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Corporate Governance and Value Creation in M&A – The Impact of The EU Action Plan of 2012

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Abstract

In this study we examine value creation in European public-to-public M&A transactions and the impact of corporate governance variables using a sample of 759 deals. Furthermore, we explore how value creation and its drivers have changed following the announcement of the EU Action Plan of 2012 by comparing deals in the periods 1999-2011 and 2012-2020. Our first hypothesis is that, due to an increased focus on corporate governance by the regulatory bodies following the financial crisis of 2008, that deals announced in the period 2012-2020 will enjoy a structurally higher abnormal return around announcement. We test for this using matching methodology, matching on propensity scores and Mahalanobis distance matching. We also use coarsened exact matching. We find that deals in the later period don't have a positively higher abnormal return, and thus reject this hypothesis. Our second hypothesis is that board independence is positively and significantly related to announcement abnormal returns, a hypothesis we accept. We reject our third and fourth hypotheses, which state respectively that insider ownership has an inverse U-shaped relationship with announcement returns and that gender diversity has a positive relationship to acquisition returns.

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1. Introduction

The decision to acquire or merge with a company is often the most significant decision a corporate executive makes in their career. A successful transaction can result in a spur of growth, operational improvements as a result of synergies between the acquiror and the target, an increase in bargaining power due to scale, and a number of other positive outcomes for the acquiror (Homberg, Osterloh, & Rost, 2008). Most importantly however, a successful acquisition is one that creates abnormal, risk-adjusted return for the acquiring shareholders (Bruner, 2001).

In 2020 alone, global deal value was approximately $2.8 trillion. While there are some fluctuations, global M&A value has not dipped below $2 trillion since 2004 (Rudden, 2021). The enormous value of global M&A has resulted in what Bruner (2001) terms a "small mountain of literature", which has formed a quasi-consensus that M&A on average creates value for the shareholders of the target company but destroys value for the acquiring shareholders. Grubb and Lamm (2000) state that "the sobering reality is that only about 20% of all mergers really succeed. Most mergers typically erode shareholder wealth", a striking statement given the huge value of global M&A.

There are multiple reasons for an acquisition to fail at creating value for the acquiring shareholders. First and foremost, acquisitions are "plagued" with agency costs (Dahya, Golubov, Petmezas, & Travlos, 2019). Agency costs are costs that arise due to the conflict between shareholders and managers, the agents shareholders hire to oversee the companies they own (Jensen, 1986). An acquisition might be in the interest of a manager but not in the interest of shareholders. The acquisition might have a negative NPV, destroying value for shareholders but creating utility for managers as it increases the resources under the manager's control, thereby increasing their power. This dynamic is referred to as "empire building", where managers are incentivized to grow the size of their firms beyond the point of optimal size in an effort to increase their power, despite the destruction of value to shareholders.

Other reasons for value destruction in M&A can include overconfidence by managers. Overconfident managers overestimate their ability to generate value. This leads them to overpaying for acquisitions, thereby destroying value for their shareholders (Malmendier & Tate, 2008). Furthermore, managers can also overestimate the synergies that will be generated by an acquisition. Bruner (2001) states that reality following most transactions does not line up

with optimistic expectations leading up to them, specifically regarding synergies and added efficiencies.

However, new evidence is pointing towards a change in this reality. Alexandridis, Antypas, & Travlos (2017) show that acquisitions occurring after 2009 are creating more value for shareholders than ever before. Using a sample of around 26,000 deals announced in 1990-2015 with acquirors from the USA, they compare the abnormal returns to acquirors around the time of announcement. Transactions announced from 1990 to 2009 have resulted in an average loss of around -1.08% to acquirors, providing support to proclamations in the early 2000's that M&A destroys value. However, from 2010 to 2015, US listed acquirors have seen an abnormal return of around 1.05% around the announcement date, showing marked improvement. Furthermore, 54% of deals in the 2010-2015 sample are associated with positive abnormal returns, compared to only 39% in the 2000's and 43% during the 1990's.

Alexandridis et al. (2017) point towards structural changes that have occurred in the wave of M&A following the Great Financial Crisis of 2008. In its aftermath, internal control measures and risk management were put in the spotlight, an argument made by the authors citing Gupta and Leech (2015) and Ittner and Keusch (2015). This shift in attitudes was also supported by the US government, specifically the Dodd-Frank Act of 2010. While its primary focus is financial institutions, it also enhances governance mechanisms for all US listed firms (Alexandridis et al., 2017).

The outcome of this shock is not contained only to the United States. Tihanyi, Graffin, & George (2014) point out that government intervention in response to the crisis was a worldwide phenomenon, as companies around the globe went into bankruptcy and required government capital to continue operating. Seeing as governments became shareholders in some countries, this raised questions about governance practices and pushed for strong government-backed initiatives to reform corporate governance practices (Tihanyi et al., 2014).

In Europe specifically, this meant the EU Action Plan of 2012, which is aimed at increasing transparency, increasing shareholder involvement, and supporting companies' in their growth and competitiveness (European Commission, 2012). Importantly, this is not just aimed at financial institutions, but at companies in all sectors. These changes in the regulatory attitude towards corporate governance, combined with the observed changes in the outcomes of M&A in the USA following similar government action means that a closer look at how European

M&A has developed is necessary. Therefore, we pose the following question: "**How has the EU Action Plan of 2012 Affected Value Creation in European Public-to-Public M&A?**"

We answer this question using a sample of 759 public-to-public European deals. We employ a treatment effects analysis methodology to analyze value creation following Action Plan of 2012. We then take a closer look at how corporate governance relates to M&A value creation. Specifically, we look at insider ownership (CLOSELY), board independence (IND), and board gender diversity (MALERATIO), and how these variables interact with abnormal returns around acquisition announcement. Addressing this question provides feedback to the policies undertaken by the European Commission following the 2012 Action Plan. It is also significant for practitioners since as mentioned, M&A is often a pivotal decision taken by management and their companies. Therefore, a close assessment of the value created by M&A is necessary.

This paper is organized as follows. Following this introduction, in the second section of the paper, we review the literature on M&A waves, corporate governance and decision making, and value creation in M&A. Furthermore, the hypotheses held are explained and motivated. In section three, the data sources are presented, and the sample is described. In the fourth section of the paper, we present the statistical methodology, and we perform diagnostic checks on the model. The fifth section describes the empirical findings of the paper. In section six, the paper is concluded, and the limitations are presented. Furthermore, we provide recommendations for the possible directions future research could take.

2. Theoretical Background

2.1 The History of M&A Waves

It has become a stylized fact of acquisition literature that M&A occurs in waves (Bernile, Lyandres, & Zhadnov, 2009). There have been seven distinct merger waves observed in the literature, with the most recent wave peaking in 2015 with global deal value reaching approximately $4.8 trillion (Alexandridis et al., 2017; Rudden, 2021). Harford (2005) states that there are two theories of aggregate merger waves. M&A waves could be the outcome of market timing, or the outcome of regulatory, technological, or economic shocks, with Harford (2005) providing evidence that supports the latter argument, deemed the neoclassical view of merger waves. Specifically, the author argues that industry shocks supported by liquid capital markets with low transaction costs result in merger waves.

The first merger wave is documented to have occurred from 1897 to 1903 (Banerjee & Eckerd, 1998). This time period is seen as a largely laissez-faire economic environment, where antitrust prosecution of mergers was virtually nonexistent. Therefore, the first wave of mergers mainly saw horizontal mergers, often including more than the presently usual two companies. This means that in some M&A deals, more than two companies were combined into one large operation. The laissez-faire attitude of regulators allowed firms to combine into "industrial trusts", where the combined entity having market shares that often exceeded 80%. Banerjee & Eckerd (1998) argue that these mega-mergers were generally motivated by increases in operational efficiencies due to scale, and indeed generally created value for the participating parties.

The first wave ended in 1904 due to a change in the political attitude in the early 1900's. The inauguration of Theodore Roosevelt in 1901, known for a strong antitrust attitude and nicknamed "Trust-busting Teddy". In 1904, the Supreme Court issued a decision on the Northern Securities case that stopped the merger of two railroads citing worries that the resulting entity would have monopoly power and adversely affect the industry's competitive landscape. Banerjee & Eckerd (1998) cite this ruling to show that a federal response in response to mergers for monopoly became actionable.

The second merger wave took place from 1919 to 1929, enjoying the economic benefits of the roaring post-war economy. Stigler (1950) describes this wave as one that created oligopolies, as opposed to the monopolies created by the first wave. Borg, Borg, and Leeth (1989) argue

that the first wave of mergers provides a track record for mergers to be judged against, and therefore the mergers of the second wave should be more successful and value-creating. However, the authors find that mergers of the second wave are value destroying in the long run following merger consolidation. Specifically, acquirors have a high abnormal return three to five years before consolidation, small but positive returns in the year of consolidation, and negative returns in the three years following consolidation.

The second wave of merger activity ended due to the Great Depression. A long period of dormancy in merger activity lasted during the 1930's and extended into the 1940's due to the second World War. Merger activity started picking up once more, and resulted in the third merger wave, observed during the late 1960's. This third wave is considered the conglomerate wave and is characterized by companies expanding into new markets and new divisions through acquisitions. This was a response to increasing antitrust efforts that made deals where the target and acquiror operated in similar industries exceedingly difficult. Shleifer and Vishny (1991) argue that these conglomerate takeovers were largely a failure in the long run. Strikingly, more than half of these diversifying acquisitions made by conglomerates were later reversed by divestment (Porter, 1989).

The fourth wave took place in the 1980's, a time period characterized by an easing of antitrust policies and deregulation. Shleifer and Vishny (1991) argue that the fourth wave of takeover activity was a response to the disappointment of the third wave. This wave saw the rise of leveraged buyout specialists, who generally bought up conglomerates, broke them up, and sold the separate divisions to relevant industry specialists. Acquisitions by public firms in the 1980s still destroyed value using a variety of different methodologies looking at long-term and short-term return data (Agrawal, Jaffe, & Mandelker, 1992; Lubatkin & Srinivasan, 1997; Walker, 2000).

