P40	1	1	0,5	0,5	1	4	High
P41	1	1	1	0.5	1	4,5	High
P42	0	1	0,5	0	0,5	2	Medium
P43	0	1	1	0,5	0,5	3	Medium
P44	1	1	1	1	1	5	High
P45	1	1	1	0,5	1	4,5	High
P46	0	0,5	0	0	0	0,5	Low
P47	0	1	1	0,5	1	3,5	High
P48	1	1	1	1	1	5	High
P49	1	1	1	0,5	1	4,5	High
P50	1	1	1	0	1	4	High
P51	1	1	1	0,5	0,5	4	High
P52	1	1	1	0,5	1	4,5	High
P53	1	0,5	1	0	1	3,5	High
P54	0	0,5	0,5	0	0,5	1,5	Medium
P55	0	1	1	0,5	1	3,5	High
P56	0	1	1	1	1	4	High
P57	0	1	1	0	1	3	Medium
P58	1	1	1	0,5	1	4,5	High
P59	1	1	1	0	1	4	High
P60	1	0,5	1	0	1	3,5	High
P61	1	0,5	1	0	1	3,5	High
P62	1	1	1	0,5	1	4,5	High
P63	1	1	1	0,5	1	4,5	High
P64	1	1	1	0,5	1	4,5	High
P65	1	0,5	0,5	0,5	0,5	3	Medium
P66	1	0,5	1	0	0,5	3	Medium

Table 7. Main findings of the literature (Status quo)

NO.	AUTHORS (YEARS)	METHODOLOGY	PRE-INTERIM & POST MERGER (PREMIUM, MOP, TOC)	M&A, FINANCE AND MEDIA COVERAGE (MC)	ASSOCIATED EXAMINATION
1	*Greco (1996)*	E. QUAL[10]		M&A & MC	This paper Investigates the governance in media and five pivotal developments.
2	*Nesvold (1996)*	E. QUAL /MCS[11]		M&A & MC	The author in this study suggest the Investigation on communication breakdown in media industry and relations with M&A procedure.
3	*Jussawalla (1996)*	E. QUAL		M&A & MC	This paper argues that it is up to the viewers to make the television revolution succeed, and up to the programmers to reach and benefit all classes of society.
4	*Hayward & Hambrick (1997)*	E. QNT[12]	Premium		This study finds that four indicators of CEO hubris are highly associated with the size of premiums paid.
5	*Conrad (1997)*	E. QUAL		M&A & MC	"This paper studies the antitrust shift in media merger and suggest strong social and political implications if the mass media continues to become centralized.
6	*Chan-Olmsted, (1998)*	E. QUAL	TOC	M&A & MC	This study suggests that the international M & A transactions should pick up as more deregulatory policies such as the World Trade Organization's treaty on open telecommunications markets are implemented.
7	*Waterman, (2000)*	E. QUAL & E. QNT		M&A & MC	This paper studies the CBS-Viacom and the economic perspective in media merger.
8	*Hellgren et al. (2002)*	E. QUAL		M&A & MC	This study suggests suggest that the ability of different actors such as top managers, make use of different discursive strategies and resources in promoting their 'versions of reality' in the media (or public discussion) is a crucial avenue for research in this area.

[10] E. QUAL = Empirical Qualitative
[11] MSC= Multiple Case Study
[12] E.QNT= Empirical Quantitative

NO.	AUTHORS (YEARS)	METHODOLOGY	PRE-INTERIM & POST MERGER (PREMIUM, MOP, TOC)	M&A, FINANCE AND MEDIA COVERAGE (MC)	ASSOCIATED EXAMINATION
9	*Vaara & Tienari (2002)*	E. QUAL /MCS	TOC	M&A & MC	This article concentrate on the discursive construction of mergers and acquisitions in the media and suggests that rationalistic discources typically dominate discussions while the other discourses are subortinated to the rationalistic discursive practives.
10	*Jung (2002)*	E. QNT		M&A & MC	This study examined how magazines covered media companies' mergers and suggest that Favoring of parent companies for the focused subject and shows how merger is framed by newspapers.
11	*Tienari et al. (2003)*	E. QUAL		M&A & MC	The main contribution of this study lies in identifying how key actors draw on and mobilize rationalistic and nationalistic discourses in public discussion.
12	*Warf (2003)*	E. QUAL & E. QNT		M&A & MC	This paper reviews the number and size of mergers and acquisitions globally and suggests the impacts of this oligopolization on consumer prices, labor, equity of access to telecommunications services, and the political and cul- tural repercussions of increasingly concentrated ownership.
13	*Risberg et al. (2003)*	E. QUAL		M&A & MC	This paper suggests that the popular media can provide a significant arena for (re)constructing national identities and power in this kind of dramatic industrial restructuring and are an under-utilized source of empirical data in research studies."
14	*Shah (2004)*	D. QUAL		M&A & MC	Global conglomerates can at times have a progressive impact on culture, especially when they enter nations that had been tightly controlled by corrupt crony media systems or nations that had significant state censorship over media.
15	*Vaara et al. (2005)*	E. QUAL /MCS		M&A & MC	The finding of this study suggests how language skills become empowering or disempowering resources in organizational communication, how these skills are associated with professional competence, and how this leads to the creation of new social networks.
16	*Kuronen et al., (2005)*	E. QUAL /MCS			This paper outlines a methodological framework that combines three perspectives of text analysis and interpretation: critical discourse analysis, systemic functional grammar and rhetorical structure theory.
17	*Gal-Or & Dukes (2006)*	E. QNT	MOP	M&A & MC	The findings suggests higher levels of competition make media mergers more profitable.

NO.	AUTHORS (YEARS)	METHODOLOGY	PRE-INTERIM & POST MERGER (PREMIUM, MOP, TOC)	M&A, FINANCE AND MEDIA COVERAGE (MC)	ASSOCIATED EXAMINATION
18	*Muehlfeld et al., (2007)*	E. QUAL	TOC		The results show that although firm-level characteristics are relevant, transaction-specific and regulatory factors are even more important.
19	*Halsall (2008)*	E. QUAL /MCS		M&A & MC	The paper examines how cultural, economic and political discourses relating to globalization.
20	*Chandra & Collard-Wexler (2009)*	E. QNT		M&A & MC	The results suggest that greater concentration did not lead to higher prices for either newspaper subscribers or advertisers.
21	*Chon wt al. (2009)*	E. QUAL		M&A & MC	This article analyzes structural changes in the information industries including publishing, broadcasting, film, cable, telephony, software and data processing, and the Internet in the era of "convergence" before and after 1996.
22	*Peltier (2009)*	E. QUAL		M&A & MC	This paper studies the analysts and managers whom may claim M&A deals generate greater economic efficiency, especially through size effects and raises the issue of the economic rationality of such mergers.
23	*Rolland (2009)*	E. QUAL	TOC		This paper studies the takeover of British company Mecom on Norwegian Company Orkla Media and discusses the media management effects on this takeover.
24	*Sullivan & Jiang (2010)*	E. QUAL		M&A & MC	The research studies finds that how a firm conceptualizes the Internet relative to its existing business has a significant impact on M&A activity—and understanding investing in the Internet as being more about change than simply growth is key to success.
25	*Vaara & Monin (2010)*	E. QUAL /MCS	Post-Merger		This paper challenges the predominant view that legitimation is merely a specific phase in merger or acquisition pro- cesses and discusses a better understanding of postmerger organizational dynamics calls for conceptualization of discursive legitimation as an inherent part of unfolding merger processes
26	*Carapeto et al. (2010)*	E. QUAL /MCS		M&A & MC	"integrates management and finance theories to develop hypotheses on the role of business expectations as a predictor of merger and acquisition (M&A) activity."
27	*Jope et al. (2010)*	E. QUAL		M&A & MC	The result shows the changes in analyst expectations and management expectations have a positive significant power in predict changes in the number of M&As when are lagged by one quarter.

NO.	AUTHORS (YEARS)	METHODOLOGY	PRE-INTERIM & POST MERGER (PREMIUM, MOP, TOC)	M&A, FINANCE AND MEDIA COVERAGE (MC)	ASSOCIATED EXAMINATION
28	*Shao (2010)*	E. QNT		M&A & MC	This paper examined how media firms chose among acquisitions, equity alliances, and non-equity alliances when they decided to venture their digital business.
29	*Vaara & Tienari (2011)*	E. QUAL		M&A & MC	This paper contributes to discourse-cultural studies of organizations using media data by explaining how narrative constructions of identities and interests are used to legitimate or resist change.
30	*Scheufele et al. (2011)*	E. QUAL		Media & Finance	This article investigates the short-term relationship betweenmedia coverage, stock prices, and trading volumes ofeight listed German companies.
31	*Riad & Vaara (2011)*	E. QUAL /MCS		M&A & MC	The findings of this study show that national metonymy contributes to the construction of emotive frames, stereotypes, ideological differences, and threats.
32	*Riad et al. (2012)*	E. QUAL /MCS		M&A & MC	This study demonstrate the ways in which facets of international relations are produced in media accounts of this acquisition, and analyse the intertextual dynamics entwined with their production and elucidates the ways in which international M&As are immersed in a seascape of intertextual international relations.
33	*Zhu & McKenna (2012)*	E. QUAL		M&A & MC	This paper identifies political-ideological discourse as a prominent discourse in addition to the commonly acknowledged rationalistic and nationalistic discourseand finds that the use of legitimation strategies is purposive and deliberate.
34	*Anderson & McLaren (2012)*	E. QNT	MOP		This study presents an economic model of media bias and media mergers and suggests that while media bias may reduce the profit incentives to merge, media markets nonetheless err by being insufficiently competitive, and the consequences of merger are more severe than in other markets.
35	*Jeziorski (2012)*	E. QNT		M&A & MC	This article estimates fixed-cost efficiencies from mergers using a dynamic oligopoly model in which mergers and repositioning ofproducts are endogenous.

NO.	AUTHORS (YEARS)	METHODOLOGY	PRE-INTERIM & POST MERGER (PREMIUM, MOP, TOC)	M&A, FINANCE AND MEDIA COVERAGE (MC)	ASSOCIATED EXAMINATION
36	*Floris et al. (2013)*	E. QUAL /MCS		M&A & MC	This paper aim to obtain a comprehensive understanding of the role of discourse in relation to a strategic activity in case of merger which requires consideration of the multi-modal rhetorical strategies brought to bear by both external and internal actors
37	*Liu & McConnell (2013)*	E. QNT	MOP, Premium		The paper finds that, in deciding whether to abandon a value-reducing acquisition attempt, managers' sensitivity to the firm's stock price reaction at the announcement is influenced by the level and the tone of media attention to the proposed transaction.
38	*Ahern & Sosyura, (2014)*	E. QNT	MOP		The results suggests that the bidders in stock mergers originate substantially more news stories after the start of merger negotiations, but before the public announcement.
39	*Persson et al. (2014)*	E. QUAL /MCS		M&A & MC	A discourse analysis shows that the relationship development process is not only a matter of rational arguments. It is rather a struggle between actors drawing on discourses that change over time, as a means to affect perceptions of legitimate behaviours to reach the preferred outcome.
40	*Iosifidis (2014)*	E. QUAL		M&A & MC	This study Investigates the concentration of media ownership and merger media.
41	*Var der burg & Van den Bulck (2015)*	E. QNT		M&A & MC	The results suggest specific tests must review the impact of media mergers on political and socio-cultural welfare.
42	*Evens & Donders (2015)*	E. QUAL		M&A & MC	This study argues that while EU competition policy has difficulties to fully grasp anti-competitive effects resulting from vertical M&A activity in particular, industrial and media-specific policies dealing with the creation of an economically and culturally sustainable, European broadcasting and distribution sector are virtually absent from national and European policy agendas.
43	*Sinha et al. (2015)*	E. QUAL /MCS		M&A & MC	This study is based on the merger case using media data of Air New Zealand's trans-national acquisition of Ansett Australia where a delegitimizing event occurred at Ansett relatively early after the integration had started.

NO.	AUTHORS (YEARS)	METHODOLOGY	PRE-INTERIM & POST MERGER (PREMIUM, MOP, TOC)	M&A, FINANCE AND MEDIA COVERAGE (MC)	ASSOCIATED EXAMINATION
44	*Mazboudi & Khalil (2017)*	E. QNT	MOP		This study finds that the acquirer size is a main determinant of disclosing acquisition announcements on Twitter. Large acquirers announce their acquisitions on Twitter and, as a result, are able to attenuate the anticipated negative market reaction at acquisition announcement.
45	*Kölbel et al. (2017)*	E. QNT		M&A & MC	The authors find that firms receiving higher CSI coverage face higher financial risk and show that the reach ofthe reporting media outlet is a critical condition for this relationship.
46	*Yost-Bremm & Huang (2017)*	E. QNT		M&A & MC	The result suggest that financial media speculation can facilitate the release of useful private information to shareholders. However, significantly positive excess returns and volume in the few days prior to publication also suggests that certain shareholders may benefit disproportionately.
47	*Gamache & McNamara (2017)*	E. QNT			This paper argues that negative media reactions to the announcement of a major acquisition will shape the degree to which the firm will engage in subsequent acquisition activity and finds strong support for thier hypotheses.
48	*Borochin & Cu, (2018)*	E. QNT	Yes		"I identify this effect using an exogenous shock to market-driven governance from the Split-Share Structure Reform of 2007."
49	*Cayseele and Vanormelingen (2019)*	E. QNT		M&A & MC	This study suggests a limit impact of merger on reader and avdertiser welfare.
50	*Yang et al. (2019)*	E. QNT	MOP, Premium		The study finds that bidders with higher growth opportunities are less likely to use cash payments in acquisitions. This effect is stronger for financially constrained bidders, who face greater opportunity costs ofholding cash.
51	*Shipilov et al. (2019)*	E. QNT/MCS		Media & Finance	The authors find that both direct and indirect media coverage have a strong effect on firms' adoption of practices, either when the tone is positive or negative. The findings indicate that media coverage has broader and deeper effects on firms' actions than previously known.

NO.	AUTHORS (YEARS)	METHODOLOGY	PRE-INTERIM & POST MERGER (PREMIUM, MOP, TOC)	M&A, FINANCE AND MEDIA COVERAGE (MC)	ASSOCIATED EXAMINATION
52	*Kim (2019)*	E. QNT	MOP	M&A & MC	The author examines the cross-country variation in the effectiveness of the media's corporate governance role and finds this role to be more effective in countries with greater societal trust or concern for shareholder wealth maximization.
53	*Raimondo (2019)*	E. QUAL	MOP		This paper aims to present knowledge about the media's role in finance, calling on a large variety of research from the fields of finance, accounting, management, and economics.
54	*Gay et al. (2019)*	E. QNT		M&A & MC	The findings of this study show that CEOs' openness to experience, one of the Big Five personality traits, is positively associated with the likelihood of M&A initiations and the effect of openness to experience is stronger for diversifying M&As than for non-diversifying M&As.
55	*Anderson and Peitz (2020)*	E. QNT		M&A & MC	Studying the media platform, in presence of media are ad-financed and ads are a nuisance to consumers, merger decreases consumer surplus, but advertiser surplus tends to increase.
56	*Sjøvaag et al. (2020)*	E. QUAL		M&A & MC	The analysis reveals the precarity of independent ownership in digitizing news markets, to which corporatization emerges as a necessary and welcomed solution.
57	*Hawn (2020)*	E. QNT		M&A & MC	This study distinguishes the media coverage of CSR from CSI and suggests that managers should beware media coverage of CSI when acquiring abroad.
58	*Hossain, Javakhadze (2020)*	E. QNT	Premium		This study suggests that the media connectedness is associated with the higher bid announcement return, lower takeover premium, poorer post-merger operating performance, greater likelihood of deal closure, and greater acquisitiveness.
59	*Jia et al (2020)*	E. QNT		M&A & MC	They find that merger rumors accompanied by greater Twitter activity elicit greater immediate market reaction even though rumor-related Twitter activity is unrelated to the probability of merger realization.
60	*Yang and Wu (2021)*	E. QNT		M&A & MC	The authors suggest that the likelihood of abandoning a proposed M&A transaction is positively associated with negative media coverage, and this association is stronger with lower announcement abnormal returns. In addition, they demonstrate that the negative information effect is amplified for glamour acquirers.

NO.	AUTHORS (YEARS)	METHODOLOGY	PRE-INTERIM & POST MERGER (PREMIUM, MOP, TOC)	M&A, FINANCE AND MEDIA COVERAGE (MC)	ASSOCIATED EXAMINATION
61	*Chung & Kim (2020)*	E. QUAL & E. QNT		M&A & MC	The results of this study reveal that the evaluation of M&As has a positive relationship with perceived brand beliefs and luxury values, and consequently on brand loyalty. The moderating effect of luxury tier differences on the relationship between M&A evaluation and perceived values is stronger when the acquiring brand is from a lower luxury tier.
62	*Ivaldi and Zhang (2021)*	E. QNT		M&A & MC	The empirical analysis of media platforms, the results show that ignoring the existence of substitutes or complements on the advertising side would result in over- predicting the losses of the viewers' surplus and in underpredicting the gains in platforms' revenues.
63	*Buehlmaier and Zechner (2021)*	E. QNT		M&A & MC	The findings suggest that a one standard deviation increase in the media-implied probability of merger completion increases the subsequent 12-day return of a long-short merger strategy by 1.2 percentage points.
64	*Wu and Yang (2021)*	E. QNT		M&A & MC	The results of this study indicate that the media is biased, referring to impression migration from merger and acquisition experience.
65	*Gorman et al (2021)*	E. QNT	MOP		The result of this analysis suggests that media coverage is positively associated with target firms' trading activity and stock liquidity.
66	*Liao, Wang, & Wu (2021)*	E. QNT	MOP, Premium		This study suggests that firms with high media sentiment are more likely to become an acquirer and to pay a higher deal premium.

Appendix

Description of journals and number of citations of selected papers.

NO.	PAPERS	CITATION COUNTS (UNTIL 03/03/2022)	NAME OF JOURNAL	TOTAL %
1	Greco, (1996)	*32*	*Publishing Research Quarterly*	*0,42%*
2	Nesvold, (1996)	*38*	*Fordham Intellectual Property Journal*	*0,50%*
3	Jussawalla, (1996)	*5*	*Media Asia*	*0,07%*
4	Hayward & Hambrick, (1997)	*2368*	*Administrative science quarterly*	*31,33%*
5	Conrad, (1997)	*25*	*Federal Communication Law Journal*	*0,33%*
6	Chan-Olmsted, (1998)	*141*	*Journal of Media Economics*	*1,87%*
7	Waterman, (2000)	*41*	*Federal Communication Law Journal*	*0,54%*
9	Hellgren et al., (2002)	*151*	*British Journal of Management*	*2,00%*
10	Vaara & Tienari, (2002)	*272*	*Organization*	*3,60%*
11	Jung, (2002)	*31*	*Journalism & Mass Communication Quarterly*	*0,41%*
12	Tienari et al., (2003)	*124*	*Journal of Management Inquiry*	*1,64%*
8	Warf, (2003)	*80*	*Growth and Change*	*1,06%*
13	Risberg et al., (2003)	*102*	*Culture and Organization*	*1,35%*
14	Shah, (2004)	*66*	*Nation Magazine*	*0,87%*
15	Vaara et al., (2005)	*508*	*Journal of Management Studies*	*6,72%*
16	Kuronen et al., (2005)	*61*	*Organization*	*0,81%*
17	Gal-Or & Dukes, (2006)	*56*	*The Journal of Business*	*0,74%*
18	Muehlfeld et al., (2007)	*72*	*Journal of Media*	*0,95%*
19	Halsall, (2008)	*41*	*Organization*	*0,54%*
20	Chandra & Collard-Wexler, (2009)	*191*	*Journal of Economics and Management Strategy*	*2,53%*
21	Chon et al., (2009)	*164*	*Journal of Media Economics*	*2,17%*
22	Peltier, (2009)	*116*	*Journal of Media Economics*	*1,53%*
23	Rolland, (2009)	*16*	*The International Communication Gazette*	*0,21%*
24	Sullivan & Jiang, (2010)	*26*	*Journal of Media Business Studies*	*0,34%*
25	Vaara & Monin, (2010)	*410*	*Organization Science*	*5,42%*
26	Carapeto et al., (2010)	*2*	*Finance and Mergers & Acquisitions Research Centre Cass Business School*	*0,03%*
27	Jope et al., (2010)	*16*	*Journal of Telecommunications Management*	*0,21%*
28	Shao, (2010)	*17*	*Journal of Media Business Studies*	*0,22%*
29	Vaara & Tienari, (2011)	*380*	*Organization Science*	*5,03%*
30	Scheufele et al., (2011)	*57*	*Journal of Communication*	*0,75%*
31	Riad & Vaara, (2011)	*109*	*Journal of Management Studies*	*1,44%*
32	Riad et al., (2012)	*57*	*Organization Studies*	*0,75%*
33	Zhu & McKenna, (2012)	*36*	*Discourse & Society*	*0,48%*
34	Anderson & McLaren, (2012)	*257*	*Journal of the European Economic*	*3,40%*
35	Jeziorski, (2012)	*78*	*The RAND Journal of Economics*	*1,03%*
36	Floris et al., (2013)	*29*	*Journal of Management Studies*	*0,38%*

NO.	PAPERS	CITATION COUNTS (UNTIL 03/03/2022)	NAME OF JOURNAL	TOTAL %
37	Liu & McConnell, (2013)	*340*	*Journal of Financial Economics*	*4,50%*
38	Ahern & Sosyura, (2014)	*449*	*Journal of Finance*	*5,94%*
39	Gebert Persson et al., (2014)	*6*	*International Business Review*	*0,08%*
40	Iosifidis, (2014)	*15*	*The Palgrave Handbook of European Media Policy*	*0,20%*
41	Var der Burg & Van den Bulck, (2015)	*3*	*Information Economics and Policy*	*0,04%*
42	Evens & Donders, (2015)	*51*	*Telematics and Informatics*	*0,67%*
43	Sinha et al., (2015)	*23*	*Strategic Organization*	*0,30%*
44	Mazboudi & Khalil, (2017)	*22*	*Journal of Financial Stability*	*0,29%*
45	Kölbel et al., (2017)	*180*	*Strategic Management Journal*	*2,38%*
46	Yost-Bremm & Huang, (2017)	*1*	*Journal of Behavioral Finance*	*0,01%*
47	Gamache & McNamara, (2017)	*85*	*Academy of Management Journal*	*1,12%*
48	Borochin & Cu, (2018)	*29*	*Journal of Financial Stability*	*0,38%*
49	Cayseele and Vanormelingen, (2019)	*19*	*Review of Industrial Organization*	*0,25%*
50	Yang et al., (2019)	*12*	*Economic Modelling*	*0,16%*
51	Shipilov, Greve, & Rowley, (2019)	*18*	*Strategic Management Journal*	*0,24%*
52	Kim, (2019)	*3*	*Asia-Pacific Journal of Financial Studies*	*0,04%*
53	Raimondo, (2019)	*8*	*Asia-Pacific Journal of Financial Studies*	*0,11%*
54	Gay et al., (2019)	*2*	*SSRN Electronic Journal*	*0,03%*
55	Anderson and Peitz, (2020)	*30*	*Journal of Economic Theory*	*0,40%*
56	Sjøvaag, Owren, & Borgen, (2020)	*1*	*Journalism Practice*	*0,01%*
57	Hawn, (2020)	*22*	*Strategic Management Journal*	*0,29%*
58	*Hossain, Javakhadze, (2020)*	*5*	*Journal of Corporate Finance*	*0,07%*
59	*Jia et al., (2020)*	*20*	*Journal of Accounting and Economics*	*0,26%*
60	*Chung & Kim, (2020)*	*24*	*Journal of Business Research*	*0,32%*
61	*Yang and Wu, (2021)*	*0*	*Research in International Business and Finance*	*0,00%*
62	*Ivaldi and Zhang, (2021)*	*1*	*International Journal of Industrial Organization*	*0,01%*
63	*Buehlmaier and Zechner, (2021)*	*8*	*Review of Finance*	*0,11%*
64	*Wu and Yang, (2021)*	*0*	*Economic Research-Ekonomska Istraživanja*	*0,00%*
65	*Gorman et al., (2021)*	*0*	*The European Journal of Finance*	*0,00%*
66	Liao et al., (2019)	*7*	*Journal of International Financial Markets, Institutions and Money*	*0,09%*
TOTAL		*7559*		*100,00%*

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CHAPTER II.

No News is Good News!

Media Coverage and Corporate Takeover Characteristics

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Credit author statement

Narmin Nahidi: Methodology, Writing, Resources, Data curation, Software, Formal analysis, Conceptualization, Investigation, Funding acquisition, Project administration, Visualization, Writing - Original Draft, Writing - Review & Editing. **Stefan Hirth:** Validation, Writing - Review & Editing, Supervision, Funding acquisition.

No News is Good News!
Media Coverage and Corporate Takeover Characteristics

Abstract

The purpose of this study is to empirically examine the relationship between a target firm's media coverage (measured by level of media coverage, and positive and negative media coverage), and various takeover characteristics. We find that media coverage is negatively associated with the takeover premium. This holds for both positive and negative media coverage. No news is thus good news in terms of achieving a higher takeover premium. The method of payment demonstrates an ambiguous relationship with media coverage. All three measures of media coverage have a positive effect on the time of completion. Our findings are robust to additional control for alternative variable measurement as well as tests for endogeneity.

***Keywords*:** Mergers and Acquisitions; Media Coverage; Premium; Method of Payment; Time of Completion; Information Asymmetry.

***JEL Classifications*:** G34, G30, L82, D82

"The acquisition of information and its dissemination to other economic units are, as we all know, central activities in all areas of finance" Robert Merton

1. Introduction

Mergers and acquisitions (M&A)[1], takeovers, and buyouts are among the most important investment decisions that firms make during their business lifetimes. An extensive body of literature has examined takeovers from an asymmetric information point of view (Elnahas & Kim, 2017; Ismail & Krause, 2010; Mazboudi & Khalil, 2017). Media coverage is a notable factor in the decision-making process, particularly in markets with information frictions (Li et al., 2018;Yang et al., 2018). The success of a firm strongly depends on informed decisions (Adra & Barbopoulos, 2018). Media coverage has a key role to play in takeover decisions, most importantly to mitigate information asymmetry between the two sides of the acquisition deal (Dyck et al., 2008). Given the informative nature of the media, there is no doubt that the dissemination of information through the media can be an important tool with which to reduce information asymmetry for a broader audience, which in our case are the potential acquirers of a target firm.

A growing body of literature has studied how media coverage can decrease information asymmetry and affect various aspects of relevant markets, such as investment funds, pricing and stock returns (Fang & Peress, 2009; Tetlock, 2010, 2011). This supports the notion that the media might be a relevant tool on which investors can base their financial decisions. One concern about news-based information is that the media is a perceptual concept by its very nature (Tsfati & Cohen, 2013; Yang, Sun, Guo, et al., 2019). To address this concern, we look at media and its relation in takeover from information asymmetry perspective. We categorize media coverage as the level of media coverage, positive media coverage, and negative media coverage to examine the influence of perceived information from media into acquisition process. We define level of media coverage as a general perception from the media and whether if the information from media is positive or negative. We further define positive/negative (good or bad) news as information units that have positive or negative implications for the target (Bhattacharya et al., 2011).

In this study, we evaluate the extent to which different types of media sentiment purposively influence merger deals. In order to identify firms that have received incentives

[1] "Definition of M&A is 'the partial or full merger or acquisition of firms that are legally independent from each other'" (Arvanitis & Stucki, 2015). The analysis in this study is limited to the acquisitions of listed target firms. The terms 'acquisition' and 'M&A' therefore refer throughout this paper exclusively to listed target acquisitions (Adra & Barbopoulos, 2018).

from media coverage, we concentrate only on target firms[2]. We focus our attention on the method of payment, the takeover premium, and the time of completion in the pre-merger and interim phases of the acquisition deal. To identify the association between the media and mergers, we rely on agency theory and contract theory to measure the takeover reaction to information that is disseminated from the media. Agency problems can result in conflicts of interests between the parties to the acquisition. As an alternative, the "lemon effect" between the acquiring and target firm (Akerlof, 1970) explains the unstable attitude of both parties as the result of asymmetric information. Related to the contract theory (Akerlof, 1970) and agency theory (Eisenhardt & Eisenhardt, 1989; Shapiro, 2005), we highlight the effect of information asymmetry on various aspects of the acquisition transaction by focusing on the mitigation of information asymmetry between acquirer and target. Therefore, we construct our hypotheses based on agency theory and the lemon effect due to asymmetric information.

First, we examine the relationship between information asymmetry and premium paid. We focus on the premium paid in the merger deal with reference to three levels of media coverage (level of media, positive and negative). To shape our dependent variable, we identify the premium as the offer price per share minus the closing price four weeks before the date of announcement, which is divided by the closing price four weeks before the announcement date (Martynova & Renneboog, 2011). We Take the literature that discusses informed buyers who pay a lower bid premium to the target due to the effect of winners 'curse' (Dionne et al., 2015; Jory et al., 2016; Raman et al., 2013). We incorporate the discussion by Hernando-veciana et al., (2005) that analyzes the English auction and relation between disclosure of information and the acquirer who is willing to pay more in premium, in this context, and follow the above model which implied that less target asymmetric information (news) encourages the acquirer to pay more for the premium in a merger deal (Loughran & McDonald, 2011; Rozin & Royzman, 2001; Yang, Guo, Sun, et al., 2019).

Secondly, we look at the different types of media coverage, and how they affect to means of payment as a cash. To see the relation of information from media and means of payment, we rely on classical studies which address the effect of asymmetric information on choice of payments in acquisition deal (Eckbo et al., 1990; Hansen, 1987; Travlos, 1987). Prior

[2] For instance, Hossain & Javakhadze, (2020) examine the media connectedness of acquirers in takeover; or Yang, Sun, et al., (2019) explore media pessimism from an acquirer point of view.

studies use different measurements to test the relationship between choice of payment and information asymmetry (Faccio & Masulis, 2005; Karampatsas et al., 2014; Yang et al., 2019). These studies use agency theory and incorporate the lemon problem and information asymmetry to show how information asymmetry effects on choice of payment to be other than cash (Dierickx & Koza, 1991; Parvinen & Tikkanen, 2007; Reuer, 2005). Motivated by these studies, we posit that there is a positive association between the level of media coverage and cash as a method of payment, a positive association between positive media and cash offers, and a negative association between negative media and cash as a method of payment. We use cash payment as an indicator variable to check each measure of media coverage independently. We include additional control variables in each analysis to examine further aspects of the deal.

Thirdly, we test the effect of media coverage on time of completion in an acquisition deal. Since information asymmetry affects the time of completion of a merger deal (Luypaert & De Maeseneire, 2015), we test how various types of information from media affect the time taken for the deal to be completed. We use a different approach as previous literature which focuses on effect of media coverage (negative) on the abandoned a proposed M&A transaction deal from acquirer perspective (Yang & Wu, 2021). Alternatively, we calculate media coverage a month prior to the announcement date of the takeover transaction and identify the time of completion by the target firms by the number of days from the announcement date of the merger deal to the date that the deal is completed. With respect to agency theory and information asymmetry, we hypothesize that level of media coverage is ambiguously associated with time of completion, and that positive media coverage is associated with a shorter time of completion, and conversely that negative media coverage prolongs the time to completion.

We exploit comprehensive data sets that include a large number of US domestic listed target M&A transactions from 2000 to 2017. For the empirical analysis, we use a unique dataset for media coverage that was manually collected. We collect daily financial media coverage about the target firms one month prior to the announcement with over 118,000 media reports categorized as overall media coverage (level of media), positive media and negative media, from LexisNexis® which includes hardcopies and electronic data. We collect daily newspapers and newswires from four well-known newspapers, which represent more than 10% of the weekday circulation of newspapers in the USA (Fang et al., 2014): *Wall Street Journal Abstracts* (*WSJ Abstract*), *New York Times* (*NYT*), *USA Today* (*USAT*), and *The Washington Post* (*WP*).

We additionally study how the level of media coverage is positively associated with cash offers, positive media is negatively associated with cash offers, and negative news is

negatively associated with cash offers in a merger deal. There is no significant result for the relationship between level of media coverage and premium, positive media coverage and premium are negatively significant, and negative media coverage is negatively associated with the premium. We complement our analysis with several robustness tests. We address potential concern regarding the endogeneity of our sample and assess sample selection bias using propensity score matching (PSM), as well as split-sample and adding exogenous factors to our model. We use a Rozenbaum bounds (RB) analysis to ensure that our PSM sensitivity test is accurate (Adra & Barbopoulos, 2019; Rosenbaum & Rubin, 1983). This evidence is consistent with the view that, as long as the extent of media is used as a source of information, it can have a significant impact on acquisition outcomes. Taking everything into account, our findings of the robustness test are aligned with the results from the main analyzes.

First, previous studies present extensive results on the impact of media coverage in corporate finance. For example, Tetlock, (2007) suggests that high media pessimism predicts pressure on market prices followed; Liu et al., (2013) find the effects of media coverage on pre-IPO with positive and negative results on various financial factors; Ahern & Sosyura, (2014) suggests that the acquirer in stock merger creates considerably more news which effects the stock price; Fang & Peress, (2009) report that stocks with no media coverage earn higher return than the ones which have media coverage. Our study introduces a new thematic of social ties called level of media coverage and compares it with two other thematic categories of media coverage (positive and negative) and shows how information disseminated by different measures of media coverage influence various characteristics of a takeover transaction. Second, by uncovering evidence about the relationship between the media and acquisition's outcomes, we show that the effect of media coverage works in part through the information asymmetry in a takeover deal (Bushee et al., 2010; Hossain & Javakhadze, 2020). Finally, we contribute to the prior M&A literature by discussing the role of media coverage and providing the evidence that suggests that the scrutiny of various types of media coverage[3] is intended to uncover different outcomes of takeovers' characteristic concomitantly through M&A setting.

The remainder of this study is structured as follows. Section 2 reviews the literature on M&A and media coverage, as well as the determinants of financial media coverage. Section 3

[3] This is the first study that introduces the level of media and compare it with positive and negative media coverage.

develops the models and methodology, discusses the database, and sets the empirical predictions. Section 4 reports the findings. Section 5 addresses the potential endogeneity. Section 6 discusses the conclusions and limitations of this study.

2. An overview of the literature

2.1.Media coverage and corporate takeover

A prominent view in the corporate finance literature suggest that media coverage is one of the most important sources of information (Ahern & Sosyura, 2014; Brown & Ryngaert, 1991; Cheng et al., 2017). The synchronicity of media broadcasts and the financial crisis of a firm offers new insights into the information status of firms (Fang & Peress, 2009; Tetlock, 2007, 2010). A large number of studies document the efficiency of media coverage in disseminating corporate information and facilitating the decision-making process (Brown & Ryngaert, 1991; Bushee et al., 2010; Tetlock, 2014). The prevailing consensus in the M&A literature show that the news and its effect on the financial behavior of firms, such as creating narrative and policymaking, plays an important role in corporate decisions (Chan, 2003; O'Connell & Mills, 2003; Soroka, 2006). Many studies suggest the mitigating role of the media on asymmetric information in financial market (Bushee et al., 2010; Dyck & Zingales, 2003). The media applies its power to influence various aspects of corporate policy (Zingales, 2000). There is a clear unanimity about the power of the media in creating common knowledge for decision-making processes in the financial market (Dyck & Zingales, 2004; Liao et al., 2019; Yang & Wu, 2021). The media coverage has powerful impact over different aspects of finance. For instance, a study on the stock price model by Tetlock (2010) suggests that public news eliminate asymmetric information between the two sides of the deal. Hossain and Javakhadze (2020) explain the mechanism of the media and suggest that important information catches the eyes of media reporters, and that audiences pay attention to what the media disseminates around the globe. Media coverage is a crucial mechanism in disseminating information to the stakeholders and investors (Naumer & Yurtoglu (2019). The media's ability to integrate, package, and spread information means it has become an increasingly important source of information for decision-makers (Gao et al., 2009). As a result, it is impossible for firms to ignore the influence of media sentiment on financial decisions.

2.2.Information asymmetry in takeovers

With this paper we extend the literature and its core to discover how information asymmetry affects corporate takeover and, seeking to further this point, we focus on three types of information as a form of general, positive, and negative information from the media.

Asymmetric information can mean that a deal fails to generate real value for shareholders, and that acquirers eventually "run the risk of adverse selection" (Reuer, 2005) and face a "Lemon Problem". Meyer an Majluf (1984) suggest that to avoid the "Lemon" problem due to asymmetric information, an acquirer with private information ought to be cautious about the target's estimation of the value that the acquirer suggested in the primary stages of the transaction. Along similar lines, information diffused by the media strongly affects M&A transactions (Yang et al., 2019). There is thus a notable focus on investors in the financial market whose vigorous desire to hunt for information plays a significant role in M&As (Shleifer & Vishny, 2003). Among others, Tetlock (2007) argues about casual observation of media coverage, and suggests that the content of news, especially from newspapers, could be linked to the financial behavior of investors.

It is well known in the literature that M&A success is strongly characterized by informed decisions (Dionne et al., 2015). In principle, information asymmetry between the acquirer and target puts both sides of the deal into a vague situation. Accordingly, it is important to recognize the results of prior research that studied media coverage and its effect in diminishing information asymmetry and affecting numerous aspects of the relevant market, such as the positive impact of media coverage on investment funds (Dyck et al., 2008), media coverage predicts stock returns (Tetlock et al., 2008), reducing information asymmetry by media (Bushee et al., 2010;Dyck & Zingales, 2003), media coverage to enhance corporate governance (Dyck et al., 2008), negative impact of media on stock returns (Fang & Peress, 2009), and the "independent influence" of media coverage on the cost of debt (Gao et al., 2009). Peeters and Czapinski (1990) suggest that asymmetric information places negative weight on the evaluation of firms in the decision-making process. Asymmetric information also alleviates the doubtful and unclear thoughts of both acquirer and target if the information disseminated by the media is positive, and whereas negative news would have different consequences for the takeover and might lead the method of payment to be other than cash, prolong the time of completion or lead to a higher premium.

While there are many sources of information that influence an acquirer in decision-making process about the target and how to close the deal, determining the type and source of information that affects investor decisions is difficult. This may be due to various types of information (media coverage) that can draw the attention of stakeholders from different perspectives (Westphal & Zajac, 2013). Although the nature of the media as an information source has been acknowledged by many scholars (Ahern & Sosyura, 2014; Chan, 2003; Dyck & Zingales, 2003; Fang & Peress, 2009; Liu & Li, 2019), there is little understanding of how

different types of information propagated from the news can influence the deal between acquirer and target.

2.3. Thematic categories of media coverage (Level, positive, and negative)

The literature on the financial media includes variety of empirical studies that aim to determine the value of financial news through textual analysis (Feng, 2010; Kearney & Liu, 2014; Loughran & McDonald, 2011; Nardo et al., 2016; Tetlock, 2014). Tetlock (2010) verifies that public news plays a significant role in decision-making processes for investors, and Roll (1988) emphasizes that the information deduced from the news alone cannot act as a tool to affect the financial behavior of firms. The common perception of media coverage is that information from the media, which is occasionally referred as the "news attention cycle", is extremely important in attracting attention, and, subsequently, for decision-making (Olsen et al., 2003). *New York Times* columnist Bob Herbert argues that "A common problem with the media is their tendency to lead with stories the public wants to read, rather than what it needs to know." The assessment of sentiment in written text is inevitably subjective, and subject to considerable disagreement (Wiebe et al., 2001). Different levels of news have various effects on the financial behavior of firms, such as negative media coverage influencing the formation of leader behavior and the independence of boards (Bednar, 2012); positive corporate social responsibility (CSR) media coverage being associated with shareholder value (Byun & Oh, 2018); positive impacts of media on prices and trading (Rogers et al., 2016); and eventually the negative effect of media coverage on a firm's stock returns (Tetlock, 2011).

Generally, the level and the influence of the media is divided into two positive and negative perspectives. Despite the fact that media coverage plays a compelling role in whether the perception of individuals is either positive or negative, Diermeier et al. (2017) suggest that at macro levels of analysis, media coverage is probably the best tool for providing individuals with a general perception of information of the media without propensity to positive or negative perspective. In fact, the notion of the level of media coverage applies to how the audience perceive the information without knowing the details of the news. Conventionally, the information from media coverage is interpreted as positive or negative; nevertheless, we introduce information from media coverage as general media (level of media coverage[4]) which can act as a unit of provenance for information without any categorization. Based on these

[4] The idea of the level of media coverage is introduced by Nordlund (1978), in his study about media interaction.

discussions, we categorize, *ceteris paribus,* the media to the positive, negative, or neutral forms of information, which can influence on acquisition outcomes.

To better understand the relationship between uncertainty and information asymmetry, we refer to prior research that examines the effect of information asymmetry and uncertainty on the acquisition process (Barney, 1988; Hennart & Reddy, 2000; F. Jensen, 2008) and we connect this uncertainty, which has a negative effect on public perception, to information asymmetry in takeovers (Van Dalen et al., 2017).Figure 1 demonstrates how uncertainty can be interpreted as a proxy for different types of media coverage in the context of takeover. Accordingly, uncertainty and information asymmetry are correlated, and the same is true of certainty and symmetric information. The X-axis is labelled as "uncertainty" axis and represents the distribution of information. The Y-axis is labelled as "frequency" axis and represents the frequency of information. The upper curves represent the distribution of media coverage with regard to the uncertainty index. As the "level of media coverage" demonstrates, the middle is the general concept of media coverage and the more the line extends to left and right, the more it represents the positive and negative curve of media coverage. In other words, the more uncertainty, the more dispersion of positive and negative media coverages, whereas outsiders will more agree on a narrower view which results to less uncertainty.

[Insert Figure 1]

3. Theoretical framework and hypothesis

In the M&A-related literature, abundant empirical studies suggest that people tend to periodize negative information rather than positive information (Fournier et al., 2020). Several studies examine the intersection between specific industries and the media coverage (Chandra & Collard-Wexler, 2009; Evens & Donders, 2015; Greco, 1996). Among these studies, many more examine predominantly the influence of media coverage in specific facets of takeover process. Research in this area indicates that a novel information source such as media has an impact on different outcomes in the financial market of the firm and, subsequently, impact on financial behavior in the merger content. This research posits different roles played by the media coverage in the financial performance of a firm. Media coverage is a tool used by firms to collect and certify information, and to reduce information asymmetry as an intermediary between corporate parties (Diamond & Verrecchia, 1991). Furthermore, media plays a key role to shape the corporate policy of firms by advising and assisting them as regards socially acceptable behavior (Dyck et al., 2008), to alleviate the cost of capital through advisors' attention (Merton, 1987) and eventually to influence the public perception of events by

providing the information. Lack of information in these studies indicate the uncertainty, which brings ambiguity to the financial environment of the firm.

3.1. The determinants of premiums in a takeover

In this study, we develop hypotheses about the effect of the levels of media coverage, and positive and negative media coverage on the acquisition premium. Our focus is thus on how information disseminated by the media is associated with the acquisition premium. The literature offers conflicting perspectives regarding the effect of symmetric/asymmetric (certainty/uncertainty) information in mergers and acquisitions. On one hand, some studies suggest that targets with more asymmetric information receive larger bid premiums in takeovers. For instance, Cheng et al. (2016) interprets the positive relationship between premium paid and information asymmetry as meaning that the more sources of information the acquirer has about a target, the more the acquirer is willing to pay (which means a less discounted price, that is, by the market investors) to the target[5]. Epstein and Schneider (2008) study the role of uncertain information and how ambiguity-averse investors tend to react more to negative information that positive. They note that the premium paid changes to different level with regards to increasing the information quality, and eventually it is intuited that higher quality information in the news will lead to a higher premium. Last but not least, the likelihood and the magnitude of the "Winner's Curse" in uncertain condition leads the acquirer to overestimate the price of the deal, and to pay a higher price (overpayment) than the current market value (Varaiya & Ferris, 1987)[6].

On the other hand, a large literature argues that uncertainty and asymmetric information in financial reporting of the target can create difficulty in value estimation for the acquirer, leading to major losses for the winning bidder (Raman et al., 2013; Thaler, 1988; Varaiya, 1988). In this context, we follow the model which implies that target asymmetric information (news) induces the acquirer to pay a higher premium in a merger deal (Loughran & McDonald, 2011; Rozin & Royzman, 2001; Yang, Guo, Sun, et al., 2019). Regardless of the previous

[5] According to Cheng et al. (2016) this positive relationship is the result of "…evidence that the market endorses the acquirer's valuation of the opaque target and rewards the acquirer that efficiently resolves a target's information asymmetry problem by posting a bid on the target that is opaque to the market. Furthermore, such relationships hold irrespective of the payment method."

[6] The winner's curse hypothesis suggests that in the event of a bidding competition, there is a tendency for the acquirer winning the auction to exceed the value (intrinsic or true) of the target (Varaiya & Ferris, 1987). This indicate that as information asymmetry arises, the probability of the acquirer to pay more premium is higher which will impact to the current market value of the target firm.

literature on the direct relationship between information asymmetry and premium, Dionne et al. (2015) investigated the premium equilibrium from the perspective of English auctions, and how information asymmetry affects the premium paid in takeovers. They used the theory of dynamic auctions with private and common value to predict that informed buyers pay a lower bid premium to the target. They draw conclusions about the relationship between different aspects of the premium and information asymmetry, such as a) sealed-bid auctions[7], b) and English auctions,[8]. Their findings suggest that when faced with information asymmetry, and informed acquirer pays a lower premium. Reviewing the subject of premiums further, we find many other studies with different perspectives about premiums and asymmetric information in the takeover literature. Jory et al. (2016) examined whether the presence of a credit rating which mitigates asymmetric information, and a rated as opposed to non-rated firm, means that the acquirer is willing to pay a lower premium and fair price in a takeover transaction. Brusleriede (2013) found that in order to solve information asymmetry, which is a risk in acquisition deal, the price and premium paid should be lower, which also results in an endogenous relationship with the method of payment.

Finally, according to the above research, the mixed results from the previous literature, and with relying on auction theory and the winners' curse problem, we develop hypotheses regarding the level to which media coverage and positive media coverage are associated with the acquirer paying a lower bid premium. As the information asymmetry between acquirer and target is affected by the price paid in a takeover (Dionne et al., 2015), we also propose that negative media coverage (which is associated with uncertainty and information asymmetry) is associated with the acquirer paying a higher bid premium in a takeover; and the following hypotheses:

Hypothesis 1a: The level of media coverage is associated with the acquirer paying a lower premium in a takeover.

[7] The classical study by Milgrom and Weber (1982) on sealed-bid auctions examines the different adaptations of premium equilibrium and information asymmetry by predicting winning the auction in lower price if the potential buyers are informed about the takeover deal. This suggests that uninformed participants in the deal are coaxed into a winner's curse situation, where an informed buyer wins by bidding too high.

[8] Prior to their research in 2015, Dionne et al. (2009) study the empirical implications of informed participants in English auctions and how the information asymmetry between the participants influences the equilibrium price of an auction.

Hypothesis 1b: Positive media coverage of the target is associated with the acquirer paying a lower premium in a takeover.

Hypothesis 1c: Negative media coverage of the target is associated with the acquirer paying a higher premium in a takeover.

3.2. The determinants of method of payment in a takeover

Empirical studies have examined information asymmetry and its effect on different methods of payment, such as the use of cash, stock, or a hybrid of both methods (Eckbo et al., 1990; Glascock et al., 2017; Hansen, 1987; Martin, 1996; Travlos, 1987; Zhao & Renneboog, 2014). Many scholars have found that there are fewer cash payments and more stock payments when the information asymmetry is high in takeover transactions (Eckbo et al., 1990; Hansen, 1987; Zhao & Renneboog, 2014). It is also well established in the literature that the more information asymmetry caused by the media, the lower probability that the acquirer will pay in cash. As elaborated by Hansen (1987), acquirers prefer to pay with stock rather than cash when asymmetric information stands between acquirer and target. In line with the above results, Eckbo et al. (1990) study the intention of the acquirer to pay using a mixed method of cash and stock when there is information asymmetry.

Studies on the methods of payment in corporate acquisition are intriguing. One of the main focuses in this study is the role of information channeled by the media into methods of payment in acquisition deals. The significant role of information and how the media as a tool can assist decision-makers in firms in the takeover process is undeniable. Noting types of information gathered from the media (e.g., positive, and negative), might affect the reactions of investors as regards different methods of payment in merger deals. There are many potential reasons that may lead to cash being used for payment in takeovers. Noting different types of information disseminated from the media (e.g., positive, and negative) alters the reactions of investors regarding the methods of payment in a merger deal. In this framework, Kalay and York (1987) emphasize the influence of negative information on the new equities of market participants in firms. Accordingly, we posit that in general the level of media coverage and positive media coverage are positively related to cash offers, and that the converse is true for negative media coverage. Based on above arguments, we propose:

Hypothesis 2a: The level of media coverage is positively associated with cash offers in a takeover.

Hypothesis 2b: Positive news is positively associated with cash offers in a takeover.

Hypothesis 2c: Negative news is negatively associated with cash offers in a takeover.

3.3. The determinants of time of completion in takeovers

According to prior studies, understanding the drivers of completion time is important, as a prolonged deal is costly and postpones the realization of synergy gains. However, there is no clear evidence that faster due diligence is better than a due diligence that takes longer during takeover transactions (Salim et al., 2018). Having said that, it is important to understand that time to completion matters not only for merging companies but also for their investors and rivals (Luypaert & De Maeseneire, 2015). Various studies have discussed the importance of deal completion time in M&As (Ahern & Sosyura, 2014; J. Kolb & Tykvová, 2016; Luypaert & De Maeseneire, 2015). Examining negative media coverage and its effect on the outcomes of mergers in depth, Yang and Wu (2021) studied the positive association of negative media coverage on an acquirer abandoning the whole deal. On an asymmetric level, Luypaert and De Maeseneire (2015) posit that information asymmetry affects due diligence, and accordingly prolongs the time of completion in takeover transactions. Although no prior studies suggest that longer due diligence is problematic, potential investors might take more time in decision-making process when applying due diligence, which is costly for both sides of the acquisition deal. The time of completion can be prolonged without the knowledge of managers due to hindsight bias[9], which is caused by the "degrees of consistency between old and new information" (Angwin, 2004).

As much as there are various incentives to shorten the time of completion in takeover transactions, there are some deterrents that generate delays in completion time, and information, whether positive or negative, can be one of them, affecting the takeover transaction. From a legal perspective, information asymmetry is one of the factors that makes hidden actions in legal due diligence visible, which leads to prolonging the deal (Parvinen & Tikkanen, 2007). The propagation of positive news leads to more information, and the more information that exists, the less time will be taken to complete a deal. Conversely, negative news produced by the media leads to information asymmetry and prolonging the deal. In light of the empirical evidence, we propose that media coverage in general has a uncertain effect on time of completion, meaning that it can have a positive or negative effect on the time taken to

[9] Hindsight bias is a psychological phenomenon that occurs in people who believe that they predicted an event accurately. This phenomenon has a direct effect on a person's judgment (Fischhoff, 1975).

close the deal depending on the situation of the deal. Consistently with the above arguments, we propose the following testable hypotheses:

Hypothesis 3a: The level of media coverage has a positively effect on the time for completion in a takeover.

Hypothesis 3b Positive media coverage positively affects the time of completion in a takeover.

Hypothesis 3c: Negative media coverage negatively effects the time of completion in a takeover.

4. Methodology

4.1.Data

We collected data on the target firm from comprehensive data on M&A deals in the US announced between January 1, 2000, and December 31, 2017, from the Thomson Financials' Eikon Mergers and Acquisitions database. We obtained the accounting data from Compustat for the same period as our takeover dates. We used the Centre for Research in Security Prices (CRSP) for stock prices which is used in the robustness check. Finally, we used the Institute Brokers Estimate System (I/E/B/S) to provide data for analyst coverage. We first sorted the data according to the 2000–2017 period (due to the availability of media data). We then applied the following restriction criteria: (1) both acquirer and target firms must be publicly traded; (2) only the highest percentage owned by the acquirer was chosen in double mergers in the same year; (3) the selected acquirer should own less than 5% of the targets' share before the takeover transaction; (4) only three methods of payment should be chosen, cash, stock, and a combination of both, and missing values should be omitted (Luypaert & Van Caneghem, 2014; J. Yang et al., 2019); and finally there are some studies that focus on acquirer level of takeover (Ahern & Sosyura, 2014; Barbopouloset al., 2019). With all the data merged, the final sample includes 902 observations.

The initial sample consists of media coverage data from the first of January 1992 until the end of 2017 to detect the sentiment embedded in financial media coverage, however, due to a lack of negative news compared to positive news in the dataset, we decided to eliminate the years from 1992 to the end of 1999. With further eliminations, our final data on media coverage ran from 01 January 2000 to 31 December 2017, and was manually collected from

LexisNexis[10] (Fang & Peress, 2009; Gao et al., 2009). We then categorized the data into three level of media coverage *(TLEMC)*, positive media coverage *(TPMC)* and negative media coverage *(TNMC)* (Shu et al., 2017).

4.2. Construction and measurement of the independent variable (media coverage)

The measure of information from media coverage varies between research. Previous M&A studies show different approaches to calculating the period during which information is disseminated; some from the announcement to 60 days of negotiation (Yang & Wu, 2021), and some 10 days of beginning of the announcement of takeover (Liu & McConnell, 2013). We measure media coverage in our paper using the measurement for the total number of newspaper and newswire articles written about target firm to proxy for the M&A news in well-known daily newspapers and newswires, including the *Wall Street Journal Abstracts*, *New York Times*, *USA Today*, and *The Washington Post* (Fang & Peress, 2009) in the month prior to announcement (Liu et al., 2011). We chose these newspapers as they represent more than 10% of the weekday circulation of newspapers in the USA (Fang et al., 2014).

Next, we merge the data from the newspapers into one comprehensive file. We then restrict our data to the period from 1 January 2000 to 31 December 2017 to match the mainstream of recent financial news. We narrow our data to the four newspapers for "date," "geography by document," and "negative news," which includes both "negative business" and "negative personal news" (due to the overlap of these two types of negative news, we aggregate them into negative news in general). When searching for articles, we apply the exact name of the target firm as used in the in LexisNexis database. We also include "geography by documents" in "North America" and specifically the USA (as our M&A data are based on this area). Each newspaper article includes the title, date of publication, section, body, link, graphics, classification, subject, organization, and industry of the related news. We also included the industry trade press, which is a type of news, and finally, we excluded all other languages except English as the majority of the news are English for US target listed firms.

We categorize the news with the unique NexisUni®[11] algorithm to define the positive and negative news and distinguish it from the general concept of media coverage (which we

[10] LexisNexis is an academic database that provides information on firms' media coverage, with the ability to filter into various classifications.

[11] https://www.lexisnexis.com/en-us/professional/academic/nexis-uni.page

include as level of media coverage). First, we download all the news without specifying positivity, negativity, or the news. We then deselect negative news, so the results are positive news, and finally we select only negative news, which results in all the negative news concerning the target firms. According to NexisUni:

"…The Negative News category can be described as follows: Contains negative news (adverse or unfavorable) stories relating to a business entity or person. The Negative News search enables users to quickly and easily find out important negative information about an organization or person that might not be readily available through other means. Examples of terms that Negative News looks for in the text of articles include "mismanagement," "incompetence," "deceptive business practice," "misconduct," "negligence," and "theft." The full taxonomy is available in English and smaller subsets in French, German, Dutch, Spanish, Portuguese, Italian, Russian and Arabic. The terms have been selected by a LexisNexis Smart indexing team. Limitation of the Negative news queries: There is no proximity between the subject of the negative personal news and the negative terms that are picked up by the classifier."[12], and that is how we identify negative news by selecting a category with the same name.

When selecting the newspaper articles about the target firms, we also match the names of the firms with all the content in the news from the title to the text (Solomon et al., 2014; Tetlock et al., 2008). We check the full name of the target firms, the abbreviation of names and any possible alternative names of the target firms. For the analysis of our independent variables (media coverage), we first use the logarithm of one plus the number of newspaper articles as a proxy for media effect (Chen et al., 2020; Fang & Peress, 2009; Gao et al., 2009; Liu et al., 2013). To examine the effect of media coverage, we use a portfolio, sort, and divide the sample into level of media coverage (MC^{LE}), and positive/negative media coverage (MC^{pn}) and (MC^{nn}), one month prior to the announcement date of the takeover transaction. As media and the trust of information and data related to media has multidimensional scales (Kohring & Matthes, 2007), we use data visualization to identify hidden patterns and understand the association between different types of data (Hajderanj et al., 2019). Figure 2 shows that we implement the probabilistic method to visualize highly dimensional data. We demonstrate the

[12] Source: Client developer Business Information Solutions LexisNexis. https://www.lexisnexis.com/en-us/gateway.page

t-distributed stochastic neighbor embedding of all media coverage variables, from the level of media coverage to positive and negative media coverage. We use this method to explore our data and visualize multidimensional independent variables. Two different divergences are minimized in this method; one with which we measure the pairwise similarities of all our *media data points*[13], and one with which we measure the pairwise similarities of the *corresponding low-dimensional media data point* in the embedding model. We then compute the similarity between three sets of media data points using conditional probability (Van der Maaten & Hinton, 2008). As indicated in the figure 2, we obtain a 13 clusters algorithm that analyses the average points between data. The distribution shows that *media data points* are focused on maintaining the nearest neighbor in a low dimension map, and that they are preserved in the local structure of the *media point data*.

[Insert Figure 2]

Appendix A is an example of three types of media coverage for a target firm. As the figures indicate, the samples include the source of the news, body of the news, time of the news, category of the news (general/positive/negative) and classification of the news, and contain the language, company, organization, ticker, and bibliography of the news as well. For copyright reasons, only part of body of the sample news is included in the figures.

4.3. Construction and measurement of dependent variables (premium, method of payment, and time of completion)

4.3.1. Premium

Prior studies define the premium as the price difference between the price of the purchasing firm and the price of the assets of the target firm in the takeover transaction (Yuheng Zhao et al., 2018). A premium is generally calculated according to the bid price that the acquirer suggests, minus the market value of the target firm prior to the announcement of the takeover, divided by the value of the target firm prior to the announcement of takeover (Jory et al., 2016; Kim et al., 2011; Laamanen, 2007; Reuer et al., 2012). Various papers have studied how the premium offered is usually computed based on the target stock price between one month to 40 days prior to announcement (Barbopoulos et al., 2019; Gomes & Marsat, 2018; Kim et al., 2011). To prevent the possible fluctuation of, or implications about the market value of the

[13] The media data point is a location in a two or three-dimensional map that shows the high-dimensional data of media coverage in the plot (Van der Maaten & Hinton, 2008).

target firm due to rumors about value of the target prior announcement (Schwert, 1996), we use a month prior announcement in this model to calculate the effect of MC on the premium.

$$Premium_i = \left[\frac{FDV_i - MVT_{-28}}{MVT_{-28}}\right] \quad (1)$$

where the FDV_i is the final deal value between two sides of takeover transactions. MVT_{-28} is the market value of the target firm 28 days prior to the announcement of the deal in the takeover (Barbopoulos et al., 2019). Table 1 shows the distribution of different types of acquisition payments for all the target firms in the sample, including level of media coverage, positive and negative media coverage. As indicated in table 1, the higher premium belongs to 2001 and 2010 with 0.638 and 0.561 respectively.

[Insert Table 1]

4.3.2. Method of Payment

We use a binary method to analyze method of payment and convert our nominal data to 1 if the method of payment is exclusively cash and 0 otherwise. Dataset is gathered from Thomson Financials' EIKON Mergers and Acquisition, including all the transactions from 2000 to 2017 and the three methods of cash, stock, and a combination of both. As presented in the table 1, 2006 with 35 and 2016 with 35 deals have the highest number of cash deals. On non-cash payments (Other Payments) 2000 and 2014 have highest rank with 41 number of deals.

4.3.3. Time of Completion

We also examine the time of completion in the takeover transaction as a dependent variable. Prior studies have focused on different timing categories in acquisition deals, including speed of completion, duration, barriers and how to extend the time to complete a deal (Buczek, 2016; Deng et al., 2013; Offenberg & Pirinsky, 2015; Salim et al., 2018). The timing involves the length of the takeover process which is divided into various periods, including pre-negotiation to the negotiation, announcement and transaction periods (Ahern & Sosyura, 2014). We calculate the time of completion as the deal completion day minus the date of deal announcement. Normally, the longer it takes to complete the takeover transaction, the most the cost escalates for both acquirer and target. As it has shown in table 1, the longest period of completion belongs to year 2015 with 70 days and 2016 with 69 days for the deals to complete.

4.4. Control variables

To support our conjectures on media coverage's impact on takeover, we use the common control variables from the empirical literature, and we define and describe all the variables in Appendix B. We obtain data from several sources from The Centre for Research in Securities Prices (CRSP) supplies stock price and return data to the Institute Brokers Estimate System

(I/B/E/S) provides analyst data and Compustat accounting data. We use various control variables. Previous literature suggest the key role analyst coverage and its significant determinant of media coverage (Engelberg, 2008) For instance, firms with analyst are less likely to have media coverage according to Fang & Peress, (2009), or firms with high analyst coverage tend to experience greater media coverage (Tsileponis et al., 2020). Hence, we use target and acquirer analysts' coverage as a control to reduce the information asymmetry (Li et al., 2019) in our analyzes. We also use duplicitous literature on target and acquirer Market-to-Book ratio (MTB) as other control variables for our study. On one hand, Bushee et al., (2010) study suggest firms with low MTB ratio have higher media coverage. On the other hand Fang & Peress, (2009) show the evidence that suggest firms with high MTB ratio receive greater media coverage. Next, we use target and acquirer leverage using Tsileponis et al., (2020) which suggest that highly leveraged firms have higher attention from media. We further test the target and acquirer firm size as according to the literature, the larger the size of the firm is, the more likely the firm attracts media (Bushee et al., 2010; Fang & Peress, 2009; Solomon et al., 2014). In addition, we adopt acquirer cash flow, target high-tech, target R&D, target sale growth, target and acquirer-related industry, and target and acquirer same states status (Jory et al., 2016; Luypaert & De Maeseneire, 2015).

4.5. Model specification

4.5.1. Premium Model

To analyze the nexus of media coverage and premium in the takeover transaction, we opted for an ordinary least squares (OLS) model to test *H1a*, *H1b and H1c*. *4W.Premium (Hereafter Premium)* is the excess price offered to the target one month (four weeks) before the announcement of the deal. Applying this measurement for the premium will eliminate the effect of the run-up stock price of the target firm (Jory et al., 2016; Schwert, 1996). The premium in a takeover transaction is calculated based on the price that the acquirer suggests to the target minus the target's market value prior to the announcement date, divided by the market value of the target.

We use OLS regression to analyze the relationship between media coverage and premium:

$$(4W.Premium)_i = \beta_0 + \beta_1 \, ln \, MC^x{}_i + \gamma \, Control \, Z_i + \delta_j + \varepsilon_i \qquad (2)$$

where *4W.Premium* represents the premium four weeks prior to the announcement, and x in $lnMC^x$ represents the logarithm of level of media, and positive and negative media in the regression results. Control Z_i is a vector to control our independent variable, including acquirer free cash flow *(A.FCF)*, acquirer book-to-market ratios *(A.MTB)*, relative size (*REL.SIZE*),

acquirer leverage *(A.LEV)*, acquirer stock return *(A.STOCK.RE)*, acquirer analyst coverage *(A.ANALYST.C)*, target analyst coverage *(T.ANALYST.C)*, target sales growth *(T.SALES.GR),* target book-to-market ratios *(T.MTB)*, target leverage *(T.LEV)*, target R&D *(T.R&D)* target size *(T.SIZE),* target high-tech industry *(T.Hi.TECH)*, same states for target and acquirer *(SAME.STATES)* and related industry *(RELATED)*. All the regressions include fixed effects dummy variables based on industry, and time periods as per the Fama-French 48 classification (Fama & French, 1997). The control variables are valid for other models as well.

4.5.2. Method of Payment Model

We run a binary Probit regression to measure the effect of media coverage on method of payment. We have a dichotomous dependent variable, which is $Y_i \in \{0,1\}$. To redefine our variable, we transform the dichotomous *Y* dependent into the continuous variable $Y' \in (-\infty, +\infty)$, and by using the "link function," the outcome defines the real-valued *Y*. Eventually, we arrive at $\Pr(y_i = 1|x_i) = \Phi(X^T\beta)$. In order to create a dummy variable, we recoded the variable mean of payment to cash offer:

$$Cash = \begin{cases} 1, & if\ the\ means\ of\ pyment\ is\ cash \\ 0, & otherwise \end{cases} \quad (3)$$

We use this model to test our *H2a*, *H2b* and *H2c* hypotheses:

$$Pr(CASH = 1)_i = \beta_0 + \beta_1\ ln\ MC^x{}_i + \gamma\ Control\ Z_i + \delta_j + \varepsilon_i \quad (4)$$

where the probability of cash offer as the dummy variable is one when the mean of payment is cash and zero otherwise, and x in $lnMC^x$ represents the logarithm of level of media, and positive and negative media in the regression results. In addition, *i* index is the number of the deal, δ_j is industry and Φ is the cumulative distribution function of standard normal distribution. The marginal index effect *(MIE)* is zero, as x_i is the binary variable so MIE of $x_i =$ value of $x_i\beta$ when $x_i = 1\ or\ x_i = 0$. The marginal probability effect *(MPE),* that is the partial effect of the independent variable on the probability that the dependent variable is equal to one, $y_i = 1$ and $MPE\ of\ x_i$=$\emptyset\ (x_i\beta) - \emptyset(x_0\beta)$.

Control Z_i represents a vector that includes the control variables of primary interest in our study. The control variables are the same as previous model.

4.5.3. Time of Completion Model

Various factors can affect the takeover time required to complete, such as high-quality accounting information reducing time (Marquardt & Zur, 2015) or investment bankers increasing the time of completion (Agrawal et al., 2013). In this model, we test our *H3a*, *H3b* and *H3c* hypotheses to determine the relationship between media coverage as level, and positive or negative news, and the time of completion *(TOC)*. We use the Luypaert and De

Maeseneire (2015) method to analyze the time of completion by calculating deal completion day *(DCD)* minus the date of deal announcement *(DDA)*.

$$TOC = DCD - DDA \quad (5)$$

By focusing on information asymmetry and the likelihood of the media affecting time of completion, we estimate the following regression. We use ordinary least squares (OLS) to regress the variable in order to reduce the effect of outliers on our dependent variable.

$$(\mathrm{TOC})_i = \beta_0 + \beta_1 \ ln\, MC^x{}_i + \gamma\, Control\, Z_i + \delta_j + \varepsilon_i \quad (6)$$

where the *TOC* is calculated as the number of the days between the deal announcement and actual day of completion, and x in $lnMC^x$ represents the logarithm of level of media, and positive and negative media in the regression results. Control Z_i represents a vector that includes the control variables of primary interest in our study. The control variables are the same as previous model.

To further see the results of our hypotheses, we check the sensitivity of our data summary and the outliers by using some robustness checks. Figure 3 shows the scatter plot for the independent and dependent variables combined over the period 2000 to 2017. The figures represent the mean calculated for each variable. As indicated in the graphs, the mean is demonstrated as the horizontal axis. Panel A is scatter plot of premium, panel B is scatter plot for MOP and panel C is scatter plot for TOC and level, positive and negative media coverage respectively.

[Insert Figure 3.]

5. Empirical results

5.1. Descriptive statistics

Table 2 provides the summary statistics for the media coverage of target firms during the period 2000 to 2017 from four well-established journals, *Wall Street Journal Abstracts (WSJ Abstract), New York Times (NYT), USA Today (USAT), and The Washington Post (WP)*. Panel A tabulates the summary statistics of media coverage categorized by level of media coverage, and positive and negative news. The "Total number of media coverage" column represents the total number of all news related to level, and positive and negative news, sorted by year. The next three columns present the mean, standard deviation, 25th percentile, median and 75th percentile of the independent variables. Panel A of table 2, reports the mean, standard deviation, median, and the first and third quartiles of total media coverage news. As reported in Panel A, the amount of media coverage per year escalates gradually, with two peaks in 2009 and 2014. In contrast, there are only a few target firms with negative or positive news at the

same time, and all the target firms in our sample have either positive or negative media coverage over 2000 to 2017. Panel B of Table 2 reports the distribution of all three types of media coverage across different industries.

[Insert Table 2.]

Table 3 presents the descriptive statistics for the variables in this study. The variables are winsorized at the 99th and 1st percentiles to mitigate the effect of the outliers. The number of observations, mean, standard deviation, minimum, 25th percentile, median, 75th percentile and maximum are presented for all variables. The mean and standard deviation of logarithm of level of media *(ln.TLEMC)* are 2.90 and 1.78, respectively. The mean and standard deviation of logarithm of the positive media coverage of the target *(ln.TPMC*) are 0.78 and 1.75, respectively. The of logarithm of media coverage of a target with negative news *(ln.TNMC*) has a mean and standard deviation 0.73 and 1.55, respectively. Method of payment by cash (*MOP.CASH*) has a mean and standard deviation of 0.45 and 0.49, respectively. The mean and standard deviations for the four-week premium are 0.42 and 0.40, respectively, and finally the mean and standard deviations for time of completion are 0.32 and 0.97, respectively. Overall, the total numbers of Level of Media Coverage are greater than positive media coverage and negative media coverage combined. Target firms have 42% 4 weeks premium paid. There are 45% cash method of payments for the firms in sample. 32% of the target firms have completed takeover deal. Target firms are about 24% of the size of acquirer firms. Acquirer firms have greater Market-to-Book ratio and analyst coverage. Target firms have greater sales growth. 27% of target firms have same state. 23% of target firms are in high-tech industries. 70% of target firms transactions are in related industries.

[Insert Table 3.]

Table 4 reports the Pearson correlation coefficient for the dependent and independent variables in this study. The sample consists of 902 observations of publicly traded target firms, and the sample period spans 2000 through 2017. As indicated the table has several significant correlations among variables. The highest significant correlation, 0.99, is observed between the level of media and positive media, and 0.92 between positive and negative media which are significant at the 1% level. As a result, we ensure that we do not include all media variables simultaneously in an estimation. We, furthermore, control for the absence of multicollinearity among regressors by checking whether there is any linear association between dependent and independent variables via the variance inflation factor (VIF). The estimated coefficients for the variables are significant at the 5% and 10% level. The VIF value is less than ~2.4, which is below the 10 suggested for low multicollinearity, does not exceed critical values, and there

are no severe multicollinearity issues in our model (Greene, 2002; Hair et al., 1973). All variables are winsorized at the 1% and 99% levels and Bonferroni adjustment is used to adjust the significance level. T-statistics are referred to as standard errors adjusted for the autocorrelation and ∗, ∗∗, and ∗∗∗ represent statistical significance at the 10%, 5%, and 1% levels, respectively.

[Insert Table 4.]

5.2. Multiple Regressions of M&A Premium

Table 6 reports the result of the OLS regression for the dependent variable (4W.Premium) and independent variables (level of media coverage, positive media coverage and negative media coverage). The table presents coefficients and t-statistics, and all the standard errors and p-values are reported in parentheses.

[Insert Table 5]

We control the association between independent variables and control variables in Model (1) of this table. Model (2) measures the association between level of media coverage and takeover premium. It indicates that the coefficient is weakly negatively associated with the premium and leads the acquirer to pay a lower premium to the target. This is consistent with the findings of Hossain and Javakhadze (2020) regarding the association of media and premium, however, although we find a weakly negative coefficient, it is not significant. Thus, we cannot directly confirm *H1a,* which is that a higher level of media coverage leads the acquirer to pay less to the target. Model (3) presents the effect of positive media coverage and, as anticipated, the coefficient is negative -0.020 and significant at the 5% level, which leads the acquirer to pay less to the target. The result is robust for *H1b*, that positive media coverage of the target will lead the acquirer to pay less in an M&A transaction. Model (4) includes negative media coverage of the target, and the coefficient is negative -0.027 and significant at the 5% level. The result does not confirm our third hypothesis *H1c*, although the result is significant at the 5% level, as the result suggests that negative media coverage is negatively associated with the premium, which leads the acquirer to pay a higher premium to the target. To explain this phenomenon, we follow another strand of literature that conversely suggests that greater information asymmetry about the target will lead the acquirer to pay a higher premium (Cheng et al., 2016). Even though this is not the literature that our paper relied on, it could be an explanation for the opposite results regarding premium paid.

5.3. Multiple Regressions of M&A Methods of Payment

We assess the measurement of payment by applying the binary method and converting the nominal variable to 1 if the method of payment is cash and 0 otherwise. Table 5 displays the results for the multiple Probit regression.

[Insert Table 6]

The table demonstrates the different results for the multiple regression from Model (1) to Model (4) for our *H2a*, *H2b and H2c.* We test the relationship between level of media coverage, positive and negative media coverage and methods of payment, and how it affects the decision of the acquirer to make the payment. The table presents coefficients and *t-statistics*, and all the standard errors and *F-statistics* are adjusted for heteroscedasticity/consistency (White, 1980). Model (1) presents the test between the dependent variable and control variables. This model shows that most of the control variables are significant at the 5% level. The level of media coverage for the target is added in Model (2) of *H2a*. The results indicate that increasing one unit of level media coverage is positively significant at 10% level and associated with increasing the expected number of 0.001 units of cash offer on average, holding all other variables at their observed values. At the economic level, the result is significant for media coverage which leads a firm to make a cash offer rather than other types of payments. In Model (3), we show the test of hypothesis *H2b,* which is about positive media coverage of the target. The coefficient associated with positive media coverage is negative and significant at 10% level. Model (4) concerns *H2c*, which is about the negative media coverage of target firms. The relationship is negative and significant at the 1% level. This suggests that negative media coverage is associated with the acquirer paying less cash as a method of payment. This is consistent with the findings of de La Bruslerie (2013) and Zhu and Jog (2009), which suggest that the acquirer does not favor paying cash and prefers to make share payments in the presence of information asymmetry.

5.4. Multiple Regression of M&A Time of Completion

Table 7 reports the results of the OLS regression for the dependent variable (time of completion) and independent variables.

[Insert Table 7]

Model (1) reports the test between the dependent variable and control variables. Model (2) presents the level of media coverage in the model and the positive coefficient 0.345 and *p-value* 0.032, which is significant and consistent with the hypothesis. Model (3) measures the effect of positive media coverage on time of completion, and the coefficient is positive and

significant at 0.365 and a *p-value* of 0.040. Model (4) measures the effect of negative media coverage on time of completion in takeover transactions, with a significant coefficient of 0.685 and *p-value* of 0.033, which is significant at the 10% level and does confirm that negative media coverage is positively associated with time of completion or decreases the probability of prolonging time of completion in takeover.

6. Robustness Tests

In this section, we acknowledge that in research studies on the subject of media coverage subject, it is important to address endogeneity problems and sample selection bias and therefore to find the exogenous variables and external factors, we investigate the results of the analyses using several additional methods. We divide the robustness analyses into two sections. First, we conduct tests for potential endogeneity bias and evaluate the robustness of the results. To find the potential endogeneity of our selected sample, we introduce new variables to the test to determine the effect of the media on several related variables (Fang & Peress, 2009). Second, we check for possible sample selection bias in the next section. Next, we determine whether there are any external, unobserved, or redundant factors that might affect the sample target and bias the selection.

6.1. Bias due to endogeneity

The first model of Table 8 includes "other payments" as the dependent variable, which in turn includes other methods of payment, stock and the combination of cash and stock. This variable takes the value of 1 for other payments and 0 for cash.

$$Otherpayment = \begin{cases} 1, & if\ the\ means\ of\ pyment\ is\ other\ than\ cash \\ 0, & otherwise \end{cases} \quad (7)$$

$$Pr(Otherpayment = 1)_i = \beta_0 + \beta_1\, MC^x{}_i + \gamma\, Control\, Z_i + \delta_j + \varepsilon_i \quad (8)$$

where the probability of other payments as dummy variable is one when the mean of payment is other payments than cash and zero otherwise, and x in MC^x represents level of level media coverage, positive and negative media in the regression results, respectively. With rely on the same literature about the methods of payment in literature section, we propose that our result for model 1 to be the aligned with the result from our models for *MOP.CASH*. Accordingly, the result for the model 1 indicates that the relation between level of media coverage and other types of payments is positive and significant at 10%. This holds true for positive media coverage. These two results suggest that the more level of media coverage and positive coverage, the probability of the payment to be "Other Payments" increases. Contrariwise, there

is significant and negative coefficient for negative media coverage which suggest negative media decreases the "Other Payments".

For the second and third models of the subsample, we compute t 5-day cumulative abnormal returns *(5D.CAR)* and 5-day cumulative abnormal returns (CARs) *(3D.CAR)*. The 3D.CAR is the cumulative abnormal return over the window [-1,+1], three days prior and three days subsequent to the date of the announcement, and the *5D.CAR* is the cumulative abnormal return over the window [-2,+2], five days prior and three days subsequent to the date of the announcement (Masulis et al., 2007; Schoenberg, 2006). Using daily adjusted stock returns from CRSP, first we calculate the abnormal return for stock i at time t as the adjusted return on the stock minus the expected return at time t :

$$r_{i,t}^{abnormal} = r_{i,t} - er_{i,t} \quad (9)$$

Where the abnormal share price return of target firm i on time t, $r_{i,t}$ is the observed share price return of target firm i on time t, and $er_{i,t}$ is target firm i expected return on time t. There is a significant and positive association for both *3D.CAR* and *5D.CAR* with level and positive media, and a negative and significant association with negative media.

For the fourth model, which is the stock price (4W.Stock.Price), we calculate the target's stock price four weeks prior to the announcement of the stock price in the subsample. The association between level and positive media is positive for stock price, and not significant. On the negative level of media, however, the association is negative and significant at the 10% level.

For the fifth model, we check the profitability, operating performance and characteristics of the target firm, and introduce the target return of assets *(T.ROA)* to the regression (Hossain & Javakhadze, 2020; Salim et al., 2018). The results for the fifth model are significant and positive at the 5% level for both level and positive media, and the association is significant and negative at 10% for negative media.

[Insert Table 8]

Next we use premium paid on the market price one week prior to the announcement to check the robustness of our analyzes (Maung et al., 2019). Table 9 reports the result of the OLS regression for the dependent variable (1W.Premium) and independent variables (level of media coverage, positive media coverage and negative media coverage). We use the acquisition premium calculated based on a one-week window by measuring the natural logarithm of offer premium 1 week prior to the announcement of the takeover transaction and the results are presented in Table 8.

$$1W.Premium_i = \left[\frac{FDV_i - MVT_{-7}}{MVT_{-7}}\right] \quad (10)$$

where the FDV_i is the final deal value and MVT_{-7} is the market value of the target firm 7 days prior the date of announcement of the deal in takeover.

$$ln\,(1W.Premium_i) = \beta_0 + \beta_1\, ln\, MC^x{}_i + \rho\, Control\, X_i + \gamma\, Control\, Z_i + \delta_j + \varepsilon_i \quad (11)$$

where 1W.Premium represents natural logarithm of premium 1 week prior to the announcement and x in $lnMC^x$ represents level of media, positive and negative media in the regression results.

[Insert Table 9]

The results for the sensitivity test of bias due to the self-selection of 1W.Premium suggests no change in our main results from 4W.Premium. This indicates that there is a positive but not significant association with 1W.Premium and level of media, and that it is negative and significant at the 10% level for positive and negative media coverage and 1W.Premium.

6.2. Bias due to self-selection

6.2.1. Propensity Score Matching

In this section, we further assess the self-selection bias of our sample. We use PSM for this study (Smith & Todd, 2005; Titus, 2007). We use the Rosenbaum & Rubin, (1983) definition of propensity score as a conditional probability to receive a treatment given pre-treatment characteristics:

$$p(X) \equiv \Pr(D = 1|X) = E\{D|X\} \quad (9)$$

where $D = \{0,1\}$ is the indicator to the treatment and C is the vector of pre-treatment characteristics. In this equation, the exposure to treatment is random within cells defined by X which is also random within cells defined by the value of variable $p(X)$. Next, we apply the stratification method to estimate the Average Treatment Effect on the Treated (ATT) and compare methods of payment, premium and time of completion with and without media coverage (level of media, positive media, and negative media). This method, which is based on some stratification procedure, estimates the difference between the untreated and treated outcome. We should take to the consideration that by construction in each of the defined blocks in stratification method, the covariates are balanced and the treatments are randomly assigned (Becker & Ichino, 2002). The baseline model is:

$$ATT = \frac{\Sigma i\, MC \in I(q)\; Y_i^T}{N_q^T} - \frac{\Sigma i\, MC \in I(q)\; Y_j^C}{N_q^C} \quad (9)$$

where *I(q)* is the set of media coverage variable in block q and N_q^T and N_q^C are the numbers of treated and control variables in block q. Here is the modified model of ATT according to our treatment variables.

$$ATT = \frac{\Sigma_{i:\,Media\ Coverage=1}\{Media\ Coverage_i(lower\ MC) - Media\ Coverage_i(Higher\ MC)}{N} \quad (10)$$

In another word, ATT is the mean difference between lower than the median of the media coverage (all three forms), and higher than the median of the media coverage (all three forms). *N* is the total amount of media coverage for each of the dependent variables (premium, cash method of payment and time of completion). We follow the method and estimate the propensity score which convert our independent variables to dummy variables, and those targets whose level of media coverage, and positive and negative media coverage are above the median of the sample are the treatment group, and those below the median of the sample are the control group. We repeat these steps for methods of payment, premium and time of completion. Following the previous literature, we use a two-step approach (Adra & Barbopoulos, 2018, 2019; Gomes, 2019). We estimate the propensity score using a logit model. Table 10 reports the assessment of the effectiveness of the PSM and calculates the propensity scores before and after matching for each of the key variables. First, when the target receives low rather than high media coverage, it is sufficient to eliminate the bias due to observed covariates (Adra & Barbopoulos, 2019; Rosenbaum & Rubin, 1983).