The fifth M&A wave took place in the 1990's, and peaked in 2000 (Alexandridis, Mavrovitis, & Tralos, 2012). This period was characterized by equity payments, a trend of overpayment and large deals, overvaluation of acquirors, and most importantly large value destruction (Andrade, Mitchell, & Stafford, 2001; Dong, Hirshleifer, Richardson, & Teoh, 2006; Moeller, Schlingemann, & Stulz, 2005). The sixth wave emerged in 2003 and lasted till late 2007, until the great financial recession. Despite being characterized differently compared to the fifth wave, specifically in terms of lower valuations for acquirors, prevalence of cash in acquisition financing,

and less over-optimism, Alexandridis et al. (2012) document that acquisitions in the sixth wave destroyed as much value as acquisitions in the fifth wave.

The most recent wave following the great financial crisis took place from 2010 and has peaked in 2015. Despite a slowdown following 2015, and despite headwinds from the COVID-19 pandemic, it is possible that this wave is still in progress. As mentioned before, it is characterized by improved corporate governance measures spurred on by government action, both in the US and in Europe. Looking at a sample of US deals, Alexandridis et al. (2017) document that the majority of acquisitions from 2010 to 2015 are now value creating, with abnormal return of around 1.05% around acquisition announcement.
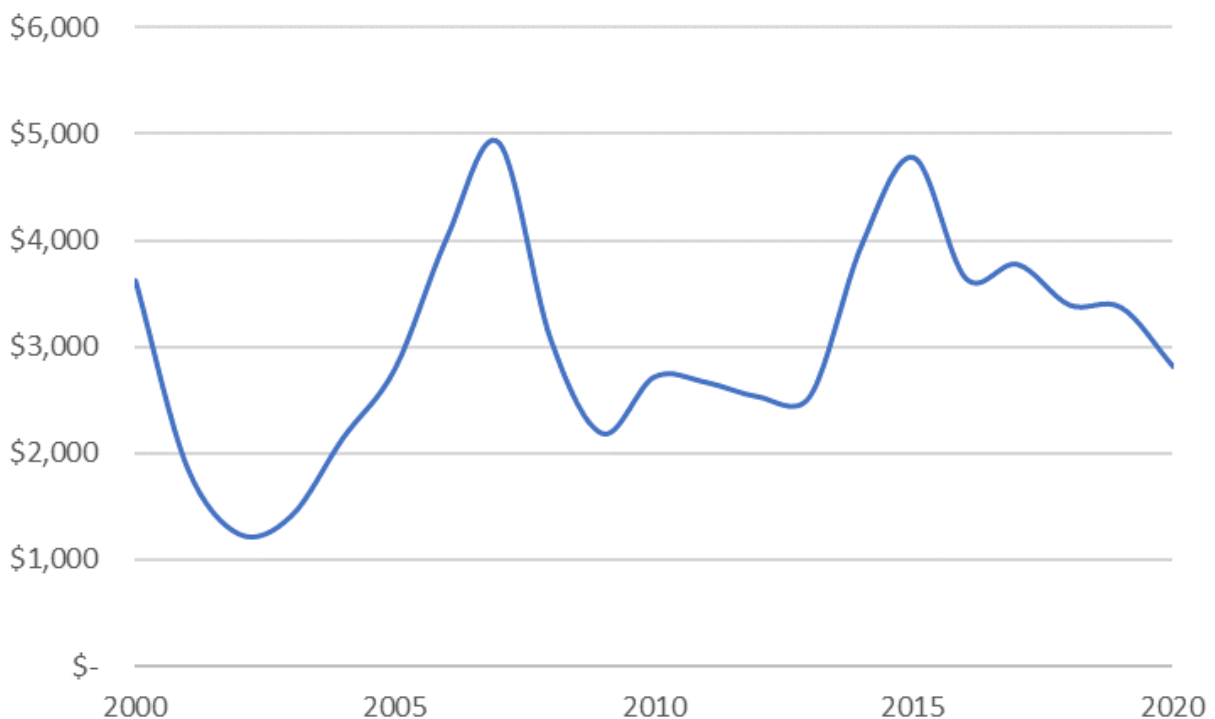
Figure 1- Global M&A Deal Value Sourced from Statisa - Rudden (2021)

The above summary shows that acquisition waves in the past have had different characteristics and motives. These different characteristics have led to different outcomes for value creation, with the first wave being value creating while the rest seem to have been value destructive, until the currently ongoing seventh wave. This leads to the first hypothesis studied in this paper. Specifically, it is hypothesized that deals occurring in 2012-2020 in Europe will benefit from the improved corporate governance mechanisms spurred on by the financial crisis, and they will have structurally higher returns than deals in the earlier period, 1999-2011. The year 2012

is considered as a breaking point as it is the year that the European Commission announced a change in the regulatory attitude towards corporate governance by releasing the EU Action Plan.

2.2 The EU Action Plan of 2012

The European Commission defines corporate governance as the "relationship between a company's management, its board, its shareholders and its other stakeholders" in its Action Plan of 2012. As an influential entity, summarizing the European Commission's views on corporate governance is worthwhile, as it provides a relevant background to the subject matter of this paper.

In their Action Plan, the European Commission state that the 2008 financial crisis is one that brought to light significant shortcomings in mechanisms of corporate governance, specifically of financial institutions but for other listed entities as well. They highlight a perceived lack of engagement and interest from shareholders in holding managers accountable on their decisions and investments. Furthermore, there is a perceived lack of transparency from managers in terms of the "comply or explain" attitude held towards governance code of conduct. This means that managers are generally expected to comply with the relevant EU corporate governance code, but if managers wish to depart, they are expected to provide a clear and adequate explanation as to why. However, the reality is that managers rarely provide an explanation, generally electing to simply state that a certain decision does not comply with the EU governance codes. Moreover, when explanations are provided, they are deemed vague and unsatisfactory by the European Commission.

These issues have led to several initiatives being promoted by the European Commission. With regards to shareholder engagement, the Commission aims to improve transparency on renumeration policies, allowing shareholders to vote on these policies. Furthermore, initiatives include improving the control of shareholders over related-party transactions, and providing further transparency on conflicts of interest relevant to proxy advisors. Another significant initiative is aiming to make voting records by institutional investors more transparent.

The Commission also outlines several initiatives aimed at decreasing informational asymmetries between management and shareholders. The quality of governance reports, specifically on the explanations provided when managers don't comply with the EU

Governance codes, are to be improved. Furthermore, the risk management and diversity arrangements upheld by boards of directors are expected to be disclosed.

Corporate governance research in the late 1990's highlights the importance of the interaction of law and finance. La Porta, Lopez-de-Silanes, and Shleifer (1999) show that legal action is highly correlated with shareholder protection and is a main driver for higher corporate governance standards. Laws protecting shareholder rights, along with their level of enforcement, are the drivers of development in corporate governance for each country.

These findings are supported by Dahya et al. (2019) in their attempt to assess whether the Cadbury Report (issued 1992) and the Higgs Report (issued 2003) have led to an increase in independent director representation on the boards of UK acquirors in public-to-public transactions. Both reports were aimed at increasing independent director representations in the boards of public UK companies, among other initiatives. Dahya et al. (2019) separate the sample into two, with the Cadbury Report sample containing deals announced from 1989-1996 and the Higgs Report sample containing deals announced from 2000-2007. The authors regress outside director representation on a dummy variable indicating whether the deal is post-reform (announced after 1992 for the Cadbury Report and after 2003 for the Higgs Report), controlling for a variety of deal and acquiror characteristics. They find that the post-treatment variable is positive and significantly related to board independence, with a significance level of 1% in the Cadbury Report sample and 10% in the Higgs Report sample. These results support the notion that government directives and changes in the regulatory attitude have a positive influence on corporate governance indicators.

Alexandridis et al. (2017) report similar findings for a US sample. In their paper, Alexandridis et al. (2017) use an OLS methodology to determine how board independence, independent director ownership, and an index measuring anti-takeover measures have changed from 1990-2009 to 2010-2015. The year 2010 is considered as a breakpoint due to the passing of the Dodd-Frank act, which bolstered accountability, realigned executive compensation, and increased shareholder authority. Alexandridis et al. perform their analysis using a sample of around 1,400 US deals valued higher than $500m. Controlling for a variety of deal and acquirer characteristics and industry fixed effects, the main explanatory variable is a dummy variable indicating whether the deal was announced in the period 2010-2015. The 2010-2015 dummy had a positive effect on board independence and independent director ownership at the 1% and

5% significance levels, respectively. This implies that acquirors in the 2010-2015 had more independent director representation, and more independent director ownership. Furthermore, the anti-takeover index was shown to decrease in the 2010-2015 period with the 2010-2015 dummy having a negative coefficient, significant at the 1% level.

Furthermore, Dı´az, Dı´ez, & Ramos (2017) find that the increased focus on corporate governance of European governments following the financial crisis has led to a tangible change in variables measuring corporate governance in the UK, Spain, France, and Germany. Using a sample of 206 firms belonging to the stock indexes of Spain (IBEX 35), France (CAC 40), Germany (DAX 30), and the UK (FTSE-100), and a variety of tests including ANOVA, Kruskal-Wallis, chi-square, and dependent t-tests, the authors find that there is an increase in certain governance indicators following the financial crisis. Specifically, they find that board size, director tenure, performance-based compensation, board independence, board meeting attendance, and a variety of other indicators were significantly higher in 2013 compared to 2007 for at least one of the geographies studied.

2.3 Corporate Governance, Firm Performance, and M&A

The previous section shows that government directives encouraging better corporate governance have been shown to improve corporate governance as measured by a variety of indicators. In this section, we explore the effects of the indicators used in our study, the board independence ratio (IND), insider ownership (CLOSELY), and board gender diversity (MALERATIO) on firm performance and acquisition performance.