In the step, we divide the predicted probability from the logit model from Tables 10.1A, 10.1B and 10.1C, match the propensity treated with a one-to-one nearest neighbor methodology without replacement, and set the caliper width equal to 0.01 (Bose et al., 2021; Rosenbaum & Rubin, 1983). We restrict the sample to the premium, target methods of payment and time of completion, and we estimate a logit model based on the target, and control for target market-to-book ratio, target leverage, target analyst coverage, target sales growth, target size and industry effect. To check other control variables, we also use the nearest-neighbor matching method. Using our treated variables and set of control variables, we denote set of control units to match with treated variables:

$$C_{(i)} = \underset{j}{Min} \parallel p_i - p_j \parallel \quad (11)$$

where $C_{(i)}$ is the set of control variables matched to the treatment variables. After matching treated and control observations, the results for Panel B in 10.1A, 10.1B and 10.1C show the estimation of ATT for the cash method of payment and level of media as 0.48% and is statistically significant at the 5% level; the cash method of payment and positive media as

0.46% and statistically significant at the 5% level; and the cash method of payment and negative media as 0.48% and statistically significant at the 5% level, respectively.

[Insert Table 10]

Our evidence from the PSM test for the premium and media is robust with our previous analyses. In panel A, we additional control of target market-to-book ratio, target leverage, target analyst coverage, target sales growth, target size and industry effect. The results for Panel B of 10.1A, 10.1B and 10.1C suggest that ATT for premium and level of media is 0.39% and not significant, the premium and positive media is negative and statistically significant at the 10% level, and the premium and negative media is negative and 0.39% and statistically significant at the 5% level. The results in 10.2A, 10.2B and 10.2C for the sensitivity analyses offer great support to the initial examination of the cash method of payment and media coverage at different levels. The results suggests that level of media coverage is positively associated with a cash offer at 10% level, positive media coverage is -46% and negatively associated with a cash offer and negative media is -48% and negatively associated with a cash offer. The results for Panel B of 10.3A, 10.3B and 10.3C suggest that time of completion and media coverage support our previous analyses with premium and level of media at 30.35% and highly significant at the 1% level, premium and positive media at 29.10% and highly significant at the 1% level, and premium and negative media at 21.90% and highly significant at the 1% level. Our results for method of payment, premium and time of completion ultimately support our conjecture regarding the role of level of media, positive media, and negative media in different aspects of corporate takeovers.

6.2.2. Selection bias through split-sample and external variables

In addition, to better investigate the effects of bias on media coverage, we examine the robustness of our results to solve the problems driven by selection bias of unobserved firm characteristics. First, we add an exogenous variable to our models to test the impact of external factors in our results. Second, we divide our sample in two-way terciles and the split-up is based upon target firm size (Borochin & Cu, 2018; Peress & Schmidt, 2020). The first tercile is defined as target size with below-median with total 199 target firms. The second tercile is fixed as above-median. As the tercile 2 is bigger than tercile 1, we expect the results to be stronger and more align on the second tercile. Furthermore, to add the exogenous factor to our model, we use Borochin & Cu, (2018)'s method and create an external variable called politically sensitive deal (POLIT.SEN.D) using sales and same state of target firm (Appendix

B). We additionally add analysis coverage of the target and acquirer as a proxy to measure the asymmetric information in the presence of new external variable.

[Insert Table 11]

Table 11 reports the subsample of target firm size and combined with exogenous factor of politically sensitive deal. First, we look at the tabulation of low and high tercile of target firm size and then we will analyze the results on the exogenous factor. On the lower tercile (below-median) of the split-sample suggest that smaller companies are willing to pay in cash rather than mixed method which is consistent with the findings of our initial analyses and previous literature (Zhao et al., 2019). There are no significant effects on lower tercile for premium and TOC, but the signs of the results show the same logic as our proposed hypotheses for both low and high terciles. On the higher tercile, we find statistical support for Hypotheses 1b,1c and 3a,3b and 3c but not for Hypotheses 2a, 2b and 2c. The same as previous logic, the results on premium size is consistent with study by Maung et al., (2019) that suggest larger target tend to receives lower premium and that is what our results indicate.

Next, as the media coverage is politically biased (Borochin & Cu, 2018), we analyze if different characteristics of the acquisitions are politically sensitive deal. The results shows that on payment method level, there is negative and significant reaction to the political sensitive deal varies in both terciles of the sample and can be interpreted as more political news coverage of the target can result the acquirer to pay less the cash offer. The outcome on TOC level is positive and significant on high tercile of the split-sample meaning that the more political sensitive the deal is, the more is likely to prolong the deal completion. On premium level, there are no reactions on the political sensitivity of the deal. Indeed, media coverage of any kind is not affected by premium at low or high tercile. Overall, the acquisition reaction to media coverage varies not only based on the type of news coverage but also the size of the target firm influences how much information is transmitting through the firm.

7. Conclusion

7.1. Theoretical conclusion

In this study, we examine the impact of target media coverage on various takeover characteristics. We demonstrate on the interaction between financial information and premium, method of payment and time of completion. Drawing from agency theory, this paper argues that the neutral, positive, and negative information that an acquirer receives from the media coverage of the target affects different characteristics of the acquisition process, from pre-merger to interim and post-merger. While previous studies examined the relationship between

media coverage and mergers and acquisitions, we discuss in depth how media coverage with neutral, positive, and negative information affects the premium paid, methods of payments, and time of completion in the pre-merger and interim-merger process.

The findings of this study are obtained by considering these hypotheses from three angles. First, the results on premium suggest that the level of media coverage is negatively associated with the premium and leads the acquirer to pay less premium to the target. Conversely, positive media coverage and premium are negatively significant and associated with less premium paid in the deal. This is aligned with previous literature on less asymmetric information led to less premium (Cheng et al., 2016a; Milgrom & Weber, 1982). The results for negative media coverage and premium show that there is a negative and significant association between them which confirms the proposed hypothesis. These results have contradiction with other strands of literature suggest otherwise about asymmetric information and premium (Dionne et al., 2015; Jory et al., 2016) and emphasizes that the negative information has a greater impact compared to positive information (Ito et al., 1998).

The second results on our investigation about the media and the method of payment provide the findings that the level of media coverage is positively related to the cash method of payment in the acquisition process. In addition, the finding for the positive media coverage of the target is negatively associated with the acquirer paying cash to the target. As the same as previous test, the finding for the negative media coverage shows negatively significant result which is associated with cash methods of payment. As expected, both results for *level of media coverage* and *negative media coverage* are in line with previous literature (Faccio & Masulis, 2005; Yang, Guariglia, et al., 2019) but the rejection on the results related to the positive media coverage indicates a possible reason for this phenomenon that is, even though the acquirer receives positive news about the target, sometimes overload of positive information prompts the reverse reaction and the outcomes would be negative instead (Andrejevic, 2013). Another plausible explanation would be that the perception of the news depends on the audience for that news, and the same news with a positive weight for one person, might have a different meaning and concept for another. That is why the level of positive news is somehow negatively correlated to negative news.

Finally, the third results on time of completion and media coverage suggest that the level of media coverage, the positive media coverage, and negative media coverage, are all positively associated with time of completion which only the first two hypotheses cover previous literature (Buczek, 2016; Luypaert & Van Caneghem, 2017). To explain the rejection

of our third hypothesis, we refer to the study by Soroka (2006), which studies the relevance of news according to an individual's response to the news, and suggests that there is an asymmetric response to the information. He further proposes from a political science and psychology perspective that when measuring the effect, the effect of the news, it is unlikely that an individual has a symmetric response (prospect theory)[14] to different types of news, meaning that an increase of one unit of negative media coverage is not equal to a decrease of one unit t of the same unit. This means that an individual may respond differently to financial news, and relatively negative news may affect them differently than expected in the deal ahead. Accordingly, the responsiveness of the media and public information makes it evident that the positivity and negativity of news may lead to different types of deals in the takeover process.

This study explores the effect of target media coverage with different dimensions of takeover transaction. Previous literatures suggest that media coverage as a source of information, plays key role in corporate decision-making process. However, there is no evidence in the literature that shows how various thematic categories of media coverage such as natural, positive or negative influence M&A outcome. This paper addresses this relation by uncovering evidence to show that the effect of media coverage works in part through information asymmetry. Furthermore, we document that there is a positive association between increasing media coverage and premium which is consist with previous opportunistic acquisition literatures (Cheng et al., 2016a; Milgrom & Weber, 1982). As our relied literature says otherwise about the premium (Dionne et al., 2015; Jory et al., 2016), our results suggest that some of our inferences on the subject of media coverage and premium, method of payment and time of completion are likely affected by reverse causality (Buehlmaier, 2012). Although with various tests on endogeneity, we examined the effect of reverse causality in our sample (Mayssara A. Abo Hassanin Supervised, 2014; Peress, 2014). We address the taxonomy and extensive categorization of media coverage, and we show that eventually our results suggest that reverse causality is not likely to explain our primary results. Finally, we raise the ignored concerns regarding the enigmatic rule of different types of media coverage and how these types can have duplicitous pattern and effectiveness. Overall, our investigation reveals that there are important implications on the interplay between several types of information disseminated

[14] "In economics, prospect theory is built upon an asymmetric response to negative and positive information: people are risk-averse facing gains and risk-seeking facing losses" (Fournier et al., 2020)

from media coverage and its governance role in corporate acquisition. In this regard, our results add unique insights into the discussion on the relationship between media and M&A. Eventually, one probably fair argument would be that even though there is strong correlation between media and information asymmetry, yet the outcome of this relation cannot be predicted as the perception of media coverage varies for different people.

7.2. Managerial implications

Our study carries certain managerial implications which are practically relevant and provide important insights for executives. To this end, the study suggests practical approaches that recommended by the literature and suggest that the acquirer ought to see media coverage as a key source to get the information about the target, but the outcome might vary depends on what kind of information comes. By clarifying how media coverage works into M&A transaction, this study suggests two more approaches through takeover path. First, managers should carefully analyze the information that comes from media in decision-making process. In another word, managers should be careful about the power of the media and be sure that the source of information is reliable and trustworthy. Executives should focus on concrete material (Vaara & Monin, 2010) and make sure that media coverage is a tool for assistance and not a way to sabotage a decision process. Second, this study examines how media coverage as a source of information interferes both constructively and destructively in the takeover transaction.

7.3. Limitations and future research directions

Certainly, our paper also suffers from several limitations that provide opportunities for future research. First, we only looked at the thematic categories of media coverage of the target firm. Albeit there are previous studies which discuss positive/negative media in acquirer level but to our knowledge, there are no studies to examine all three thematic categories on other outcomes of takeover from both sides of the deal. Second, future research could incorporate new insights by introducing post-merger phase of media coverage for acquirer and target.

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Figures

Figure 1: Media Coverage on Frequency and Certainty axes

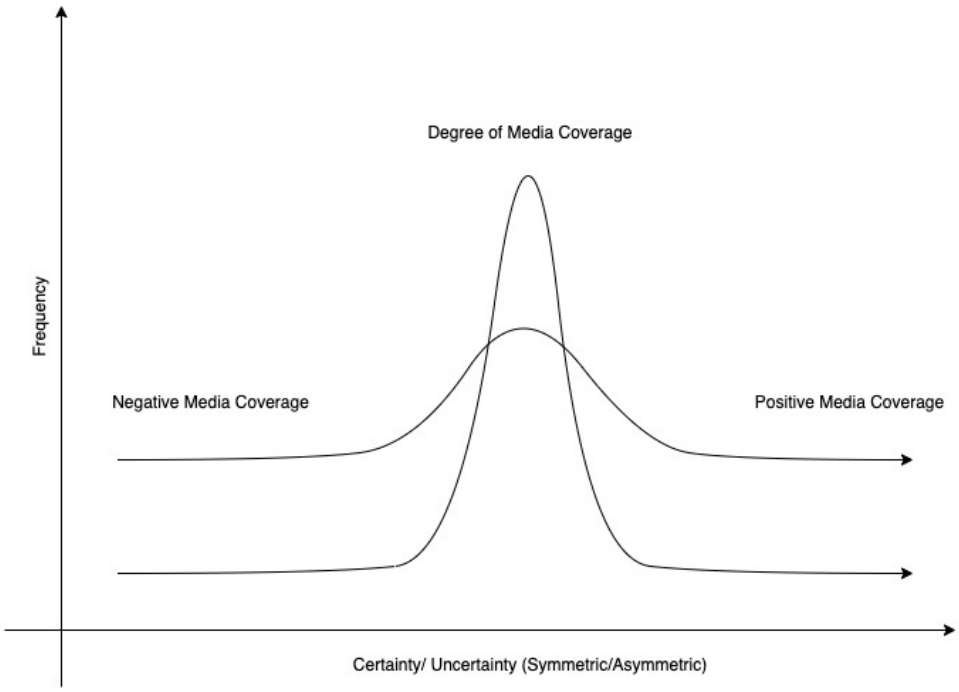


Figure 1 demonstrates how uncertainty can be interpreted as a proxy for different types of media coverage. Accordingly, uncertainty and information asymmetry are correlated, and the same is true of certainty and symmetric information. The X-axis is labelled as "uncertainty" axis, represents the distribution of information. The Y-axis is labelled as "frequency" axis. The upper curves represent the distribution of media coverage with regard to the uncertainty index. As the "level of media coverage" demonstrates, the middle is the general concept of media coverage and the more the line extends to left and right, the more it represents the positive and negative curve of media coverage. In other words, the more uncertainty, the more dispersion of positive and negative media coverages, whereas outsiders will more agree on a narrower view (a lot of frequency at the same level) which results to less uncertainty.

Figure 2: T-Distributed Stochastic Neighbor Embedding of Media Coverage

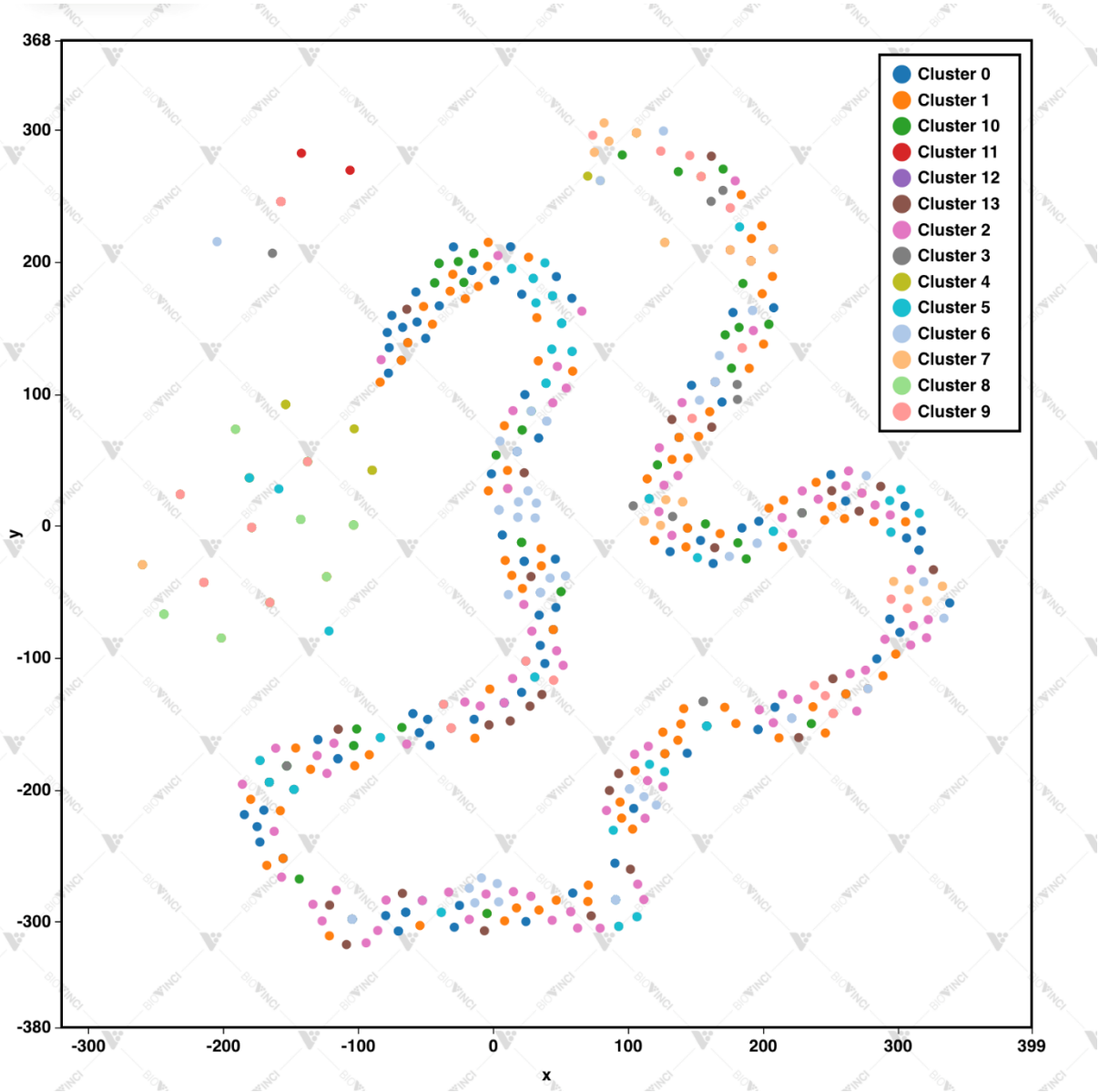
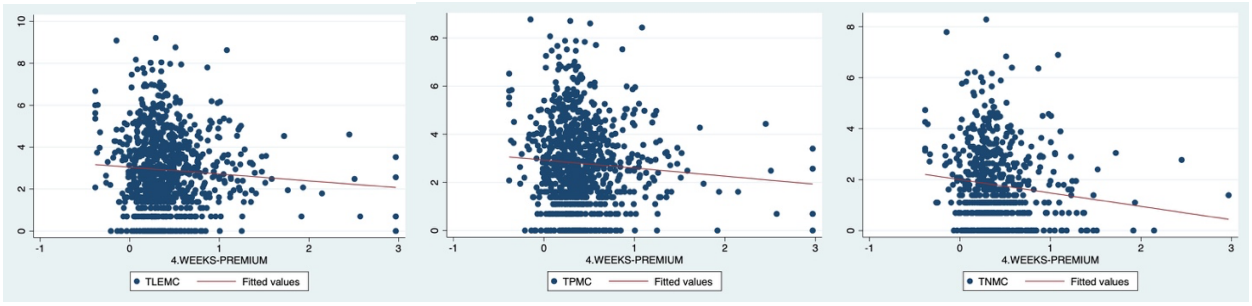


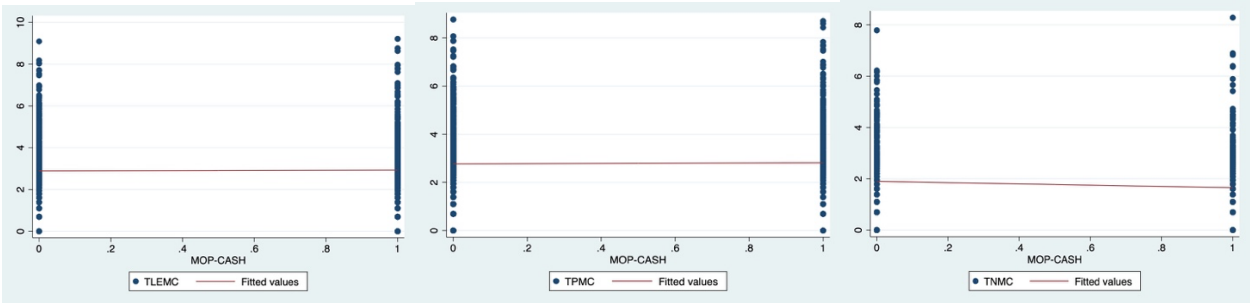
Figure 2, we use probabilistic method to visualize high dimensional data. We demonstrate the t-distributed stochastic neighbor embedding of all media coverage variables from level of media to positive and negative media coverage. We use this method to explore our data and visualize high dimension of the variables. To explain more, two different divergences are minimized in this method; one which we measure pairwise similarities of all our media data point and one we measure pairwise similarities of the corresponding low-dimensional media data point in the embedding model. we then compute the similarity between three sets of media data points using a conditional probability. As indicated in the figure, we get 13 clusters algorithm that analyzes the average points between data. The distribution shows that media data points are focused on maintaining the nearest neighbor in low dimension map and they are preserved the local structure of the point data.

Figure 3. Distribution of level, positive and negative media coverage through premium, MOP, and TOC.

Panel A: Premium and MC



Panel B: MOP and MC



Panel C: TOC and MC

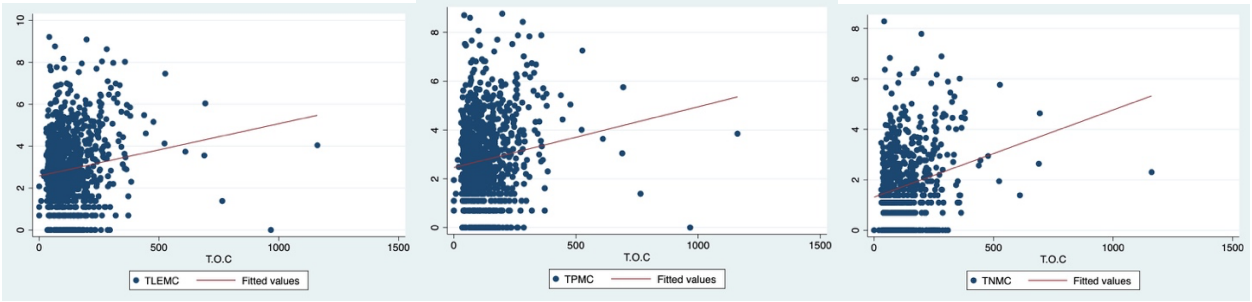


Figure 3 shows the scatter plot for the independent and dependent variables combined over the period 2000 to 2017. The figures represent the mean calculated for each variable. As indicated in the graphs, the mean is demonstrated as the horizontal axis. Panel A is scatter plot of premium, panel B is scatter plot for MOP and panel C is scatter plot for TOC and level, positive and negative media coverage respectively.

Tables

Table 1. Sample Distribution of Method of Payment, Premium and Time of Completion.

Year	# Deals	% Deals	# Premium	# MOP.Cash	# Other Payments	# Time of Completion
2000	55	6%	0.489	14	41	55
2001	48	5%	0.638	18	30	48
2002	35	4%	0.548	15	20	35
2003	39	4%	0.432	13	26	39
2004	53	6%	0.315	23	30	53
2005	53	6%	0.325	25	28	53
2006	55	6%	0.321	35	21	55
2007	60	7%	0.306	28	32	60
2008	39	4%	0.501	18	21	39
2009	40	4%	0.509	16	24	40
2010	54	6%	0.561	34	20	54
2011	29	3%	0.372	8	21	29
2012	51	6%	0.472	30	21	51
2013	46	5%	0.386	26	20	46
2014	61	7%	0.415	20	41	61
2015	70	8%	0.381	30	40	70
2016	69	8%	0.395	35	33	69
2017	45	5%	0.329	23	22	45
Total	902	100%	0.422	411	491	902

Table 1 represents the distribution for the number of all sorts of payments methods (Cash and other forms of payment), premium and time of completion for all the firms in the sample with level of media coverage, positive and negative media coverage. The vertical axis also represents the numbers of the deals and percentage of the deals and horizontal axis represent the years of the sample from 2000-2017.

Table 2. Sample Distribution of Media Coverage

Panel A: Summary Statistics of Media Coverage Categorized by Level of Media Coverage, Positive and Negative Media Coverage																		
	Total Number of Media Coverage			Level of Media Coverage					Positive Media Coverage					Negative Media Coverage				
Year	TLEMC	TPMC	TNMC	Mean	Std.	P25	Median	P75	Mean	Std.	P25	Median	P75	Mean	Std.	P25	Median	P75
2000	2740	2433	307	48,07	116,03	2874,50	11,00	8859,25	42,68	100,14	2504,25	11,00	7554,75	5,39	16,69	466,50	0,00	1304,50
2001	3167	2718	449	64,63	138,72	3326,50	14,00	11771,00	48,59	107,22	2830,75	12,50	9545,25	7,13	20,14	529,25	0,50	1571,00
2002	984	810	174	27,33	36,37	3805,00	10,50	12545,00	48,53	111,50	3169,00	13,00	10023,00	6,55	17,77	560,00	1,00	1649,00
2003	1714	1397	317	40,81	100,27	3948,25	10,00	12735,25	39,99	90,65	3369,25	11,00	10241,25	6,78	19,42	617,00	1,00	1796,25
2004	2334	2077	257	42,44	135,42	4580,50	10,00	12925,50	39,48	100,83	3913,00	10,00	10459,50	6,29	17,60	639,50	1,00	1943,50
2005	5165	4390	775	93,91	170,75	5170,75	19,00	13115,75	47,02	112,10	4399,75	12,00	10677,75	7,75	20,33	676,00	1,00	2090,75
2006	9449	8112	1337	180,18	927,91	5188,00	14,00	13306,00	61,97	222,75	4429,00	12,00	10896,00	10,21	36,92	643,00	1,00	2238,00
2007	3805	3169	636	58,54	217,60	4890,00	14,00	13454,25	59,92	216,23	4180,75	12,00	11087,25	10,15	37,39	641,25	1,00	2499,25
2008	13306	10023	3283	309,44	1383,05	5222,50	10,00	13602,50	76,04	370,82	4487,00	11,50	11278,50	16,29	120,36	735,50	1,00	2760,50
2009	13899	11661	2238	339,00	1033,51	5205,25	18,00	13560,50	93,02	433,92	4458,00	12,00	11469,75	19,42	125,96	689,25	1,00	2090,75
2010	2777	2258	519	47,07	95,10	5188,00	11,00	12545,00	87,27	411,52	4429,00	12,00	10896,00	18,30	119,40	643,00	1,00	1649,00
2011	5600	4716	884	164,71	522,49	5239,75	6,50	14359,25	90,21	413,68	4516,00	11,00	11752,00	18,74	117,22	781,75	1,00	2607,25
2012	5188	4545	643	101,73	207,02	5222,50	26,00	16173,50	90,12	400,43	4487,00	12,00	12608,00	18,26	112,69	735,50	1,00	3565,50
2013	3996	3436	560	79,92	171,86	5715,25	10,00	17987,75	88,59	387,92	4792,50	12,00	13464,00	17,75	108,76	922,75	1,00	4523,75
2014	5257	4429	828	77,31	198,28	7090,00	13,00	19802,00	86,50	373,60	5883,00	12,00	14320,00	17,25	104,28	1207,00	1,00	5482,00
2015	19802	14320	5482	244,47	1172,50	11181,25	13,00	44556,00	95,15	423,65	9642,75	12,00	35058,25	22,08	169,40	1538,50	1,00	9497,75
2016	7090	5883	1207	86,46	324,32	9817,50	10,50	65681,50	93,08	411,68	8389,50	12,00	54084,50	21,43	162,97	1428,00	1,00	11597,00
2017	12545	10896	1649	250,90	983,44	39113,25	13,50	92249,75	99,46	444,34	32490,25	11,50	75678,75	22,02	161,78	6623,00	1,00	16571,00
Total	118818	97273	21545	2256,91	7934,65	118818,00	234,00	118818,00	1287,62	5132,97	97273,00	211,50	331094,50	251,80	1489,06	20076,75	16,50	75436,75

Panel B: Distribution of Media Coverage across Industry						
	(Level of Media Coverage) Overall News		Positive Media Coverage		Negative Media Coverage	
	N	%	N	%	N	%
Consumer Products and Services Energy and Power	8722	0,06	7726	0,069	996	0,042
Consumer Staples	3368	0,02	2828	0,025	540	0,023
Energy and Power	5481	0,04	4578	0,041	903	0,038
Financials	9329	0,07	7801	0,070	1527	0,065
Healthcare	13732	0,10	11784	0,105	1948	0,083
High Technology	32785	0,24	24911	0,223	7868	0,334
Industrial	14613	0,11	11496	0,103	3117	0,132
Materials	2167	0,02	1916	0,017	251	0,011
Media and Entertainment	21234	0,16	17971	0,161	3263	0,138
Real Estate	382	0,00	343	0,003	39	0,002
Retail	4225	0,03	3691	0,033	534	0,023
Telecommunications	2780	0,02	2228	0,020	552	0,023

Table 2 reports the summary statistics of 902 news for the target firms during the period of 2000 to 2017 from four well-stablished journals Wall Street Journal Abstracts (WSJ Abstract), New York Times (NYT), USA Today (USAT), and The Washington Post (WP). Panel A tabulates the summary statistics of media coverage categorized by level of media coverage, positive and negative news. The column “Total number of media coverage” represents the total number of all news related to level, positive and negative ones sorted by year. The next three columns present the mean, standard deviation, 25th percentile, median and 75th percentile of the independent variables. Panel B reports the distribution of all three types of media coverage across different industries.

Table 3. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
ln.TLEMC	902	2.90	1.78	7.64	1.60	2.77	4.04	9.21
ln.TPMC	902	0.78	1.75	5.98	1.38	2.63	3.91	8.76
ln.TNMC	902	0.73	1.55	5.76	0.69	1.49	2.77	8.28
MOP.CASH	902	0.45	0.49	0	0	0	1	1
4W.PREMIUM	902	0.42	0.40	-.384	0.19	0.35	0.55	2.96
T.O.C	902	0.32	0.97	0.72	3.70	5.85	165	11.6
A.FCF	902	0.05	0.09	-0.62	0	0.60	0.10	0.28
A.MTB	902	4.27	9.47	-13.05	1.63	2.43	3.91	10.76
REL.SIZE	902	0.24	0.35	0	0.03	0.10	0.33	3.93
A.LEV	902	0.17	0.16	0	0.03	0.13	0.25	0.89
A.STOCK.RE	902	0.08	0.25	-0.55	-0.05	0.05	0.19	1.29
A.ANALYST.C	902	14.24	9.90	0	6	12	21	54
T.MTB	902	2.86	5.76	-24.62	1.17	1.91	3.30	45.99
T.SIZE	902	2.69	0.76	0.88	2.11	2.69	3.18	4.79
T.R&D	902	0.07	0.13	0	0	0	0.09	0.98
T.SALES.GRO	902	0.21	0.89	-0.93	-0.01	0.07	0.21	10.26
T.LEV	902	0.15	0.23	0	0	0.06	0.22	3.23
T.ANALYST.C	902	6.82	6.95	0	2	5	9	44
T.HI.TECH	902	0.23	0.42	0	0	0	0	1
SAME.STATE	902	0.27	0.44	0	0	0	0	1
RELATED	902	0.70	0.45	0	0	1	1	1

Table 3 reports the summary statistics of variable used in the regressions. The sample includes 902 M&A public completed deals of target from 2000 to 2017 drawn from Thomson Financials' EIKON mergers and acquisitions database. The table reports number of observations, mean, standard deviation, min and max. All variables are defined in Table 1 of Appendix B.

Table 4. Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
(1)lnTLEMC	1																					
(2)lnTPMC	0.99***	1																				
(3)lnTNMC	0.91***	0.85***	1																			
(4)MOPCASH	0.01	0.01	0.01	1																		
(5)4WSPREM	-0.04	-0.04	-0.03	0.12***	1																	
(6)TOC	0.07*	0.08*	0.03	-0.34***	-0.08*	1																
(7)AFCF	0.02	0.02	0.01	0.32***	-0.02	-0.14***	1															
(8)AMTB	0.06*	0.07*	0.04	-0.00	0.04	-0.01	0.07*	1														
(9)RELSIZE	0.07*	0.08	0.04	-0.26***	-0.19***	0.22***	-0.09**	0.03	1													
(10)ALEV	0.10**	0.11***	0.08**	0.10**	-0.04	-0.00	0.11***	0.22***	0.13***	1												
(11)ASTOCKRE	-0.06	-0.06*	-0.05	-0.06	-0.10**	-0.03	0.02	0.04	-0.00	0.01	1											
(12)AANALYSTC	0.10**	0.11***	0.07*	0.24***	0.02	-0.06	0.25***	0.04	-0.26***	0.05	-0.03	1										
(13)TMTB	-0.02	-0.02	-0.02	-0.01	-0.07*	-0.06*	0.06*	0.06	0.03	0.01	0.08*	0.09**	1									
(14)TSIZE	0.21***	0.22***	0.15***	-0.26***	-0.21***	0.42***	0.00	-0.00	0.28***	0.11***	-0.01	0.19***	-0.10**	1								
(15)TRD	-0.05	-0.05	-0.04	0.17***	0.26***	-0.24***	-0.05	0.02	-0.15***	-0.06*	0.00	0.12***	0.19***	-0.45***	1							
(16)TSALESGRO	-0.02	-0.02	-0.01	-0.02	0.04	-0.08**	-0.03	0.25***	-0.01	0.03	0.05	0.01	0.07*	-0.14***	0.06*	1						
(17)TLEV	0.04	0.05	0.03	0.00	0.04	0.11***	0.09**	0.08**	0.14***	0.37***	-0.00	0.05	-0.04	0.24***	-0.05	-0.02	1					
(18)TANALYSTC	0.22***	0.23***	0.15***	0.01	-0.06*	0.10**	0.17***	0.07*	0.13***	0.14***	-0.00	0.54***	0.06*	0.50***	0.00	-0.01	0.17***	1				
(19)THITECH	0.02	0.01	0.04	0.17***	0.02	-0.22***	0.08**	0.05	-0.04	-0.07*	0.11***	0.12***	0.11***	-0.28***	0.26***	0.07*	-0.16***	0.09**	1			
(20)SAMESTATE	0.02	0.01	0.03	-0.17***	-0.02	0.09**	-0.15***	-0.05	0.10**	-0.07*	-0.01	-0.10**	-0.02	0.07*	-0.06	-0.05	-0.06	-0.03	-0.02	1		
(21)RELATED	-0.04	-0.03	-0.04	-0.18***	0.01	0.14***	-0.07*	-0.01	0.03	-0.02	0.03	-0.07*	0.03	0.10**	0.05	0.06	0.02	-0.03	-0.06	0.05	1	
(22)DEALATT	-0.01	-0.01	-0.00	-0.00	-0.11***	-0.00	0.02	-0.01	-0.01	-0.05	0.05	0.01	0.00	0.02	-0.02	0.00	-0.00	0.003	0.01	-0.04	0.00	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4 represents the Pearson Correlation coefficient for the dependent and independent variables in this study. The sample consists of 902 observations of publicly traded target firms, and the sample period spans 2000 through 2017. *ln.TLEMC* is the total number of media coverage for target firms. *ln.TPMC* refers to the media coverage of target with positive news and *ln.TNMC* refers to the media coverage for target firms with negative news. *A.FCF* is acquirer free cash flow. *A.MTB* is acquirer book-to-market ratios, *A.LEV* is leverage of the acquirer, A.STOCK.RE is the stock return of the acquirer and *A.ANALYST.C* is the acquirer analyst coverage. These refer to target firms: *T.MTB* target book-to-market ratios, *T.SIZE* target size, *MOP.CASH* is an indicator variable with the value of one if the target firm has media coverage, otherwise zero. 4W.Premium is the excess priced offered to the target one month (4 weeks), *T.R&D* target R&D, *T.SALES.G* target sales growth, *T.LEV* is target leverage, T.ANALYST.C is target analyst coverage. In addition, other dummy variables in this study are *T.HI.TECH* which is target high tech industry, *Related* as industry relatedness of both acquirer and target firms and *SAME.STATE* as both firms being in the same state. All variables are winsorized at the 1% and 99% levels and used Bonferroni adjustment to adjust the significance level. *T*-statistics are referred on standard errors adjusted for the autocorrelation and ∗, ∗∗, and ∗∗∗ represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table 5. Multiple Regression of M&A Premium and Media Coverage

Ordinary least squares Regression				
Dependent variable: 4W.Premium				
	Model (1)	*Model (2)*	*Model (3)*	*Model (4)*
Intercept	0.612***	0.629***	0.633***	0.627***
	(0.000)	(0.000)	(0.000)	(0.000)
ln.TLEMC		-0.002		
		(0.807)		
ln.TPMC			-0.020**	
			(0.007)	
ln.TNMC				-0.027**
				(0.004)
A.FCF	-0.098	-0.969	-0.191	-0.154
	(0.714)	(0.707)	(0.748)	(0.536)
A.MTB	0.002	0.002	0.002	0.003**
	(0.078)	(0.087)	(0.072)	(0.004)
REL.SIZE	-0.167***	-0.160***	-0.161***	-0.120***
	(0.000)	(0.000)	(0.000)	(0.000)
A.LEV	-0.198*	-0.187*	-0.124	-0.044
	(0.025)	(0.034)	(0.153)	(0.540)
A.STOCK.RE	-0.154**	-0.161**	-0.163**	-0.106
	(0.008)	(0.009)	(0.008)	(0.237)
A.ANALYST.C	-0.001	0.001	0.000	0.001
	(0.414)	(0.299)	(0.593)	(0.824)
T.ANALYST.C	0.002	0.001	0.001	0.000
	(0.331)	(0.512)	(0.506)	(0.980)
T.SALES.GR	0.002	0.005	0.005	-0.015
	(0.861)	(0.757)	(0.764)	(0.544)
T.MTB	-0.007***	-0.007***	-0.007***	-0.005*
	(0.000)	(0.000)	(0.000)	(0.034)
T.LEV	0.194*	0.199**	0.198*	0.075
	(0.015)	(0.010)	(0.010)	(0.231)
T.R&D	0.653***	0.627***	0.626***	0.382*
	(0.000)	(0.000)	(0.000)	(0.022)
T.SIZE	-0.064*	-0.072**	-0.071*	-0.077
	(0.012)	(0.010)	(0.010)	(0.076)
T.HI.TECH	0.057	0.058	-0.032	-0.064
	(0.087)	(0.080)	(0.365)	(0.105)
SAME.STATE	-0.027	-0.026	-0.008	-0.013
	(0.353)	(0.387)	(0.747)	(0.657)
RELATED	0.014	0.013	0.013	0.024
	(0.615)	(0.647)	(0.570)	(0.445)
YR.EF	Yes	Yes	Yes	Yes
IND.EF	Yes	Yes	Yes	Yes
Observation	902	902	902	902
Adj R-squared	0.131	0.313	0.325	0.236

Table 5 reports the result of Ordinary least squares (OLS) regression for the dependent variable (4W.Premium) and independent variables (Total number of media coverage, Positive media coverage and Negative media coverage). 4W.Premium is excess offer price over stock price four weeks prior the announcement of takeover. *ln.TLEMC* is the level of media coverage and equal to total number of media coverage for target firms. *ln.TPMC* refers to the media coverage of target with positive news and *ln.TNMC* refers to the media coverage for target firms with negative news. All control variables are defined in Appendix B. All variables are winsorized at the 1% and 99% levels and used Bonferroni adjustment to adjust the significance level. *T*-statistics are referred on standard errors adjusted for the autocorrelation and ∗, ∗∗, and ∗∗∗ represent statistical significance at the 10%, 5%, and 1% level, respectively. The table presents coefficients and t-statistics, and all the standard errors and *P-values* are reported in parentheses.

Table 6. Multiple Regression of M&A Methods of Payment and Media Coverage

Probit Regression				
Dependent variable: Method of Payment (Cash)				
	Model (1)	*Model (2)*	*Model (3)*	*Model (4)*
Intercept	-0.721***	-0.692***	-0.698***	-0.721***
	(0.000)	(0.000)	(0.000)	(0.000)
ln.TLEMC		0.001*		
		(0.043)		
ln.TPMC			-0.000*	
			(0.032)	
ln.TNMC				-0.000***
				(0.001)
A.FCF	0.510***	0.469***	0.468***	0.473***
	(0.000)	(0.000)	(0.000)	(0.000)
A.MTB	-0.014**	-0.013*	-0.013*	-0.013*
	(0.003)	(0.020)	(0.031)	(0.021)
REL.SIZE	-0.617*	-0.617*	-0.615***	-0.630
	(0.022)	(0.039)	(0.000)	(0.054)
A.LEV	0.927**	0.765*	0.762*	0.789
	(0.003)	(0.034)	(0.018)	(0.086)
A.STOCK.RE	-0.404*	-0.380	-0.379*	-0.408
	(0.031)	(0.057)	(0.044)	(0.056)
A.ANALYST.C	0.022**	0.024**	0.024***	0.024**
	(0.001)	(0.003)	(0.000)	(0.009)
T.ANALYST.C	-0.008	-0.006	-0.006	-0.008
	(0.378)	(0.471)	(0.472)	(0.358)
T.SALES.GR	-0.080	-0.093	-0.093	-0.093
	(0.099)	(0.095)	(0.094)	(0.095)
T.MTB	-0.019**	-0.022**	-0.022*	-0.022**
	(0.010)	(0.005)	(0.011)	(0.005)
T.LEV	0.060	0.153	0.155	0.144
	(0.754)	(0.491)	(0.503)	(0.563)
T.R&D	0.184	0.295	0.285	0.316
	(0.657)	(0.516)	(0.535)	(0.532)
T.SIZE	-0.483***	-0.519***	-0.521***	-0.510*
	(0.000)	(0.000)	(0.000)	(0.012)
T.HI.TECH	0.275*	0.301*	0.303*	0.301*
	(0.021)	(0.014)	(0.015)	(0.022)
SAME.STATE	-0.251*	-0.324**	-0.325**	-0.326
	(0.013)	(0.005)	(0.003)	(0.073)
RELATED	-0.333***	-0.279*	-0.277*	-0.290
	(0.001)	(0.019)	(0.011)	(0.071)
YR.EF	Yes	Yes	Yes	Yes
IND.EF	Yes	Yes	Yes	Yes
Observation	902	902	902	902
Pseudo R Squared	0.036	0.038	0.043	0.037

Table 6 reports the result of Probit regression for the dependent (methods of payment) and independent variables (Total number of media coverage, Positive media coverage and Negative media coverage) in this study. *MOP.CASH* is an indicator variable with the value of one if the target firm has media coverage, otherwise zero. *ln.TLEMC* is the level of media coverage and equal to total number of media coverage for target firms. *ln.TPMC* refers to the media coverage of target with positive news and *ln.TNMC* refers to the media coverage for target firms with negative news. All control variables are defined in Appendix B. All variables are winsorized at the 1% and 99% levels and used Bonferroni adjustment to adjust the significance level. *T*-statistics are referred on standard errors adjusted for the autocorrelation and ∗, ∗∗, and ∗∗∗ represent statistical significance at the 10%, 5%, and 1% level, respectively. The table presents coefficients and t-statistics, and all the standard errors and *Z-statistics* are adjusted for heteroscedasticity-Consistent. *P-values* are reported in parentheses.

Table 7. Multiple Regression of M&A Time of Completion and Media Coverage

Ordinary least squares Regression				
Dependent variable: Time of Completion (TOC)				
	Model (1)	*Model (2)*	*Model (3)*	*Model (4)*
Intercept	1.820**	1.656*	1.622*	1.818*
	(0.010)	(0.019)	(0.022)	(0.037)
ln.TLEMC		0.345*		
		(0.032)		
ln.TPMC			0.365*	
			(0.040)	
ln.TNMC				0.685*
				(0.033)
A.FCF	-0.111**	-0.111**	-0.112**	-0.137**
	(0.002)	(0.002)	(0.002)	(0.006)
A.MTB	0.239	0.235	0.244	0.245
	(0.296)	(0.301)	(0.286)	(0.316)
REL.SIZE	0.257*	0.249*	0.252*	0.182
	(0.016)	(0.020)	(0.020)	(0.139)
A.LEV	-0.336	-0.373	-0.367	-0.278
	(0.133)	(0.099)	(0.105)	(0.329)
A.STOCK.RE	-0.464	-0.402	-0.287	-0.289*
	(0.685)	(0.728)	(0.808)	(0.037)
A.ANALYST.A	-0.224	-0.198	-0.157	-0.126
	(0.440)	(0.480)	(0.591)	(0.735)
T.ANALYST.C	0.856	-0.813	-0.815	-0.896
	(0.102)	(0.107)	(0.016)	(0.087)
T.SALES.GR	-0.415***	-0.426***	-0.438***	-0.430**
	(0.000)	(0.000)	(0.000)	(0.003)
T.MTB	-0.032	-0.009	-0.010	-0.026
	(0.944)	(0.983)	(0.980)	(0.592)
T.LEV	0.156	0.159	0.162	0.168
	(0.373)	(0.369)	(0.366)	(0.531)
T.R&D	-0.313	-0.329	-0.317	-0.300
	(0.154)	(0.133)	(0.144)	(0.236)
T.SIZE	0.494***	0.478***	0.479***	0.498***
	(0.000)	(0.000)	(0.000)	(0.000)
T.HI.TECH	-0.168**	-0.181***	-0.184***	-0.158*
	(0.003)	(0.001)	(0.001)	(0.003)
SAME.STATE	0.498	0.689	0.697	0.402
	(0.372)	(0.190)	(0.191)	(0.451)
RELATED	0.183***	0.193***	0.191***	0.221***
	(0.001)	(0.001)	(0.001)	(0.001)
YE.EF	Yes	Yes	Yes	Yes
IND.EF	Yes	Yes	Yes	Yes
Observation	902	902	902	902
Adj R-squared	0.203	0.199	0.195	0.256

Table 7 reports the result of Ordinary least squares (OLS) regression for the dependent variable (Time of completion) and independent variables (Total number of media coverage, Positive media coverage and Negative media coverage). The sample consists of 902 observations of publicly traded target firms, and the sample period spans 2000 through 2017. T.O.C is the number of the days between deal announcement and actual day of completion. *ln.TLEMC* is the level of media coverage and equal to total number of media coverage for target firms. *ln.TPMC* refers to the media coverage of target with positive news and *ln.TNMC* refers to the media coverage for target firms with negative news. All control variables are defined in Appendix B. All variables are winsorized at the 1% and 99% levels and used Bonferroni adjustment to adjust the significance level. *T*-statistics are referred on standard errors adjusted for the autocorrelation and ∗, ∗∗, and ∗∗∗ represent statistical significance at the 10%, 5%, and 1% level, respectively. The table presents coefficients and t-statistics, and all the standard errors and *P-values* are reported in parentheses.

Table 8. Robustness test for Media Coverage

Robustness test (Multiple regression results)

	Model (1)			*Model (2)*			*Model (3)*			*Model (4)*			*Model (5)*		
	Dep: Other Payments			Dep: 3D.CAR			Dep: 5D.CAR			Dep: 4W.Stock.Price			Dep: T.ROA		
Intercept	3124	3674	3.909*	-2.294***	-2.314***	-2.980***	-2.431**	-2.477**	-3.650***	-48.42***	-48.35***	-46.10**	1.308	1.259	0.985
	(0.301)	(0.216)	(0.030)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.010)	(0.104)	(0.096)	(0.324)
ln.TLEMC	0.0901*			0.002*			0.002**			0.018			0.003**		
	(0.050)			(0.018)			(0.004)			(0.299)			(0.001)		
ln.TPMC		0.086*			0.002*			0.003**			0.022			0.003**	
		(0.048)			(0.025)			(0.005)			(0.256)			(0.001)	
ln.TNMC			-0.080**			-0.003*			-0.005**			-0.058*			-0.003*
			(0.003)			(0.041)			(0.005)			(0.038)			(0.018)
A.FCF	0.542	0.448	-0.005	0.098***	0.095***	0.166***	0.107***	0.107***	0.107***	-0.106	-0.118	-0.134	0.338***	0.341***	0.343***
	(0.637)	(0.459)	(0.988)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.721)	(0.748)	(0.758)	(0.000)	(0.000)	(0.000)
A.MTB	0.002	0.0015	0.003	0.000	0.000	-0.000	0.000	0.000	-0.000	-0.003	-0.003	-0.004	-0.000	-0.000	-0.000
	(0.713)	(0.675)	(0.378)	(0.137)	(0.267)	(0.894)	(0.231)	(0.356)	(0.115)	(0.398)	(0.323)	(0.287)	(0.121)	(0.146)	(0.314)
A.LEV	-0.002	-0.005	0.215	0.019	0.020	0.0237	0.021*	0.0249*	0.026	0.402*	0.477*	0.680*	0.029*	0.0251*	0.0129
	(0.997)	(0.980)	(0.420)	(0.048)	(0.062)	(0.098)	(0.046)	(0.050)	(0.121)	(0.048)	(0.041)	(0.017)	(0.050)	(0.041)	(0.421)
T.MTB	0.008	0.007	0.0139*	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.009	0.008	0.0033	0.001***	0.001***	0.000*
	(0.314)	(0.282)	(0.042)	(0.923)	(0.735)	(0.228)	(0.561)	(0.457)	(0.111)	(0.211)	(0.191)	(0.628)	(0.000)	(0.000)	(0.016)
T.R&D	-0.256	-0.386	-0.630	0.009	0.007	0.003	0.020	0.017	-0.015	0.102	0.142	0.506	-0.438***	-0.447***	-0.449***
	(0.512)	(0.335)	(0.171)	(0.574)	(0.634)	(0.853)	(0.298)	(0.318)	(0.501)	(0.698)	(0.604)	(0.138)	(0.000)	(0.000)	(0.000)
T.LEV	0.253	0.253	0.253	0.0028	0.0033	0.008	0.001	0.001	0.005	-0.078	-0.071	0.20	-0.069***	-0.066***	-0.042***
	(0.163)	(0.163)	(0.170)	(0.724)	(0.662)	(0.442)	(0.972)	(0.900)	(0.628)	(0.689)	(0.652)	(0.325)	(0.000)	(0.000)	(0.000)
YR.EF	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IND.EF	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	902	902	902	902	902	902	902	902	902	902	902	902	902	902	902
Adj-R2/Chi2 (%)	36.15	38.22	42.93	0.074	0.088	0.139	0.076	0.082	0.086	0.020	0.023	0.045	0.831	0.620	0.588

Table 8 reports the result of Ordinary least squares (OLS) regression. The dependent vaiables are Other payment which is 1 if the methods of payment is stock or combination of stock and cash and 0 if it is cash, cumulative abnormal return *(3D.CAR), (5D.CAR)* and *(4W.Stock.Price)*. The *(3D.CAR)* is the cumulative abnormal return over the window [-1,+1] i.e. three days prior and three day subsequent to the date of announcement and the *(5D.CAR)* is the cumulative abnormal return over the window [-5,+5] i.e. five days prior and three day subsequent to the date of announcement. The third model is targets' stock price four weeks prior to the announcement stock price *(4W.Stock.Prive)*. The fifth model is return on assets *(T.ROA)* of the target firm to measure the profibilitay and performance of the firm. *ln.TLEMC* is the target level of media coverage, *ln,TPMC* refers to the media coverage of target with positive news and *ln.TNMC* refers to the media coverage for target firms with negative news. All control variables are defined in Appendix B. *T*-statistics are referred on standard errors adjusted for the autocorrelation and ∗, ∗∗, and ∗∗∗ represent statistical significance at the 10%, 5%, and 1% level, respectively. The table presents coefficents and t-statisitics and all the standard errors and *P-values* are reported in parantheses.

Table 9. Multiple Regression of M&A Premium

Robustness Test Regression				
Dependent variable: 1W.Premium (Log)				
	Model (1)	*Model (2)*	*Model (3)*	*Model (4)*
Intercept	-1.056***	-1.057***	-1.029***	-0.866***
	(0.000)	(0.000)	(0.000)	(0.000)
ln.TLEMC		0.001		
		(0.960)		
ln.TPMC			-0.038*	
			(0.014)	
ln.TNMC				-0.056*
				(0.014)
A.FCF	0.063	0.063	0.088	-0.477
	(0.805)	(0.805)	(0.720)	(0.250)
A.MTB	-0.001	-0.001	-0.001	0.000
	(0.664)	(0.664)	(0.750)	(0.820)
REL.SIZE	-0.398*	-0.399*	-0.400*	-0.349*
	(0.030)	(0.031)	(0.031)	(0.035)
A.LEV	0.132	0.131	0.133	0.394*
	(0.667)	(0.684)	(0. 679)	(0.044)
A.STOCK.RE	-0.617**	-0.617**	-0.625**	-0.143
	(0.001)	(0.001)	(0.001)	(0.477)
A.ANALYST.C	0.000	0.000	-0.004	0.002
	(0.970)	(0.971)	(0.565)	(0.760)
T.ANALYST.C	-0.004	-0.004	0.013	0.001
	(0.513)	(0.566)	(0.757)	(0.878)
T.SALES.GR	0.014	0.014	0.013	0.013
	(0.748)	(0.749)	(0.757)	(0.670)
T.MTB	0.00448	-0.004	0.009	0.004
	(0.384)	(0.357)	(0.361)	(0.489)
T.LEV	-0.181	-0.181	-0.180	-0.337
	(0.560)	(0.561)	(0.561)	(0.364)
T.R&D	0.549	0.548	0.539	0.282
	(0.141)	(0.140)	(0.149)	(0.469)
T.SIZE	-0.084	-0.085	-0.083	-0.143
	(0.394)	(0.358)	(0.374)	(0.141)
T.HI.TECH	-0.110	-0.110	-0.107	-0.216
	(0.479)	(0.470)	(0.491)	(0.150)
SAME.STATE	0.013	0.013	0.024	-0.027
	(0.853)	(0.838)	(0.723)	(0.749)
RELATED	0.075	0.075	0.053	-0.047
	(0.364)	(0.369)	(0.540)	(0.611)
YR.EF	Yes	Yes	Yes	Yes
IND.EF	Yes	Yes	Yes	Yes
Observation	902	902	902	902
Adj R-squared	0.491	0.491	0.499	0.439

Table 9 reports the result of Ordinary least squares (OLS) regression for the dependent vaiable (*1W.Premium*) and independent variables (Level of media coverage, Positive media coverage and Negative media coverage). *1W.Premium* is excess offer price over stock price one day prior the announcement of takeover. Premium calculated as the natural logarithm of offer premium 1 day prior to the announcement of takeover transaction. *ln.TLEMC* is the total number of media coverage for target firms. *ln.TPMC* refers to the media coverage of target with positive news and *ln.TNMC* refers to the media coverage for target firms with negative news. All control variables are defined in Appendix B. All variables are winsorized at the 1% and 99% levels and used Bonferroni adjustment to adjust the significance level. *T*-statistics are referred on standard errors adjusted for the autocorrelation and ∗, ∗∗, and ∗∗∗ represent statistical significance at the 10%, 5%, and 1% level, respectively. The table presents coefficents and t-statisitics and all the standard errors and *P-values* are reported in parantheses.

Table 10. Propensity Score Matching Analyses

Table 10.1A

Panel A: Logit Model							
Outcome Variable: Premium	Treatment Variable: Level of Media						
Intercept	T.MBT	T.LEV	T.ANALYST.C	T.SALES.GRO	IND.EFF	N	Pseudo R-Squared
0.4452***	- .00141	0.2247	0.0736***	- 0.0291	- 0.0023	902	0.1024
(0.001)	(0.070)	(0.188)	(0.000)	(0.550)	(0.520)		

Panel B: Matching Outcome	
Matching algorithm	Caliper matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	902
Total original number of treated observations	451
Total matched observations	432
ATT (%)(Abadie & Imbens, 2006)	- 0.3969%
Standard Errors)	(0.0611)

Panel C: Covariates' Balancing						
	Before matching			After matching		
	Treatment group	Control group	p-value	Treatment group	Control group	p-value
T.MBT	2.6865	3.04	0.358	2.6865	3.0635	0.290
T.LEV	0.1849	0.1323	0.001	0.1849	0.1841	0.964
T.ANALYST.C	9.2284	4.4169	0.000	9.2284	9.0976	0.795
T.SALES.GRO	0.1893	0.2423	0.376	0.1893	0.1672	0.579
IND.EFF	26.767	27.993	0.131	26.767	24.257	0.004

Table 10.1B

Panel A: Logit Model							
Outcome Variable: Premium	Treatment Variable: Positive Media						
Intercept	T.MBT	T.LEV	T.ANALYST.C	T.SALES.GRO	IND.EFF	N	Pseudo R-Squared
0.4401***	-0.0158	0.2243	0.0711***	-0.0363	0.0037	902	0.0974
(0.029)	(0.042)	(0.226)	(0.000)	(0.458)	(0.302)		

Panel B: Matching Outcome	
Matching algorithm	Caliper matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	902
Total original number of treated observations	451
Total matched observations	345
ATT (%) (Abadie & Imbens, 2006)	-0.4201%*
Standard Errors)	0.1298

Panel C: Covariates' Balancing						
	Before matching			After matching		
	Treatment group	Control group	p-value	Treatment group	Control group	p-value
T.MBT	2.6865	3.04	0.358	2.3922	1.2719	0.005
T.LEV	0.1849	0.1323	0.001	0.1659	0.1893	0.142
T.ANALYST.C	9.2284	4.4169	0.000	5.843	3.6582	0.000
T.SALES.GRO	0.1893	0.2423	0.376	0.1968	0.0337	0.001
IND.EFF	26.767	27.993	0.131	25.483	25.45	0.973

Table 10.1C

Panel A: Logit Model							
Outcome Variable: Premium	Treatment Variable: Negative Media						
Intercept	T.MBT	T.LEV	T.ANALYST.C	T.SALES.GRO	IND.EFF	N	Pseudo R-Squared
- 0.4434***	-0.0025	0.1762	0.0794***	-.0144	-.0036	902	0.1091
(0.001)	(0.737)	(0.342)	(0.000)	(0.757)	(0.320)		

Panel B: Matching Outcome	
Matching algorithm	Caliper matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	902
Total original number of treated observations	451
Total matched observations	439
ATT (%) (Abadie & Imbens, 2006)	-0.3979%**
Standard Errors)	0.0328

Panel C: Covariates' Balancing						
	Before matching			After matching		
	Treatment group	Control group	p-value	Treatment group	Control group	p-value
T.MBT	2.9719	2.7546	0.572	2.9719	4.5687	0.000
T.LEV	0.1834	0.1338	0.002	0.1834	0.2377	0.020
T.ANALYST.C	9.3215	4.3237	0.000	9.3215	9.2772	0.933
T.SALES.GRO	0.2005	0.2311	0.609	0.2005	0.2953	0.185
IND.EFF	26.639	28.122	0.068	26.639	26.594	0.959

Tables 10.1A, 10.1B and 10.1C report the outcome of the Propensity Score Matching analysis that estimates the effect of level of media, positive and negative media on premium in corporate takeover. The treatment variable are level of media, positive media and negative media which is discussed in Appendix B. The outcome variable is premium. Panel A of tables 10.1A estimates the propensity scores via the Logit Model. Variables are included in Logit regression provided that such an inclusion modification the balance of the key covariates in the sample that is matched. Panel B of tables 10.1B indicates the matching outcome with caliper 0.01 which is used in the matching algorithm, the number of treated and control observations in the matched sample, and the Average Treatment Effect ATT with standard errors. Panel C of tables 10.1C indicates the covariates' balancing of propensity scores and the some of the important variables in this study. It also represents the mean value of key empirical variables in wo groups of treated control and indicates the bootstrapped p-value from the t-test of the null hypothesis that the difference is statistically equal to 0 are reported before and after the matching. Please refer to Appendix B for an accurate description of the variables.

Please refer to Appendix B for an accurate description of the variables.

*** Represents significance at the 1% levels.

** Represents significance at the 5% levels.

* Represents significance at the 10% levels.

Table 10.2A

Panel A: Logit Model							
Outcome Variable: Methods of payment		Treatment Variable: Level of Media					
Intercept	T.MBT	T.LEV	T.ANALYST.C	T.SALES.GRO	IND.EFF	N	Pseudo R-Squared
0.4324***	- 0.0134	0.2275	0.0740***	- 0.0300	- 0.0016	902	0.1021
(0.001)	(0.088)	(0.217)	(0.000)	(0.537)	(0.643)		

Panel B: Matching Outcome	
Matching algorithm	Caliper matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	902
Total original number of treated observations	451
Total matched observations	433
ATT (%) (Abadie & Imbens, 2006)	0.4850%*
Standard Errors)	0.0491

Panel C: Covariates' Balancing						
	Before matching			After matching		
	Treatment group	Control group	p-value	Treatment group	Control group	p-value
T.MBT	2.6865	3.04	0.358	2.6865	3.7424	0.008
T.LEV	0.1849	0.1323	0.001	0.18491	0.1995	0.421
T.ANALYST.C	9.2284	4.4169	0.000	9.2284	9.2217	0.990
T.SALES.GRO	0.1893	0.2423	0.376	0.18931	0.2515	0.329
IND.EFF	26.767	27.993	0.131	26.767	27.244	0.582

Table 10.2B

Panel A: Logit Model							
Outcome Variable: Methods of payment		Treatment Variable: Positive Media					
Intercept	T.MBT	T.LEV	T.ANALYST.C	T.SALES.GRO	IND.EFF	N	Pseudo R-Squared
0.4368***	- 0.0153*	0.2118	0.0713***	- 0.0369	- 0.0032	902	0.0972
(0.004)	(0.051)	(0.250)	(0.000)	(0.449)	(0.367)		

Panel B: Matching Outcome	
Matching algorithm	Caliper matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	902
Total original number of treated observations	451
Total matched observations	434
ATT (%) (Abadie & Imbens, 2006)	-0.4659%*
Standard Errors)	0.0155

Panel C: Covariates' Balancing						
	Before matching			After matching		
	Treatment group	Control group	p-value	Treatment group	Control group	p-value
T.MBT	2.6352	3.0912	0.235	2.6352	3.8414	0.002
T.LEV	0.1842	0.1330	0.001	0.1842	0.1970	0.480
T.ANALYST.C	9.1619	4.4834	0.000	9.1619	9.1951	0.948
T.SALES.GRO	0.1858	0.2459	0.315	0.1858	0.2569	0.264
IND.EFF	26.632	28.129	0.065	26.632	27.395	0.378

Panel A: Logit Model							
Outcome Variable: Methods of payment		Treatment Variable: Negative Media					
Intercept	T.MBT	T.LEV	T.ANALYST.C	T.SALES.GRO	IND.EFF	N	Pseudo R-Squared
0.4345***	-0.0018	0.1619	0.0796***	- 0.0156	- 0.0031	902	0.1090
(0.000)	(0.807)	(0.379)	(0.000)	(0.739)	(0.403)		
Panel B: Matching Outcome							
Matching algorithm							Caliper matching
Caliper							0.1
Matched observations per treated deal							1:1
Total original number of observations							902
Total original number of treated observations							451
Total matched observations							439
ATT (%) (Abadie & Imbens, 2006)							-0.4852%*
Standard Errors)							0.0255
Panel C: Covariates' Balancing							
	Before matching				After matching		
	Treatment group	Control group	p-value		Treatment group	Control group	p-value
T.MBT	2.9719	2.7546	0.572		2.9719	3.3885	0.410
T.LEV	0.18336	0.13381	0.002		0.18336	0.2081	0.140
T.ANALYST.C	9.3215	4.3237	0.000		9.3215	9.2106	0.833
T.SALES.GRO	0.20052	0.23108	0.609		0.20052	0.23949	0.538
IND.EFF	26.639	28.122	0.068		26.639	28.381	0.041

Tables 10.2A, 10.2B and 10.2C report the outcome of the Propensity Score Matching analysis that estimates the effect of level of media, positive and negative media on methods of payment in corporate takeover. The treatment variable are level of media, positive media and negative media which is discussed in Appendix 1. The outcome variable is methods of payment. Panel A of tables 10.2A estimates the propensity scores via the Logit Model. Variables are included in Logit regression provided that such an inclusion modification the balance of the key covariates in the sample that is matched. Panel B of tables 10.2B indicates the matching outcome with caliper 0.01 which is used in the matching algorithm, the number of treated and control observations in the matched sample, and the Average Treatment Effect ATT with standard errors. Panel C of tables 10.2C indicates the covariates' balancing of propensity scores and the some of the important variables in this study. It also represents the mean value of key empirical variables in wo groups of treated control and indicates the bootstrapped p-value from the t-test of the null hypothesis that the difference is statistically equal to 0 are reported before and after the matching. Please refer to Appendix for an accurate description of the variables.
Please refer to Appendix B for an accurate description of the variables.
*** Represents significance at the 1% levels.
** Represents significance at the 5% levels.
* Represents significance at the 10% levels.

Table 10.3A

Panel A: Logit Model							
Outcome Variable: Time of Completion		Treatment Variable: Level of Media					
Intercept	T.MBT	T.LEV	T.ANALYST.C	T.SALES.GRO	IND.EFF	N	Pseudo R-Squared
- 0.5435***	- 0.0123	0.1771	0.0742***	- 0.0230	- 0.0030	902	0.1060
(0.000)	(0.115)	(0.343)	(0.000)	(0.638)	(0.423)		

Panel B: Matching Outcome	
Matching algorithm	Caliper matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	902
Total original number of treated observations	451
Total matched observations	451
ATT (%) (Abadie & Imbens, 2006)	30.3503% ***
Standard Errors)	0.000

Panel C: Covariates' Balancing						
	Before matching			After matching		
	Treatment group	Control group	p-value	Treatment group	Control group	p-value
T.MBT	2.6865	3.04	0.358	2.6865	2.8481	0.641
T.LEV	0.18491	0.13227	0.001	0.18491	0.17504	00.581
T.ANALYST.C	9.2284	4.4169	0.000	9.2284	9.2262	0.997
T.SALES.GRO	0.18931	0.2423	0.376	0.18931	0.22373	0.473
IND.EFF	26.767	27.993	0.131	26.767	24.109	0.002

Table 10.3B

Panel A: Logit Model							
Outcome Variable: Time of Completion		Treatment Variable: Positive Media					
Intercept	T.MBT	T.LEV	T.ANALYST.C	T.SALES.GRO	IND.EFF	N	Pseudo R-Squared
- 0.4692***	- 0.0144	0.1652	0.0714***	- 0.0300	- 0.0044	902	0.1011
(0.001)	(0.067)	(0.375)	(0.000)	(0.541)	(0.231)		

Panel B: Matching Outcome	
Matching algorithm	Caliper matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	902
Total original number of treated observations	451
Total matched observations	451
ATT (%) (Abadie & Imbens, 2006)	29.1065%***
Standard Errors)	0.000

Panel C: Covariates' Balancing						
	Before matching			After matching		
	Treatment group	Control group	p-value	Treatment group	Control group	p-value
T.MBT	2.6352	3.0912	0.235	2.6352	2.7667	0.705
T.LEV	0.1842	0.1330	0.001	0.1842	0.1836	0.977
T.ANALYST.C	9.1619	4.4834	0.000	9.1619	8.8492	0.540
T.SALES.GRO	0.1858	0.2459	0.315	0.1858	0.2131	0.571
IND.EFF	26.632	28.129	0.065	26.632	23.681	0.001

Table 10.3C

Panel A: Logit Model							
Outcome Variable: Time of Completion		Treatment Variable: Negative Media					
Intercept	T.MBT	T.LEV	T.ANALYST.C	T.SALES.GRO	IND.EFF	N	Pseudo R-Squared
- 0.5470	- 0.0011	0.1222	0.0770	- 0.0092	- 0.0042	902	0.1120
(0.000)	(0.888)	(0.512)	(0.000)	(0.846)	(0.258)		

Panel B: Matching Outcome	
Matching algorithm	Caliper matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	902
Total original number of treated observations	451
Total matched observations	451
ATT (%) (Abadie & Imbens, 2006)	21.9069%***
Standard Errors)	0.001

Panel C: Covariates' Balancing						
	Before matching			After matching		
	Treatment group	Control group	p-value	Treatment group	Control group	p-value
T.MBT	2.9719	2.7546	0.572	2.9719	4.0829	0.016
T.LEV	0.1834	0.1339	0.002	0.1834	0.1891	0.755
T.ANALYST.C	9.3215	4.3237	0.000	9.3215	9.7339	0.443
T.SALES.GRO	0.2006	0.2311	0.609	0.2006	0.2057	0.923
IND.EFF	26.639	28.122	28.122	26.639	27.614	0.254

Tables 10.3A, 10.3B and 10.3C report the outcome of the Propensity Score Matching analysis that estimates the effect of level of media, positive and negative media on time of completion in corporate takeover. The treatment variable are level of media, positive media and negative media which is discussed in Appendix B. The outcome variable is time of completion. Panel A of tables 10.3A estimates the propensity scores via the Logit Model. Variables are included in Logit regression provided that such an inclusion modification the balance of the key covariates in the sample that is matched. Panel B of tables 10.3B indicates the matching outcome with caliper 0.01 which is used in the matching algorithm, the number of treated and control observations in the matched sample, and the Average Treatment Effect ATT with standard errors. Panel C of tables 10.3C indicates the covariates' balancing of propensity scores and the some of the important variables in this study. It also represents the mean value of key empirical variables in wo groups of treated control and indicates the bootstrapped p-value from the t-test of the null hypothesis that the difference is statistically equal to 0 are reported before and after the matching. Please refer to Appendix B for an accurate description of the variables.

Please refer to Appendix B for an accurate description of the variables.

*** Represents significance at the 1% levels.

** Represents significance at the 5% levels.

* Represents significance at the 10% levels.

Table 11. Sample Split by Firm Size

Sample Split by Firm Size						
	Model (1)			*Model (2)*		
Subsample	*Tercile 1*			*Tercile 2*		
No.	*199*			*703*		
	Panel A: Premium					
Intercept	0.600***	0.587***	0.568***	0.424***	0.440***	0.487***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln.TLEMC	-0.028			-0.005		
	(0.367)			(0.443)		
ln.TPMC		-0.022			-0.034*	
		(0.456)			(0.028)	
ln.TNMC			-0.014			-0.020*
			(0.711)			(0.039)
POLIT.SEN.D	-0.084	-0.077	-0.094	0.010	0.011	0.001
	(0.283)	(0.324)	(0.489)	(0.691)	(0.661)	(0.961)
A.ANALYST.C	0.001	0.001	0.006	0.002	0.002	0.003*
	(0.688)	(0.674)	(0.201)	(0.090)	(0.097)	(0.046)
T.ANALYST.C	0.010	0.010	-0.028	-0.002	-0.002	-0.002
	(0.549)	(0.568)	(0.068)	(0.175)	(0.204)	(0.234)
	Panel B: Cash Method of Payment					
Intercept	-0.122	-0.131	-0.366	0.030**	0.041**	0.043*
	(0.629)	(0.600)	(0.203)	(0.015)	(0.011)	(0.029)
ln.TLEMC	0.031*			-0.053		
	(0.003)			(0.437)		
ln.TPMC		-0.020*			-0.055	
		(0.046)			(0.424)	
ln.TNMC			-0.054*			0.023
			(0.037)			(0.832)
POLIT.SEN.D	-0.610*	-0.581*	-0.635	-0.367**	-0.351**	-0.620**
	(0.010)	(0.015)	(0.115)	(0.001)	(0.002)	(0.000)
A.ANALYST.C	0.057***	0.056***	0.073**	0.036***	0.036***	0.037***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
T.ANALYST.C	-0.033	-0.031	-0.062	-0.024**	-0.025**	-0.022*
	(0.278)	(0.313)	(0.166)	(0.009)	(0.007)	(0.014)

(Continued)

Table 11. Sample Split by Firm Size (Continued)

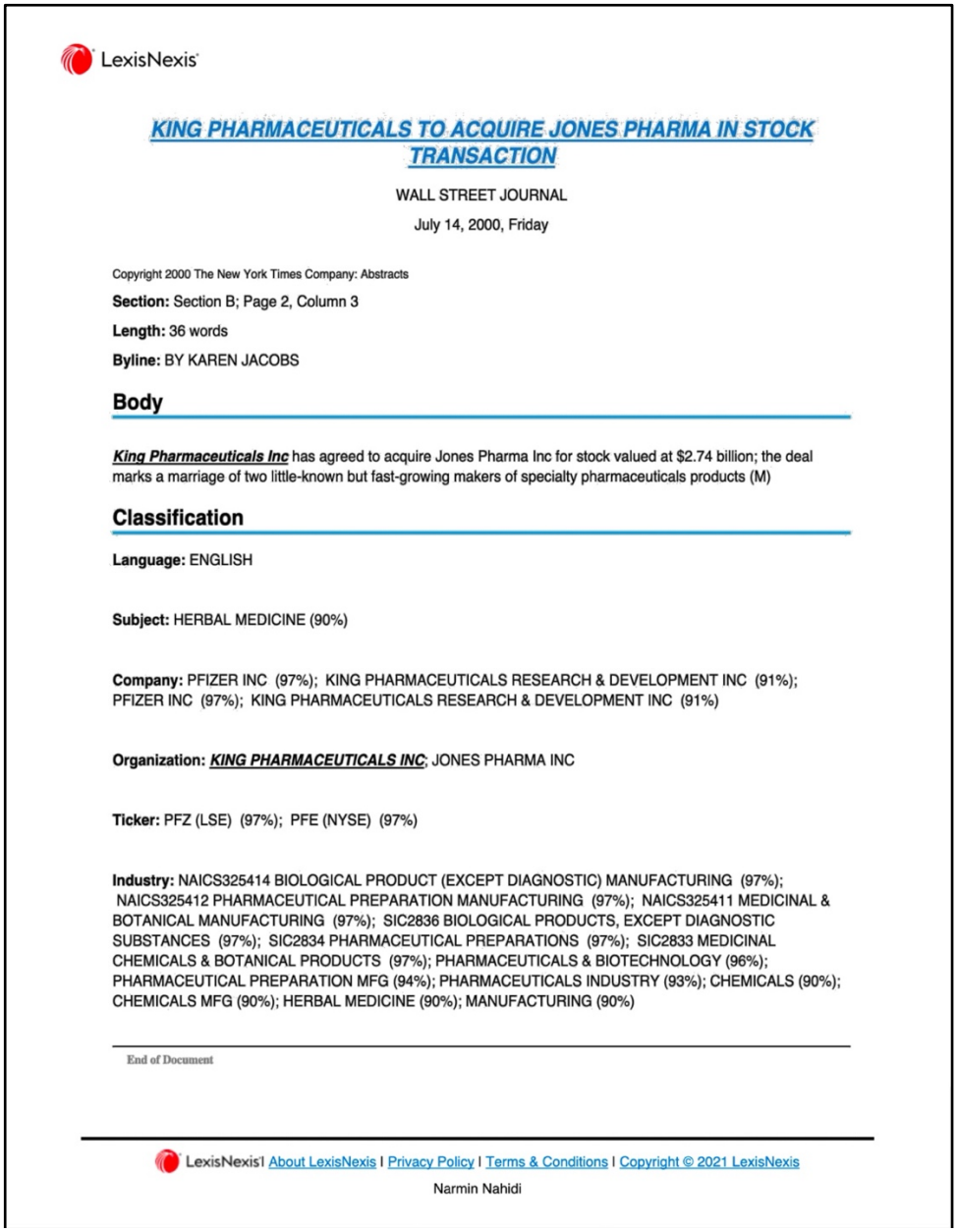
Sample Split by Firm Size						
	Model (1)			*Model (2)*		
Subsample	*Tercile 1*			*Tercile 2*		
No.	*199*			*703*		
	Panel A: Premium					
	Panel B: Time of Completion					
Intercept	99.787***	99.280***	106.667***	129.973***	129.546***	123.351***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln.TLEMC	1.676			6.852**		
	(0.402)			(0.003)		
ln.TPMC		2.024			7.077**	
		(0.311)			(0.002)	
ln.TNMC			-1.681			13.889***
			(0.612)			(0.000)
POLIT.SEN.D	8.945	8.376	11.446	17.094*	17.524*	17.323*
	(0.283)	(0.325)	(0.285)	(0.036)	(0.033)	(0.041)
A.ANALYST.C	-1.241***	-1.256***	-0.345**	-1.290**	-1.257**	-0.915
	(0.000)	(0.000)	(0.005)	(0.008)	(0.009)	(0.137)
T.ANALYST.C	-0.530	-0.595	-0.345	0.933	0.918	0.950
	(0.560)	(0.514)	(0.782)	(0.228)	(0.233)	(0.311)

Tables 11 reports the subsample of target firm size and combined with exogenous factor of politically sensitive deal. The sample is divided to two terciles with each includes 3 columns of univariable regressions for level, positive and negative media coverage. The model 1 is defined as target size below-median tercile and model 2 is target size above-median tercile. The total number of smaller target firms are 199 and the bigger target are 703 firms. The exogenous variable of *politically sensitive deal (POLIT.SEN.D)* is added to the models and to measure asymmetric information, analyst coverage of both acquirer and target is added to the model. All variables are defined in the Appendix. Robust standard errors are reported in parentheses. and ∗, ∗∗, and ∗∗∗ represent statistical significance at the 1%, 5%, and 10% level, respectively.

Appendices

Appendix A

Appendix A1. Sample of Acquisition Event as General Media Coverage (Level of Media)[28]



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KING PHARMACEUTICALS TO ACQUIRE JONES PHARMA IN STOCK TRANSACTION

WALL STREET JOURNAL

July 14, 2000, Friday

Copyright 2000 The New York Times Company: Abstracts

Section: Section B; Page 2, Column 3

Length: 36 words

Byline: BY KAREN JACOBS

Body

King Pharmaceuticals Inc has agreed to acquire Jones Pharma Inc for stock valued at $2.74 billion; the deal marks a marriage of two little-known but fast-growing makers of specialty pharmaceuticals products (M)

Classification

Language: ENGLISH

Subject: HERBAL MEDICINE (90%)

Company: PFIZER INC (97%); KING PHARMACEUTICALS RESEARCH & DEVELOPMENT INC (91%); PFIZER INC (97%); KING PHARMACEUTICALS RESEARCH & DEVELOPMENT INC (91%)

Organization: ***KING PHARMACEUTICALS INC***; JONES PHARMA INC

Ticker: PFZ (LSE) (97%); PFE (NYSE) (97%)

Industry: NAICS325414 BIOLOGICAL PRODUCT (EXCEPT DIAGNOSTIC) MANUFACTURING (97%); NAICS325412 PHARMACEUTICAL PREPARATION MANUFACTURING (97%); NAICS325411 MEDICINAL & BOTANICAL MANUFACTURING (97%); SIC2836 BIOLOGICAL PRODUCTS, EXCEPT DIAGNOSTIC SUBSTANCES (97%); SIC2834 PHARMACEUTICAL PREPARATIONS (97%); SIC2833 MEDICINAL CHEMICALS & BOTANICAL PRODUCTS (97%); PHARMACEUTICALS & BIOTECHNOLOGY (96%); PHARMACEUTICAL PREPARATION MFG (94%); PHARMACEUTICALS INDUSTRY (93%); CHEMICALS (90%); CHEMICALS MFG (90%); HERBAL MEDICINE (90%); MANUFACTURING (90%)

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Narmin Nahidi

[28] By Karen Jacobs. (July 14, 2000, Friday). King Pharmaceuticals to acquire Jones Pharma in stock transactions. Wall Street Journal. https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:40R5-W2K0-0030-D4HV-00000-00&context=1516831.

Appendix A2. Sample of Acquisition Event as Positive Media Coverage [a]

[a] (May 24, 2000, Wednesday). Percent Changes in stocks listings. Wall Street Journal. https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:40B9-BFD0-0030-D312-00000-00&context=1516831.