2.3.1 Board Independence

Independent directors are seen to be more capable of monitoring executives and managers, especially CEOs. Fama and Jensen (1983) state that the board of directors is the company's highest-order method of internal control and monitoring. Their independence from management means that outside directors are less likely to collude with executives to extract wealth from shareholders. Relative to internal directors, independent directors lack disincentives to properly monitor management. Fama and Jensesn (1983) further argue that independent directors have a strong reputational incentive to properly perform their control duties. They point out that outside directors are either managers or decision-making agents in other organizations and have an incentive to signal the markets for decision agents that they are expert decision makers. This means that their future income depends on their reputation.

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These factors contribute to why independent director representation is considered a sign of a well-run firm.

Dahya et al. (2019) point out that the literature on the relationship between board composition and firm performance is vast. Several studies show that board composition affects how boards perform certain tasks, such as CEO hiring and firing (Weisbach, 1988), the adoption of anti-takeover provisions (Brickley, Coles, & Terry, 1994), and responding to hostile takeovers (Byrd & Hickman, 1992). However, studies on the relationship between board composition and performance is far less clear and faces issues of endogeneity. While this may be the case, Nguyen and Nielsen (2010) implement a novel research design to show that independent directors have a positive effect on shareholder value. The authors examine the stock price reaction to sudden independent director deaths, finding that firms experiencing a sudden loss of an independent director suffer a negative market reaction, a stock price drop of 0.85% on average. Furthermore, they implement a director fixed effect technique and find that firms in which the director was an outsider suffer a larger decrease in market value than firms in which the same director was an insider. This indicates that independent directors do increase value for shareholders.

In the context of acquisitions, the findings on board independence and acquiror returns has been conflicting (Dahya et al., 2019). Using a sample of 128 US tender offers in the period 1980-1987, Byrd and Hickman (1992) find that acquirors with majority independent boards have higher announcement date abnormal returns. More recently, Defrancq, Huyghebaert, and Luypaert (2021) use a sample of 2,230 M&A deals in continental Europe and find that independent director representation has a significantly positive effect on announcement returns. Using a sample of 555 aborted and completed public-to-public acquisitions from 1982 to 1996, Paul (2007) shows that firms with more representation of independent directors are less likely to complete value-destructive bids. However, using a sample of 3,333 acquisitions in the US occurring from 1990 to 2003, Masulis, Wang, and Xie (2007) find that majority-independent boards don't have a significantly positive effect on announcement abnormal return. To take it further, Bauguess and Stegemoller (2008) study a sample of 1,411 acquisitions by S&P 500 firms and find that bidder returns are more positively related to the level of insider directors on the board.

Dahya et al. (2019) reconciles these differences by utilizing the reputational capital argument put forward by Fama and Jensen (1983). A loss to a director's reputational capital is likely to be greater if the target of the acquisition is a public company, due to the increased media attention such acquisitions garner. The authors support this argument by citing Golubov, Petmezas, and Travlos (2012), who find that the reputation of investment banks advising the acquiror leads to higher acquisition returns only if the target company is publicly listed, likely due to a similar reputational capital incentive. Dahya et al. (2019) then proceed to show that independent director representation leads to a more positive effect on acquiror returns if the target of the bid is a public company. Using our sample of public-to-public acquisitions, we hypothesize that we will see a positive relationship between board independence and acquiror returns.

2.3.2 Insider Ownership

Insider ownership is another corporate governance indicator that mitigates the agency costs inherent in M&A and wider decision-making in firms. Jensen and Meckling (1976) state that managers are inclined to allocate resources in a way that benefits them, even when in direct conflict with the interest of shareholders. It is in a manager's best interest to increase the resources under the control, as this allows them to have more power, a phenomenon referred to in the literature as "empire building". This may lead to large acquisitions, even if they are negative NPV investments that destroy value for shareholders.

With higher degrees of equity ownership by managers, their interests are more aligned with the interests of shareholders (Han & Suk, 1998). This mitigates agency costs, and compels managers to take value-maximizing decisions, and to forego value-destroying decisions. However, excess insider ownership can lead to entrenchment of managers (Han & Suk, 1998; Walters, Kroll & Wright, 2008). Entrenchment is the extent to which managers avoid the disciplining effects of monitoring systems, external and internal alike. such as monitoring by members of the board or the threat of dismissal or takeover (Berger, Ofek, & Yermack, 1997; Stulz, 1987). Entrenched managers with high degrees of ownership may take value-destroying acquisitions as a method of diversifying their portfolio (Wright, Kroll, Lado, & Van Ness, 2002). Wright et al. (2002) argue that managers with substantial levels of ownership are less able to diversify their portfolios relative to other investors and may take it upon themselves to

diversify their portfolios by taking risk-reducing acquisitions that are to their benefit but to the detriment of other shareholders.

While the theory behind the relationship between ownership and performance is well established, empirical results have been conflicting. Stulz (1987) shows that the relationship between shareholder wealth and managers' ownership of voting rights depends on the starting point of managerial control of these rights. When managerial control is small, an increase in managerial control leads to an increase in shareholder wealth. However, when ownership and control are large, further increases lead to a decrease in shareholder wealth. In an analysis of long-term stock returns, Han & Suk (1998) show a similar result using a sample of 301 manufacturing firms in the US from 1988-1992. Han & Suk (1998) include a linear term and a squared term for insider ownership. The linear term has a positive coefficient, while the squared term has a negative coefficient. This shows that insider ownership has an inverse-U-shaped relationship with the performance of the firm. Morck, Shleifer, and Vishny (1988) report similar results using Tobin's Q as a dependent variable on a sample of Fortune 500 firms. On the other hand, papers such as Demsetz and Lehn (1985), Loderer and Sheehan (1989), and Holderness and Sheehan (1988) all report an inconclusive relationship between managerial ownership and performance.

In the context of acquisitions, the evidence on insider ownership lines up with the theory. Walters et al. (2008) find that moderate levels of managerial ownership led to positive outcomes for acquiring shareholders using a sample of US acquisitions. Carline, Linn, & Yadav (2002) find a similar result for a UK sample between 1985 and 1994. Wright et al. (2002) report similar results for a sample of 163 US acquisitions from 1993 to 1997. Furthermore, they find that the value of CEO ownership in the company has an inverse-U-shaped relationship with the acquisition risk strategy, operationalized as the covariance of returns to investors of the acquiror and target companies for a 60-month time period prior to acquisition announcement. Examining acquisitions that took place from 1985 to 1991, Hubbard and Palia (1995) also find an inverse-U-shaped relationship between insider ownership and acquisition returns.

This leads to the second hypothesis explored in this paper. We hypothesize that insider ownership (CLOSELY) has a non-linear relationship with acquisition value creation. This relationship is likely to be a concave parabola, where negligible and excessive values of

ownership lead to value destruction, while a moderate level of ownership positively impacts acquisition performance.

2.3.3 Gender Diversity

The final corporate governance indicator we test for is board gender diversity, using the ratio of male to female members in the board of the acquiring company (MALERATIO). Literature has shown that key differentiators between males and females in the workplace is their risk appetite and their propensity to be overconfident (Croson & Greezy, 2009; Niederle & Vesterlund, 2007). Women have been found to be more risk averse, leading them to generally purse less aggressive and more sustainable investment strategies, mitigating the effects of overconfident managers. This argument is supported by Lenard, Yu, and York (2014) who find that firms with more gender diverse boards have a lower variability in their stock returns in a sample of US firms from 2007-2011. Furthermore, in an agency costs framework, gender diversity is likely to improve governance through offering a multitude of new perspectives, enhancing board functioning and through that leading to better performance (Reguera-Alvarado, de Fuentes, & Laffarge, 2017).

Empirical studies on gender diversity and firm performance have been largely inconclusive (Adams & Fereira, 2009). Using a sample of S&P 500 firms from 1998 to 2002, Carter, D'souza, Simkins, and Simpson (2010) find that there is no significant relationship between gender diversity and firm financial performance, operationalized through Tobin's Q and the return on assets. Using a sample of Australian firms and a portfolio-based methodology, Chapple and Humphrey (2014) report similar results. However, using a sample of Fortune 1,000 firms, Carter, Simkins, and Simpson (2003) report a positive relationship between gender diversity and Tobin's Q. Reguera-Alvarado et al. (2017) report similar findings for 125 firms listed on the Madrid Stock Exchange from 2005 to 2009. Meanwhile, Adams and Fereira (2009) find a negative relationship between gender diversity and firm performance. However, they do find that CEO turnover is more sensitive to stock returns and financial performance in firms with gender diverse boards, suggesting that gender diverse boards are more likely to dutifully monitor executives. This result is supported by the findings of Wahid (2018), who finds that firms with gender diverse boards commit fewer mistakes in financial reporting and are less likely to engage in fraud.

Studies on gender diversity and the M&A process, including value creation for acquirors, have also been largely inconclusive. Willemsen (2019) studies the effects of gender diversity on the bid premium offered to target shareholders using a sample of 277 European acquisitions from 2003 to 2017 and finds no significant relationship. Parola, Ellis, and Golden (2014) use a sample of 310 acquisitions by Fortune 1000 companies and find that gender diversity is beneficial to pre-integration performance, operationalized as cumulative abnormal return in a three-day window around announcement, but detrimental to post-integration performance, operationalized as abnormal return three years following the announcement. Vloet (2020) finds that gender diversity has no significant effect on acquiror announcement returns in a sample of 14,982 European public-to-public and public-to-private deals. However, using a sample of 2,230 European M&A deals announced from 2007 to 2013, Defrancq et al. (2021) find that gender diversity has a positive, although marginally significant, effect on acquiror announcement returns.