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PERCENT CHANGES IN STOCK LISTINGS

WALL STREET JOURNAL

May 24, 2000, Wednesday

Section: Section C; Page 15, Column 4

Length: 30 words

Body

Among recent stock-listing changes, ***King Pharmaceuticals Inc***, formerly trading on Nasdaq Stock Market, is now trading on New York Stock Exchange; other listing changes noted (S)

Classification

Language: ENGLISH

Subject: STOCK EXCHANGES (95%); SECURITIES TRADING (91%); CHEMICALS & RUBBER MARKETS (90%); COMMODITIES EXCHANGES (90%); COMMODITIES TRADING (90%); HERBAL MEDICINE (90%); SECURITIES & OTHER INVESTMENTS (90%)

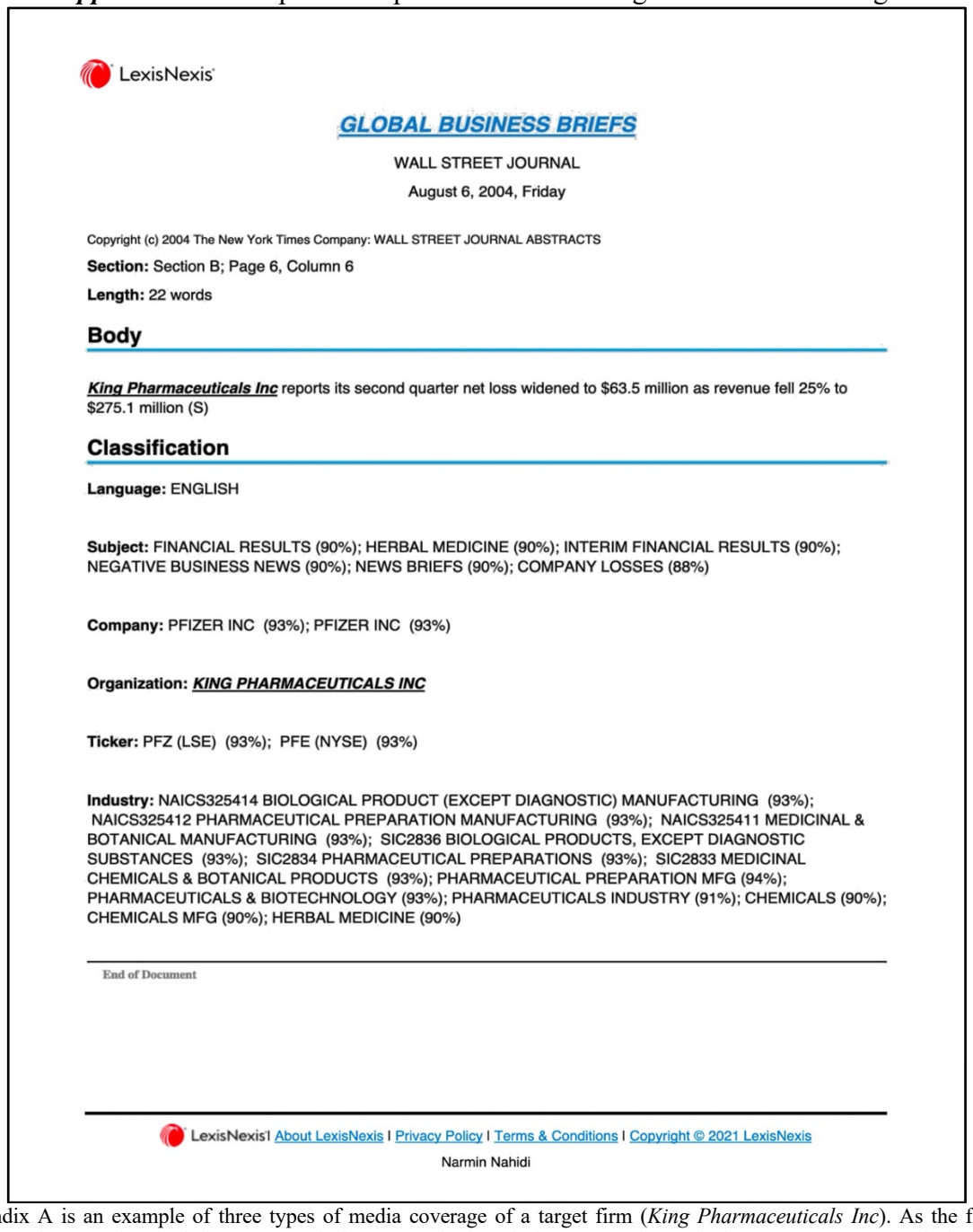
Company: PFIZER INC (91%); NASDAQ OMX GROUP INC (58%); NEW YORK STOCK EXCHANGE LLC (58%); PFIZER INC (91%); NASDAQ OMX GROUP INC (58%); NEW YORK STOCK EXCHANGE LLC (58%); NASDAQ STOCK MARKET (74%)

Organization: NASDAQ STOCK MARKET (74%); ***KING PHARMACEUTICALS INC***; PRECISION STANDARD INC; PEMCO AVIATION GROUP INC; CARBO CERAMICS INC NASDAQ STOCK MARKET (74%); PRECISION STANDARD INC; PEMCO AVIATION GROUP INC; CARBO CERAMICS INC NASDAQ STOCK MARKET (74%); PEMCO AVIATION GROUP INC; CARBO CERAMICS INC NASDAQ STOCK MARKET (74%); CARBO CERAMICS INC NASDAQ STOCK MARKET (74%)

Ticker: PFZ (LSE) (91%); PFE (NYSE) (91%); NDAQ (NASDAQ) (58%)

Industry: NAICS325414 BIOLOGICAL PRODUCT (EXCEPT DIAGNOSTIC) MANUFACTURING (91%); NAICS325412 PHARMACEUTICAL PREPARATION MANUFACTURING (91%); NAICS325411 MEDICINAL & BOTANICAL MANUFACTURING (91%); SIC2836 BIOLOGICAL PRODUCTS, EXCEPT DIAGNOSTIC SUBSTANCES (91%); SIC2834 PHARMACEUTICAL PREPARATIONS (91%); SIC2833 MEDICINAL CHEMICALS & BOTANICAL PRODUCTS (91%); NAICS523210 SECURITIES & COMMODITY EXCHANGES (58%); SIC6231 SECURITIES & COMMODITY EXCHANGES (58%); STOCK EXCHANGES (95%); PHARMACEUTICAL PREPARATION MFG (94%); PHARMACEUTICALS & BIOTECHNOLOGY (93%); PHARMACEUTICALS INDUSTRY (91%); SECURITIES TRADING (91%); CHEMICALS (90%); CHEMICALS &

Appendix A3. Sample of Acquisition Event as Negative Media Coverage[b]



LexisNexis

GLOBAL BUSINESS BRIEFS

WALL STREET JOURNAL

August 6, 2004, Friday

Section: Section B; Page 6, Column 6

Length: 22 words

Body

King Pharmaceuticals Inc reports its second quarter net loss widened to $63.5 million as revenue fell 25% to $275.1 million (S)

Classification

Language: ENGLISH

Subject: FINANCIAL RESULTS (90%); HERBAL MEDICINE (90%); INTERIM FINANCIAL RESULTS (90%); NEGATIVE BUSINESS NEWS (90%); NEWS BRIEFS (90%); COMPANY LOSSES (88%)

Company: PFIZER INC (93%); PFIZER INC (93%)

Organization: ***KING PHARMACEUTICALS INC***

Ticker: PFZ (LSE) (93%); PFE (NYSE) (93%)

Industry: NAICS325414 BIOLOGICAL PRODUCT (EXCEPT DIAGNOSTIC) MANUFACTURING (93%); NAICS325412 PHARMACEUTICAL PREPARATION MANUFACTURING (93%); NAICS325411 MEDICINAL & BOTANICAL MANUFACTURING (93%); SIC2836 BIOLOGICAL PRODUCTS, EXCEPT DIAGNOSTIC SUBSTANCES (93%); SIC2834 PHARMACEUTICAL PREPARATIONS (93%); SIC2833 MEDICINAL CHEMICALS & BOTANICAL PRODUCTS (93%); PHARMACEUTICAL PREPARATION MFG (94%); PHARMACEUTICALS & BIOTECHNOLOGY (93%); PHARMACEUTICALS INDUSTRY (91%); CHEMICALS (90%); CHEMICALS MFG (90%); HERBAL MEDICINE (90%)

End of Document

Narmin Nahidi

Appendix A is an example of three types of media coverage of a target firm (*King Pharmaceuticals Inc*). As the figures indicate, the samples include source of the news, body of the news, time of the news, category of the news (general/positive/negative) and classification of the news contain language, company, organization, ticker and bibliography of the news. For the purpose of copyright, only a part of body is demonstrated in the figures. Appendix A.1, A.2 and A.3 include the sample of general media coverage, positive and negative media coverage respectively. LexisNexis® use special algorithm to categorize news to general, positive and negative news.

[b] (August 6, 2004, Friday). Global Business Briefs. Wall Street Journal. https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:4D1M-X670-0030-D3HR-00000-00&context=1516831.

Appendix B

Appendix B. Descriptions, Definitions and Sources of Data

Variables	Descriptions and Definitions	Source of Data
ln.TLEMC	Level of media coverage of target (no specification of the type of media coverage) = Natural logarithm of total number of target news media coverage	LexisNexis
ln. TPMC	Natural logarithm of number of positive media coverage of target	LexisNexis
ln.TNMC	Natural logarithm of number of negative media coverage of target	LexisNexis
A.FCF	Acquirer free cash flow is earnings before interests, taxes, amortizations, and depreciations over book value of total assets	Eikon
A.MTB	Acquirer market value of stock is acquirer No. of common share outstanding × share price / book value of equity [from Compustat]	Compustat
REL.SIZE	Relative size = ratio of the target's market value of equity to the acquirer's market value of equity as of the end of the fiscal year prior to the M&A announcement date.	Compustat
A.LEV	Acquirer Leverage is firm total long-term financial debt divided by book value of total assets at the end of the year prior to the announcement of acquisition [from Compustat]	Compustat
A.STOCK.RE	Acquirer stock return = over 28 trading days before the announcement deal - acquirer share price 154 trading days before the deal announcement divided by acquirer share price 154 trading days before the deal announcement.	Eikon
A.ANALYST.C	Acquirer Analyst Coverage = acquirer stock analysts issuing earnings forecasts in the year before the takeover announcement.	I/B/E/S
T. ANALYST.C	Target Analyst Coverage = target stock analysts issuing earnings forecasts in the year before the takeover announcement.	I/B/E/S
T.SALES.GR	Target sales Growth = percentage change in sales from the previous year.	Compustat
T.MTB	Target market value of stock is market Value of Stock= Target No. of Common share outstanding × share price / Book value of equity [from Compustat]	Eikon
T.LEV	Target Leverage is firm total liability over book value of total assets at the end of the year prior to the announcement of acquisition [from Compustat]	Compustat
T.R&D	Target R&D = investment over total assets and expenditure scaled by sales.	Eikon
T.SIZE	Target Size = Logarithm of total assets of target for the fiscal year before the takeover announcement.	Eikon
MOP.CASH	Methods of payment = dummy variable as cash if the primary payment is cash = 1 and 0 otherwise.	Eikon
T.O.C	Time of completion = number of days from the M&A deal's announcement date to completion date.	Eikon
4W. PREMIUM	Four weeks premium = offer Price Per Share – Closing Price Four Weeks Before the Announcement Date / the Closing Price Four Weeks Before the Announcement Date. The four-week time lag is used to ensure the baseline of the stock price is not affected by potential information leakage prior to the official announcement date.	Eikon, CRSP
1W. PREMIUM	one week premium = offer Price Per Share – Closing Price one Week Before the Announcement Date / the Closing Price Four Weeks Before the Announcement Date.	Eikon, CRSP
T.ROA	Target return on assets = net income of Target over shareholders' total assets.	Compustat
5D.CAR	5 Days Cumulative abnormal return = the [-2, +2] window around merger announcement date.	Authors' Estimations
3D.CAR	3 Days Cumulative abnormal return = the [-1, +1] window around merger announcement date.	Authors' Estimations
4W.Stock.Price	Four weeks stock price = stock price runup is equity return over 11-month period ending 1 month prior to M&A announcement.	CRSP

Variables	Descriptions and Definitions	Source of Data
T.HI.TECH	Target high tech industry = indicator variable that takes the value of 1 if the target firm is in the high-tech industry.	Eikon
SAME.STATE	Same state = Indicator dichotomous variable that takes the value of 1 of both acquirer and target firm share identical states in the US and zero otherwise pursuant to according to Thomson Financials' EIKON database M&A database.	Eikon
RELATED	Indicator dichotomous variable that takes the value of 1 of both acquirer and target firm share identical two-digit SIC codes and zero otherwise.	Eikon
PROPENSITY SCORE MATCHING	The propensity scores estimated from the logit model in Table 8.1, 8.2 and 8.3. Dummy = 1 if more than 50% of the media (level of media, positive media, and negative media) is above median, and 0 otherwise.	Authors' Estimations
POLIT.SEN.D	Politically sensitive deal = dummy variable as SAME.STATE ×SALE > 0 then Politically sensitive deal equals one, and 0 otherwise.	Authors' Estimations

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CHAPTER III.

Digital Rights Management System in Corporate Takeover

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- British Accounting and Finance Association (BAFA) Corporate Finance and Asset Pricing, London, January 2022(Online), Best Paper of the conference Awarded.
- Department of Finance and Accounting Seminar 2022, Oakland University of Michigan, February 2022 (Online).

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[b] This manuscript is dedicated to our dear friend and colleague Thomas W. Lauer for his inspiration and support to create this paper and whom we lost to battle with cancer on 25 April 2022.

Credit author statement

Narmin Nahidi: Methodology, Writing, Resources, Data curation, Software, Formal analysis, Conceptualization, Investigation, Funding acquisition, Project administration, Visualization, Writing - Original Draft, Writing - Funding acquisition - Review & Editing. **Thomas W. Lauer:** Supervision.

Digital Rights Management Systems in Corporate Takeovers

Abstract

We examine the extent to which a digital rights management (DRM) system affects mergers and acquisitions (M&A) due diligence. We use manually collected data comprising the full dataset of digital M&A and patent M&A. To measure the performance of target firms in the due diligence phase, we introduce the market-to-book ratio for business due diligence, return on assets for financial and accounting due diligence, the target high-tech industry approach for IT due diligence, environmental score for environmental due diligence, and legal advisors as a measurement for performance in legal due diligence. Our findings suggest that at one end, target firms with DRM have positive and significant impact on financial/Accounting, legal and high-tech performance of firms. In contrary, the results of patent M&A suggest that there are negative and significant impacts from DRM on business and high-tech performance. We did not find any association with DRM and environmental performance of target firm due diligence. We employ lagged regressions and propensity score matching of digital/non-digital and patent/non-patent target firms to make our results more robust.

Keywords: mergers and acquisitions; due diligence; digital rights management; digital M&A; intellectual property

JEL classifications: G34, O34, K11

1. Introduction

The foundation of mergers and acquisitions (M&A) is based on financial calculations and decisions and due diligence is one of the most important tools to evaluate the information in takeover process. Due diligence is a procedure that includes financial and legal consideration (Savović & Pokrajčić, 2013). While the information is transmitted between acquirer and target in due diligence, trust plays a significant role in implementing legal steps through transaction of information. The co-movement of trust and legal steps in this procedure, however, is a challenging task. Firms undertake due diligence to examine pertinent information between the acquirer and target and investigate the potential investment as well as the authorization of information to use in the merger deal. Recently, protecting information[1] has become a crucial issue for consideration, particularly when digital tools and digital information[2] are involved. With higher demand for digitalization and using digital information in financial systems, more attention is nowadays concentrated on data security, however, little analytical work has concentrated on the role of digital rights over information.

This paper focuses on digital information that is transmitted during due diligence process in takeover transaction. Due diligence is an essential activity in mergers and acquisitions (M&A) transactions that allows the parties of the deal to investigate about each other by looking into different types of information from contracts to finances activities. Due diligence process begins with analyzing purpose of the project, pre-analyzing of financial business cases, full check of documents, risk analyzes and final offering of ongoing monitory. This loop of controlling information in due diligence can start from any of these stages. Once the due diligence is implemented, the acquirer and target may share various information, and the legitimacy of this shared information need to be controlled by digital rights management (DRM)[3].

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[1] There is a regulation proposed and made by the European Parliament and Council of the European Union called the General Data Protection Regulation (GDPR), which according to EU law is to protect the privacy of data. This regulation does not apply to US citizens although there are several states with their own privacy regulations that are similar to GDPR.

[2] We define information in this study as the digital information of firms, and therefore digital information hereafter refers to information.

[3] DRM is defined in various ways, but the most important definition is as a system which enables the legal distribution of digital information and contents, and the user of a digital right should be obliged to protect the content itself (Gaber, 2013).

We seek to bridge the above gap by investigating the DRM system as one of the methods to protect and secure digital information in a takeover transaction. From a corporate takeover perspective, DRM is a system of control that is typically applied to protect sensitive information (e.g., financial reports, M&A contracts, M&A plans) that is transferred between acquirer and target. In this sense, DRM manages multiple economic channels such as digital information and increases information asymmetry which causes agency conflict. Another key role that the DRM plays is to be a tool that helps the owners of information to supervise access to data, to restrict the costs of digital piracy[4] and to give access only to end-users (Wu et al., 2020). As part of copy right and intellectual property[5] rights, DRM is a tool with which to protect data and information on the internet and in software (Kiema, 2008). Finally, firms tend to have DRM system as an extra security for their digital information and depend of firms' security protocols, managers decide to have DRM as protection system or not.

We begin to identify DRM in takeover transactions by looking at digital information transmitted in the due diligence process. This approach is consistent with the construction of digital units, intellectual property, and the integration of technology with finance (see, e.g., Benitez et al., 2018; Hanelt et al., 2020; Robins, 2008). In this study, we recognize two forms of digital products based on DRM in the digital content of M&A, and DRM in the patent content of M&A. We focus on information that the acquirer access from the target directly[6]. In this paper we show one of the appealing features of DRM, which is digital M&A and Patent M&A that are used in various stages of acquisition process from financial systems and restricting and limiting the use of proprietary hardware and copyrighted products. This scrutiny demonstrates that information in software and hardware are protected by DRM, as is all the digital information in the system. Financial incumbents in firms therefore ought to use digital tools to secure their financial activities in the acquisition procedure.

Once we have identified DRM in due diligence, we concentrate on the frequent compensation incentives created by agency theory in the takeover process and ask how DRM

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[4] Digital piracy has been defined as the "distribution of information products by the users without the authorization of their legal owner" (Belleflamme & Peitz, 2010).

[5] "Intellectual property is defined as any intangible asset that consists of human knowledge and ideas, or a real-world representation of them. The forms of IP are patents; copyrights; trade secrets; and trademarks, service marks, and trade names." (Edwin, 2005)

[6] More explanations in Figure 1, specifying three levels of sources that the acquirer obtain information from (direct, indirect and a combination of both).

affects various facets of due diligence. This study uses the conventional method of controlling acquisitions between acquirer and target (due diligence) in analyzing the aim of this study. We introduce five types of due diligence, including business due diligence (BDD), financial and accounting due diligence (FADD), legal due diligence (LDD), high-tech due diligence (ITDD) and environmental due diligence (EDD). We find that these five types of due diligence are more likely to appear in the case of controlling information in a takeover. In all the above due diligences, both target and acquirer inspect various types of information from both sides of the deal. We are particularly interested in analyzing DRM for the proxies representing the performance of target firms from various angles (in this case, various due diligence levels). Naturally, as the acquirer is the body that makes the purchase, the focus of due diligence is more on the information about the target, which is the main purpose of our study. We then define the market-to-book ratio as a proxy for performance in BDD, return on assets as a proxy for performance in FADD, legal advisors as a proxy for performance in LDD, high-tech as a proxy for performance in ITDD, and environmental scores as a proxy for the performance of firms in EDD.

In order to investigate our hypotheses, we use hand collected data from various databases, including the S&P Capital IQ to the NBER patent database and the Orbit Intelligence database for a period of seventeen years from January 1, 2001, through December 31, 2017. We combine two databases of digital data with a short business description of target firms and digital data from the SEC Edgar financial forms to create data for digital M&A, and merge NBER patent data and the Orbit Intelligence database to create data for patent M&As. We examine whether there is a correlation between DRM and due diligence on business, finance, accounting, legal, IT and environmental levels.

In this paper, we show that a target firm's performance varies substantially across due diligence process, particularly when DRM is involved. More importantly, we find that copyright (digital M&A) and intellectual property rights (patent M&A) are related to the acquisition of information at different levels of due diligence. Some studies examine performance at different levels of takeover transaction, from information technology in due diligence (Robins, 2008) to performance in digital innovation and M&A (Hanelt et al., 2020). In line with previous studies on the relationship between digital M&A and the performance of firms, our findings suggest that, on average, DRM is associated with different types of performances in acquisition due diligence. Data is treated in the analyses as time series, and we follow the approach of Müller et al. (2018) to use ordinary least (OLS) regression analysis to avoid unobserved difference levels of firms, and to approximate the "time-variant effect

within a firm" (see e.g., Bertrand & Schoar, 2003; Sheikhbahaei & Shams, 2021). Our findings show that target firms with DRM as a form of digital M&A have a lower market-to-book ratio, a higher return on assets in financial and accounting due diligence, higher legal activities in legal due diligence, and a higher technological approach in high technology due diligence. Target firms with DRM as a form of patent M&A also have a higher return on assets, higher legal activities, and lower technological approach. There is also no significant relationship between patent M&A and the market-to-book ratio of the target, and no relationship between digital M&A and patent M&A and the environmental performance of the target firm.

To ensure the robustness of our results, we have outlined the interactions between the selected variables by examining the sensitivity to self-selection and endogeneity concerns. There may be unobservable DRMs which are associated with digital M&A and patent M&A. In other words, even though the digital M&A and patent M&A have been carefully selected and various patents have counted by patent pool model and used two sources of data, still it is possible that some DRMs in the digital M&A content are not detected as they might not be officially determined as information with digital rights. We also have time-series data, and we take into account that a time invariant error term might be correlated with any of the right-hand side variables in our analyses. We thus control for DRM in merger deals with digital/non-digital and patent/non-patent M&A deals. To address these issues, we use two sets of analyses to check the robustness of our sample. First, we lag all independent variables to test for the endogeneity of our sample. To avoid autocorrelation problems and alleviate the endogeneity problem in the sample, we also lag all the control variables by one year. Secondly, we use propensity score matching (PSM) to test self-selection. Using the estimation of the average treatment effect on treated (ATT) and Probit regression, our results for both practices are robust and remain unchanged.

The paper contributes to the M&A literature in several ways. First, from the angle of target firm performance, it contributes to the emerging literature regarding digitalization in takeovers by addressing the important role of DRM for digital information. The results are consistent across different measurements of firm performance. Secondly, our results imply that there is a negative association between DRM and market-to-book ratio (business/market performance in digital M&A), and this indicates undervalued stock for the target firm with DRM, together with no correlation on patent M&A. On financial level, the positive association of DRM and return on assets (financial and accounting performance in digital and patent M&A) and indicates that higher earnings are generated from invested capital. The results on legal level

suggest that the positive association of DRM and legal advisors (legal performance in digital and patent M&A) and indicates that a higher number of legal advisors increases the probability of more legal activity and performance. The findings on legal level suggest that positive correlation of DRM and high-tech (technological performance in digital M&A) and suggests that DRM lead target firms have higher technical performances, together with negative correlation of DRM and high-tech (technological performance in patent M&A), and indicates that DRM lowers the technological performance of the target firm due to the barriers that patent creates, and, eventually on environmental level, the findings show no association between DRM and environmental score in any levels of digital or patent M&A. Finally, this research contributes to the emerging literature by establishing a relationship between digital right management and mergers and acquisitions as two forms of digital and patent M&A. Furthermore, this paper makes a distinction between digital M&A and patent M&A

The remainder of the study is organized as follows. Section 2 provides a brief overview of the relationship between the aim of this paper and the literature related to the subject. Section 3 discusses the theoretical framework and hypotheses development. Section 4 describes the data, models, and sample selection procedure. Section 5 presents the empirical results regarding the association of DRM and corporate takeovers. Section 6 presents the sensitivity analyses. Section 7 sets out the conclusions and limitations of this study.

2. Literature Review

2.1. Incumbents of information in corporate takeover

In acquisitions, information from the target plays a significant role in the acquirer's decision-making process (Welch et al., 2019). Information is transformed through documents between the acquirer and target, from financial statements to bonds and market securities, certificates, licenses, list of liabilities, collateral for debt, approvals, and any digital documents. Information flows during a takeover transaction and creates a path between both sides of the acquisition. Conventionally, the acquirer, and target attempt to be fair during the process of the takeover transaction when it comes to using mutual information. Any information between the acquirer and target resulting from negotiations over documents for bids is usually transferred digitally, and this implies that the data needs to have digital rights in order to be legitimate. During the pre-merger, the information for the due diligence process is mostly collected and uploaded online or using software in digital format. In addition to the complexity of structured

finance[7] (Committee on the Global Financial System, 2005), it is also important to consider securing the information among different transactions in financial activities (Hirotsugu et al., 2009). A stylized fact in DRM is that the secure structured process in a financial system can be characterized in various models and methods. While the information is assessed in due diligence, the magnitude and extent of information cannot be evaluated in the same process and DRM thus protects information as well as being a measure for the quality and quantity of information in the system. In such a case, the acquirer and target consider which areas to protect through due diligence, such as fraudulent financial statements (FFSs), regulations, new technologies and corporate cyber threats. Accordingly, DRM can protect information and avoid the asymmetric information that is caused by a misuse of information in the system.

To understand how to connect the contents of information in the due diligence process with a DRM system, we need to first understand the constraints in the transition of information, and how information asymmetry can be avoided by the acquirer and target. For this purpose, we use the notion of agency theory (Fama, 1980; Shapiro, 2005) to build a decent framework with which to scrutinize the relationship between information that is protected by a DRM system in digital M&A. We generalize the idea of agency theory at many levels of firm performance, from macro-level issues to managerial (Eisenhardt & Eisenhardt, 1989), and as the unit of analysis in our study is information, we use information governance to discuss the corporate information governance of firms using agency theory (Lajara & Maçada, 2013). Agency structure is applicable at different levels of finance, from the macro level to the micro level (Eisenhardt & Eisenhardt, 1989). The focus of this study is based on the tenets of agency theory (Jensen & Meckling, 1976) which implies the relationship between agents (acquirer and target) and the distribution of information[8]. As a result, we emphasize how agency theory assumes that information asymmetry plays a negative role in a digital-era context (Donaldson

[7] The Bank of International Settlement explains that "…Structured finance instruments can be defined through three key characteristics: (1) pooling of assets (either cash-based or synthetically created); (2) tranching of liabilities that are backed by the asset pool (this property differentiates structured finance from traditional "pass-through" securitizations); (3) de-linking of the credit risk of the collateral asset pool from the credit risk of the originator, usually through use of a finite-lived, standalone special purpose vehicle (SPV)". This definition continues with explaining the tranching process which creates security for assets. Our aim in noting structured finance is to indicate DRM as part of the security for assets.

[8] In different stream of literature, information asymmetry appears to have positive association with the effectiveness of information security services (InfoSec) (Da Veiga & Martins, 2015; Wu & Saunders, 2016). Although DRM is systematic approach to copyright protection for digital data, but it does not act as information security service per se.

& Davis, 1991; Wiener et al., 2019). There is only one more point to consider in order to bridge the agency problem with DRM at a digital level, which is that the flows of information between acquirer and target fluctuate from case to case, and that this causes the agency problem. As patents produce information through innovation (Saidi & Žaldokas, 2021), they are a major ingredient in the recipe for agency problems.

In order to better understand the mechanism of information in takeover transactions, we focus more on the significant role of the information system (IS) which is protected by DRM, and its relevance to M&A. DRM is an important part of the IS body in any digital system (Benitez et al., 2018; Hedman & Sarker, 2015; Henningsson et al., 2018). In fact, integrating and protecting the IS plays an important role in the success of M&A. Focusing on information alongside the software which stores this information is critical to shaping the IS of a firm (Hedman & Sarker, 2015). To study IS and how we identify it as digital and patent, we should consider that there is a distinct difference between information content that is already in a firm's database and the information content that is transferred between target and bidder during M&A (which means that it may be accessible to more users). To make sure that the information on which we focus in this study has DRM, we chose only information that is protected digitally. This implies that the information included in documents protected and managed by a DRM system is secured by copyright (digital M&A) and intellectual rights (Patent M&A) in a digital environment (Kravitz, 2001).This information cannot be protected if the information leaves the system, which means that tracking and securing the information can be an issue for the owner of that information.

Prior studies have mainly investigated the content of digital mergers and acquisitions, innovation and digital knowledge based on specific industries (Hanelt et al., 2020; Hüseyin & Vahap Bülent, 2011), and our research raises serious concerns about protecting information as digital documents, and the use of protected information by studying the DRM in digital M&A and patent M&A and testing the performance of target in due diligence through digital rights perspective. To secure the information as a part of corporate governance and to monitor the rights of digital information, the DRM system protects the copyright, intellectual rights, and encryption of digital data. Copyright, fair use and fair sale allow individuals to use information from the providers of the information (Hess & Ostrom, 2003). While sources of information are an enormous concern for investors, from an acquirer's perspective, due diligence is conducted to assure the bidder about the reliability of information acquisition, and to substantially decrease the probability of erroneous decisions and risks. Due diligence plays a critical role in examining the authenticity of information in the acquisition of the target

(Angwin, 2001). From the target perspective, due diligence assures the acquirer of the accuracy and credibility of sources of information and improves the mutual relationship. Similarly, due diligence confirms and provides valuation-relevant information that improves the acquirer's decision regarding the target firm. Following the previous literature, we examine the performance of firms and the effect of digital information in M&A (Hanelt et al., 2020). We measure five different performances by target firms by categorizing five different due diligence processes.

More specifically, we look at how important it is for the target to secure their information by investigating digital data in two categorizations, digital and patent information. Target and acquirer firms ought to have adequate awareness of, and permission to use, digital information, copyrights, and the intellectual rights of shared information. The acquirer and target have a fiduciary and trustworthy relationship that creates an assurance that they will not divulge their mutual information to the public (Wu & Saunders, 2016). The ultimate concerns between parties in a takeover deal are failure to retain mutual trust, and adverse selection[9] and moral hazard[10] (Levinthal, 1988; Nilakant & Rao, 1994).

As part of a digital takeover, DRM focuses on digital information and detects the users of information who are violating the privacy protocols in the system. Ultimately, the users of information can only use that information with rights from the copyright holders, which helps them to protect their information from misuse (Yuan et al., 2011). This information can be shared via three channels: direct from the target, from a third party, or a combination of both. In this study, our focus is on information protected by DRM which the acquirer gets directly from the target. We cannot include the indirect and combination of direct/indirect method to our analyzes as it is difficult to recognize whether the information from a third party alone has DRM or is secured[11]. Our main goal is thus to look at the significant effect of DRM in the digitalization process in digital documents in M&A due diligence.

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[9] A simple definition of adverse selection and moral hazard has given by Fama & Jensen, (1983) is "moral hazard or the lack of effort on the part of the agent and adverse selection or the misrepresentation of ability by the agent".

[10] Prior studies document the capture of two important dimensions of agency problems, adverse selection, and moral hazards. These dimensions are found when information is not distributed equally between principal and agent (acquirer and target), and as a result of asymmetry information, the principal won't be able to determine whether the actions of the agent are optimal or not (Dobson, 1993; Eisenhardt & Eisenhardt, 1989; Nilakant & Rao, 1994).

[11] The focus can only be on the information that is protected by DRM. To access to this information, we only can rely on written contracts and business descriptions for digital content and innovation information for patent content.

2.2.Pros and cons of sharing information in takeover transactions

As the disclosure of information is one of the factors that mitigate information asymmetry (Al Guindy, 2021), it is important to disclose information using the right method and authorization. An acquirer ought to use due diligence when studying the private and public information of a target firm by performing due diligence (Elson & Lajoux, 2010). According to Henningsson et al. (2018) this information, which is part of an information system (IS), plays a critical role in digital M&A. Similar research studies the importance of information in takeovers, and how information asymmetry has an effect on different facets of takeovers, such as methods of payment and premiums (Dhaliwal et al., 2013; Dionne et al., 2015; Eisenhardt & Eisenhardt, 1989; Faccio & Masulis, 2005; Luypaert & Van Caneghem, 2017).

Firms tend to share their information without enquiring whether they have a digital right to share it. An over-reliance on digital documents may lead to the quality of the contents and information being ignored. The target's needs to protect their intellectual property and the content of their information, but the disadvantage of sharing this information is that the acquirer gains access to the same information without DRM from a third party, as this can sometimes lead to litigation over content or intellectual property. The same scenario applies to licensed software and programs that require permission to use, and if these are ignored then both acquisition parties may incur expensive costs and damages. Even though due diligence means it is an imperative part of an acquisition that acquirer and target identify data privacy and cybersecurity, if either party intends to enter a system to gain valuable information this may be defined as fraud and an illegal action if digital rights are not observed.

Positivist researchers agree that conflict between principal and agent involves the information governance mechanism that creates principal-agent problems in the firm (Eisenhardt & Eisenhardt, 1989; Fama, 1980; M. Jensen, 1986). To avoid these problems, we propose that the information system should be able to limit access to information for the agents in the firms through a DRM system. While there are numerous methods to obtain information between both sides of a takeover deal, we believe that sharing information supported by DRM and directly from the acquirer and target is the most efficient method. Evidently, with this method, the information will probably be controlled by digital rights, and there will be permission to transfer the digital information. By all accounts, sufficient, accurate and reliable information to predict the outcome of takeover, is necessary, and assists agents in understanding the performance of their counterparts (Zollo & Meier, 2008). Using technology

in due diligence investigations ultimately provides faster and more reliable information for both acquirer stakeholders and managers.

2.3. Interoperability between DRM and corporate takeover

The mechanism of DRM interoperability[12] in a takeover is defined as focusing on securing the information in a takeover rather than concentrating on the software and how the software is functioning. A proprietary technique with standard convergence should be implemented to inspect DRM interoperability in a takeover. This technique is to improve security systems of digital documents which may be affected by a lack of regulatory compliance in organizations. This can be achieved through the restriction of information using DRM systems from a commercial or technology licensing control point (Longley, 1995). The main technique of DRM includes restrictions on licensing agreements which control access to digital content and uses encryption to control its dissemination and reproduction. Digital content contains a public cryptosystem as part of the DRM, and the key is available to enable stakeholders to obtain information (Wyant, 2001). Digital licensing is used in digital transactions involving content, through which the provider of the content gains more control over the content that the customer uses. In particular, DRM is used to protect the content of information on digital platforms. A confidential agreement is thus signed between acquirer and target in a takeover transaction to avoid any information being delivered without the consent of both sides. Legally, the Digital Millennium Copyright Act (DMCA)[13] was passed in 1998 by legislators to protect information using DRM.

According to the literature, one of the most important keys to success in M&A is due diligence (Savović & Pokrajčić, 2013). For instance, Angwin (2001) examined the due diligence of the target's operation and how its competitive positions in the market can affect the strategies, strengths and shortcomings of a firm. During the process of digitally verifying, obtaining, and collecting information about a target, one substantial factor is commonly ignored: permission to use the accessed information. To create a legitimate infrastructure for digital documents, DRM systems manage, facilitate and tailor personalized content to the preferences of the users (Engelberger et al., 2005). This indicates that the acquirer is obliged

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[12] According to Wegner, (1996), interoperability is defined as "the ability of two or more software components to cooperate despite differences in language, interface, and execution platform."

[13] "The Digital Millennium Copyright Act (DMCA) is a 1998 United States copyright law that implements two 1996 treaties of the World Intellectual Property Organization (WIPO).

to use only the information that they have permission to use. Wangerin (2019) explains that the synergy of acquisition when the acquirer has access to private information about the target, from the value of the target firm to potential risks between bidder and target.

In modern corporate finance, firms and their stakeholders are under siege from technology in every angle of the market, and know little about how their information might affect protection from cyber threats from outside, or within the information from the inside (Trope, 2017). Indeed, concentrating on collecting legitimate information can lead to competent decisions by both acquirer and target. To avoid the lemon problem (Akerlof, 1970) and reduce the asymmetric information that causes the knot between buyer and seller, both sides of the deal need to make sure that the information security system is reliable and trustworthy (Dierickx & Koza, 1991). Accordingly, cyber-vulnerable assets [as part of the digital documents that are controlled in the due diligence process] which potentially include all the digital assets in the databases of both parties should be protected by digital and reliable systems (Trope, 2017). DRM is a tool that allows both takeover parties to protect their vulnerable information from cyber abuse.

The aim of DRM is to combine software and hardware in techniques that limit users to accessing the purchased digital contents, and to avoid accessibility of digital contents without permission license. In this way, DRM users of digital content and technology can have the access to the encryption and decryption form of keys and can let secondary users have other keys to access the information. Nevertheless, the complex technologies can involve flaws that both parties of the transaction deal should be aware of. For example, multiple keys can result in key abduction on digital platforms, and the owners of these systems (DRM) should be more cautious about how and when to use these systems as protection for their own information. In this paper, we try to show how DRM as a protection system, affects the accessibility of information and how this information affects the performance of a firm.

The structure of due diligence processes in M&A with typical DRM system architecture is divided as shown below. The core concept in Table 1 is the strongly complementary relationship between conducting due diligence and providing cyber system architecture. In this framework, the structure of due diligence in M&A is divided into the five stages of business, financial and accounting, legal, IT and environmental due diligence. Each of these levels represents part of a rigorous process of examining the target firm to evaluate its performance along with an assessment of the infrastructure of each level, and an analysis of the information on which it is based. This part of our taxonomy is also part of the content realm which will

later be connected to the content in the DRM system architecture. Eventually, to show the overview of digital rights management, we incorporate the peculiarities of cybersecurity and the digital rights of content with the concept of agency theory to build our core concept, as defined in Table 1. This table represents the core concept and overview of digital rights management in this study. Digital rights management (DRM) is defined as management for the interchange of digital products, software, or information. We then briefly explain the classification of digital M&A and patent M&A. In addition to focusing on the core concept of the paper, we categorize due diligence into five groups: business due diligence, finance and accounting due diligence, legal due diligence, information technology due diligence and environmental due diligence.

[Insert Table 1.]

3. Theoretical framework and hypotheses development

In order to develop our theoretical framework and methodological concept, we examine different types of performances in due diligence, and define three sources of information that the acquirer is willing to use[14]. In M&A, due diligence is conducted by the acquirer to facilitate the flow of information between acquirer and target. In order to reduce the agency problem which leads the acquirer to perform less due diligence (Wangerin, 2017), it is also important to make sure that permission is given to access the information in due diligence. When due diligence is conducted, the acquirer assessment of the valuation of the target helps to mitigate information asymmetry and avoids information risk (Lambert et al., 2007). Eventually, the acquirer reviews internal and external information and targets firms to confirm financial assumptions about the firm (Hellmann, 2018). Whilst it is necessary to proceed with due diligence on target, implementing all types of due diligence in a takeover is something that only high-level acquirers undertake.

The information in our conceptual framework (Figure 1), is classified first by the information that comes directly from the target firm. This information is accessed for the acquirer by the target's websites, mutual documents that are transferred between both parties, and any other sources where the acquirer obtains information from the target directly. In general, any disclosure of information that is properly and legally shared by the target directly

[14] As explained before, there are three main sources of accessing information (Direct, indirect and the combination of both. Here we only focus on direct form of information.

with the acquirer will be in the first category, which is the focus of this paper. In this category, the acquirer studies the information that is given by permission of the target and accessed directly through them. In the direct form of accessibility, both parties of the acquisition will be aware of the digital protections of the information. Next, the information that has external sources. In this type of source, it is difficult to define whether the digital content[15] has digital right or not. Furthermore, the digital content does not have direct source from the target which cause to limitation to access, unusual legal entities, and unusual authorities. Lastly, digital content can get outsources by both direct and indirect sources for the acquirer. The same as the indirect source, this one has the same obstacles to determine legal permission of digital content. Thereby, we focus only on the first categorization which we can obtain written evidence that the documents are protected digitally and have digital rights to use.

In order to classify our hypotheses and see how DRM works with due diligence in the takeover process, we apply three levels of performance (task performance, acquisition performance and firm performance) to test our dependent variables (Zollo & Meier, 2008). According to Zollo and Meier (2008), task performance involves integration process performance and knowledge transfer system conversion in the short term, and over the long term it represents customer- and employee-related intentions; on the other hand, acquisition and firm level performances indicate financial performance in the short term, and financial performance in the long-term, including accounting and innovation performance.

[Insert Figure 1.]

3.1.Business due diligence (BDD) and DRM

Novel digital infrastructures in business define new standard-setting with the ability to coordinate numerous actions and interactions in the ecosystem (Nambisan, 2017; Yoo et al., 2010). Indeed, research has reported that business due diligence (BDD) validates the ability to strengthen market, improve economies of scale, and develop the growth and return of the market (Mc Gee & Byington, 2017). Business due diligence provides information related to a business by focusing on different areas of that business, such as commercial activities and marketing in the firm. The acquirer needs to identify and study the business performance of a

[15] There are more classifications for the content in a DRM system which we do not focus on them as the nature of the subject doesn't match with the purpose of our paper. Some of these classifications are content provider with encrypted content and license issuer with DRM license (Key, Rights) (Gaber, 2013).

target firm to complete such steps. BDD involves analyzing both business tasks and firm performance, as much as systematically assessing the risks and probable future opportunities for the business-related models. In business-related models and characteristics, the key concept is the customer as the user of the DRM system, who purchases the right, can use the license instead of buying the digital content (Wang, 2003).

Hanelt et al. (2020) studied these characteristics in digital technologies and the essential differences between digital M&A and other forms of M&A. These characteristics include re-programmability, homogenization and self-reference, which enable businesses to grow more and allow the information to flow in a secure environment (Hinings et al., 2018). These characteristics can be combined to enforce a business model to fit the system. The characteristics of a target's cybersecurity in BDD thus include products and services "direct from target", outsourcing professionals and contracts from "external sources", human resources, insurance coverage sales and marketing from "direct and external sources". Each of these segments reflect the performance of the business. The task for digital business due diligence in this paper is to evaluate the above segments through the lens of DRM by focusing on the information that is accessed directly through the target. The objective of DRM is to screen out target firms to be monitored, and to check the business performance of the firm. The authors use the market-to-book ratio of the target firm to test the business performance in business due diligence implemented by the acquirer. In summary, they use all the digital documents in the business DRM that need to be considered during the information transaction. Based on the discussions above, we examine whether DRM as two forms of digital M&A and patent M&A can affect the business performance of a target firm.

Accordingly, we posit the following hypothesis:

Hypothesis 1a: There is a positive association between digital rights management as digital M&A and business performance.

Hypothesis 1b: Digital rights management as patent M&A has a vague (ambiguous) effect on business performance.

3.2. Financial/Accounting due diligence (FADD) and DRM

Previous empirical studies have documented financial and accounting due diligence in takeover transactions (Howson, 2017; Mc Gee & Byington, 2017; Savović & Pokrajčić, 2013; Wangerin, 2019). Cybersecurity in due diligence ought to be one of the most important factors from the financial and accounting perspective of a firm. When financial and accounting due diligence (FADD) is implemented in a takeover process, the core requirement is not only to

analyze the financial activities of the firm but also to determine whether financial units are sufficient for the acquisition process. Some of the units that are significantly important in the due diligence process are incumbents of information, financial statements, collateral for debts, certificates and licenses, list of liabilities and bonds, and market securities. The core approach of financial and accounting due diligence is to analyze the financial activities of the acquirer and target firm, including cash flows, EBITDA, revenue analysis, budgeting, forecasts and much more. To achieve to this goal, the acquirer needs to follow governmental and financial compliances. Similarly, the acquirer must heed the source of information and determine whether they have permission to use the accessed information from the owner of that information. To that end, the acquirer needs to control whether the information in due diligence is legitimately used with regard to its patent license and digital rights.