As mentioned, our sample includes exclusively public-to-public acquisitions. The increased media attention of public-to-public deals raises the stakes, so to speak. We therefore expect that our results will show a positive relationship between board gender diversity and value creation. Malmendier and Tate (2008) show that overconfident managers tend to undertake value destroying acquisitions, and Roll (1986) puts forward the hubris hypothesis which states that overconfidence is one of the main motivators for acquisitions. The mitigating effect of female director representation, along with their positive effect on board monitoring and control will likely lead to more value creating acquisitions when combined with the higher media attention garnered by public-to-public acquisitions. This would be similar to the pattern shown in the literature, where the board independence exhibits a positive relationship with acquiror announcement returns in the environment of higher media attention of public-to-public deals.

2.4 Motivating the Control Variables

The above section identifies the key variables that will be studied in this paper. The purpose of the following section is to review the literature in an attempt to identify target, acquiror, and deal characteristics to be include as control variables.

Several deal characteristics have been shown to affect acquiror returns. Per Alexandridis et al. (2017), mega deals, deals valued at $500m or higher are associated with higher degrees of investor scrutiny and agency costs and are negatively related to CAR3. Alexandridis et al.

(2017) point out that their findings are similar when the mega-deal cutoff is at $1bn and $500m. Therefore, we include a dummy variable indicating whether a deal is valued at $1bn or more (MEGADEAL). The method of payment, specifically whether a deal is financed purely in stock, is another crucial variable to control for. A common outcome produced in the literature is that acquisitions financed purely in stock tend to result in negative abnormal return around acquisition announcement (Travlos, 1987; Alexandridis et al., 2017). Therefore, a dummy variable indicating an all-stock deal is included in the analysis (ALLSTOCK). Furthermore, Moeller and Schlingemann (2005) show that industrial and geographical diversification in M&A are both related to lower announcement window abnormal returns for acquirors in a sample of deals with US acquirors. We control for geographical diversification by including a dummy variable if acquiror headquarter nation is different from the target's headquarter nation (CROSSBORDER). Industrial diversification is controlled for by including a dummy variable that is equal to one if the acquiror and the target have different 2-digit SIC codes (DIVERSIFICATION) (Alexandridis et al., 2017). Moreover, Alexandridis et al., (2013) show that the relative size of the acquisition, defined as deal value over the acquiror's market cap four weeks prior to announcement, has a negative effect on acquiror returns (RELSIZE). Finally, we control for the premium paid over the target's share price by taking the offer price per share divided by the target's share price four weeks prior to announcement (FOURWKPREMIUM).

Certain bidder characteristics also have an effect on M&A value creation. Moeller, Schlingemann, and Stulz (2004) show that acquiror size has a negative effect on acquiror returns around announcement. This is controlled for by including the natural logarithm of the acquiror's market capitalization four weeks prior to announcement (ASIZE). In the same paper, Moeller et al., (2004) find a negative relation between the acquiror's Tobin's Q (Q) and cumulative abnormal return around the announcement window. Tobin's Q is the market value of assets over the book value of assets. The market value of assets is the total value of assets minus the book value of equity plus the market value of equity four weeks prior to acquisition announcement (Masulis et al., 2007). The acquiror's leverage (LEVERAGE) is also controlled for, as it has been shown to positively affect acquiror returns (Maloney, McCormick, & Mitchell, 1993), while the percentage of assets held in cash (CASHASSETS) has been shown to have a negative effect on acquiror returns.

3. Data and Sample Description

3.1 Data Sources

The data sample in this paper contains 759 mergers and acquisitions from European countries, sourced from the Thomson One database. The following criteria were imposed. It is important to note that we restricted our sample to public-to-public transactions due to the findings of Alexandridis et al. (2017), who document that the improvement in acquisition performance in the 7th wave of US acquisitions came almost entirely from public-to-public transactions. Therefore, for the sake of brevity and impact, we limit our sample to public-to-public transactions.

1. Deals were announced from 01/01/1999 – 31/12/2020
2. The acquiror is a firm listed on a European exchange with European headquarters
3. The target of the acquisition is publicly listed, with no restriction on where the target firm is based
4. The minimum value of the deal is set at $50 million
5. The percentage of shares acquired during the deal is at a minimum of 50%
6. The deal has been completed
7. If an acquiror announces several acquisitions on the same date, all of these acquisitions were dropped from the sample

Acquiror characteristics data were collected from CompuStat, Worldscope, and BoardEx. Stock price and return data was also collected from CompuStat. Return data for the European market, proxied as the MSCI Europe index, was collected from the Global Financial Data database. Exchange rate data was collected from the European Central Bank and used to transform accounting variables into USD to match the currency of ThomsonOne data. Furthermore, we adjust for inflation by rebasing all relevant data to 2015 prices using the annual CPI, retrieved from the US Bureau of Labor Statistics.

Table 1, found below, contains the definitions of the key independent variables used and their sources. Table 6 found in section A of the Appendix presents a similar table for the various control variables. Seeing as the key dependent variable, cumulative abnormal return around acquisition announcement, can be defined in several ways, it will be discussed in detail in section 4.1. Furthermore, as its description has implications on the results of our study, it is

analyzed and described in detail in section 5.1, as opposed to the independent variables which are described in the coming subsection, section 3.2.

Table 1 - Definition and Sourcing of Key Variables

Variable Name	Definition	Source
CLOSELY	Shares held by insiders as a percentage of shares outstanding at the end of year t	Worldscope
CLOSELYSQUARED	Squared value of CLOSELYACQ	
IND	The percentage of board members classified by BoardEx as independent at the end of year t	BoardEx
MALEARTIO	The ratio of males to females on the acquiror board at the end of year t	BoardEx
CAR3	Cumulative abnormal return in the event window (-1,+1), with 0 being the day of announcement	CompuStat, Global Financial Data

3.2 Data Description and Summary Statistics

Figure 2, shown below, shows the sum of deal value and deal count by year in the used sample. There is a clear clustering of deal value and count in 1999-2000 and 2004-2007. There is a less pronounced clustering from 2014-2020, however there is a clear peak in deal value in 2015, during which annual deal value reaches \$449 billion. Increasing activity from the late 1990s to the early 2000s lines up with the fifth M&A Wave. The sixth wave took place from 2004-2007 and came to a drastic end with a severe trough in deal value in 2009. Furthermore, the early 2010s are characterized by a stagnant M&A market, as Europe was recovering from the financial crisis and the European debt crisis of 2012. The seventh wave starts picking up again from 2014 and peaks in 2015 with a deal value of \$449 billion. These patterns line up with those outlined in previous studies, implying confidence in the representativeness of the dataset used in this study. Table 9 in section B of the Appendix presents the distribution of acquiror nations across the dataset. Table 10 presents is a similar table showing the distribution of target nations across the dataset.
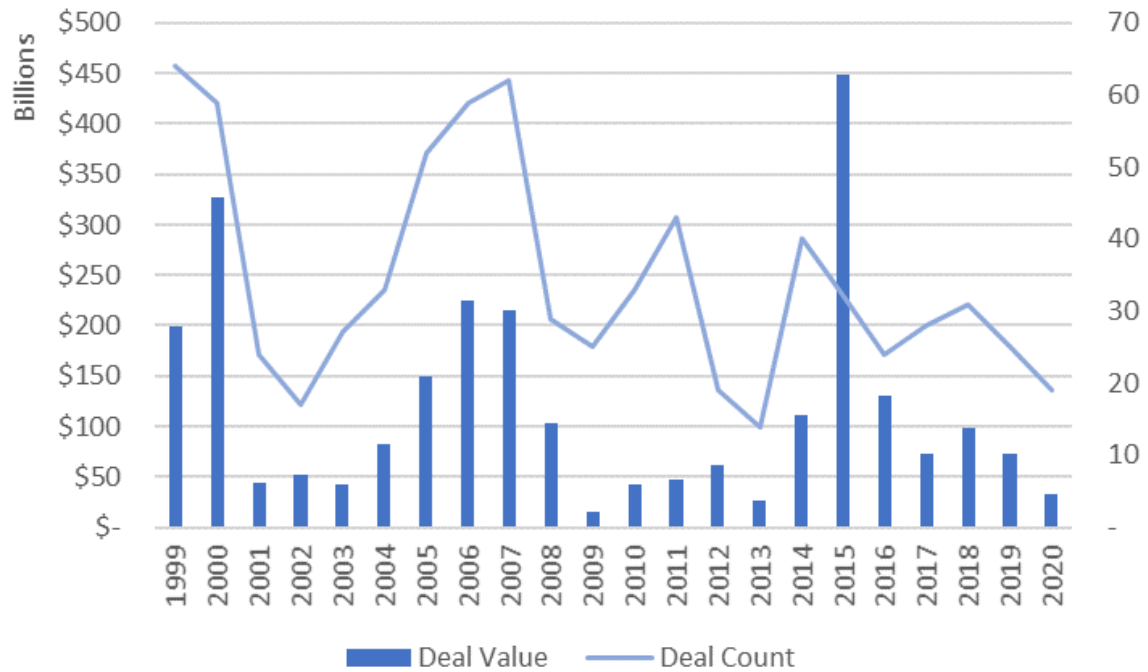
Figure 2 - Deal Value and Count by Year

Table 2, found below, describes the key independent variables partitioned by period, with the third column showing descriptive statistics for the whole sample. All variables have increased, on average, in the period following the release of the EU Action Plan. The CLOSELY variable increases from 20.6% to 22.5%, the IND increases from 68.6% to 79.0%, and the MALERATIO variable decreases from 92.0% to 75.1%. Therefore, while the average company seems well governed, it is important to note that there is strong variation in the CLOSELY variable. In the third column, the CLOSELY variable has a mean that is almost 150% of the median. This implies that the variable has outliers providing extremely high values. This may result in some issues in the data which will be further explored and tackled in section 4.2.

Table 2- Descriptive Statistics of Key Independent Variables by Period

The table reports mean, median, and standard deviation values of the key independent variables in the study.

		1999-2011	2012-2020	ALL
n		527	232	759
CLOSELYACQ	mean	20.22%	22.21%	20.83%
	median	13.08%	13.88%	13.32%
	standard deviation	21.30%	22.81%	21.77%
IND	mean	68.1%	79.2%	71.5%
	median	69.2%	80.0%	72.7%
	standard deviation	16.9%	13.8%	16.8%
MALEARTIO	mean	92.03%	75.05%	90.00%
	median	94.10%	75.00%	86.84%
	standard deviation	9.67%	13.39%	13.45%

Table 3, found below, provides a similar table for the control variables. It shows that the average deal size is increasing while the average acquiror has gotten smaller, as shown by the MV_FOURWEEKS variable. In line with an increasing average deal size, mega deals have become more prevalent. Unlike what has happened in the US according to Alexandridis et al. (2017), the percentage of deals financed purely in stock has increased, while all-cash acquisitions have decreased. This could be due to the increase of the relative size. Hansen (1987) shows that an increase in relative size of an acquisition results in more equity financing. Furthermore, deals in the seventh wave have become less diversifying in terms of industry, but the percentage of cross-border deals is slightly higher. Interestingly, acquiror leverage is down, both in the average and the median companies, despite the current low interest rate environment in Europe. The percentage of assets held in cash has increased across the periods, especially for the median company, increasing from 6.58% to 8.41%. Tobin's Q has also increased for acquirors in the seventh wave, up to 1.16x compared 1.12x in the prior period. Q is still biased upwards in both periods, with the median companies having a Q of 0.84x and 0.98x in the prior and later period respectively.

Table 3 - Descriptive Statistics for Control Variables

The table reports mean, median, and standard deviation values of the key control variables used in the study. Panel A presents deal characteristics, while panel B presents bidder characteristics. "n.m." stands for not meaningful, and is reported for dummy variables.

Panel A: Deal Characteristics

		1999-2011	2012-2020	ALL
n		527	232	759
MEGADEAL	mean	41.37%	46.12%	42.82%
	median	n.m.	n.m.	n.m.
	standard deviation	n.m.	n.m.	n.m.
RELSIZE	mean	33.6%	38.0%	34.9%
	median	15.2%	22.7%	17.1%
	standard deviation	49.5%	52.2%	50.4%
DEALVALUE	mean	$2,933m	$4,564m	$3,432m
	median	$635m	$824m	$663m
	standard deviation	7,372	13,933	9,871
ALLSTOCK	mean	18.79%	26.18%	21.08%
	median	n.m.	n.m.	n.m.
	standard deviation	n.m.	n.m.	n.m.
ALLCASH	mean	50.66%	45.92%	49.28%
	median	n.m.	n.m.	n.m.
	standard deviation	n.m.	n.m.	n.m.
FOURWKPREMIUM	mean	40.87%	38.16%	40.04%
	median	34.56%	30.78%	33.75%
	standard deviation	52.40%	48.25%	51.15%
CROSSBORDER	mean	58.82%	59.05%	58.89%
	median	n.m.	n.m.	n.m.
	standard deviation	n.m.	n.m.	n.m.
DIVERSIFICATION	mean	40.23%	37.07%	39.26%
	median	n.m.	n.m.	n.m.
	standard deviation	n.m.	n.m.	n.m.

Panel B: Bidder Characteristics

		1999-2011	2012-2020	ALL
MV_FOURWEEKS	mean	$24,195m	$23,610m	$24,017m
	median	$6,435m	$7,021m	$6,526m
	standard deviation	41,127	38,842	40,417
LEVERAGE	mean	14.18%	11.76%	13.44%
	median	14.18%	12.70%	13.57%
	standard deviation	22.95%	22.16%	22.72%
CASHASSETS	mean	10.39%	11.65%	10.78%
	median	6.58%	8.41%	7.04%
	standard deviation	11.28%	11.53%	11.37%
Q	mean	1.12x	1.16x	1.13x
	median	0.84x	0.98x	0.88x
	standard deviation	1.23x	1.20x	1.22x

4. Methodology

In this section, we outline the statistical methodology used to test our hypotheses. We use a treatment effects analysis to test for hypothesis 1 and an OLS methodology to test for the hypotheses 2-4. The OLS model is then outlined and diagnosed using a variety of tests.

This section is divided as follows. Subsection 4.1 outlines our value creation statistic, CAR3. Subsection 4.2 outlines the treatment effects methodology used to test for hypothesis 1. Subsection 4.3 includes the model diagnostics on our OLS model.

4.1 Event Study Methodology

The classic methodology to assess value creation in M&A is the event study methodology (Binder, 1998). In essence, an event study examines the behavior of security prices around the occurrence of an event, which can be an acquisition announcement, an accounting rule change, or any other instance where unique and new information comes to the market (Binder, 1998; Fama, Fisher, Jensen, & Roll, 1969). Specifically, an event study requires measuring the abnormal return of a security around the event window, measured against some benchmark for "normal" returns.

The event study methodology is appropriate for studies on M&A value creation for two main reasons. Firstly, given a somewhat rational market, the market's reaction around announcement is an accurate, forward-looking assessment on the present value of the transaction's value. Secondly, the market's reaction is less susceptible to manipulation by managers and executives compared to accounting-based metrics of acquisition performance (Defrancq et al., 2021).

There are several models used to measure abnormal returns, the most common method being the market model. In this model, shown in equation 1 below, the market return is the benchmark for normal returns. The market model isolates the effect of new information on the security's return, removing the effect of market and economy-wide factors. In essence, abnormal return is the residual term $e_{i,t}$. Equation two rearranges equation 1 and provides a strict definition for abnormal return under the market model. While there are other more sophisticated methods of measuring abnormal return, such as adjusting for Fama-French portfolios and the momentum effect, it has been shown that the market model's finding in short-term event studies do not differ greatly from those of the more complex models (Brown & Warner, 1985; Campbell, Lo, & Mackinlay, 1997).

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_{it}$$

Equation 1 - The Market Model

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt})$$

Equation 2 - Abnormal Return under the Market Model

An alternative to the market model is the adjusted market model. In this model, β_i is assumed to be equal to one, while α_i is equal to zero. The specification of the adjusted market model is shown in equation 3. We use the adjusted market model, as its findings are largely similar to those of the market model or other more complex models, especially for short-term event windows with daily data (Dahya et al., 2019; Brown and Warner, 1985; Fueller, Netter, & Stegemoller, 2002). Furthermore, Brown and Warner (1980) show adjusting for risk does not increase the accuracy of abnormal return estimation over short-term event windows.

$$AR_{it} = R_{it} - R_{mt}$$

Equation 3- Abnormal Return under the Adjusted Market Model

Following Dahya et al. (2019), we cumulate abnormal returns over the event window (-1, +1), where the acquisition announcement date is day 0. This means that we assess abnormal return over a three-day window around acquisition announcement. Following Defrancq et al. (2021), we take the MSCI Europe index as a market benchmark. Therefore, the main variable tested for significance, CAR3, is formulated as shown in equation 4, shown below.

$$CAR3_i = \sum_{t=-1}^{+1} R_{i,t} - R_{MSCI\ Europe,t}$$

Equation 4 - Formulation of CAR3 in This Study

4.2 Treatment Effects Analysis

Our first hypothesis is that deals happening in the 2012-2020 period have a structurally higher CAR3 relative to deals announced from 1999-2011. Following Alexandridis et al. (2017), we implement a treatment effects analysis using matching methodology. We use propensity score

matching (PSM) and Mahalanobis distance matching (MDM) following Alexandridis et al. (2017), and we supplement this analysis coarsened exact matching (CEM). We use this multitude of matching methodologies following the advice of King, Nielsen, Coberley, Pope, and Wells (2011), who point out that an extensive iterative process across different methodologies is necessary for matching, with the purpose of maximizing the balance between the treated and control samples and the size of the sample.

We consider matching to be the appropriate methodology to assess our first hypothesis because we use observational data, and we are trying to study the effect of a dichotomous variable (POST2011). Matching attempts to control for the fact that this treatment variable is not assigned randomly by balancing the distribution of covariates across the treatment and control samples (Stuart, 2010). Specifically, we control for the fact that deals announced in 1999-2011 have certain characteristics that differ from those deals announced in 2012-2020. Since the treatment was not assigned randomly, and the covariates differ across time periods, a simple comparison of the CAR3 across time periods will be biased (Rubin, 1976). The general intuition behind matching is that we match observations in the treated sample with similar observations in the control sample by using some distance measure that encapsulates the closeness of the observations based on the value of the covariates.

The general notation and setup used in matching methodology is as follows, as per Iacus, King, and Porro (2011). Consider a sample of n, drawn from population N where $n \leq N$. We consider the treatment variable T_i, which takes the value of 1 if unit i belongs to the treated population and 0 otherwise. We observe the outcome variable $Y = T_i Y_i(1) + (1-T)Y_i(0)$. In this setup, $Y_i(1)$ is the potential outcome if unit i received treatment, while $Y_i(0)$ is the potential observed outcome if unit i does not receive treatment. As discussed above, matching controls for pretreatment covariates. We denote $X = (X_1, X_2, \ldots X_k)$ as a dataset with k dimensions, where each X_j is a column vector of observed values for the pretreatment covariate j for n observations.

The quantities of interest which we can use for causal inference are the average treatment effect (ATE) and the average treatment effect on the treated (ATT). Treatment effect is simply $TE_i = Y_i(1) - Y_i(0)$. The average treatment effect is E(TE), while the average treatment effect on the treated is E(TE | T=1), and is calculated as $ATT = (1/n_{T=1}) * \Sigma TE_i$, where $n_{T=1}$ is the number

of treated observations in the sample. Benedetto, Head, Angelini, and Blackstone (2018) recommend the use of ATT in matching, and we will be doing so for all three methods.