To avoid cyber incidents such as the case of "*Neiman Marcus"* [16] (Trope, 2017), we bridge the FADD with DRM by looking at the information that is accessed directly from the target (in some rare cases, indirect sources can be reliable if they come from legitimate sources such as SEC). This information consists of annual reports, taxation, audit reports, capital budget and public filing (10-K). To analyze FADD, we investigate the financial and accounting performance of firms via examining the return on assets (ROA) of the target. Using the ROA of the target, we test how profitable the target company is relative to the target's total assets at the time of due diligence. We check the copyright (digital M&A) and intellectual property rights (patent M&A) in financial level of performance in due diligence. We analyze the relationship between FADD and DRM by positing the following hypothesis:

Hypothesis 2a: Digital rights management has positive relevance to digital M&A and financial and accounting performance.

Hypothesis 2b: Digital rights management has positive relevance to patent M&A and financial and accounting performance.

3.3.Legal due diligence (LDD) and DRM

In general, there are various types of domestic or international acquisition, which consist of different types of principals that must be followed in order to complete a legal review

[16] "Luxury department store Neiman Marcus experienced, unawares, a cyber incident that began as early as July 16, 2013. The incident involved injection of malware into the retailer's customer payment-processing system, potentially compromising data on about 350,000 customer payment cards." (Trope, 2017).

of documents and information. These principles, which are supported by international law consist of state responsibility, non-state actors, and legal due diligence (LDD) (Barnidge, 2012). LDD is one of the due diligences to which both acquirer and targets pay more attention, as it is directly pertinent to the contracts. When De facto merger doctrine [17] (Edwin, 2005) occurs, it is important not only to detect the transactions and control liabilities but also to make sure that in addition to the statutory aspects, legal actions in any form are controlled. To conduct legal due diligence (LDD), it is essential to check and review all the documents and information about the firm from a legal perspective. In LDD, the DRM system exists in all the documents and programs from both parties of the takeover, and deficiencies in presenting legal rights should be taken in to account as fraud. Mc Gee & Byington (2017) argued that one fifth of firms do not take fraud into consideration, particularly fraudulent financial statements (FFSs) during acquisition transactions.

In LDD, the documents between acquirer and target are usually transmitted legally through each party's lawyers. In a few cases, the acquirer obtains legal information about the target from external sources such as contacts, and sometimes the information comes directly from the target to the acquirer, such as regularity issues. In most cases, the information source is the target themselves, and legitimate outsources. Having said that, the acquirer and target should be aware of some concerns in this area, such as antitrust issues, the HSR threshold[18], Exon-Florio Amendment[19], litigation and intellectual property. These are only some of the things that should be taken into account in takeover. This doesn't mean, however, that the accessed information does not have digital rights or is illegal. The scope of LDD is determined by the type of legal activities on which the target firm is focused. Intuitively, the number of lawyers reflects the capacity for legal activity and the performance of the firm. The authors use this information to check the legal performance of the target firm in LDD using the number

[17] The de facto merger doctrine states that courts will look to substance over form when determining whether statutory merger law applies to a company's shareholders.

[18] "When Congress passed the Hart-Scott-Rodino Antitrust Improvements Act of 1976, it created minimum dollar thresholds to limit the burden of premerger reporting. In 2000, it amended the HSR statute to require the annual adjustment of these thresholds based on the change in gross national product. As a result, reportability under the Act changes from year to year as the statutory thresholds adjust. The PNO fields many questions about the upcoming adjustments to the HSR thresholds from parties whose transactions may take place around the time of the revisions."

[19] "The Exon–Florio Amendment (Exon-Florio or the Amendment) in response to a surge in the rate of foreign takeovers of American firms that produce high technology goods and services." (Greidinger, 1991)

of legal advisors. In this process, the legal representative will analyze different aspects of legal due diligence. The exactitude in due diligence protects the contractual agreement between acquirer and target and forms a comprehensive platform that both parties can negotiate with more precise assessment and pertinent legal outcomes.

Hypothesis 3a: Digital rights management has positive relevance to digital M&A and legal performance.

Hypothesis 3b: Digital rights management has positive relevance to patent M&A and legal performance.

3.4.IT due diligence (ITDD) and DRM

In large scale takeover transactions, information technology due diligence (ITDD) is an important tool with which to identify particular risks related to the deal (Andrews & Sternberg, 2013). ITDD requires an in-depth technical and fundamental analyses of the IT system. In the case of mergers, there are at least four dimensions that must be assessed in ITDD, including the IT system, IT infrastructure, IT process evaluation and IT organizational assessment. How each step of these assessments affects securing the merger process depends on implementing and applying DRM in the entire system. Typically, the ITDD starts with the identification of the IT system and how the system is functioning for the firm. Once the system is analyzed, ITDD appoints the digital rights of the IT systems. This assessment involves a preliminary check in which the IT system in the firm allows legitimate documents with digital rights to be accepted in the processors. Meanwhile, even though the major burden of due diligence involves financial, legal and technical issues (Gleich et al., 2010), digital rights should be considered from a protection of the data perspective.

In ITDD, firms should identify the levels of ITDD in infrastructure management, from the objectives and complexities of ITDD to planning, conducting and finalizing ITDD (Andrews & Sternberg, 2013). In light of this consideration, it should be noted that time as M&A due diligence tends to phase swiftly, and it is important to prepare documents in advance and analyze software and programs to help the ITDD to finish in due time. According to Robins (2008), there are multifaceted approaches that reflect the due diligence process, including analyzing the IP, threats from third-party providers of data, and alleged infringements of third-party access to data. Firms subject to IT factors should thus strategically contemplate how to protect their information with regards to third parties. In other words, in ITDD, firms should provide DRM system to secure the information from access by a third-party. This manifests

the statement that DRM as protecting system has impact on IT performance of the firm in ITDD. Given that tech-firms use more extensive programs and software than firms in other sectors, the probability of their applying a protection system for their information is higher than for other firms. According to the above explanation, we suggest using target firms in the high-tech sector as they are more likely to use DRM for the protection of their digital and patent information. Target firms in the high-tech industry ought to apply such security in their systems to protect their information with DRM from access by a third-party. To determine the relationship between DRM and ITDD, we posit:

Hypothesis 4a: Digital rights management has positive relevance to digital M&A and IT performance.

Hypothesis 4b: Digital rights management has negative relevance to patent M&A and IT performance.

3.5.Environmental due diligence (EDD) and DRM

One of the most significant factors that affects target assets and liabilities is environmental issues (Cooke, 2016). Environmental due diligence (EDD)[20] has become one of the most important features of M&A transactions, and in the event of a takeover, the role of EDD in extending liability to the impairment vs impediment of the environment is unavoidable (Taylor, 2008). EDD helps the acquirer and target to allocate potential risks, mitigate the remediation costs of environmental damage, and address potential problems. EDD is a form of due diligence which assesses potential environmental risks such as economic risks, social issues, political risks, government regulations, licensing, barriers, incentives and all environmental issues relevant to the contamination of soil, air and water (Corino, 2000; Seiler, 1989). In line with these features, Taylor (2008) argues that EDD is a new trend in the corporate governance of firms and has been incorporated into corporate social responsibility in recent years.

Environmental due diligence significantly improves the quality of data in the value chain of a specific process (Singha et al., 2014). Due diligence also helps banks to protect

[20] "Environmental Due Diligence (EDD) is a technical investigation used to support property acquisition, industrial Site concessions and corporate expansions or mergers. Its aim is to issue an opinion of compliance with respect to environmental law, calculate the costs of detected environmental liabilities and reduce the risks of legal litigations." (Brancone-Capponi et al., 2016)

themselves from risk (Gershonowitz, 2014). Environmental and social governance (ESG) and the environmental performance of firms have been widely studied in the literature (Barros et al., 2021; Fatemi et al., 2018; Sabbaghi, 2020; Tampakoudis et al., 2021). To assess the environmental performance of firms, we use the same method as previous studies and use the ESG score as a factor with which to measure environmental performance in EDD (Barros et al., 2021; Leucht & Rydell, 2020). We therefore propose our last set of hypotheses:

Hypothesis 5a: Digital rights management as digital M&A has an ambiguous effect on environmental performance.

Hypothesis 5b: Digital rights management as patent M&A has an ambiguous effect on environmental performance.

4. Methodology

4.1.Data selection and description

We collect M&A listed target firm transactions from 2001 to 2017 from the S&P Capital IQ Mergers and Acquisitions database. We use extra filters to shape our specific sample data: (1) the deal is classified as a "merger"; (2) the status of the acquirer and target is set as "public"; (3) the acquirer owns more than 50% of the target share on the date of announcement; (4) in a double merger, that with the highest percentage was chosen; (5) the acquirer owns less than 50% of the target before date of announcement and tends to purchase more than 50% or more of the target after the date of announcement; and (6) the deals are "completed". Additionally, we obtain accounting and financial data from the Center for Research in Security Prices (CRSP) and COMPUSTAT via the Wharton Research Data Service (WRDS), Thomson Reuters DataStream and Institutional Brokers Estimate System I/B/E/S databases. We also collect extra data for digital M&A from the SEC Edgar database. We collect patent data through both the Orbit Intelligence[21] database and the Patent Data Project of the National Bureau of Economic Research (NBER)[22] database, which is available from the World Intellectual Property Organization (WIPO)[23].

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[21] Orbit Intelligence is "BUSINESS INTELLIGENCE SOFTWARE Powerful patent search and analysis Request a demo Login Unlock hidden insights in global Patent Database."

[22] NBER patent data is a project that contains US Patent data for 1976-2006 and assignee match to Compustat database.

[23] World Intellectual Property Organization contains various datasets for researchers including patent data with digital rights to use.

4.2.Sample statistics

Table 2 Panel A reports the annual distribution of the sample (921 M&A deals, 592 digital M&As, and 423 patent M&As) according to the number of deals, number of target firms with digital M&A, number of digital M&A cases, number of target firms with patent M&A and number of patents. Panel B of Table 3 presents the distribution of digital M&A and patent M&A based on the industry sectors of target firms and the period selected in our study. As it shows, there are 12 sectors included in the digital M&A category and 11 sectors in the patent M&A category. As the statistics show, the highest numbers are associated with the "high technology" industry for both digital M&As and patent M&As.

[Insert Table 2.]

In order to obtain an impression of the relationship between our independent variables (digital M&A and patent M&A) and all the dependent variables (target market-to-book ratio, target return on assets, target legal advisor, target high-technology and target environmental score), we create a two-way scatter plot in Figure 2 which shows the distribution of digital M&A and patent M&A throughout the selected period. The first figure (the one above) shows the observed fraction of DRM (digital) via M&A deals from 2001 to 2017 owned by five different dependent variables. The second figure shows the observed fraction of DRM (patent) via M&A deals in the same period owned by the same five dependent variables of this study. All the fractions are winsorized at the 1st and 99th percentiles to prevent distortion of our estimates.

[Insert Figure 2.]

4.3.Independent variables

In this section, we define the specific construction of each of our variables to emphasize the importance of digital rights. Consistent with previous studies, we also calculate the independent variables with natural logarithms (natural logarithm of one plus the number of each variable) to check the mitigation of potential bias and the pure count of the variables for the robustness of our hypotheses (Balsmeier et al., 2017; Custódio et al., 2019; Hanelt et al., 2020).

4.3.1. Digital mergers and acquisitions (DRM.dig.M&A):

To identify digital mergers and acquisitions as our independent variable, we first select the digital M&A of the target firms in the sample which is part of copyright. To do so, we extract all completed deals from the US mergers and acquisitions database to determine which ones have their documents secured by DRM, and we run two different assignments to construct our independent variable. First, we use the targets' business description in our S&P Capital IQ

Mergers and Acquisitions database and select the target firms which utilized digital anchors as part of their services and products. To determine this, we manually collected this data by reading all short business descriptions of the target firm and chose only the ones which explained specifically how and in what way they used digital content in their deals[24]. To identify which target firms used digital products and digital rights, we searched for terms related to digital rights (Table 2) in the official forms of the Securities and Exchange Commission website. According to U.S. law, the Digital Millennium Copyright Act (DMCA)[25] of 1995 banned the development and distribution of technology designed to sidestep DRM, and to avoid any circumventions of copyright and access to information using DRM (Foroughi et al., 2002), and it is suggested that firms are legally obliged to use DRM if they are using digital products of any kind. Hypothetically, all digital content that is legally introduced in the M&A reports[26] have digital rights, and we identify which target firms have legal authorization in their content to use, distribute and apply digital information by identifying digital M&A as a form of DRM.

Secondly, by applying the "bags of word" from the previous section, we manually collected information on the number of the times that digital discourses have been disseminated in a target firm's 10-K, 10-KSB, 10-Q, 8-K and 425 forms. In addition, using textual analysis method (Loughran & Mcdonald, 2016) we detect the deals that DRM is included in their public financial information and determine the deals that have digital and protected data[27]. The EDGAR database portal only includes deal information from 2001, so our data is limited from 2001 to 2017. We collected the data for the target firm with written evidence of digital rights, and we label this variable DRM.dig.M&A. The search terms and descriptions of forms are included in Table 3.

[Insert Table 3.]

[24] The selection of the digital words and how digital M&A is defined in business description of target firm, is based on the perceptions of the authors and there is no specific algorithm for this selection.

[25] The Digital Millenium Copyrights Act of 1998

[26] The EDGAR database which terms which can be included as exhibits for the company's 10-k or 10-Q reports.

[27] The pioneers of textual data analysis are Loughran and McDonald (2011), who have extensive data on different financial words and use the "bag of words" when analyzing 10-K documents. We were inspired in this study by previous studies by Loughran and McDonald to create our own "Bag of Words" with words related to the subject of our paper (Table 2, Panel A).

4.3.2. Patent mergers and acquisitions (DRM.Pat.M&A):

Another variable from the target firm that we take into the consideration is the ownership of patents which are part of intellectual property rights and indicate the official authorization of innovation in the firm. Intellectual property rights (IPRs) consist of copyrights, patents[28] and trademarks, and by protecting the inexpensive and unlimited copying and dissemination of content, firms have a more secure environment in which to trade (Longley, 1995). The ability to give licenses to recipients (licensees), means that patent owners (licensors) use an authorized method to apply DRM to their information (Van Zimmeren et al., 2011). This method means that they know which licensee has permission to use the patent and digital rights of information. In this paper, we use patent M&A alongside digital M&A to determine DRM in the merger deal., We use two databases and merge their information on patents to create the patent M&A variable.

First, we use the National Bureau of Economic Research (NBER) patent database, using the patent pool[29]. The NBER data base is part of intellectual property rights and all the content in this website is according to the regulations of intellectual property rights. According to the NBER description of the database, *"This database has been used extensively in economic research and contains granted United States Patent and Trademark Office (USPTO) patent data, including names of inventors, names of assignees, grant and application dates, technology classes, forward citations and a key matching patent to firms in the COMPUTSAT database. This key is particularly useful as matching firms to patents is an otherwise difficult task."* As stated in the NBER PDP project (Bessen, 2009), the data for ownership of the patent is from the patent office database and about 5% of the patents are owned jointly by multiple firms (Patent Pool). To manage the patent pool and the intellectual property (which provides a bundle of rights to the holder) of digital information, we make recourse to the patent pool licensing model[30] (Den Uijl et al., 2013). Patent pool[31] or the "one-stop license" (Kumari et al.,

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[28] "A patent is a grant from the government conveying and securing for the owner of an invention the exclusive right to exclude others from making, using, selling, offering to sell, or importing the invention." (Edwin, 2005).

[29] According to the WIPO "**Patent pools** can be defined as an agreement between two or more **patent** owners to license one or more of their **patents** to one another or to third parties. Often, **patent pools** are associated with complex technologies that require complementary **patents** in order to provide efficient technical solutions."

[30] "A patent pool aggregates intellectual property rights (IPR) for the purpose of joint licensing. It is an innovative business model to enhance technology adoption and IPR monetization by facilitating the interaction of multiple licensors with many licensees." (Den Uijl et al., 2013).

[31] Henceforth referred to as Patent.

2017), refers to a license that lets the patent information user have an individual license without any negotiation with patent holders in the future (Van Zimmeren et al., 2011). The advantage of the patent pool is in giving access to a third party (Satyanarayana & Srivastava, 2010), which can facilitate using information from a third party that has a legitimate license. Merging the multi-step matching[32] patent data from the NBER to our M&A data, we identify the target firms with patents. Patent information from NBER is only available to 2006 so we decided to draw more complementary data from Orbit Intelligence to obtain the number of patents for each target firm up to 2017.

Secondly, we include the extensive patent coverage from the Orbit Intelligence database using direct content analysis (Elo et al., 2014; Hsieh & Shannon, 2005), and carefully match the patent information of each target firm with digital information to ensure the accuracy of the database. We identify the number of patents for each target firm in this database by searching the index list for the applicant's name, corporate tree, and invention text. We use the advanced algorithm of Orbit Intelligence for the period 2001 to 2017. Figure 3 demonstrate the data gathering for Digital M&A and Patent M&A. The data related to digital M&A indicate the association of digital M&A and copy rights, and the data related to patent M&A is associated with intellectual property rights in takeover. The source from digital M&A consist of business description of the target firm from mergers and acquisition Capital IQ database. In addition, we use SEC EDGAR form to obtain digital data of the target firm using textual analyses and bag of words (Table 3, Panel A). For the patent M&A, we obtain data from National Bureau of Economic Research (NBER) database which is included in WIPO database (patent data), and Orbit Intelligence database using content analyses.

[Insert Figure 3.]

4.4.Dependent variables

To measure the digital and patent M&A, we developed many proxies at different levels to determine how information asymmetry might affect our equation. Borochin et al. (2019) suggest that factor analysis helps the proxies in the analysis to better describe the information asymmetry factor between variables. We also categorize the levels of performance in acquisition for each variable (Wang & Moini, 2012). Our approach combines variables at different levels of performance and due diligence to determine the measurement and

[32] NBER "Matched USPO patent to the North American Compustat data at WRDS (not to the global data)".

construction of our dependent variables. We chose the below dependent variables to assess the performance of the target firm, and to test them with our independent variables.

4.4.1. Target market-to-book ratio as a measure of BDD (firm level):

One of the tools used to measure the market-based performance of a firm is market-to-book ratio (Chilale, 2018). Various studies suggest that acquirer firms with a high market-to-book ratio tend to buy target firms with lower market-to-book ratios (Rau & Vermaelen, 1998; Renneboog et al., 2019). Higher market-to-book ratios will cause target firms to have negative abnormal return for the acquirer and higher premiums for the target (Goergen & Renneboog, 2004). Many other studies use the market-to-book ratio as a tool with which to measure the growth and performance of a firm (Brown & Sarma, 2007; Dass et al., 2021; Elnahas & Kim, 2017). We thus use this approach to define the market-to-book ratio as a measure of business performance in business due diligence.

4.4.2. Target return on assets as a measure of FADD (firm level):

Many studies describe return on assets (ROA) as a factor with which to measure the financial performance of a firm and to evaluate the efficiency of management (Ramaswamy & Waegelein, 2003; Sharma, 2016). Return on assets is a measure used to present the actual performance of the firm from a corporate perspective (Kwon et al., 2020). This measurement is also used by Cai et al. (2016) study which suggests that ROA is one of the actual economic benefits of assets. Various studies use ROA as a measure of probability, firm performance in post-merger phase and operating performance (Borochin et al., 2019; Kalinowska & Mielcarz, 2014). We follow Nataraja et al. (2018), and calculate the ROA as an indicator with which to measure internal-based financial performance.

4.4.3. Target legal advisor as a measure of LDD (firm level):

Legal advisors are one of the pillars of a takeover, and the likelihood of good legal performance is greater when the firm adopts legal advisors (Krishnan & Masulis, 2013; Westbrock et al., 2019). We use the number of legal advisors in the target firm through the takeover process to measure how legal due diligence functions through the takeover process. We select target firms with legal advisors to determine whether these firms use legal services and follow legal compliance. In other words, we expect target firms with legal advisors to have more legal engagements and performances. Krishnan and Laux (2008) promote the idea that legal advisors are one of the dominant intermediaries in takeover deals, and lead to reduce information asymmetry in the firm. Krishnan and Masulis (2013) suggest that there is a positive relationship between legal advisers and the outcome of a deal, and a higher premium. They

also propose that acquirers with legal advisors have stronger incentives to close the deal, while target firms with legal advisors have stronger incentives to close the deal with higher premiums.

4.4.4. Target high-tech industry as a measure of ITDD (industry level):

These days, high-tech firms represent the majority of takeovers among different types of acquisitions (Davis & Madura, 2015). Previous studies show that high-tech firms are considered to have better governance which leads to significantly higher returns (Thraya et al., 2019). Conn et al. (2005) report that high-tech firms in cross-border acquisition have positive announcement and long run whilst non-high-tech firms have zero announcement. Previous studies suggest that firms in the high-tech industry have relatively higher capital expenditure and better deals (Faccio & Masulis, 2005a). With increasing numbers of high-tech firms over recent years, protecting digital rights seems more important. Managing the digital information of a target firm will be even more relevant when high-tech firms are involved in takeovers. In this study, we focus on target firms with high-tech codes to see how their digital information is affected by DRM from a digital and patent point of view. To identify the high-tech firms, we use the primary SIC codes for target firms including 3571, 3572, 3575, 3577, 3578 (computer hardware), 3661, 3663, 3669 (communications equipment), 3674 (electronics), 3812 (navigation equipment), 3823, 3825, 3826, 3827, 3829 (measuring and controlling devices), 4899 (communication services), and 7370, 7371, 7372, 7373, 7374, 7375 and 7379 (software) (Faccio & Masulis, 2005a; Ljungqvist & Wilhelm, 2003; Loughran & Ritter, 2004).

4.4.5. Target environmental as a measure of EDD (deal level):

Environmental due diligence is uncommon due diligence that only specific sectors of industry prefer to control. Although limited attention has previously been paid to the environmental dimension of takeovers (Aktas et al., 2011; Gomes & Marsat, 2018), many firms have recently been inclined to care about the risks of environmental liabilities (Seiler, 1989). Currently, ESG is one the most important valuation indexes in the organization, and firms invest extensively in it. There are many studies that find a positive association between CSR performance (ESG) and firm performance (Capelle-Blancard & Petit, 2017; Fatemi et al., 2018; Jo & Harjoto, 2011; Tampakoudis & Anagnostopoulou, 2020). The environmental score of ESG comprises many elements, from resource management to energy consumption and animal welfare, but most importantly it is about disclosing information about environmental policies (Markopoulos et al., 2020). The ESG score also reflects the environmental, social and governance performance of a firm, and we thus focus on the environmental index of ESG (Fatemi et al., 2018) to test how digital rights management is associated with the environmental performance of the target firm in EDD.

4.5. Control variables

4.5.1. Target Sales Growth (Firm Level):

An important factor in the acquisition deal structure with which to control performance is the sales growth of the target firm (DePamphilis, 2008) which affects the decisions that the acquirer make in the due diligence period. There are also positive and negative relationships between past performance of a firm and different aspects of the takeover, from methods of payment to premium (Amel-Zadeh & Zhang, 2015). The quality of financial reporting is associated with high growth and earnings volatility, so controlling sales growth is one of the factors in due diligence to control the quality of financial reports.

4.5.2. Acquirer Size (Firm Level):

According to the literature about acquirer size effect, large acquirer firms make fewer announcement returns compared to small acquirer firms, particularly in countries with stronger governance (Humphery-Jenner & Powell, 2014; Moeller et al., 2004). Zhao et al. (2019) argue that larger acquirer firms have higher levels of prestige, quality in management skills, better performance in the long term and more resources which give them a competitive advantage in the integration phase of a post-merger. The larger size of acquirers is associated with cash offering methods of payment for the acquirer which lower the acquirer's bankruptcy costs (Faccio & Masulis, 2005b).

4.5.3. Relative Size (Firm Level):

Relative size has been described by many scholars as the size of the target compared to the acquirer based on the total assets of the target prior to the year of merger (Kumar, 2009; Moeller & Schlingemann, 2005; Seth et al., 2002). Bertrand and Betschinger (2012) found that the larger the size of a firm, the less negative the effect of domestic acquisition. Similarly, Draper and Paudyal (2008) stated that the relative size has a positive effect on an acquirer's gain, especially when the information asymmetry is higher for the acquirer. Information asymmetry will be reduced between managers and future investors when companies are larger, which leads to more attention from outsiders (investors) (Karpoff et al., 2013). There are many factors related to the size of a target firm. Various studies have examined such positive gains, including the number of a target firm's shareholders (Conrad & Niden, 1992; Goergen & Renneboog, 2004).

4.5.4. Acquirer and Target Firm's Financial Advisor (Firm Level):

One of the factors that investment banks take into consideration in a takeover transaction, is that target firms have financial advisors (Forte et al., 2008). Advisor involvement in a takeover transaction mitigates the risk in the process (Angwin D., 2001). As the nature of

advisors is to take part in multiple acquisitions, this will give them experience to help the acquirer firm to evaluate the target firm from a better perspective (Zhang et al., 2020). Controlling the effect of a target firm's financial advisor in FADD will thus help the acquirers to improve their knowledge of the target's financial behavior.

4.5.5. Acquirer and Target Leverage (Deal Level):

There are many fundamental risk characteristics which can effect financial analysis, and leverage is one of them (Borochin et al., 2019). We know that leveraged acquisition is a combined transaction involving the internal (equity) and external (debt) sources of investors, and that leverage can improve the perceived synergy in takeover (Pires & Pereira, 2020). This shows that the leverage of the target plays a significant role in presenting the level of debt. As a control variable, leverage also helps to investigate the effect of digitalization on firm performance (Hanelt et al., 2020).

4.5.6. Target Legal advisor (Firm Level):

There are only a few studies regarding the importance of legal advisors in takeover transactions, although M&A lawyers play a key role in legal due diligence in order to check the legal evidences, draft documents and play as intermediary between the sides in the acquisition deal (Krishnan & Laux, 2008). The reputation of lawyers affects the transaction, and they also ensure that the participants in the deal play fairly and do not act fraudulently (Ribstein, 2003).

4.5.7. Acquirer and Target Liquidity (Deal Level):

There are many proxies with which to measure information asymmetry, one of which is liquidity (Zhu & Jog, 2009). Target liquidities affect the behavior of acquirers, such as when the high stock liquidity of listed target firms are less likely to interest cash-paying acquirers (Adra & Barbopoulos, 2019). In a continuous-time framework, liquidity has an effect on corporate investment (Hirth & Uhrig-Homburg, 2010). Various empirical studies note the implications of stock market liquidity in the corporate decision-making process (Adra & Barbopoulos, 2019; Amihud & Mendelson, 1986; Rosenbaum & Rubin, 1983). Stock market liquidity is one of the key factors in the competitive benefit of the bargaining of listed firms (Faccio & Masulis, 2005b; Officer et al., 2008). Many studies examine the relationship between corporate liquidity and cash flow in takeover transactions (Hanson, 1992; Yang et al., 2019).

4.5.8. Acquirer and Target Analyst Coverage (Deal Level):

Analyst coverage is one of the factors that help a financial analyst to make decisions regarding investment recommendations and forecasting future activities (Hinze & Sump, 2019). Another example of the casual effect of analyst coverage on corporate decisions is a

study that uses broker disclosure in M&A to identify the influence of analyst coverage on the financial policies of the firm (Derrien & Kecskés, 2013). Analyst coverage has a direct impact on the distribution of information and a positive effect on the value of a firm (K. H. Chung & Jo, 1996). Prior literature has shown the relationship between information asymmetry and analyst coverage and how increasing analyst coverage leads to a reduction of information asymmetry and a decrease in equity mis-valuation (X. Chang et al., 2006; K. Li, 2020).

4.5.9. Cash Methods of Payment (Deal Level):

Various studies have developed theories and models regarding the choice of payment methods and asymmetric information (Faccio & Masulis, 2005a; Hansen, 1987; Martin, 1996; Travlos, 1987). For instance, Travlos (1987) suggests that choice of payment affects a stock's announcement period, such as the negative impact of common stock financing on common stock return and a non-negative impact otherwise for cash payment. In another study, Goergen and Renneboog (2004) suggest that methods of payment is sensitive to share prices in takeover transactions. The payment in a deal is categorized in various ways, but mostly the acquirer firm faces the choice of payment between stock and cash (Yang et al., 2019). Here, we chose cash offer as the literature indicates "costly signals of high valuation of target by the acquirer" (Chemmanur et al., 2009). Eventually, acquirers tend to use cash payments when the information asymmetry is lower and, it is more likely for the acquirer to control the target firm (Zhu & Jog, 2009).

4.5.10. Premium (Deal Level):

It is undoubtedly true that both sides of acquisition have private information, and that asymmetric information between the acquirer and target has a direct effect in takeover acquisition (Hansen, 1987). Premiums are affected by many aspects of deal transactions, from lower premiums paid by block holders due to information asymmetry (Dionne et al., 2015a) to higher premiums when the deal is financed by equity in levered acquisition (Pires & Pereira, 2020). The fluctuation of the premium paid depends on various factors. Gomes and Marsat (2018) suggest a positive relationship between premium paid and a target's overall CSR performance. Emerging markets also affect the level of premiums in such a way that with higher levels of information asymmetry, acquirer firm favor other methods of payment such as stocks rather than paying by cash (Zhu & Jog, 2009). Commensurate with the deal terms, the premium paid varies in different environments, and in particular targets "in countries with better investment environment" are having higher premiums paid (Maung et al., 2019).

4.5.11. Target R&D Intensity (Firm Level):

There are various proxies to demonstrate our hypotheses. Inspired by Sapra et al. (2014), we use target R&D intensity to define and measure innovation. We use target R&D intensity as a proxy for the target's information asymmetry and to determine whether the target has a high level of R&D expenditure. Investment R&D is one of the factors that can escalate innovation and growth in a firm (Ivarsson & Christensen, n.d.). R&D is one of the significant variables that affect takeovers, as Phillips & Zhdanov (2013) suggest that small firms with R&D are better candidates in takeover transitions. In acquisitions, the acquirer tend to obtain information from target R&D to direct the payment to cash (Chemmanur et al., 2009). Several empirical studies suggest a positive correlation between the market value of the firm and R&D expenditures (Chauvin & Hirschey, 1993; Hall, 1988). R&D expenditures are used as a proxy for information asymmetry in corporate finance (Chen & Hennart, 2004; Officer et al., 2008). Many studies use R&D intensity as proxy not only for information asymmetry but also for uncertainty (Cai et al., 2016; P. Cheng et al., 2016a; Officer et al., 2008).

4.6.Model Specification

To test our hypothesis, we apply multiple regression techniques to measure firm performance at different levels of due diligence for the five indicators based on our dependent variables: target market-to-book (market-to-book/*T.MTB*), target return on assets (*ROA*), target legal advisor (*T.L.Advisor*), target in high-tech industry (*T.Hi-Tech*) and environmental (*Environ*). We also add the Hausman augmented regression test of endogeneity to identify whether a potentially exogenous variable is endogenous, to eliminate the bias in parameter estimates which stems from endogenous unobserved effects and to make sure that the instrumental variables are sufficiently strongly correlated with our independent variables and confirmed to use ordinary least regression for our models.

4.6.1. Target firm performances and DRM

In order to test our hypotheses, we ran multiple regressions to determine whether digital M&A and patent M&A have an impact on different levels of performance in various types of due diligence. We use ordinary least regression to avoid unobserved differences in the levels of firm and to approximate the "time-variant effect within a firm" (Hanelt et al., 2020). To investigate ***H1a and H1b*****,** which involve the effect of digital rights management (digital M&A and patent M&A) and firm performance on business due diligence, we estimate the market-to-book ratio in the following model:

$$T.MTB_{j,t} = \beta_0 + \beta_1 \, (ln.DRM.dig.M\&A)_i + \beta_2 \, (ln.DRM.Pat.M\&A)_i + \gamma \, Control \, Z_i + \delta j + \varepsilon i \quad (1)$$

where (*j)* is the index of the firm and (*t)* is the index for time. Our main variables of interest are *(DRM.dig.M&A)* and *(DRM.Pat.M&A)* which measure the digital M&A and patent M&A. The *T.MTB* is the independent variable that calculates Target market value 4 weeks prior to announcement divided target total assets (Borochin et al., 2019). Control Z_i represents a vector that includes the control variables of primary interests. We employ acquirer market-to-book *(A.MTB),* acquirer financial advisor *(A.Fin.Adv),* acquirer size *(A.Size),* acquirer liquidity *(A.Liquidity)*, acquirer analyst coverage *(A.Analyst.C)*, acquirer leverage *(A.Lev),* target sales growth *(T.Sales.Growth),* relative size *(Rel.Size)*, target financial advisor *(T.F.Advisor),* target analyst coverage *(T.Analyst.C)*, target leverage *(T.Lev),* target liquidity *(T.Liquidity)*, target R&D intensity *(T.R&D.In),* methods of payment as cash *(MOP.C),* premium *(Premium)*, and acquisition attitude (*Attitude*).

To test ***H2a and H2b*** which involve the effect of digital rights management (digital M&A and patent M&A) and firm performance in finance and accounting due diligence, we estimate the following model:

$$T.ROA_{j,t} = \beta_0 + \beta_1 (ln.DRM.dig.M\&A)_i + \beta_2 (ln.DRM.Pat.M\&A)_i + \gamma\ Control\ Z_i + \delta j + \varepsilon i \quad (2)$$

where the *T.ROA* is the independent variable that calculates the net operating income divided by average target total assets in the recent year (Yang, Guariglia, et al., 2019).

For ***H3a and H3b*****,** which investigate the effect of digital rights management (digital M&A and patent M&A) and firm performance in legal due diligence, we estimate the following model using Binary Logistic Regression:

$$T.Legal.Adv_{j,t} = \alpha\beta_0 + \beta_1 (ln.DRM.dig.M\&A)_i + \beta_2 (ln.DRM.Pat.M\&A)_i + \gamma\ Control\ Z_i + \delta j + \varepsilon i \quad (3)$$

where the *T.Legal.Adv* is the independent variable calculated as an indicator variable if the target firm has a legal advisor and zero otherwise.

For ***H4a and H4b***, we use the Cobb–Douglas production function framework (Müller et al., 2018) to measure the effect of digital rights management (digital M&A and patent M&A) and firm performance in IT due diligence using Binary Logistic Regression, and hypothesize:

$$T.Hi.Tech_{j,t} = \beta_0 + \beta_1 (ln.DRM.dig.M\&A)_i + \beta_2 (ln.DRM.Pat.M\&A)_i + \gamma\ Control\ Z_i + \delta j + \varepsilon i \quad (4)$$

where the *T.Hi-Tech* is the independent variable, which is an indicator variable equal to the value one if the target is in the hi-tech industry and zero otherwise.

Based on ***H5a and H5b*** which hypothesize the effect of digital rights management (digital M&A and patent M&A) and firm performance in environmental due diligence, we estimate the following model:

$$T.Environ_{j,t} = \beta_0 + \beta_1 (ln.DRM.dig.M\&A)_i + \beta_2 (ln.DRM.Pat.M\&A)_i + \gamma\, Control\, Z_i + \delta j + \varepsilon i \quad (5)$$

where the *T.Environ* is the independent variable that contains three components which describe the performance of a firm to reduce natural resources and energy.

All the regression controls for year and two-digit SIC industry fixed effect of Fama-French 48 classification (Fama & French, 1997), ceteris paribus. To further examine the hypothesis of this study, we examine the sensitivity of our data summary and the outliers using robustness checks after the data summary and findings.

5. Empirical Findings

5.1.Descriptive statistics

Table 4 displays number of observations, and the mean and standard deviation of all variables of a full sample, and all variables are defined in the appendix. There are 921 observations combining digital M&A and patent M&A according to the summary of descriptive statistics. There are 592 observations for each of our independent variables, for digital M&A, and 423 for patent M&A. The total numbers of Digital M&A are greater than Patent M&A. Target firms are about 24% of the size of acquirer firms. Acquirer firms have greater Market-to-Book ratio and Analyst Coverage. Acquirer firms have higher leverage than target firms. To reduce the effect of outliners, all variables are winsorized at the 99th and 1st percentiles. There is potential reverse causality in the relationship between the independent and dependents variables, and to avoid this potential bias reverse causality, we log both of the independent variables (Hanelt et al., 2020). The mean logarithm of DRM in digital M&A is 2.363 and standard deviation is 1.427; the mean and standard deviations for the logarithm of DRM in patent M&A are 2.925 and 1.978, respectively. The moderately low mean values of both independents suggests the difficulty in building up digitalization patterns in different industries (Hylving et al., 2012). Notwithstanding, the standard deviation of digital and patent M&A suggests extensive variation across target firms. The mean for the target market-to-book *(T.MTB)* ratio is 2.766 for our dependent variables, which indicates that the target's stocks are traded at 277.6% of their book values and the standard deviation is 5.611. The mean of the target returns on assets *(T.ROA)* is -0.045 and the standard deviation is 0.225. For target legal advisor the mean is 0.923 and the standard deviation is 0.267. For the last two dependent variables, the mean and standard deviation for target high technology are 0.218 and 0.413, and for target environmental score the mean and standard deviation are 1.949 and 11.028, respectively.

[Insert Table 4.]

Table 5 presents the pairwise correlation coefficient for all the variables. To avoid multicollinearity in our correlation matrix, we check the variance inflation factors (VIFs) which is less than ∼2.7 and is below the critical threshold, which is "10" and is considered acceptable and indicates no serious multicollinearity in this study (Mansfield et al., 1982). This table presents the Pearson correlation coefficient for the dependent and independent variables in this study. The sample consists of 921 observations of publicly traded target firms, and the sample period spans 2001 through 2017. There are several significant correlations among variables. The highest significant correlation, 0.85 belong to Target high-tech and Digital M&A which is positive and significant at the 1% level. Other variables have significant correlations with our independent variables at 1%, 5% and 10% level of significant. The only exception belongs to correlation between environmental variables and independent variables which there is no significant correlation. (*Ln.DRM.dig.M&A)* as one of the independent variables is the logarithm of one plus the number of digital key terms used in official SEC forms and short business descriptions of target firms. (*Ln.DRM.Pat.M&A)* is another independent variable and is the logarithm of the number of patents for each target firm. Of the dependent variables: (*T.MTB)* is target book-to-market ratios, (*T.ROA)* is target return on assets, (*T.Legal.Adv)* is target legal advisor, (*T.Hi.Tech)* is target high technology and (*T.Envirn)* is an environmental score for the target firm. Control variables are: (*MOP.C)* methods of payment as cash, (*Premium)* (4 weeks), (*A.Liquidity)* acquirer liquidity, (*A.MTB)* is target book-to-market ratios, (*A.Size)* log of acquirer assets, (*A.Lev)* is target leverage, (*A.Fin.Adv)* acquirer financial advisor, (*T.Analyst.C)* is target analyst coverage, (*T.Liquidity)* target liquidity, (*T.Sales.Gro)* target sales growth, (*Rel.Size)* is relative size between acquirer and target, (*T.Fin.Adv)* target financial advisor, (*T.Lev)* is target leverage and (*T.R&D.In*) is target R&D intensity. All variables are winsorized at the 1% and 99% levels and Bonferroni adjustment is used to adjust the significance level. T-statistics are referred to as standard errors adjusted for the autocorrelation and ∗, ∗∗, and ∗∗∗ represent statistical significance at the 10%, 5%, and 1% levels, respectively.

[Insert Table 5.]

5.2.Empirical results

We follow the model proposed in section 4.6. and illustrate the bias that results from comprehensible estimation meaning we control for symmetric/asymmetric information of the target firm in the regressions. We then present the unbiased results in the section 6 introducing two method of sensitivity analyses. Using appropriate set of covariates and control required for our model, we base the analyses on the regressions presented in the section 4.6.

5.2.1. *Univariate comparisons:*

Model 1 is the baseline model with the results of the dependent variable *(T.MTB)* and all control variables and indicates that acquirer analyst coverage is significant at (p<.05), and that premium and target R&D intensity are positively significant at (p<.001) level. Regarding our first hypothesis, Models 2 and 3 of Table 6 Panel A present the results for the effect of digital M&A and patent M&A on performance by using the market-to-book ratio of the target. The results from Model 2 (H1a) suggest that DRM in digital M&A has a negative coefficient (p<.05) and statistically significant and negative effect on target market-to-book ratio. The results for Model 3 (H1b) of DRM in patent M&A do not show any significant effect between patent M&A and the performance of target firms at firm level in business due diligence.

In Table 6 Panel A Model 4, 5 and 6, we present the results for testing another economic channel (information asymmetry) between acquirer and target, and the performances of the target. Model 4 is the baseline model and presents the results for the test between the dependent variable *(T.ROA*) and selected control variables with significance at (p<.05) for acquirer financial advisor and target sales growth, (p<.01) for the cash method of payment, premium and relative size, and significance at (p<.01) for target leverage and target R&D intensity, respectively. Model 5 (H2a) estimates the effect of digital M&A and target return on assets. Consistent with the findings in prior studies, we find that DRM in digital M&A has a positive coefficient (p<.05), is statistically significant and has a positive effect on target return of assets. Model 6 (H2b) reveals the results of the test between the dependent variable *(T.ROA*) and DRM in patent M&A and we show a positive and significant coefficient (p<.01) and the positive effect of patent M&A and target firm performance at firm level in financial and accounting due diligence.

[Insert Table 6. Panel A]

Panel B of Table 6 represents the results for (H3a), (H3b), (H4a), (H4b), (H5a) and (H5b). The first three models of Panel B of Table 6 examine the relationship between digital M&A and patent M&A and target legal advisor. Model 1 is the baseline with testing control variables with target R&D intensity significant at (p<.05) level and acquirer and target financial advisor positive and highly significant at the (p<.001) level. In Models 2 and 3 for (H3a) and (H3b), both hypotheses are statistically significant with a coefficient at (p<.01) and indicate the positive effect of DRM in digital M&A and patent M&A on the legal performance of target firms and target legal advisor at the firm level of legal due diligence. Model 4 is the baseline

for the examination of DRM digital and patent M&A and target high technology. The results show that acquirer and target analyst coverage is significant at the (p<.01) level and the cash method of payment, acquirer liquidity, acquirer size, target leverage and target R&D intensity are highly significant at (p<.001). Model 5 (H4a) reveals the results for a test between DRM in digital M&A and target high technology with the coefficient at (p<.001) and highly significant. This emphasizes that DRM in digital M&A has a positive effect on the high-tech performance of a firm. Model 6 (H4b) shows that DRM in patent M&A has a negative coefficient (p<.05), is statistically significant and negatively affects target high-tech at the industry level of high-tech due diligence. Model 7 is the baseline for the test of DRM and the target environmental score of ESG. The results of Model 7 show significance (p<.05) for the acquirer market-to-book ratio and for the target analyst coverage at the (p<.001) level. For both Model 8 (H5a) and 9 (H5b) there were no significant results. All variables are defined in Appendix A and ***, **, and * denote the significance at 1%, 5%, and 10% levels.

[Insert Table 6. Panel B]

5.2.2. Regression analysis and discussion:

By setting DRM as digital M&A and patent M&A, i.e., assuming that the data that we have in our sample for digital and patent M&A are all included digital right management, we present the results for the regressions in table 6. We report that there is negative and significant association between MTB of the target and digital M&A. This result is inconsistent with Bharadwaj et al., (1999) who stated that there is a positive association with MTB in digital content. DRM as digital and patent has significant and positive influence on financial behavior of the firm which is consistent with previous literature (Kalinowska & Mielcarz, 2014). On legal advisor analysis, the result has the same impact as ROA with positive and significant influence of DRM on the legal activities of the target firm. Schmitz & Sievers, (2021) had the same claim, ceteris paribus, on gaining more the M&A success with increasing more on legal advisors. With regards to digital M&A, the results are consistent with the literature that there is positive and significant association between digital M&A and technological performance of the target firm (Hagedoorn & Duysters, 2002). As of patent M&A, the literature suggests that as the patent are a restriction tools to protect technology protections (Langinier, 2004), and our result is consistent with the literature on this subject. The findings on environmental performance and DRM is inconsistent with that in Brancone-Capponi et al., (2016), Markopoulos et al., (2020) and Chang et al., (2021) who stated that digital finance of the firm

to be influenced by ESG. Particularly, Chang et al., (2021) finds that higher ESG performance and digital finance elevate corporate financing efficiency.

First, the use of DRM as a form of digital M&A to protect the information is associated with a lower target market-to-book ratio and the market's perception of the stock's value in business due diligence at the firm level. At the same level, DRM as form of patent M&A is not associated with the market-to-book ratio. On the level of financial and accounting due diligence, we document that DRM as forms of both digital M&A and patent M&A is associated with higher target return on assets and the performance of target firms at firm level. The same pattern is also tested for DRM as digital M&A and patent M&A which are associated with the higher target number of legal advisors and legal performance in legal due diligence at the firm level. Conversely, DRM as digital M&A is significantly associated with the higher high technology performance of the target firm in IT due diligence at industry level. DRM as patent M&A, however, is associated with the lower high-tech performance of the target firm at the same level. Finally, at the level of environmental due diligence, there is no association between DRM and environmental score at deal level.

Overall, our results yield interesting discussion related to that DRM of digital/patent M&A and various performances on target firm in due diligence process. Reasons underlying the negative influence of DRM on patent is discussed and proved and the propensity of DRM as digital/patent M&A to grow and positive impact in technological sector is emphasizes. The importance of target financial and accounting performance is explained by ROA. The strong DRM attributes increase the probability of legal performance in target due diligence which is positive for both digital and patent M&A.

6. Sensitivity analyses

6.1.Bias due to endogeneity

As we have used different proxies for measuring information asymmetry in previous sections, and due to omitting some variables, information asymmetry might be subject to measure error, which is one of the reasons for endogeneity (Borochin et al., 2019). As we know that we have time-series data, we must also take to an account the time invariant error term which might be correlated with any of the right-hand side variables, and in this case all the coefficients from Table 6 could be subject to some degree of bias. We apply lag independent variable *(LIV)* to test the robustness of our results (Borochin et al., 2019; Deephouse, 2000; Wilkins, 2018). We lag each variable by one year. To avoid the autocorrelation problem

and alleviate the endogeneity problem in the sample, we also lag all the control variables. Here is the general model for lagged Explanatory Variables:

$$Y_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_{t-1} + \gamma\, Control\, Z_{i,t-1} + \delta j + \varepsilon i \quad (8)$$

Where Y_t is equal to all the dependent variables and X_{t-1} is the value of the variable in period t-1. We test each dependent variables separately in the table 7. In this model, autocorrelation is degree of similarity between time series and a lagged version of itself over successive intervals. The results remained almost the same.

[Insert Table 7.]

6.2.Bias due to self-selection

As an additional test for DRM which may be endogenously related to digital M&A and patent M&A, we bootstrap the calculation by testing for propensity score matching (PSM). Accordingly, we use the PSM method to test the self-selection of our sample (Smith & Todd, 2005). Roberts and Whited (2013) suggest that matching is a useful tool for robustness checks of a regression-based analysis and can alleviate "asymptotic biases arising from endogeneity or self-selection". First, we use Rosenbaum & Rubin, (1983) method to calculate the propensity score:

$$p(X) \equiv \Pr(D = 1|X) = E\{D|X\} \quad (8)$$

where D={0,1} is the indicator to the treatment and C is the vector of pre-treatment characteristics. In this equation, the exposure to treatment is random within cells defined by X which is also random within cells defined by the value of variable p(X). Following the extent literature, such as Adra and Barbopoulos (2019) and Barbopoulos and Adra (2016), we first estimate the average treatment effect on treated (ATT). Using stratification method, we define ATT as the difference between the outcomes of the treated observations and the outcomes if they had not been treated. Below are two models [ATT digital] and [ATT patent]:

$$ATT_{Digital} = \frac{\Sigma_{i:\, DRM.dig.M\&A=1}\{DRM.dig.M\&A_i(lower\ DRM) - DRM.dig.M\&A_i(Higher\ DRM)}{N} \quad (9)$$

$$ATT_{Patent} = \frac{\Sigma_{i:\, DRM.Pat.M\&A=1}\{DRM.Pat.M\&A_i(lower\ DRM) - DRM.Pat.M\&A_i(Higher\ DRM)}{N} \quad (10)$$

where N is the number of matched paid. We applied the variant estimator suggested by Abadie and Imbens (2006) to create the treatment effect using the standard error. In the model, ATT is the mean difference between targets whose digital M&A and patent M&A are above the sample median as the treatment group, and those targets whose digital M&A and patent M&A are below the sample median as the control group. First, a logistic regression is run to estimate the

propensity score (likelihood) and see DRM as a function of observable firm performance in the five levels: target market-to-book ratio, return on asset, legal advisor, high technology, and environmental score. We apply the nearest-neighbor matching method and identify the treated variables and set of control variables. Then, we denote set of control units to match with treated variables:

$$C_{(i)} = \underset{j}{Min} \parallel p_i - p_j \parallel \quad (10)$$

where $C_{(i)}$ is the set of control variables matched to the treatment variables. We apply six covariances to designate the propensity score matching in the model of Panel A, including method of payment as cash, premium, acquirer size, target liquidity, industry effect and year effect. To match as many firms as possible, we use the Fama French (FF 17) industry[33] followed by the study by Al Guindy (2021).

The propensity score matching results are depicted from Table 8.1 to Table 12.2. Panel A in each of these tables indicates that the predicted probability is elicited from the logistic regression, and using match with neighbor, it is possible to see whether they are equally like each other or matched with more than one firm at a time, and we eventually use a caliber of 0.01 to test the observed covariates. Panel B in all the tables, shows the number of matchings treated and control variables as well as the ATT of each test. The result of the ATT for the Table 8.1 estimate is negative and 0.19% with statistically significant at the 10% level, and suggests that the treatment effect is related to a 19% reduction in the target market-to-book ratio; the Table 8.2 estimate is 0.041% and not significant; the Table 9.1 estimate is 0.02% and statistically significant at the 10% level, and suggests that the treatment effect (digital M&A) is related to a 02% increase in the target return on asset; the Table 9.2 estimate is 0.0411 percent points and statistically significant at the 10% level and suggests that the treatment effect (patent M&A) is related to a 04% increase in the target return on asset; the Table 10.1 estimate is 0.015 percent points and statistically significant at the 5% level, and suggests that the treatment effect (digital M&A) is related to a 01% increase in target legal firm advisor performance; the Table 10.2 estimate is 0.069 percent points and statistically significant at the 5% level, and suggests (patent M&A) that the treatment effect is related to a 06% increase in target legal advisor performance; the Table 11.1 estimate is 0.143 percent points and statistically significant at the 1% level, and suggests that the treatment effect (digital M&A) is related to a 14% increase in

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target high technology performance; the Table 11.2 estimate is 0.08% and statistically significant at the 1% level and suggests that the treatment effect (patent M&A) is related to a 08% increase in target high technology performance; the Table 12.1 estimate is 1.002% and not significant, and the Table 12.2 estimate is 1.002% and not significant. Overall, the results are all evidence for the robustness of our sample for all ten hypotheses. Panel C of each of these tables presents the results for balancing propensity between the control and treatment before and after matching. Together with lagging dependent and independent variables in previous section and the propensity score matching in this section, we use a superlative method to control the robustness of our samples.

7. Conclusion

7.1.Practical contributions

Digital rights management system as a multi-faceted new concept (Wang, 2003), enables secure and verified cyber-protection system for digital data in cyber environment. While prior literature on fin-tech and digitalization are extensive, the impact digital rights management system on takeover transaction has been largely neglected. In this article, we investigate the issue of whether digital rights management as digital/patent M&A account for target performances in M&A and particularly in due diligence. Using a large novel dataset, this study comprises the full record of digital M&A and patent M&A. Studying a sample of 921 deals over the 2001-2017 period and using various robustness tests, we present conclusive evidence that DRM plays a significant role in due diligence.

Motivated by the debated role of digital right management in the mergers and acquisition setting, we examine digital/patent M&A ties with various types of performances of target firm in M&A due diligence setting. Prior finding by Hanelt et al., (2020) show the essential role of digital M&A on building the digital knowledge and performance based on industrial-age firms. In our analysis of digital M&A, the main findings show that at one end, target firms with DRM have positive and significant impact on financial/Accounting, legal and high-tech performance of firms. In contrary, the results of patent M&A suggest that there are negative and significant impacts from DRM on business and high-tech performance. We did not find any association with DRM and environmental performance of target firm. Given the magnitude of digitalization, from digital payments to digital information, our findings align with this idea that disseminating information ought to involve rights (digital right management) in the mechanism of due diligence. Overall, our results reveal the mechanisms by which the digital and patent forms of DRM can alleviate or elevate performance on different levels of due

diligence in the pre-merger phase. In this article, we contribute to the emerging literature by addressing that the digital rights management influence takeovers from due diligence perspective. These rules out the unprotected transaction of digital information which affect the performances of target in due diligence. This study also has managerial implications.

7.2.Managerial implications

An overall implication of this paper is that protection of digital information is a matter that the management should concern more than ever. We suggest that the importance of security of the data is critical for managers especially in the content of due diligence and transmitting data to another party of acquisition. Such process would improve the safety of digital environment and effectiveness with regards to approachability of digital data without consent of the owner of the data. With respect to digital information, safer due diligence enables the better assessment of the acquirer about target firm. Our framework proposes that even though DRM acts as a preventing tool to access to any kind of digital information, it will assist managers to have control on who has access to their data. This effect on performance of the target firm in due diligence process. To investigate DRM through an economic channel such as information asymmetry (Gao et al., 2016), we should consider that DRM acts as a tool to avoid accessibility of digital information without consent of the owner. This avoidance increases asymmetric information between target and acquirer and the managers and stockholders should be aware of this consequence. Overall, our summary highlights that there are some limitations for the managerial implications and practical contributions.

7.3.Limitations

This study has several limitations. There are four reasons why we neither examined the indirect information nor gave a path to find this kind of information in general: (a) First, while we measure the direct information about the target, identify other types of information (indirect or the combination or direct/indirect) seems laborious.; (b) Second, even though the indirect information can be identified, it would be unfeasible to recognize of the DRM of the digital information unless the source of information is known (like what we did in our paper). As the information is transmitted between target and acquirer, it can be accessed by third party which means that another variable needs to be added in the equilibrium digital rights; (c) Third, we used the data that is defined as an accessed information of the target to the acquirer directly the impact of macroeconomic digital rights management was not the initial point of our study. This means that the other types of information have not been covered by this study. (d) Fourth, the initiation of the questions of this study sparkled from a place where we wanted to see how

DRM as barrier to access any kind of information, might impact on due diligence in takeover transaction.

8.Reference

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Balsmeier, B., Fleming, L., & Manso, G. (2017). Independent boards and innovation. *Journal of Financial Economics*, *123*(3), 536–557. https://doi.org/Appendix. Robustness checks References Figures (5) Fig. 1. Fractions of independent boards and directors Fig. 2. Dynamics of independent board effect on patents and citations Fig. 3. Independent boards and number of claims Fig. 4. Dynamics of independent board effect on backward and self-citations Fig. 5. Dynamics of independent board effect on patents in known and unknown classes… Tables (22) Table 1 Table 2 Table 3 Table 4 Table 5 Table 6 Elsevier Journal of Financial Economics Volume 123, Iss

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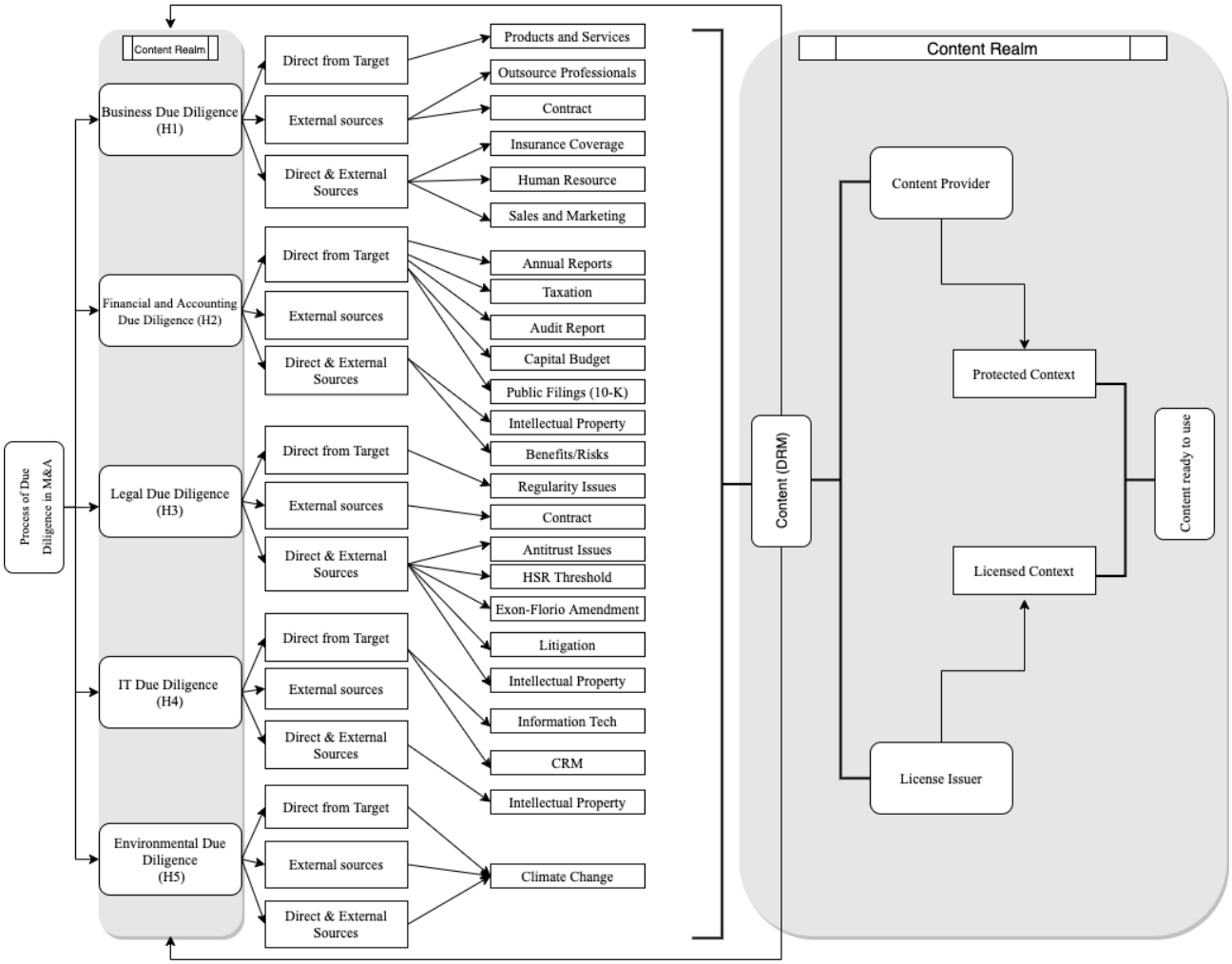
Figures

Figure 1. Conceptual framework on due Diligence process in M&A with typical DRM system architecture



Note: The figure 1 provides complex and mix of two models. First model includes the process of due diligence in M&A (on the left). The process has five subcategories (Macro level of first model) of business due diligence *(H1)*, financial and accounting due diligence *(H2)*, legal due diligence *(H3)*, IT due diligence *(H4)* and environment due diligence *(H5)*. Each subcategory is divided to three sections (Meso level for first model) of "Direct from target", "External sources" and "Direct and external sources". From each one of these three sections, some stems are divided (Micro level for first model) which explains in detail the aim of each group, allegorically. Second model which is called content realm contains the DRM system and starts with content and divides in two subcategories of "Content provider" and "License issuer". Each of these sections has one stem of "Protected context" for "Content provider" and "Licensed context" for "License Issuer". Using both stems, eventually the model provides "Content ready to use" for the users of the content. In metal level, both five subcategories from first model and the second model are part of content realm and users should follow each step to be able to use the content.

Figure 2. Distribution of DRM in digital and patent through M&A deals from 2001 to 2017

Figure 2.A.

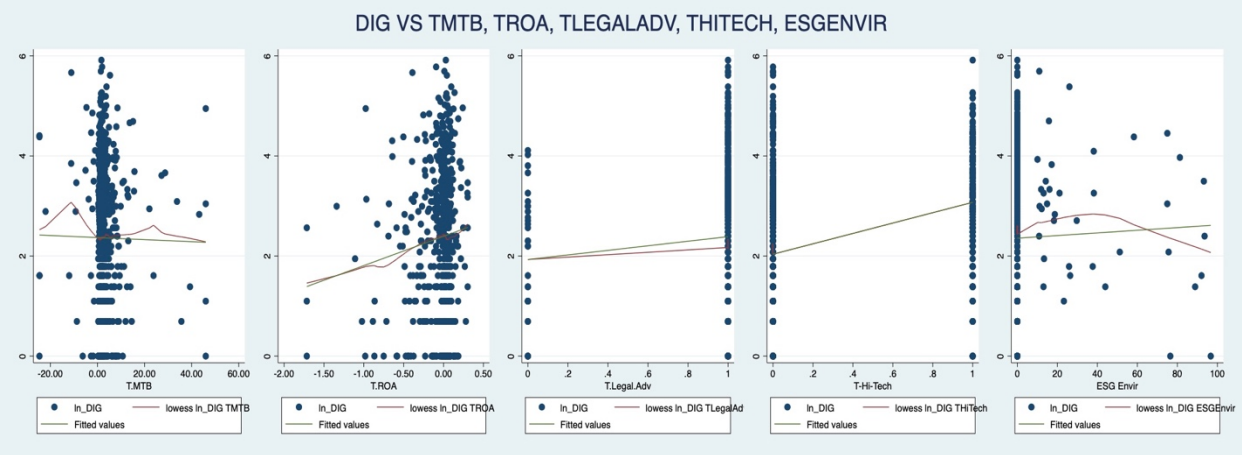
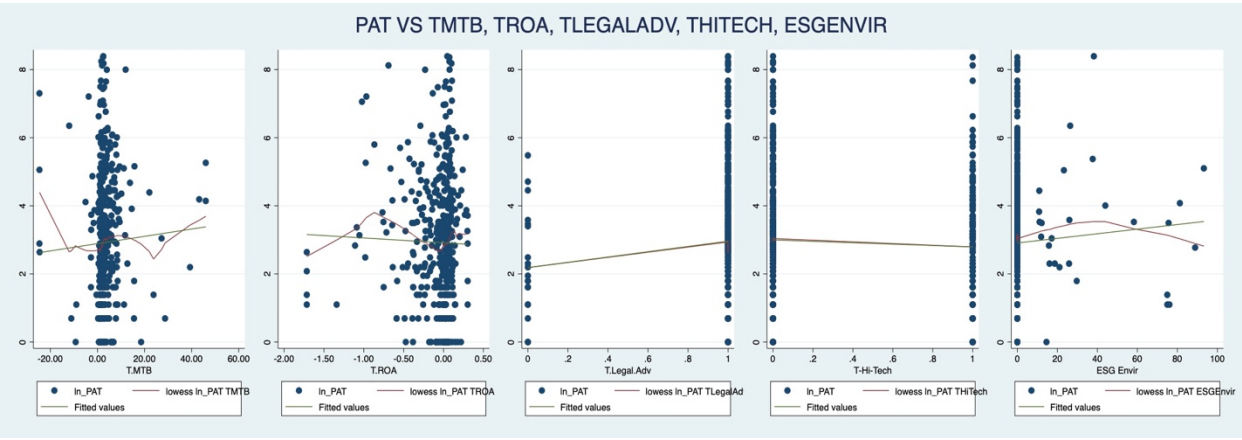
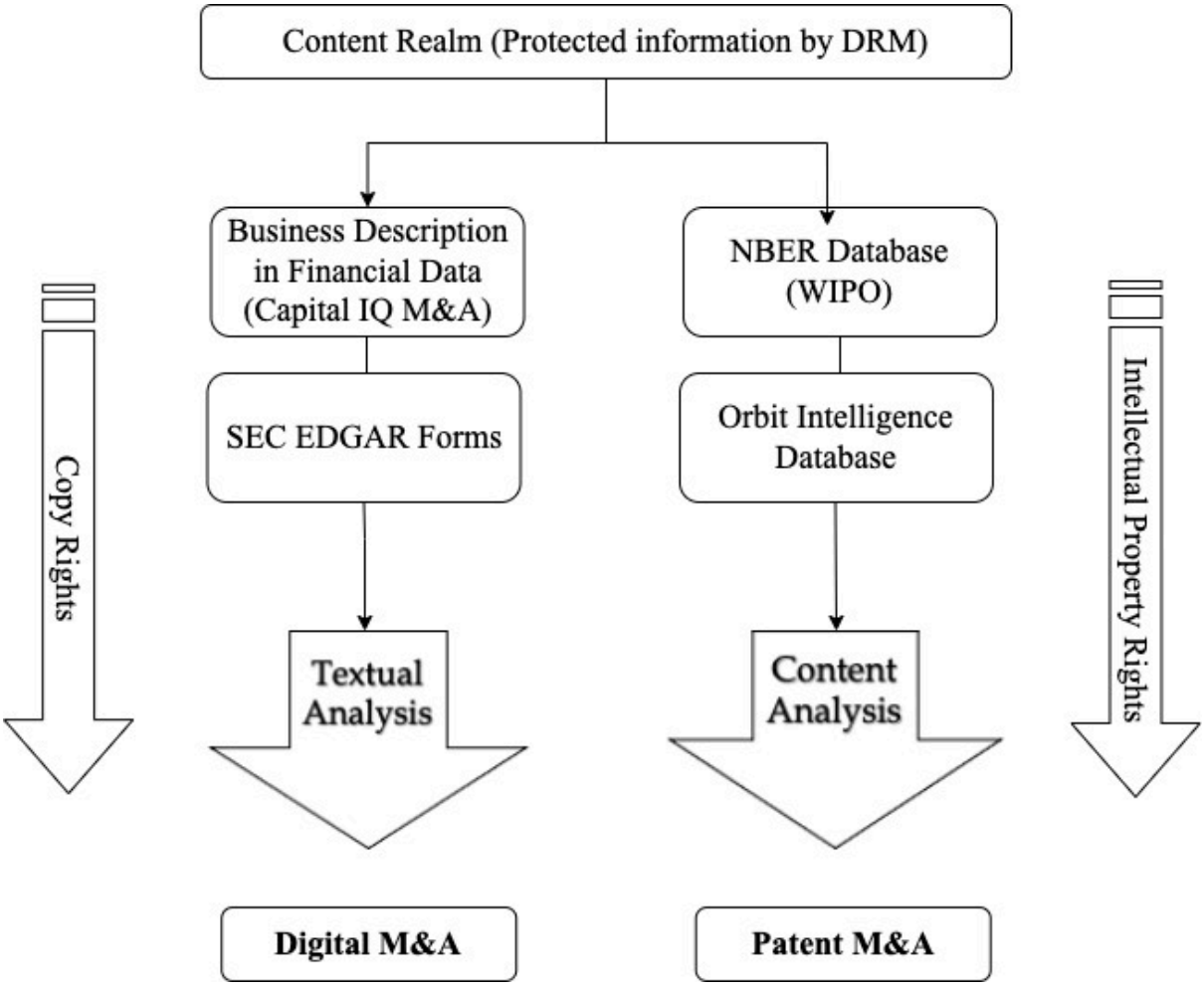


Figure 2.B.



Note: Figure 2 exhibits the two-way scatter plot of digital M&A and patent M&A throughout the selected period using simple OLS regression on each variable. Figure 2.A. exhibits the observed fraction of DRM (digital) via M&A deals owned by the dependent variables (Target Market-to-Book Ration, Target Return on Assets, Target Legal Advisor, Target High-Technology and Target Environmental Score). Figure 2.B. exhibits the observed fraction of DRM (patent) via M&A deals in the same period owned by the dependent variables (Target Market-to-Book Ration, Target Return on Assets, Target Legal Advisor, Target High-Technology and Target Environmental Score). The variables are calculated from January 2001 to December 2017. All the fractions have been censored at the 1st and 99th percentiles to prevent distortion of our estimates.

Figure 3. Design of data gathering for Digital M&A and Patent M&A



Note: Figure 3 demonstrate the data gathering for Digital M&A and Patent M&A. The data related to digital M&A indicate the association of digital M&A and copy rights, and the data related to patent M&A is associated with intellectual property rights in takeover. The source from digital M&A consist of business description of the target firm from mergers and acquisition Capital IQ database. In addition, we use SEC EDGAR form to obtain digital data of the target firm using textual analyses and bag of words (Table 3, Panel A). For the patent M&A, we obtain data from National Bureau of Economic Research (NBER) database which is included in WIPO database (patent data), and Orbit Intelligence database using content analyses.

Tables

Table 1. Core concepts

Table 1. Overview and core concept of digital right management

Concepts	Description and Definition	Selected references
DRM	Digital Right Management (DRM) is defined as management to interchange digital products, software, or information. [In this study, we present digital M&A (IT) and patent M&A (Innovation) to examine the relationship of DRM with other variables]	(Gaber, 2013; Gifar & Purnomo, 2020)
BDD	Business due diligence is defined as number of macro factors that include economic risks, social issues, political risks, government regulations, licensing, barriers, and incentives.	(Ippolito, 2019)
FADD	Financial and accounting due diligence is defined as financial detailed analysis target and acquirer with focusing on financial characteristic of the firm.	(Howson, 2018)
LDD	Legal due diligence is defined as core aim of due diligence as it is base of acquisition process.	(Howson, 2018)
ITDD	Information technology due diligence is defined as assessment of risk and issues and collect information that accelerate post-merger activities.	(Andrews & Sternberg, 2013)
EDD	Environmental due diligence is defined as assessment of environmental factors of firm such as polluted buildings, soil, and ground water any type of environmental risks.	(Corino, 2000; Seiler, 1989)

Note: This table represents the core concept and overview of digital right management in this study. The digital right management (DRM) is defined as management to interchange digital products, software, or information. Due diligence is categorized into five groups of business due diligence, finance and accounting due diligence, legal due diligence, information technology due diligence and environmental due diligence.

Table 2. Distribution of Digital M&A and Patent M&A

Panel A: Distribution based on year

Year	No. of Deals	No. of target firms with Digital M&A	No. of Digital M&A	No. of target firms with Patent M&A	No. of Patent M&A
2001	49	19	102	20	3855
2002	36	16	153	19	633
2003	42	20	254	13	2895
2004	55	31	403	18	1312
2005	55	36	777	30	4904
2006	60	35	1174	27	1498
2007	64	30	1044	23	1488
2008	44	28	577	27	1427
2009	41	24	706	27	15640
2010	59	37	759	26	8805
2011	34	23	590	16	7386
2012	51	36	996	30	5745
2013	50	32	854	31	2566
2014	68	51	1618	33	2190
2015	81	68	2870	47	2667
2016	82	68	1879	27	3174
2017	50	38	999	9	299
Total	921	592	15755	423	66484

Panel B: Distribution based on industry

No.	Name of industry	Number of the deals with Digital M&A	Number of the deals with Patent M&A
1	Consumer products and services	28	19
2	Consumer staples	10	10
3	Energy and power	28	20
4	Financials	115	15
5	Healthcare	90	121
6	High technology	186	150
7	Industrials	40	30
8	Materials	19	20
9	Media and entertainments	20	8
10	Real state	6	0
11	Retails	17	6
12	Telecommunications	33	24
Total		592	423

Note: Panel A of table 3 reports the distribution of our sample based on the year and includes the number of the deals, number of the target firm with digital M&A, number of digital M&A each year, number of the target firm with patent M&A and number of the patent M&A each year for the duration of 2001 to 2017. The sample includes 921 total merger deals with combined digital and patent deals included. There are total number of 592 deal of digital M&A and 423 firms of patent M&A. In addition, the total number of digital M&A and patent M&A are 15755 and 66484, respectively. Panel B provides number of distributions of digital M&A and patent M&A based on industries. The selected period is from 2001 until 2017. There is total 12 sectors that have digital M&A and 11 sectors for patent M&A. The total numbers of digital M&A are 592 deals and 423 deals for patent M&A.

Table 3. Search terms and description of SEC forms[66].

Panel A: Search Terms to identify digital content in SEC forms		
Key words (Bag of Words)	"Digital right management", "digital", "digital assets", "digital asset management", "digital/interactive marketing", "digital automotive network", "digital products", "digital imaginary", "digital voicemails", "digital history", “digital publishing”, “digital communications”, “digital telecommunications”, “digital media”, “digital media”	
Panel B: Selected forms		**Data links**
10-K	"Annual report – Provides audited annual financial statements, a discussion of material risk factors for the company and its business, and a management’s discussion and analysis of the company’s results of operations for the prior fiscal year.	https://www.investor.gov/introduction-investing/general-resources/news-alerts/alerts-bulletins/investor-bulletins/how-read
10-KSB	"A 10-KSB similar to a 10-K form for small businesses. They are often referred to as "Penny Stocks". 10-KSB is including all annual financial information.	https://www.sec.gov/oiea/Article/edgarguide.html
8-K	According to U.S. Securities and Exchange Commission (SEC), “Certain information about business combinations may be disclosed in a Form 8-K filing, such as the initial signing of a merger agreement or, if an acquisition doesn’t require shareholder approval, information about the company being acquired”	https://www.sec.gov/files/form8-k.pdf
10-Q	"Quarterly report – Provides unaudited quarterly financial statements, updates regarding material risks that the company faces, and management’s discussion and analysis of the company’s results of operations for the prior fiscal quarter."	https://www.investor.gov/introduction-investing/investing-basics/glossary/form-10-q
425	"Prospectuses and communications – Written disclosures and communications in connection with a business combination where securities are part of the consideration."	https://www.sec.gov/oiea/Article/edgarguide.html
Extra forms	Example including extensions and "Filings with “/A” appended to the form type code indicate an amendment. For example, the form type “10-K/A” would indicate an amendment to a Form 10-K filing.; Any other forms such as “proxy statements” in SEC.gov portal which states specifically our keywords.	https://www.sec.gov/oiea/Article/edgarguide.html https://www.sec.gov/edgar/search/?r=el#/dateRange=all

Note: This table report search terms and description of SEC forms from U.S. Edgar Security and Exchange Commission. Panel A explains the search terms to identify digital content in each firm. Panel B explains the forms that is selected from SEC web portal to search the aforementioned forms from. In addition, the link to each data is introduced in this table.

[66] https://www.sec.gov/oiea/Article/edgarguide.html

Table 4. Summary Statistics

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Ln.DRM.dig.M&A	592	2.363	1.427	0	1386	2484	3349	5.916
Ln.DRM.Pat.M&A	423	2.925	1.978	0	1386	2833	4158	8.390
T.MTB	921	27.661	5.611	-24625	1133	1870	3131	45.999
T.ROA	921	-0.045	0.225	-1715	-0.033	0.008	0.042	0.303
T.Legal.Adv	921	0.923	0.267	0	1	1	1	1
T.Hi.Tech	921	0.218	0.413	0	0	0	0	1
T.Envirn	921	19.492	11028	0	0	0	0	96.69
MOP.C	921	0.451	0.498	0	0	0	1	1
Premium	921	38829	35542	-30.84	17.86	32.33	52.19	231.33
A.Liquidity	921	2036	1506	0.874	1143	1601	2233	11.808
A.Analyst.C	921	13884	9805	0	6	12	21	54
A.MTB	921	37.154	6938	-13053	1558	2268	3831	72.184
A.Size	921	3.7	0.805	1479	3165	3701	4226	5683
A.Lev	921	0.175	0.172	0	0.037	0.135	0.254	0.971
A.Fin.Adv	921	0.811	0.392	0	1	1	1	1
T.Analyst.C	921	6.59	6918	0	1	5	9	44
T.Liquid	921	2696	2948	0.631	1127	1631	2956	23.773
T.Sales.Gro	921	0.21	0.93	-0.933	-0.027	0.068	0.214	10.265
Rel.Size	921	0.24	0.35	0	0.034	0.109	0.318	3.939
T.Fin.Adv	921	0.977	0.149	0	1	1	1	1
T.Lev	921	0.157	0.234	0	0.001	0.068	0.226	3.232
T.R&D.In	921	0.067	0.131	0	0	0	0.093	0.981

Note: In this table, the summary statistics of variable is reported. The sample includes 921 M&A public completed deals of target from 2001 to 2017 drawn from Thomson Financials' S&P CAPITAL IQ mergers and acquisitions database. The table reports number of observations, mean, standard deviation, Min and Max. All variables are defined in Appendix.