There are two main assumptions required to use matching methodology (Stuart, 2010). Firstly, we assume that the outcome of one observation is not affected by the treatment status of other observations. For our case, the outcome of one deal does not depend on which periods other deals were announced. Secondly, the treatment assignment is assumed to be independent from the outcome variable given the covariates, termed the "no hidden bias" assumption. Stuart (2010) points out that this assumption is often easier to fulfill than one would think, since matching on the covariates we observe also matches covariates we do not observe, insofar that the unobserved covariates are correlated to the observed covariates. The covariates we match on are the control variables outlined in section 2.4. Specifically, we match based on ASIZE, LEVERAGE, CASHASSETS, Q, RELSIZE, CROSSBORDER, DIVERSIFICATION, ALLSTOCK, MEGADEAL, and FOURWKPREMIUM. We do not match on the corporate governance indicators following Roberts' (2009) directive that the covariates must not be affected by the treatment. This is supported by Stuart (2010), who provides the same advice. The corporate governance variables directly affected by the treatment as outlined in section 2.2. Furthermore, our adjustment for inflation as pointed out in section 3.1 ensures that our inclusion of ASIZE and MEGADEAL do not violate this rule. With the assumptions covered, we move onto discussing the three matching methodologies used, starting with PSM.

A propensity score is a single measure that that encapsulates all the covariates into one scalar (Stuart, 2010). That scalar is the probability of being treated. Therefore, for each unit given the covariates, its propensity score is its probability of being treated. Stuart (2010) explains that propensity scores are balancing scores, and that the distribution of the covariates defining the propensity scores is the same for the treatment and the control groups. This means that PSM is similar to a randomized experiment with respect to the observed covariates. Following Alexandridis et al. (2017), we use a logistic regression to estimate the propensity scores and match using 1:1 nearest neighbor matching. The model used is outlined below in equation 5. King and Nielsen (2019) point out that PSM can increase "imbalance, inefficiency, model dependence, and bias", especially when calipers are used. We therefore do not use calipers and complement PSM with MDM and CEM.

Equation 5 - Propensity Score Estimation Model

$$\Pr(Post2011)$$
$$= \beta_1 FOURWKPREMIUM + \beta_2 RELSIZE + \beta_3 MEGADEAL + \beta_4 ALLSTOCK + \beta_5 DIVERSIFICATION + \beta_6 CROSSBORDER + \beta_7 ASIZE$$
$$+ \beta_8 Q + \beta_9 LEVERAGE + \beta_{10} CASHASSETS + \varepsilon$$

MDM uses the Mahalanobis indicator as a measure of distance between two observations. The formula for measuring the Mahalanobis indicator is shown below in equation 6. Since the relevant measure for us is the ATT, "Σ is the variance covariance matrix of X in the full control group" (Stuart, 2010). Similar to what we do in PSM, we match on 1:1 nearest neighbors. There are two disadvantages to using MDM in our sample. Firstly, Zhao (2004) shows that MDM does not perform well if there are numerous covariates, with Stuart (2010) suggesting a cutoff of eight covariates while we have 10 relevant covariates. Secondly, Gu and Rosenbaum (1993) show that it does perform well when covariates are non-normal. Therefore, we further supplement PSM and MDM with CEM.

Equation 6 - Mahalanobis Indicator Formula

$$D_{ij} = (X_i - X_j)' \sum{}^{-1} (X_i - X_j)$$

CEM temporarily coarsens X and applies exact matches to the coarsened X. For example, instead of exact matching on ASIZE, we can sort ASIZE into quantiles and use that to match observations. We would then sort observations into strata, each with unique values of the coarsened X. Any stratum with zero treated or zero control observations is pruned from the analysis. Once these observations with zero matches are pruned, we continue using the non-coarsened X in the analysis stage. It is also important to note that CEM assigns certain weights to observations, the formula for which is shown below in equation 7. To each matched unit i in stratum s, CEM applies weight w_i. The number of matched units for treated and control are m_T and m_C respectively. The superscript s refers to stratum s. With this weighting assignment, CEM eliminates all imbalances between the treated and control groups beyond the chosen level of coarsening (King et al., 2011). As per King et al. (2011), a simple regression of Y on T with the CEM weighting returns the ATT. For our analysis, we coarsen the continuous variables, RELSIZE, ASIZE, Q, CASHASSETS, LEVERAGE, and FOURWKPREMIUM into quantiles and exact match on the dummy variables MEGADEAL, ALLSTOCK, DIVERSIFICATION, and CROSSBORDER.

Equation 7- CEM Weighting Formula

$$w_i = \begin{cases} 1, & i \in T^s \\ \dfrac{m_C}{m_T} \dfrac{m_T^s}{m_C^s}, & i \in C^s \end{cases}$$

4.3 Model Diagnostics

The classical methodology used in M&A value creation studies is an OLS regression. In this section, we perform model diagnostics to refine our model. Our starting point is the following regression, presented in equation 8. This regression includes all data points across all time periods (1999-2020), and includes a dummy indicating whether or not the deal is announced prior to 2012, similar to the methodology of Alexandridis et al. (2017). This is to test for our first hypothesis, and to check whether deals announced in 2012 or after have a higher CAR3. Furthermore, note that there are two variables for insider ownership, a linear variable, and a squared variable. This is to check for the U-shaped relationship predicted in our third hypothesis.

$$CAR3 = +\beta_1 CLOSELY + \beta_2 CLOSELY^2 + \beta_3 IND + \beta_4 MALERATIO + \sum \beta_i ControlVariables_i$$

Equation 8 - Starting Point Regression

Firstly, OLS assumes that there are no outliers with undue influence on the data (Stock & Watson, 2015, p.199). As pointed out in section 3.2, there are indicators that there may be outliers in the CLOSELY variable. We further check for outliers in IND and MALERATIO. We check for this scatter plots, which are found in section C of the Appendix, figures 4 and 5. The scatter plots clearly shows that there are outliers, with one observation having an IND of 0, and several observations where CLOSELY is higher than 80%. A check of the 99th percentile of CLOSELY yields a value of 83.4%. Therefore, we winsorize all three variables at the 1st and 99th percentile, as per Alexandridis et al. (2017).

Secondly, we check for homoscedasticity of errors, an assumption outlined by Chen, Mitchell, and Wells (2003). Firstly, we run the preliminary regression outlined in equation five, and perform White's test, which has a null hypothesis that the errors are homoscedastic. This returns a p-value of 0.001, implying that the null hypothesis is to be rejected and that errors are heteroscedastic. Therefore, we will be using robust standard errors throughout this study.

Thirdly, we check for normally distributed residuals. We do this by drawing probability-probability and quintile-quintile plots, supplemented with a Bera-Jargue (Brooks, 2014, p.209). Both plots, along with the Bera-Jarque test, strongly suggest nonnormality of errors. The plots are found in section C of the Appendix, figures 6 and 7. The issues presented by nonnormality of errors are overcome due to the large sample size (759 observations), as the central limit theorem applies (LaMorte, 2016).

Fourthly, we check the functional form of the regression using the Ramsey RESET (Brooks, 2014, p.220). The RESET test is a test for nonlinearity, checking for omitted variables by regressing the dependent variable on powers of its fitted values and independent variables. The null hypothesis of the RESET test is that there are no omitted variables, and that the functional form specified in the regression is correct. The RESET test performed on the equation 8 results in a p-value of 0.25, implying that the null hypothesis cannot be rejected, and the functional form of the equation is correct.

Our fifth diagnostic test is a Chow break test, used to test for a structural break. This can be seen as a complement to our treatment effects analysis procedure and will further shed light on how the dynamics of value creation change across time periods. The essential idea of the Chow break test is to assess parameter stability across different subsamples. In our case, we asses parameter stability in the pre-2012 and post-2011 periods. We break up the sample into 1999-2011 and 2012-2020, perform the regression shown in equation 8 on the two subsamples. We then compare the residual sum of squares of the two samples with the residual sum of squares generated from applying the regression on the entire sample. The Chow-test statistic formula is shown below in equation 9, where n is the overall sample size, k is the number of coefficients in the regression including the constant term, RSS is the residual sum of squares for the regression on the overall sample, and RSS_1 and RSS_2 are the RSS of the regressions performed on the two subsamples. The null hypothesis of the Chow test is that there is no break, and we fail to reject this hypothesis due to a test statistic of 0.53 compared to the required critical value of 1.67.

Equation 9 - Chow Test Statistic Formula

$$Chow\ F-Test\ Statistic = \frac{RSS - (RSS_1 + RSS_2)}{RSS_1 + RSS_2} * \frac{n - 2k}{k}$$

Finally, an OLS regression assumes that the error term is expected to be equal to zero given the values of the independent variables. This assumption is violated when there is a variable not included as a regressor that is correlated with the dependent variables and the independent variable, or when there is omitted variable bias (Stock & Watson, 2015, p.199). Omitted variable bias biases the results of the regression and implies that interpretation of the analysis is compromised. This assumption is violated in this regression, as there are unobserved characteristics likely affecting CAR3 and the dependent variables. A likely example are financial characteristics of the target. Target characteristics likely affect the method of payment and the premium, which are included as independent variables in the regression. They also likely affect the market's reaction to acquisition announcement CAR3. Therefore, the magnitude of the coefficients is likely misleading, and in interpretation we should only consider the sign of the coefficient.

This subsection shows that several of the classical OLS assumptions are violated. We have a sample that has several outliers in the key independent variables. We overcome this issue by winsorizing the relevant variables. Furthermore, the sample has homoscedastic error terms, an issue we overcome by using robust standard errors throughout the study. Moreover, we see that the errors are nonnormal as suggested by the Bera-Jargue test. We rely on the central limit theorem to argue that the violation of this assumption does not harm the reliability of our study. Finally, we argue that there is likely omitted variable bias present in the study. To combat this, we put more stock in the coefficient sign as opposed to the coefficient magnitude.

5. Results

5.1 Univariate Analysis of Value Creation

The first step in the analysis is a comprehensive study of the value creation measure we use, CAR3. Figure 3, shown below, shows the average CAR3 by year. Two things stand out in Figure 3. Firstly, there is subdued volatility in the mean CAR3 in the later period of 2009-2020 compared to the prior period. Secondly, for most years in the prior period, the median value of CAR3 tracks the mean value to a large extent. However, in the later period, the two values are more divergent. The median deal in 2009-2014 creates value compared to a value-destroying mean deal, except for 2009. However, from 2015-2017, to the median deal destroys value at a rate much higher than the average deal. The median deal then returns to being value creating in 2019 and 2020.
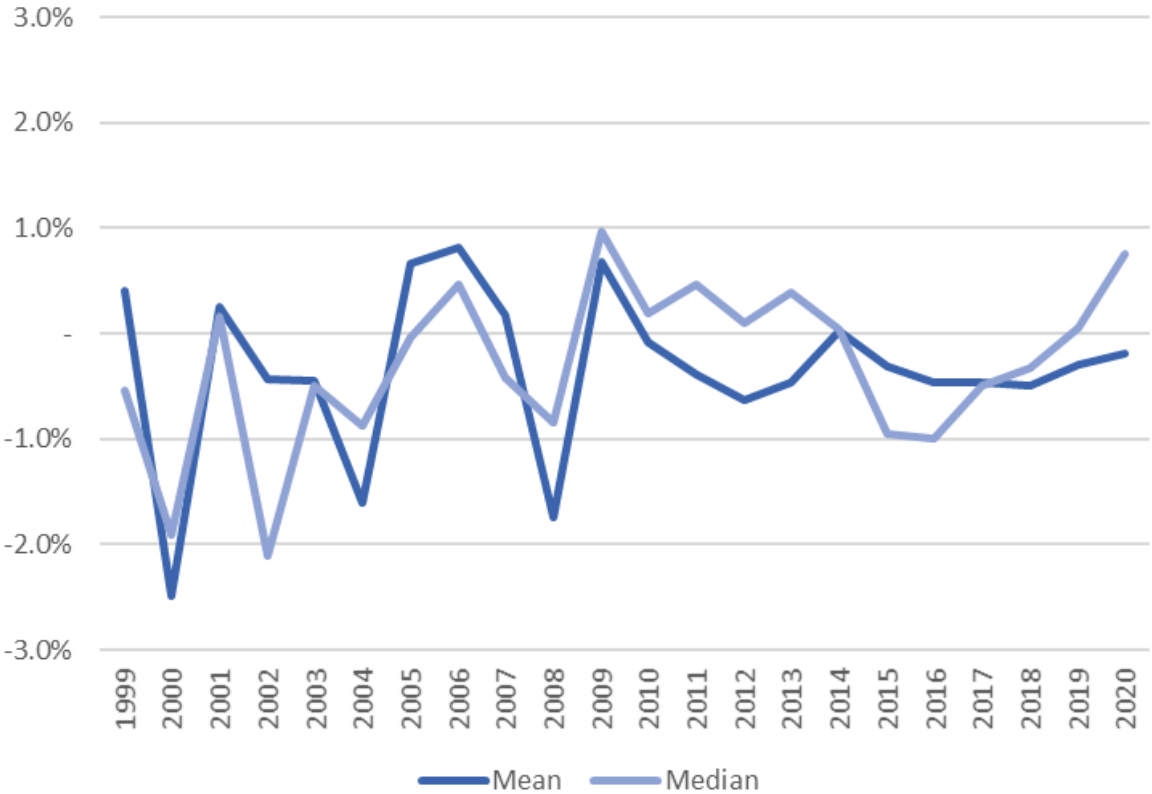

Figure 3 - Mean and Median CAR3 by Year

Table 4 - Univariate Analysis of Value Creation Partitioned by Period

The table reports mean, median, and standard deviation values of CAR3 partitioned by period for a sample of 759 deals. The indicators *, **, *** correspond to significance levels of 10%, 5%, and 1% respectively

		1999-2011	2012-2020	All
n		527	232	759
CAR3	mean	-0.28%	-0.34%	-0.30%
	median	-0.41%	-0.08%	-0.34%
	standard deviation	0.061	0.055	0.059
Number of deals with positive CAR3		242	112	354
Percentage of deals with positive CAR3		46%	48%	47%

Table 4, shown above, reports the mean, median, and standard deviation of CAR3 by period. Both periods have a negative mean CAR3 that is not significantly different from zero. The median CAR3 in the earlier period is lower than the mean value by 0.13%, implying that the mean value is biased upwards by outlier values. The opposite is true for the later period. In fact, the median CAR3 in the later period is higher than the mean value by around 0.26%. This implies that there are more value creating deals in the later period, although the CAR3 for these deals is not large enough to lead to a positive mean value for the period. This is shown to be true, as the percentage of value creating deals in the later period is around 48%, compared to 46% in the prior period. Furthermore, the standard deviation of CAR3 is lower in the later period by around 0.006.

From these results, we can infer that acquirors are becoming more restrained. The range of abnormal returns in the prior period is -27.8% to 29.1%, compared to a range of -17.5% to 25.2% in the latter period. We see that the minimum value of CAR3 has increased across the periods. While the maximum value of CAR3 has decreased by approximately 4.1%, this is minimal compared to the increase in the minimum value of around 10.3%. This is important to note, as this implies that acquirors are becoming more selective and paying more attention to minimizing value destruction, as opposed to maximizing value creation. This is congruent with the decrease in the standard deviation of CAR3 in the latter period, and a median value that is close to 0.0%. Furthermore, given the increase in insider ownership across the periods documented in table 2, this is supported by Wright et al. (2002), who document that increases in insider ownership leads to risk-reducing acquisition strategies.

As previously mentioned, a simple comparison of CAR3 across time, while informative, will lead to biased conclusions. To fully test hypothesis one, that deals happening after 2011 will

enjoy structurally higher returns than deals announced in the prior period, we will implement the treatment effects analysis methodology laid out in section 4.2.

5.2 Matching Results

In section 4.2, we outline three matching methodologies we used to test for our first hypothesis, the PSM, the MDM, and the CEM methodologies. We start this section out by discussing the results of PSM. As previously mentioned, we follow Alexandridis et al. (2017) and calculate the propensity score using a logit regression with POST2011 as a dependent variable and the control variables outlined in section 2.4 as independent variables. The results of this regression are shown below, in table 5.

From table 5, we see that the main variable to differentiate between a 2012-2020 deal from their earlier counterparts is the ALLSTOCK variable. As also shown in section 3.2, deals announced in the later period are more likely to have been financed purely by stock. We report the ATT in table 6, found below. We see that the treatment variable, POST2011, has a positive but insignificant effect on CAR3 in the treated sample.

We cross-check this with the result from MDM. In MDM, we match on the same variables we used for PSM, as outlined in section 4.2. Furthermore, we correct for the bias shown to exist when there are several continuous variables in a large sample using the method outlined by Abadie and Imbens (2006). Abadie and Imbens (2006) show that nearest-neighbor matching methods, such as MDM, are not consistent when there are two or more continuous variables, and correct for this by specifying a linear function of the continuous variables. The ATT reported by MDM is shown in table 6 as well and is also positive but insignificant.

Finally, we implement CEM as a final check. As laid out in section 4.2, we match on the same variables as the two prior methods, with one main difference being that we coarsen the continuous variables into quantiles. This results in 689 matched observations. We then regress CAR3 on POST2011 and weight observations using the weighting formula outlined in section 4.2. The coefficient on POST2011 is the ATT. We see that it is also positive, but insignificant. The results are also found in table 6.

From these results, we reject our first hypothesis. Curiously, we see in section 3.2 that independence, gender diversity, and insider ownership have all increased across the periods. However, this analysis has shown that CAR3 has not developed in a similar manner. We

continue with a multivariate analysis of CAR3 in section 3 in an attempt to take a closer look at how our corporate governance indicators relate to CAR3.

Table 5 - Results of Logit Regression

This table reports the logit regression used to calculate the propensity sores on which observations were matched following the PSM method. The indicators *, **, *** correpsond to significance levels of 10%, 5%, and 1% respectively.

Post2011	
DIVERISIFICATION	-0.08
CROSSBORDER	0.06
MEGADEAL	0.18
ALLSTOCK	0.39**
LEVERAGE	-0.25
CASHASSETS	0.43
ASIZE	-0.02
RELSIZE	0.03
Q	0.02
FOURWKPREMIUM	-0.06
INTERCEPT	-0.87
IND FE	No
YEAR FE	No
ACQUIROR NATION FE	No
R^2	1.0%
N	759

Table 6 - Summary of Treatment Effects Analysis Results

This table summarizes the results of our treatment effects analysis using Propensity Score Matching (PSM, Mahalanobis Distance Matching (MDM), and Coarsened Exact Matching. The indicators *, **, *** correpsond to significance levels of 10%, 5%, and 1% respectively.

	PSM	MDM	CEM
	(1)	(2)	(3)
ATT	0.22%	0.60%	0.20%
Nearest Neighbors	1	1	n.m.
n	759	759	689

5.3 Multivariate Analysis of Value Creation

In this section we continue with our analysis based on a series of multivariate OLS regressions, the results of which are presented below in table 7. We report results for five different specifications in line with our diagnostic tests performed in section 4.3. As per our Chow break test, which shows that there is no structural break, we report all regressions for the whole sample. Furthermore, all regressions are reported using robust standard errors to account for heteroscedastic residuals, as per White's test. Regressions 2-5 gradually include fixed effects for acquiror industry, acquiror nation, and announcement calendar year fixed effects, with regression 5 including all three fixed effects. This is following the specifications shown in Defrancq et al. (2021).