Table 5. Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
(1) ln_DIG	1																					
(2) ln_PAT	0.02*	1																				
(3) TMTB	-0.13**	-0.14**	1																			
(4) TROA	0.14**	0.14**	-0.11*	1																		
(5) TLegalAdv	0.11*	0.26**	0.06*	0.01*	1																	
(6) THiTech	0.37***	-0.23***	0.43***	0.67***	0.85***	1																
(7) ESGEnvir	0.06	0.07	0.01	0.10	0.04	0.07	1															
(8) CashOnly	-0.03	0.10	-0.05	0.00	-0.05	0.10	-0.06	1														
(9) Premium	-0.14**	0.12*	-0.02	-0.32***	-0.02	-0.07	-0.00	0.26***	1													
(10) ALiquidity	0.02*	0.01	0.03	-0.04	-0.08	0.19***	-0.06	-0.05	-0.05	1												
(11) AAnalystC	0.00	0.08	0.06	0.11*	0.15**	0.07	0.09	0.17**	-0.00	-0.13*	1											
(12) AMTB	0.08	0.08	0.06	-0.00	0.05	-0.03	0.13*	-0.12*	0.00	-0.14*	-0.00	1										
(13) ASize	-0.01	0.10	0.00	0.22***	0.13*	-0.11*	0.15**	0.26***	0.05	-0.38***	0.68***	0.04	1									
(14) ALevTLOTA	0.12*	0.06	-0.09	0.09	0.04	-0.21***	0.06	-0.03	0.03	-0.51***	-0.06	0.32***	0.18***	1								
(15) AFinAdvisor	0.08	0.06	0.03	0.10	0.31***	-0.11*	0.08	-0.20***	-0.09	-0.10	-0.14**	0.05	-0.02	0.14*	1							
(16) TAnalystC	0.08	0.09	0.03	0.23***	0.17**	0.00	0.23***	-0.15**	-0.11*	-0.16**	0.51***	0.08	0.50***	0.07	0.26***	1						
(17) TLiquid	0.02	0.03	-0.02	0.04	-0.05	0.13*	-0.05	0.10	0.00	0.34***	0.09	0.01	-0.12*	-0.19***	-0.08	-0.06	1					
(18) TSalesGro	-0.07	0.04	0.07	-0.05	-0.00	-0.02	0.01	-0.05	-0.05	-0.01	-0.00	0.27***	-0.03	0.07	-0.00	-0.04	0.027	1				
(19) RelSize	0.16**	-0.00	0.06	0.19***	0.03	-0.09	0.08	-0.43***	-0.24***	0.02	-0.26***	0.12*	-0.25***	0.19***	0.26***	0.18***	-0.11*	-0.00	1			
(20) TFinAdvisor	0.01	0.10	0.05	0.04	0.48***	0.11*	0.02	-0.00	-0.00	0.04	0.07	0.03	0.00	0.01	0.07	0.10	-0.09	0.03	0.05	1		
(21) TLev	0.10	-0.01	-0.09	0.10	0.07	-0.24***	0.06	-0.12*	-0.00	-0.24***	-0.01	0.09	0.19***	0.37***	0.21***	0.18***	-0.42***	-0.04	0.25***	0.012	1	
(22) TRD	-0.17*	0.22***	0.29***	-0.61***	0.02	0.22***	-0.08	0.04	0.25***	0.12*	-0.00	-0.02	-0.21***	-0.15**	-0.11*	-0.18***	0.09	0.05	-0.22***	0.043	-0.23***	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table represents the Pearson correlation coefficient for the dependent and independent variables in this study. The sample consists of 921 observations of publicly traded target firms, and the sample period spans 2001 through 2017. *(Ln.DRM.dig.M&A)* as one of the independent variables is logarithm of one plus number of digital key terms used in official SEC forms and short business description of target firm. *(Ln.DRM.Pat.M&A)* is another independent variable and is logarithm of number of patents for each target firm. The dependent variables are *(T.MTB)* is target book-to-market ratios, *(T.ROA)* is target return on assets, *(T.Legal.Adv)* is target legal advisor, *(T.Hi.Tech)* is target high technology and *(T.Environ)* is environmental score of the target firm. Control variables are: *(MOP.C)* methods of payment as cash, *(Premium)* (4 weeks), *(A.Liquidity)* Acquirer liquidity, *(A.MTB)* is target book-to-market ratios, *(A.Size)* log of acquirer assets, *(A.Lev)* is target leverage, *(A.Fin.Adv)* acquirer financial advisor, *(T.Analyst.C)* is target analyst coverage, *(T.Liquidity)* target liquidity, *(T.Sales.Gro)* target sales growth, *(Rel.Size)* is relative size between acquirer and target, *(T.Fin.Adv)* target financial advisor, *(T.Lev)* is target leverage and *(T.R&D.In)* is target R&D intensity. All variables are winsorized at the 1% and 99% levels and used Bonferroni adjustment to adjust the significance level. *T*-statistics are referred on standard errors adjusted for the autocorrelation and ∗, ∗∗, and ∗∗∗ represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table 6. Regressions Results

Table 6. Regression results						
Panel A (H1, H2)						
Regression Model	OLS	OLS	OLS	OLS	OLS	OLS
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
DV:	T.MTB	T.MTB	T.MTB	T.ROA	T.ROA	T.ROA
Intercept	1.678***	1.801***	1.739***	-1.759***	-1.682***	-1.604***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Ln.DRM.dig.M&A		-0.010*			0.013*	
		(0.044)			(0.027)	
Ln.DRM.Pat.M&A			0.000			0.013*
			(-0.282)			(0.014)
MOP.C	-0.386	-0.400	-0.368	0.040**	0.034*	0.038
	(0.335)	(0.316)	0.358	(0.002)	(0.047)	(0.111)
Premium	-0.020***	-0.0208***	-0.020***	-0.0005**	-0.0007**	-0.0009**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
A.Liquidity	0.048	0.072	0.060	0.004	0.0003	0.005
	(0.745)	(0.628)	(0.687)	(0.320)	(0.960)	(0.435)
A.Analyst.C	0.065*	0.064*	0.064*	0.0006	0.0007	0.0009
	(0.029)	(0.029)	(0.031)	(0.477)	(0.510)	(0.542)
A.MTB	0.028	0.034	0.028	0.0005	0.0002	0.000
	(0.298)	(0.206)	(0.292)	(0.503)	(0.815)	(0.857)
A.Size	-0.265	-0.276	-0.234	0.018	0.026	0.018
	(0.441)	(0.421)	(0.496)	(0.101)	(0.081)	(0.340)
A.Lev	0.217	0.515	0.224	0.030	-0.053	0.052
	(0.864)	(0.686)	(0.860)	(0.460)	(0.328)	(0.470)
A.F.Advisor	-0.167	-0.172	-0.146	0.040*	0.033	0.045
	(0.739)	(0.729)	(0.770)	(0.011)	(0.123)	(0.125)
T.Analyst.C	0.011	0.015	0.012	0.001	0.001	0.0006
	(0.748)	(0.652)	(0.717)	(0.120)	(0.409)	(0.725)
T. Liquidity	-0.092	-0.093	-0.094	0.002	0.008*	0.004
	(0.187)	(0.182)	(0.179)	(0.290)	(0.020)	(0.209)
T.Sales.Growth	0.160	0.158	0.157	-0.015*	0.002	-0.026**
	(0.407)	(0.413)	(0.415)	(0.011)	(0.793)	(0.002)
T.Rel.Size	1.012	1.064	1.019	0.054**	0.074**	0.058
	(0.091)	(0.075)	(0.088)	(0.005)	(0.004)	(0.125)
T.F.Advisor	0.114	0.101	0.133	-0.023	0.018	0.019
	(0.924)	(0.933)	(0.912)	(0.543)	(0.776)	(0.819)
T.Lev	-0.645	-0.622	-0.648	-0.098***	-0.014	-0.129**
	(0.469)	(0.484)	(0.466)	(0.001)	(0.722)	(0.003)
T.R&D.In	10.529***	10.698***	10.696***	-1.015***	-0.886***	-1.062***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R2	0.082	0.084	0.128	0.414	0.347	0.491
N	921	921	921	921	921	921

Table 6. Regressions Results (Continues)

Table 6. ***Regression results***

Panel B (H3, H4 and H5)

Regression Mode	Probit	Probit	Probit	Probit	Probit	Probit	OLS	OLS	OLS
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
DV:	T.Legal.Adv	T.Legal.Adv	T.Legal.Adv	T.Hi.Tech	T.Hi.Tech	T.Hi.Tech	T.Environ	T.Environ	T.Environ
Intercept	-1.437***	-1.677***	-1.671***	-1.013***	-0.993***	-0.821***	2.364***	2.469***	2.403***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln.DRM.dig.M&A		0.125**			0.113***			-0.013	
		(0.003)			(0.000)			(0.231)	
Ln.DRM.Pat.M&A			0.021**			-0.023*			0.0004
			(0.047)			(0.040)			(0.650)
MOP.C	-0.026	-0.020	0.003	0.121***	0.157***	0.128*	0.130	0.112	0.115
	(0.142)	(0.242)	(0.895)	(0.000)	(0.000)	(0.012)	(0.870)	(0.887)	(0.885)
Premium	0.000	0.000	0.000	-0.0005	0.000	-0.001*	0.001	0.0006	0.001
	(0.507)	(0.925)	(0.155)	(0.147)	(0.398)	(0.037)	(0.901)	(0.956)	(0.912)
A.Liquidity	0.004	0.002	-0.006	0.033***	0.025*	0.027	0.072	0.1006	0.062
	(0.510)	(0.757)	(0.391)	(0.001)	(0.044)	(0.075)	(0.806)	(0.734)	(0.832)
A.Analyst.C	0.002	0.003**	0.002	0.007**	0.005*	0.006	-0.069	-0.069	-0.068
	(0.142)	(0.004)	(0.112)	(0.001)	(0.029)	(0.095)	(0.243)	(0.241)	(0.247)
A.MTB	0.000	0.000	0.000	0.001	-0.0007	0.003	0.125*	0.134*	0.126*
	(0.812)	(0.921)	(0.565)	(0.523)	(0.692)	(0.367)	(0.019)	(0.013)	(0.019)
A.Size	0.013	0.016	0.023	-0.123***	-0.123***	-0.123**	1.044	1.031	1.018
	(0.383)	(0.290)	(0.198)	(0.000)	(0.000)	(0.003)	(0.127)	(0.131)	(0.138)
A.Lev	0.038	0.097	-0.05	-0.026	-0.044	-0.105	0.689	0.041	0.683
	(0.490)	(0.077)	(0.505)	(0.761)	(0.687)	(0.509)	(0.785)	(0.682)	(0.786)
A.F.Advisor	0.137***	0.167***	0.136***	-0.029	-0.065	-0.051	-0.142	-0.149	-0.159
	(0.000)	(0.000)	(0.000)	(0.386)	(0.134)	(0.433)	(0.886)	(0.880)	(0.873)
T.Analyst.C	0.001	-0.001	-0.0001	0.008**	0.008*	0.010*	0.262***	0.268***	0.261***
	(0.293)	(0.316)	(0.650)	(0.000)	(0.004)	(0.008)	(0.000)	(0.000)	(0.000)
T. Liquidity	0.001	-0.003	-0.001	-0.004	-0.002	-0.008	0.247	0.247	0.249
	(0.003)	(0.449)	(0.673)	(0.457)	(0.747)	(0.257)	(0.075)	(0.076)	(0.073)
T.Sales.Growth	0.008	-0.002	0.004	0.008	-0.0001	-0.004	-0.111	-0.114	-0.108
	(0.348)	(0.797)	(0.633)	(0.528)	(0.990)	(0.864)	(0.772)	(0.766)	(0.777)
T.Rel.Size	-0.008	-0.015	0.035	-0.025	-0.027	-0.093	0.387	0.449	0.381
	(0.753)	(0.560)	(0.321)	(0.529)	(0.596)	(0.260)	(0.744)	(0.706)	(0.748)
T.F.Advisor	0.504***	0.779***	0.574***	0.118	0.116	0.358	0.268	0.252	0.252
	(0.000)	(0.000)	(0.000)	(0.148)	(0.357)	(0.055)	(0.911)	(0.916)	(0.919)
T.Lev	0.013	-0.023	0.008	-0.254***	-0.288***	-0.257**	0.193	0.221	0.196
	(0.739)	(0.042)	(0.857)	(0.000)	(0.001)	(0.007)	(0.913)	(0.900)	(0.912)
T.R&D.In	0.175**	0.083*	0.145*	0.538***	0.643***	0.495**	-3.344	-3.145	-3.484
	(0.010)	(0.068)	(0.030)	(0.000)	(0.000)	(0.001)	(0.273)	(0.303)	(0.256)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R2/Chi2	0.193	0.316	0.211	0.220	0.342	0.147	0.055	0.051	0.078
N	921	921	921	921	921	921	921	921	921

Note: These tables report the multiple OLS and Probit regressions to test whether digital M&A and patent M&A have impact on different levels of performance in various types of due diligence. The sample consists of 921 target firms M&A deal from S&P Capital IQ from 2001 to 2017 with relevant accounting data from Compustat, digital data from S&P Capital IQ and Edgar databases and patent data from Orbit Intelligence database. The independent variables are DRM in digital M&A *(Ln.DRM.dig.M&A)* and DRM in patent M&A *(Ln.DRM.Pat.M&A)*. The dependent variables are *(T.MTB)* is target book-to-market ratios, *(T.ROA)* is target return on assets, *(T.Legal.Adv)* is target legal advisor, *(T.Hi.Tech)* is target high technology and *(T.Envirn)* is environmental score of the target firm. Control variables are: *(MOP.C)* methods of payment as cash, *(Premium)* (4 weeks), *(A.Liquidity)* Acquirer liquidity, *(A.MTB)* is target book-to-market ratios, *(A.Size)* log of acquirer assets, *(A.Lev)* is target leverage, *(A.Fin.Adv)* acquirer financial advisor, *(T.Analyst.C)* is target analyst coverage, *(T.Liquidity)* target liquidity, *(T.Sales.Gro)* target sales growth, *(Rel.Size)* is relative size between acquirer and target, *(T.Fin.Adv)* target financial advisor, *(T.Lev)* is target leverage and *(T.R&D.In)* is target R&D Intensity. Panel A represents the results for regression between digital M&A, patent M&A and *(T.MTB)* and *(T.ROA)*. Panel B represents the results for regression between digital M&A, patent M&A and *(T.Legal.Adv)*, *(T.Hi.Tech)* and *(T.Envirn)*. All variables are winsorized at the 1% and 99% levels and used Bonferroni adjustment to adjust the significance level. T-statistics are referred on standard errors adjusted for the autocorrelation and ∗, ∗∗, and ∗∗∗ represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table 7. Robust regressions result

Table 7. Regression results				
Panel A (H1, H2) Lagged Dependent Variables				
	Model 1	Model 2	Model 3	Model 4
DV:	T.MTB (t)	T.MTB (t)	T.ROA (t)	T.ROA (t)
Intercept	0.562**	0.756**	-0.137*	-0.066
	(0.008)	(0.006)	(0.017)	(0.455)
DRM.dig.M&A (t-1)	-0.013*		0.016*	
	(0.032)		(0.035)	
DRM.pat.M&A (t-1)		0.000		0.015*
		(0.957)		(0.013)
MOP.C (t-1)	-0.823*	-0.822*	0.033*	0.033*
	(0.049)	0.049	(0.017)	(0.017)
Premium (t-1)	0.007	-0.007	0.000	0.000
	(0.193)	(0.205)	(0.138)	(0.133)
A.Liquidity (t-1)	0.003	0.016	-0.007	-0.007
	(0.984)	(0.913)	(0.146)	(0.165)
A.Analyst.C (t-1)	0.027	0.028	-0.001	-0.001
	(0.372)	(0.360)	(0.127)	(0.131)
A.MTB (t-1)	0.003	0.006	0.001	0.001
	(0.892)	(0.828)	(0.210)	(0.188)
A.Size (t-1)	-0.153	-0.170	0.005	0.005
	(0.667)	(0.635)	(0.639)	(0.656)
A.Lev (t-1)	-0.137	-0.118	-0.075	-0.070
	(0.298)	(0.367)	0.097	(0.114)
A.F.Advisor (t-1)	-0.530	-0.530	0.026	-0.026
	(0.308)	(0.309)	(0.141)	(0.142)
T.Analyst.C (t-1)	0.142	0.016	0.002*	0.002*
	(0.701)	(0.656)	(0.037)	(0.033)
T. Liquidity (t-1)	-0.060	-0.061	0.001	0.001
	(0.405)	(0.403)	(0.651)	(0.656)
T.Sales.Growth (t-1)	0.678***	0.677***	-0.018**	-0.018**
	(0.001)	(0.001)	(0.007)	(0.007)
T.Rel.Size (t-1)	0.043	0.072	-0.001	-0.001
	(0.945)	(0.907)	(0.932)	(0.959)
T.F.Advisor (t-1)	0.062	0.035	-0.018	-0.019
	(0.961)	(0.978)	(0.669)	(0.660)
T.Lev (t-1)	0.648	0.660	0.027	0.027
	(0.486)	(0.478)	(0.388)	(0.385)
T.R&D.In (t-1)	0.425**	0.430**	-0.862***	-0.860***
	(0.008)	(0.008)	(0.000)	(0.000)
Year Effect	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes
Adjusted R2/Chi2	0.69	0.62	0.26	0.26
N	920	920	920	920

Table 7. Robust regressions result

Table 7. Regression results

Panel B (H3, H4 and H5) Lagged Dependent Variables

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
DV:	T.Legal.Adv (t)	T.Legal.Adv (t)	T.Hi.Tech (t)	T.Hi.Tech (t)	T.Environ (t)	T.Environ (t)
Intercept	0.193	0.185	-2.198*	-2.671***	1.121***	1.125**
	(0.940)	(0.527)	(0.035)	(0.000)	(0.003)	(0.003)
DRM.dig.M&A (t-1)	0.034**		0.004***		-0.011	
	(0.002)		(0.001)		(0.384)	
DRM.pat.M&A (t-1)		-0.032**		-0.024*		-1.001
		(0.036)		(0.033)		(0.437)
MOP.C (t-1)	-0.018	-0.018	0.908***	0.124**	1.534	1.577
	(0.357)	(0.319)	(0.000)	(0.001)	(0.517)	(0.513)
Premium (t-1)	0.000	0.000	0.000	0.000	-0.036	-0.036
	(0.692)	(0.728)	(0.989)	(0.976)	(0.056)	(0.056)
A.Liquidity (t-1)	0.000	0.000	0.122	0.022	-0.221	-0.228
	(0.945)	(0.910)	(0.082)	(0.153)	(0.815)	(0.809)
A.Analyst.C (t-1)	0.000	0.000	0.018	0.003	0.006	-0.008
	(0.796)	(0.846)	(0.072)	(0.157)	(0.953)	(0.935)
A.MTB (t-1)	0.000	0.000	0.023**	0.003*	0.013	0.009
	(0.761)	(0.602)	(0.001)	(0.013)	(0.938)	(0.935)
A.Size (t-1)	0.000	0.000	-0.444**	-0.128**	2.246	2.347
	(0.989)	(0.958)	(0.008)	(0.002)	(0.192)	(0.174)
A.Lev (t-1)	-0.032	-0.33	0.433	0.061	-1.814	-2.244
	(0.611)	(0.634)	(0.457)	(0.410)	(0.818)	(0.774)
A.F.Advisor (t-1)	-0.019	-0.020	0.195	0.034	0.417	0.447
	(0.426)	(0.442)	(0.289)	(0.212)	(0.885)	(0.876)
T.Analyst.C (t-1)	0.000	0.002	0.018	0.001	-0.421**	0.424**
	(0.734)	(0.943)	(0.192)	(0.597)	(0.003)	(0.003)
T. Liquidity (t-1)	0.000	0.000	0.068*	0.014*	-0.092	-0.097
	(0.956)	(0.711)	(0.020)	(0.029)	(0.735)	(0.720)
T.Sales.Growth (t-1)	0.002	0.002	0.157**	0.129**	0.730	0.723
	(0.817)	(0.791)	(0.007)	(0.008)	(0.423)	(0.426)
T.Rel.Size (t-1)	0.002	0.002	-0.639**	-0.050*	3.346	3.305
	(0.933)	(0.917)	(0.004)	(0.035)	(0.319)	(0.325)
T.F.Advisor (t-1)	0.284***	0.560***	0.329	0.386	-1.249	-0.097
	(0.000)	(0.000)	(0.618)	(0.645)	(0.878)	(0.720)
T.Lev (t-1)	0.064	0.064	-0.945*	-0.152**	1.166	-5.491
	(0.146)	(0.087)	(0.037)	(0.009)	(0.655)	(0.303)
T.R&D.In (t-1)	0.203**	0.198**	1.943*	0.337**	2.463	-1.213
	(0.008)	(0.002)	(0.016)	(0.005)	(0.796)	(0.889)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R2/Chi2	0.27	0.11	0.14	0.14	16.60	27.69
N	920	920	920	920	920	920

Note: These tables report the multiple OLS regressions to test robustness of previous models for digital M&A and patent M&A various levels of performance in various types of due diligence. The sample consists of 920 target firms M&A deal from 2001 to 2017. The independent variables are lagged DRM in digital M&A *(DRM.dig.M&A (t-1))* and lagged DRM in patent M&A *(DRM.Pat.M&A (t-1))*. All the dependent variables are lagged including *(T.MTB (t-1))* is target book-to-market ratios, *(T.ROA (t-1))* is target return on assets, *(T.Legal.Adv (t-1))* is target legal advisor, *(T.Hi.Tech (t-1))* is target high technology and *(T.Envirn (t-1))* is environmental score of the target firm. Control variables are: *(MOP.C (t-1))* methods of payment as cash, *(Premium (t-1))* (4 weeks), *(A.Liquidity (t-1))* Acquirer liquidity, *(A.MTB (t-1))* is target book-to-market ratios, *(A.Size (t-1))* log of acquirer assets, *(A.Lev (t-1))* is target leverage, *(A.Fin.Adv (t-1))* acquirer financial advisor, *(T.Analyst.C (t-1))* is target analyst coverage, *(T.Liquidity (t-1))* target liquidity, *(T.Sales.Gro (t-1))* target sales growth, *(Rel.Size (t-1))* is relative size between acquirer and target, *(T.Fin.Adv (t-1))* target financial advisor, *(T.Lev (t-1))* is target leverage and *(T.R&D.In (t-1))* is target R&D Intensity. Panel A represents the results between lagged digital M&A variable and lagged patent M&A with *(T.MTB (t-1))* and *(T.ROA (t-1))*. Panel B represents the results between lagged digital M&A and lagged patent M&A with *(T.Legal.Adv (t-1))*, *(T.Hi.Tech (t-1))* and *(T.Envirn (t-1))*. All variables are winsorized at the 1% and 99% levels and used Bonferroni adjustment to adjust the significance level. T-statistics are referred on standard errors adjusted for the autocorrelation and ∗, ∗∗, and ∗∗∗ represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table 8. Results for propensity matching score between T.MBT and DRM in digital M&A (table 8.1) and patent M&A (table 8.2)

Table 8.1

Panel A: Logit Model								
Outcome Variable: ***T.MTB***		Treatment Variable: ***DRM.dig.M&A***						
Intercept	MOP.C	Premium	A.Size	T.Liquidity	Year.Eff	Ind. Eff	N	Pseudo R2
-0.768**	0.210*	0.000	-0.117*	0.043**	0.076***	0.034	921	0.0800
(0.002)	(0.022)	(0.741)	(0.034)	(0.005)	(0.000)	(0.063)		

Panel B: Matching Outcome	
Matching algorithm	Caliper Matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	921
Total original number of treated observations	461
Total matched observations	919
ATT (%) (Abadie and Imbens, 2006)	-0.191%*
Standard Errors)	(0.737)

Panel C: Covariates' Balancing Properties for PSM

	Before Matching			After Matching		
	Treatment Group	Control Group	p-value	Treatment Group	Control Group	p-value
MOP.C	0.494	0.406	(0.007)	0.494	0.455	(0.236)
Premium	38.941	38.716	(0.924)	38.941	34.542	(0.060)
A.Size	3.678	3.721	(0.410)	3.678	3.666	(0.818)
T.Liquidity	2.936	2.454	(0.013)	2.936	2.649	(0.165)
Year.Eff	10.941	8.221	(0.000)	10.941	11.117	(0.556)
Ind.Eff	5.583	5.104	(0.002)	5.583	5.577	(0.969)

Table 8.2

Panel A: Logit Model									
Outcome Variable: ***T.MTB***		Treatment Variable: ***DRM.Pat.M&A***							
Intercept	MOP.C	Premium	A.Size	T.Liquidity	T.Lev	Year.Eff	Ind. Eff	N	Pseudo R2
-0.820***	0.533***	0.001	-0.163**	0.108***	0.322	0.041***	0.062***	921	0.1159
(0.001)	(0.000)	(0.118)	(0.004)	(0.000)	(0.107)	(0.000)	(0.001)		

Panel B: Matching Outcome	
Matching algorithm	Caliper Matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	921
Total original number of treated observations	461
Total matched observations	919
ATT (%) (Abadie and Imbens, 2006)	0.0411%
Standard Errors)	(0.951)

Panel C: Covariates' Balancing Properties for PSM						
	Before Matching			After Matching		
	Treatment Group	Control Group	p-value	Treatment Group	Control Group	p-value
MOP.C	0.570	0.330	(0.000)	0.570	0.600	(0.350)
Premium	42.354	35.296	(0.003)	42.354	42.557	(0.937)
A.Size	3.649	3.749	(0.060)	3.649	3.692	(0.429)
T.Liquidity	3.398	1.992	(0.000)	3.398	2.972	(0.054)
T.Lev	0.159	0.154	(0.749)	0.159	0.185	(0.110)
Year.Eff	10.191	8.973	(0.000)	10.191	10.401	(0.509)
Ind.Eff	5.748	4.939	(0.000)	5.748	5.989	(0.144)

Note: Table 8.1 and 8.2 present the results for of the Propensity Score Matching analysis that estimates the effect of DRM in digital and patent M&A on target market-to-book ratio. Panel A of both tables, estimate the propensity scores via the Logit Model. Panel B of both tables indicates the matching outcome with caliper 0.01 which is used in the matching algorithm, the number of treated and control observations in the matched sample, and the Average Treatment Effect on Treated ATT with standard errors. Panel C of both tables indicates the covariates' balancing of propensity scores and the some of the important variables in this study. It also represents the mean value of key empirical variables in wo groups of treated control and indicates the bootstrapped p-value from the t-test of the null hypothesis that the difference is statistically equal to 0 are reported before and after the matching. Please refer to Appendix for an accurate description of the variables. Please refer to Appendix B for an accurate description of the variables.

*** Represents significance at the 1% levels.

** Represents significance at the 5% levels.

* Represents significance at the 10% levels.

Table 9. Results for propensity matching score between T.ROA and DRM in digital M&A (table 9.1) and patent M&A (table 9.2)

Table 9.1

Panel A: Logit Model								
Outcome Variable: ***T.ROA***	Treatment Variable: ***DRM.dig.M&A***							
Intercept	MOP.C	Premium	A.Size	T.Liquidity	Year.Eff	Ind. Eff	N	Pseudo R2
-0.726**	0.207*	0.000	-0.112*	0.037*	0.077***	0.040*	921	0.0761
(0.003)	(0.023)	(0.776)	(0.042)	(0.013)	(0.000)	(0.027)		

Panel B: Matching Outcome	
Matching algorithm	Caliper Matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	921
Total original number of treated observations	461
Total matched observations	919
ATT (%) (Abadie and Imbens, 2006)	0.026%*
Standard Errors)	(0.304)

Panel C: Covariates' Balancing Properties for PSM

	Before Matching			After Matching		
	Treatment Group	Control Group	p-value	Treatment Group	Control Group	p-value
MOP.C	0.494	0.406	(0.007)	0.494	0.455	(0.236)
Premium	38.941	38.716	(0.924)	38.941	34.542	(0.060)
A.Size	3.678	3.721	(0.410)	3.678	3.666	(0.818)
T.Liquidity	2.936	2.454	(0.013)	2.936	2.649	(0.165)
Year.Eff	10.941	8.221	(0.000)	10.941	11.117	(0.556)
Ind.Eff	5.583	5.104	(0.002)	5.583	5.577	(0.969)

Table 9.2

Panel A: Logit Model								
Outcome Variable: ***T.ROA***		Treatment Variable: ***DRM.Pat.M&A***						
Intercept	MOP.C	Premium	A.Size	T.Liquidity	Year.Eff	Ind. Eff	N	Pseudo R2
-0.820***	0.533***	0.001	-0.163**	0.108***	0.041***	0.062***	921	0.1159
(0.001)	(0.000)	(0.118)	(0.004)	(0.000)	(0.000)	(0.001)		

Panel B: Matching Outcome	
Matching algorithm	Caliper Matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	921
Total original number of treated observations	461
Total matched observations	919
ATT (%) (Abadie and Imbens, 2006)	0.0411%*
Standard Errors)	(0.451)

Panel C: Covariates' Balancing Properties for PSM						
	Before Matching			After Matching		
	Treatment Group	Control Group	p-value	Treatment Group	Control Group	p-value
MOP.C	0.494	0.406	(0.007)	0.494	0.485	(0.792)
Premium	38.941	38.716	(0.924)	38.941	40.109	(0.604)
A.Size	3.678	3.721	(0.410)	3.678	3.717	(0.445)
T.Liquidity	2.936	2.454	(0.013)	2.936	3.231	(0.223)
Year.Eff	10.941	8.221	(0.000)	10.941	10.835	(0.720)
Ind.Eff	5.583	5.104	(0.002)	5.583	5.659	(0.648)

Note: Table 9.1 and 9.2 present the results for of the Propensity Score Matching analysis that estimates the effect of DRM in digital and patent M&A on target return on asset. Panel A of both tables, estimate the propensity scores via the Logit Model. Panel B of both tables indicates the matching outcome with caliper 0.01 which is used in the matching algorithm, the number of treated and control observations in the matched sample, and the Average Treatment Effect on Treated ATT with standard errors. Panel C of both tables indicates the covariates' balancing of propensity scores and the some of the important variables in this study. It also represents the mean value of key empirical variables in wo groups of treated control and indicates the bootstrapped p-value from the t-test of the null hypothesis that the difference is statistically equal to 0 are reported before and after the matching. Please refer to Appendix for an accurate description of the variables.
Please refer to Appendix B for an accurate description of the variables.
*** Represents significance at the 1% levels.
** Represents significance at the 5% levels.
* Represents significance at the 10% level.

Table 10. Results for propensity matching score between T.Legal.dv and DRM in digital M&A (table 10.1) and patent M&A (table 10.2)

Table 10.1

Panel A: Logit Model								
Outcome Variable: ***T.Leg.Adv***	Treatment Variable: ***DRM.dig.M&A***							
Intercept	MOP.C	Premium	A.Size	T.Liquidity	Year.Eff	Ind. Eff	N	Pseudo R2
-0.912***	0.215*	0.000	-0.119*	0.036*	0.075***	0.039*	921	0.0779
(0.001)	(0.019)	(0.765)	(0.031)	(0.014)	(0.000)	(0.034)		

Panel B: Matching Outcome	
Matching algorithm	Caliper Matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	921
Total original number of treated observations	461
Total matched observations	919
ATT (%) (Abadie and Imbens, 2006)	0.015%**
Standard Errors)	(0.021)

Panel C: Covariates' Balancing Properties for PSM						
	Before Matching			After Matching		
	Treatment Group	Control Group	p-value	Treatment Group	Control Group	p-value
MOP.C	0.494	0.494	(0.007)	0.494	0.485	(0.792)
Premium	38.941	38.716	(0.924)	38.941	40.109	(0.604)
A.Size	3.678	3.721	(0.410)	3.678	3.717	(0.445)
T.Liquidity	2.936	2.454	(0.013)	2.936	3.231	(0.223)
Year.Eff	10.941	8.221	(0.000)	10.941	10.835	(0.720)
Ind.Eff	5.583	5.104	(0.002)	5.583	5.659	(0.648)

Table 10.2

Panel A: Logit Model								
Outcome Variable: ***T.Leg.Adv***		Treatment Variable: ***DRM.Pat.M&A***						
Intercept	MOP.C	Premium	A.Size	T.Liquidity	Year.Eff	Ind. Eff	N	Pseudo R2
-1.368***	0.824***	0.003	-0.241**	0.200***	0.070***	0.110***	921	0.1138
(0.001)	(0.000)	(0.124)	(0.010)	(0.000)	(0.000)	(0.001)		

Panel B: Matching Outcome	
Matching algorithm	Caliper Matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	921
Total original number of treated observations	459
Total matched observations	919
ATT (%) (Abadie and Imbens, 2006)	0.069%*
Standard Errors)	(0.024)

Panel C: Covariates' Balancing Properties for PSM						
	Before Matching			After Matching		
	Treatment Group	Control Group	p-value	Treatment Group	Control Group	p-value
MOP.C	0.570	0.330	(0.000)	0.570	0.570	(0.996)
Premium	42.354	35.296	(0.003)	42.354	47.952	(0.029)
A.Size	3.649	3.749	(0.060)	3.649	3.598	(0.337)
T.Liquidity	3.398	1.992	(0.000)	3.398	2.91	(0.022)
Year.Eff	10.191	8.973	(0.000)	10.191	10.397	(0.519)
Ind.Eff	5.748	4.939	(0.000)	5.748	5.997	(0.119)

Note: Table 10.1 and 10.2 present the results for of the Propensity Score Matching analysis that estimates the effect of DRM in digital and patent M&A on target legal advisor. Panel A of both tables, estimate the propensity scores via the Logit Model. Panel B of both tables indicates the matching outcome with caliper 0.01 which is used in the matching algorithm, the number of treated and control observations in the matched sample, and the Average Treatment Effect on Treated ATT with standard errors. Panel C of both tables indicates the covariates' balancing of propensity scores and the some of the important variables in this study. It also represents the mean value of key empirical variables in wo groups of treated control and indicates the bootstrapped p-value from the t-test of the null hypothesis that the difference is statistically equal to 0 are reported before and after the matching. Please refer to Appendix for an accurate description of the variables.
Please refer to Appendix B for an accurate description of the variables.
*** Represents significance at the 1% levels.
** Represents significance at the 5% levels.
* Represents significance at the 10% levels.

Table 11. Results for propensity matching score between T.Hi.Tech and DRM in digital M&A (table 11.1) and patent M&A (table 11.2)

Table 11.1

Panel A: Logit Model								
Outcome Variable: ***T.Hi.Tech***		Treatment Variable: ***DRM.dig.M&A***						
Intercept	MOP.C	Premium	A.Size	T.Liquidity	Year.Eff	Ind. Eff	N	Pseudo R2
-1.177***	0.339	0.000	-0.183*	0.062**	0.125***	0.066**	921	0.0762
(0.003)	(0.023)	(0.770)	(0.043)	(0.015)	(0.000)	(0.029)		

Panel B: Matching Outcome	
Matching algorithm	Caliper Matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	921
Total original number of treated observations	460
Total matched observations	919
ATT (%) (Abadie and Imbens, 2006)	0.143%***
Standard Errors)	(0.000)

Panel C: Covariates' Balancing Properties for PSM						
	Before Matching			After Matching		
	Treatment Group	Control Group	p-value	Treatment Group	Control Group	p-value
MOP.C	0.494	0.406	(0.007)	0.494	0.485	(0.792)
Premium	38.941	38.716	(0.924)	38.941	40.109	(0.604)
A.Size	3.678	3.721	(0.410)	3.678	3.717	(0.445)
T.Liquidity	2.936	2.454	(0.013)	2.936	3.231	(0.223)
Year.Eff	10.941	8.221	(0.000)	10.941	10.835	(0.720)
Ind.Eff	5.583	5.104	(0.002)	5.583	5.659	(0.648)

Table 11.2

Panel A: Logit Model								
Outcome Variable: ***T.Hi.Tech***		Treatment Variable: ***DRM.Pat.M&A***						
Intercept	MOP.C	Premium	A.Size	T.Liquidity	Year.Eff	Ind. Eff	N	Pseudo R2
-0.771***	0.531***	0.001	-0.159**	0.100***	0.042***	0.069***	921	0.1115
(0.002)	(0.000)	(0.114)	(0.005)	(0.000)	(0.000)	(0.000)		

Panel B: Matching Outcome	
Matching algorithm	Caliper Matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	921
Total original number of treated observations	459
Total matched observations	919
ATT (%) (Abadie and Imbens, 2006)	0.088%*
Standard Errors)	(0.063)

Panel C: Covariates' Balancing Properties for PSM						
	Before Matching			After Matching		
	Treatment Group	Control Group	p-value	Treatment Group	Control Group	p-value
MOP.C	0.570	0.330	(0.000)	0.570	0.570	(0.997)
Premium	42.354	35.296	(0.003)	42.354	47.952	(0.029)
A.Size	3.649	3.749	(0.060)	3.649	3.598	(0.337)
T.Liquidity	3.398	1.992	(0.000)	3.398	2.91	(0.022)
Year.Eff	10.191	8.973	(0.000)	10.191	10.397	(0.519)
Ind.Eff	5.748	4.939	(0.000)	5.748	5.997	(0.119)

Note: Table 11.1 and 11.2 present the results for of the Propensity Score Matching analysis that estimates the effect of DRM in digital and patent M&A on target high technology. Panel A of both tables, estimate the propensity scores via the Logit Model. Panel B of both tables indicates the matching outcome with caliper 0.01 which is used in the matching algorithm, the number of treated and control observations in the matched sample, and the Average Treatment Effect on Treated ATT with standard errors. Panel C of both tables indicates the covariates' balancing of propensity scores and the some of the important variables in this study. It also represents the mean value of key empirical variables in wo groups of treated control and indicates the bootstrapped p-value from the t-test of the null hypothesis that the difference is statistically equal to 0 are reported before and after the matching. Please refer to Appendix for an accurate description of the variables.
Please refer to Appendix B for an accurate description of the variables.
*** Represents significance at the 1% levels.
** Represents significance at the 5% levels.
* Represents significance at the 10% levels.

Table 12. Results for propensity matching score between T.Environ and DRM in digital M&A (table 12.1) and patent M&A (table 12.2)

Table 12.1

Panel A: Logit Model								
Outcome Variable: ***T.Environ***		Treatment Variable: ***DRM.dig.M&A***						
Intercept	MOP.C	Premium	A.Size	T.Liquidity	Year.Eff	Ind. Eff	N	Pseudo R2
-1.177***	0.216	0.000	-0.116	0.037	0.078	0.040	921	0.0775
(0.003)	(0.018)	(0.797)	(0.036)	(0.012)	(0.000)	(0.027)		

Panel B: Matching Outcome	
Matching algorithm	Caliper Matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	921
Total original number of treated observations	459
Total matched observations	919
ATT (%) (Abadie and Imbens, 2006)	1.002%
Standard Errors)	(0.687)

Panel C: Covariates' Balancing Properties for PSM						
	Before Matching			After Matching		
	Treatment Group	Control Group	p-value	Treatment Group	Control Group	p-value
MOP.C	0.494	0.406	(0.007)	0.494	0.485	(0.792)
Premium	38.941	38.716	(0.924)	38.941	40.109	(0.604)
A.Size	3.678	3.721	(0.410)	3.678	3.717	(0.445)
T.Liquidity	2.936	2.454	(0.013)	2.936	3.231	(0.223)
Year.Eff	10.941	8.221	(0.000)	10.941	10.835	(0.720)
Ind.Eff	5.583	5.104	(0.002)	5.583	5.659	(0.648)

Table 12.2

Panel A: Logit Model								
Outcome Variable: ***T.Environ***		Treatment Variable: ***DRM.Pat.M&A***						
Intercept	MOP.C	Premium	A.Size	T.Liquidity	Year.Eff	Ind. Eff	N	Pseudo R2
-0.757***	0.216*	0.000	-0.116*	0.037*	0.078***	0.040***	921	0.0775
(0.002)	(0.018)	(0.797)	(0.036)	(0.012)	(0.000)	(0.027)		

Panel B: Matching Outcome	
Matching algorithm	Caliper Matching
Caliper	0.1
Matched observations per treated deal	1:1
Total original number of observations	921
Total original number of treated observations	460
Total matched observations	919
ATT (%) (Abadie and Imbens, 2006)	1.002%
Standard Errors)	(0.744)

Panel C: Covariates' Balancing Properties for PSM						
	Before Matching			After Matching		
	Treatment Group	Control Group	p-value	Treatment Group	Control Group	p-value
MOP.C	0.570	0.330	(0.000)	0.570	0.570	(0.997)
Premium	42.354	35.296	(0.003)	42.354	47.952	(0.029)
A.Size	3.649	3.749	(0.060)	3.649	3.598	(0.337)
T.Liquidity	3.398	1.992	(0.000)	3.398	2.91	(0.022)
Year.Eff	10.191	8.973	(0.000)	10.191	10.397	(0.519)
Ind.Eff	5.748	4.939	(0.000)	5.748	5.997	(0.119)

Note: Table 12.1 and 12.2 present the results for of the Propensity Score Matching analysis that estimates the effect of DRM in digital and patent M&A on target environmental score. Panel A of both tables, estimate the propensity scores via the Logit Model. Panel B of both tables indicates the matching outcome with caliper 0.01 which is used in the matching algorithm, the number of treated and control observations in the matched sample, and the Average Treatment Effect on Treated ATT with standard errors. Panel C of both tables indicates the covariates' balancing of propensity scores and the some of the important variables in this study. It also represents the mean value of key empirical variables in wo groups of treated control and indicates the bootstrapped p-value from the t-test of the null hypothesis that the difference is statistically equal to 0 are reported before and after the matching. Please refer to Appendix for an accurate description of the variables. Please refer to Appendix B for an accurate description of the variables. *** Represents significance at the 1% levels. ** Represents significance at the 5% levels. * Represents significance at the 10% levels.

Appendix

Appendix: Description, calculation, and data sources of variables

Independent Variable	Variable sign	Description	Calculation	Data source
DRM in Digital Mergers and Acquisitions	*Ln.DRM.dig.M&A*	Digital M&A is defined as deals with business description included key terms with digital concepts (See table 2 for key terms). For this variable, we calculate the natural logarithm.	Calculated as natural logarithm of one plus number of digital key terms used in official SEC forms and short business description of target firm (table 2). (Hanelt et al., 2020)	S&P Capital IQ and SEC.gov
DRM in Patent Mergers and Acquisitions	*Ln.DRM.Pat.M&A*	Patent M&A is defined as deals included patent owned by a firm (table 2). For this variable, we calculate the natural logarithm.	Using word frequency algorithm to identify matches between CUSIPs or GVKEYs as two variables from COMPUSTAT and PDPCO as NBER variable to create Patent data. NBER means by a patent "assignee." which names are listed in the patent data from the USPTO (Table 2).	S&P Capital IQ and WIPO (NBER database)

Dependent Variables	Variable sign	Levels of Performance	Type of Due Diligence	Calculation	Data source
Target market-to-book	*T.MTB*	Firm	BDD	Target market value 4 weeks prior to announcement divided target total assets. (Borochin et al., 2019)	S&P Capital IQ
Target Return on Assets (ROA)	*T.ROA*	Firm	FADD	Net operating income divided by average target total asset in recent year. (Yang et al., 2019)	Compustat
Target Legal Advisor	*T.Legal.Adv*	Firm	LDD	Indicator variable equal to the value one if the target has legal advisor and zero otherwise.	S&P Capital IQ
Target in High-Tech Industry	*T.Hi-Tech*	Industry	ITDD	Indicator variable equal to the value one if the target is in hi-tech industry and zero otherwise.	S&P Capital IQ

Target Environmental Score	*T. Environ*	Deal	EDD	Target environmental score contain three components which describe performance of firm to reduce natural resources and energy. (Mussardo, 2019)	Thomson Reuters ASSET4
Control Variables	**Variable sign**	**Levels of Performance**	**Type of Due Diligence**	**Calculation**	**Data source**
Methods of Payment (Cash)	*MOP.C*	Deal	FADD	Indicator variable equal to the value of one if the method of payment is cash and zero otherwise.	S&P Capital IQ
Premium	*Premium*	Deal	FADD	Difference between price paid per share and current stock price (Dionne et al., 2015).	S&P Capital IQ
Acquirer Liquidity	*A.Liquidity*	Deal	FADD	Acquirer current asset divided by acquirer current liabilities/ Total cash over total asset ratio (Zhu & Jog, 2009)	S&P Capital IQ
Acquirer Analyst Coverage	*A.Analyst.C*	Deal	FADD	Maximum number of acquirer analysts who make annual earnings forecasts in any month over a 12-month period. (X. Chang et al., 2006)	I/B/E/S
Acquirer market-to-book	*A.MTB*	Firm	BDD	Acquirer market value 4 weeks prior to announcement divided acquirer total assets. (Borochin et al., 2019)	S&P Capital IQ
Acquirer Size	*A.Size*	Firm	BDD	Log (acquirer total assets). (Seth et al., 2002)	Thomson Reuters DataStream
Acquirer Leverage	*A.Lev*	Deal	FADD	Calculated as acquirer book value of debts divided market value of acquirer total assets. (Borochin et al., 2019)	S&P Capital IQ
Acquirer Financials' Advisor	*A.Fin.Adv*	Firm	FADD	Indicator variable equal to the value one if the Acquirer has chosen an advisor and zero otherwise. (Forte et al., 2008)	S&P Capital IQ
Target Analyst Coverage	*A.Analyst.C*	Deal	FADD	Maximum number of target analysts who make annual earnings forecasts in any month over a 12-month period. (X. Chang et al., 2006)	I/B/E/S
Target Liquidity	*T. Liquidity*	Deal	FADD	Target current asset divided by target current liabilities	S&P Capital IQ

Target Sales Growth	*T.Sales.Growth*	Firm	FADD	Calculated as target sale in year *t* minus target sale in year *t*-1 divided by target sale in year *t*-1where *t* is the most recent fiscal year prior the announcement. (Dionne et al., 2015)	Compustat
Control Variables	**Variable sign**	**Levels of Performance**	**Type of Due Diligence**	**Calculation**	**Data source**
Target Financials' Advisor	*T.Fin.Adv*	Firm	FADD	Indicator variable equal to the value one if the target has chosen an advisor and zero otherwise. (Forte et al., 2008)	S&P Capital IQ
Target Leverage	*T.Lev*	Deal	FADD	Calculated as target book value of debts divided market value of target total assets. (Borochin et al., 2019)	S&P Capital IQ
Target R&D Intensity	*T.R&D.In*	Firm	BDD	Ratio of R&D expenses divided by target total asset. (Sapra et al., 2014)	Thomson Reuters DataStream
Relative Size	*Rel.Size*	Firm	BDD	Target total asset divided acquirer total assets. (Seth et al., 2002)	Thomson Reuters DataStream
PROPENSITY SCORE MATCHING	*PSM*	---	---	The propensity scores estimated from the logit model. Dummy = 1 if more than 50% of the DRM (digital M&A/ patent M&A) is above median, and 0 otherwise.	Authors' Estimations