We hypothesize that board independence has a positive relationship with value creation in public-to-public acquisitions. We argue that the increased media attention given to such transactions mean that there is a higher degree of reputational capital risk for independent directors, who want to signal to the market for decision agents that they are competent decision makers. This creates an incentive for outsider directors to perform their monitoring and control duties in the context of public-to-public M&A and will therefore have a positive impact on CAR3. We indeed see that this is the case, as IND, our variable for board independence, is positive and significant for all regressions.

We also hypothesized that insider ownership would exhibit an inverse U-shaped relationship with value creation. This nonlinear relationship would be the result of the negative effects of negligible ownership and the negative effects of excessive ownership. At negligible levels of ownership, the incentives of managers and owners are not aligned. At excessive levels, managers are entrenched and are able to avoid the disciplining effects of internal and external control systems and are therefore able to take value-destroying acquisitions in an attempt to diversify their personal portfolio which is largely tied to the firm. We see that the variables CLOSELY and CLOSELYSQUARED are both insignificant, which implies that there is no significant relationship between insider ownership and acquisition performance. We therefore reject this hypothesis.

The relationship between gender diversity and value creation is similarly inconclusive. Croson and Greezy (2009) and Niederle and Vesterlund (2007) argue that there are cognitive differences between the gender, specifically in terms of their risk appetite. Women are argued

to have higher degrees of risk aversion. We had hypothesized that this risk aversion would counteract the overconfidence of managers, especially when combined with the higher stakes of public-to-public acquisitions. However, we see that the MALERATIO variable is positive but insignificant, implying that more male representation on boards is weakly associated with a higher CAR3. This result is shown in regressions 1-5. We therefore reject hypothesis 4 and surmise that the inconclusive relationship between gender diversity and M&A performance does not change depending on the public status of the target.

Table 7 - OLS Regression Results

The table reports OLS regression coefficient estimates of CAR3 on our key corporate governance variables along with the control variables outlined in section 2.4. Industry fixed effects are based on 2-digit acquiror SIC codes. Acquiror nation fixed effects are based on acquiror headquarters base. Year fixed effects are based on the year of deal announcement. All regressions are performed with robust standard errors. The indicators *, **, *** correpsond to significance levels of 10%, 5%, and 1% respectively.

CAR3	(1)	(2)	(3)	(4)	(5)
CLOSELYACQ	-0.11%	-0.31%	-0.02%	-1.89%	-1.60%
CLOSELYSQUARED	1.56%	1.60%	1.22%	3.00%	1.97%
IND	4.59%***	4.59%**	4.48%***	4.19%**	4.89%**
IND_2011					
MALERATIO	2.29%	1.92%	2.29%	2.46%	0.71%
DIVERISIFICATION	0.00%	0.09%	0.01%	0.08%	0.03%
CROSSBORDER	0.14%	-0.26%	0.15%	-0.13%	-0.54%
MEGADEAL	-0.95%**	-1.13%**	-1.02%*	-0.96%**	-1.32%**
ALLSTOCK	-1.26%**	-1.00%	-1.05%	-1.38%**	-1.00%
LEVERAGE	1.43%	2.13%	1.73%	1.72%	2.57%
CASHASSETS	-1.40%	-0.15%	-1.23%	-1.45%	-0.30%
ASIZE	0.21%	0.44%**	0.25%	0.16%	0.46%**
RELSIZE	0.98%	0.94%	1.06%*	0.95%	1.10%*
Q	-0.27%	-0.30%	-0.20%	-0.26%	-0.19%
FOURWKPREMIUM	-0.02%	0.00%	-0.03%	-0.01%	0.05%
INTERCEPT	-6.97%**	-16.72%	-6.75%**	-5.01%	-13.08%***
IND FE	NO	YES	NO	NO	YES
YEAR FE	NO	NO	YES	NO	YES
ACQUIROR NATION FE	NO	NO	NO	YES	YES
R^2	4.2%	11.6%	6.1%	7.8%	17.1%
N	759	759	759	759	759

6. Conclusion

In this study we explore value creation in M&A and how it has changed following the EU Action Plan of 2012. We implement a treatment effects analysis using PSM, MDM, and CEM matching methodologies to examine how CAR3 has changed, comparing the results of acquisitions announced in 2012-2020 relative to acquisitions announced in 1999-2011. We had hypothesized that the increased focus on corporate governance following the Action Plan would lead to better performing acquisitions in the latter period, and that acquisitions in the latter period would enjoy a structurally higher CAR3. We reject this hypothesis based on a positive but insignificant ATT derived from all three matching methodologies.

We continue our analysis by examining how corporate governance indicators affect value creation. We examine board independence, insider ownership, and gender diversity, and how they impact value creation. Our sample includes 759 public-to-public acquisitions performed by European acquirors and announced from 01/01/1999 to 31/12/2020. We limit our sample to public-to-public acquisitions due to Alexandridis et al. (2017) finding that the improvement in acquisition performance documented in the 7th wave of US M&A came almost entirely from public-to-public acquisitions. Therefore, to maximize brevity and impact, we limit our sample to public-to-public transactions. We take 2012 to be a break year in European M&A due to the announcement of the European Commission of its 2012 Action Plan which puts corporate governance front and center and reflects a change in regulatory attitude towards corporate governance in Europe.

Our second hypothesis is that board independence is positively related to CAR3. The third hypothesis we study is that insider ownership has an inverted-U-shaped relationship with CAR3. Our fourth and final hypothesis is that gender diversity has a positive relationship with CAR3. We accept our second hypothesis while rejecting our third and fourth hypotheses.

Before outlining our recommendations for future research, we outline some limitations in our study. Firstly, due to data availability, or lack thereof, we were unable to include a variable on the percentage of equity-linked renumeration for CEOs. Equity-linked renumeration has been shown to align the incentives of managers and owners, and we expect that it would have strong explanatory power and a positive relationship with acquisition performance. Furthermore, due to the EU Action Plan of 2012 encouraging say on pay as outlined in section 2, we expect that that the percentage of equity-linked renumeration would increase in 2012-2020 compared to

1999-2011. However, for our sample of 760 deals, only 343 deals had data on the percentage of equity-linked renumeration, leading to us excluding it from our study. Secondly, similar issues prevented us from breaking down the insider ownership variable into board ownership and other insider ownership. We expect that board ownership has different effects on acquisition value creation from the ownership of other insiders and would have a stronger relationship with CAR3. This is based on the findings of Alexandridis et al. (2017), who show that director ownership specifically has a positive relationship on value creation.

We recommend that further studies remedy our limitations by including the percentage of equity-based renumeration of CEOs and isolating board member ownership from the ownership of other insiders. Furthermore, an interesting avenue of future research is a study on the determinants of risk in acquisition strategy. As mentioned in section 2.3.2, Wright et al. (2002) explore the relationship between insider ownership and the acquisition risk strategy of the firm. A similar study exploring the effect of gender diversity on risk strategy would be an insightful addition to the literature. Furthermore, an exploration of risk strategy and acquisition success would further illuminate the value drivers of M&A, benefitting academics and practitioners alike.

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8. Appendix

8.1 Appendix Section A

Table 8 - Control Variable Definitions and Sourcing

Variable Name	Definition	Source
LEVERAGE	The total value of all debt divided by the total value of the firms assets at the end of year t-1	CompuStat
ACQ_CASHASSETS	Cash and short-term investments as a percentage of total firm assets at the end of year t-1	CompuStat
Q	Tobin's Q, calculated by the total value of assets (end of year t-1) minus the book value of equity (end of year t-1) plus the market value of equity four weeks prior to acquisition announcement	CompuStat
MEGA_DEAL	A dummy variable that takes a value of 1 if the deal value is higher than $1000 million and 0 otherwise	ThomsonOne
CROSS_BORDER	A dummy variable that takes a value of 1 if the acquiror and target are headquartered in different countries and 0 otherwise	ThomsonOne
ALL_STOCK	A dummy variable that takes a value of 1 if the deal is financed purely in stock and 0 otherwise	ThomsonOne
REL_SIZE	Deal value divided by the acquiror's market capitalization four weeks prior to announcement	CompuStat, ThomsonOne
FOURWKPREMIUM	The offer price per share divided by the target's share price four weeks prior to announcement	ThomsonOne
DIVERSIFICATION	Dummy variable that takes a value of 1 if the acquiror and target have different 2-digit SIC codes, and 0 otherwise.	ThomsonOne
ASIZE	The natural logarithm of the acquiror's market capitalization four weeks prior to announcement	ThomsonOne

8.2 Appendix Section B

Table 9 - Distribution of Acquiror Nation

Country	Count	Percent
United Kingdom	291	38.3%
France	113	14.9%
Switzerland	52	6.9%
Germany	51	6.7%
Netherlands	44	5.8%
Sweden	41	5.4%
Spain	34	4.5%
Italy	25	3.3%
Ireland0Rep	18	2.4%
Denmark	16	2.1%
Norway	17	2.2%
Belgium	14	1.8%
Finland	9	1.2%
Greece	5	0.7%
Poland	6	0.8%
Luxembourg	5	0.7%
Iceland	2	0.3%
Russian Fed	2	0.3%
Austria	2	0.3%
Isle of Man	2	0.3%
Jersey	2	0.3%
Cyprus	2	0.3%
Faroe Islands	1	0.1%
Malta	1	0.1%
Turkey	1	0.1%
Gibraltar	1	0.1%
Guernsey	1	0.1%
Liechtenstein	1	0.1%

Table 10 - Distribution of Target Nation

Country	Count	Percent
United States	206	27.1%
United Kingdom	208	27.4%
France	60	7.9%
Canada	36	4.7%
Germany	21	2.8%
Australia	22	2.9%
Switzerland	22	2.9%
Sweden	18	2.4%
Netherlands	20	2.6%
Spain	19	2.5%
Norway	19	2.5%
Italy	13	1.7%
Denmark	10	1.3%
Finland	9	1.2%
Greece	8	1.1%
Other	68	9.0%
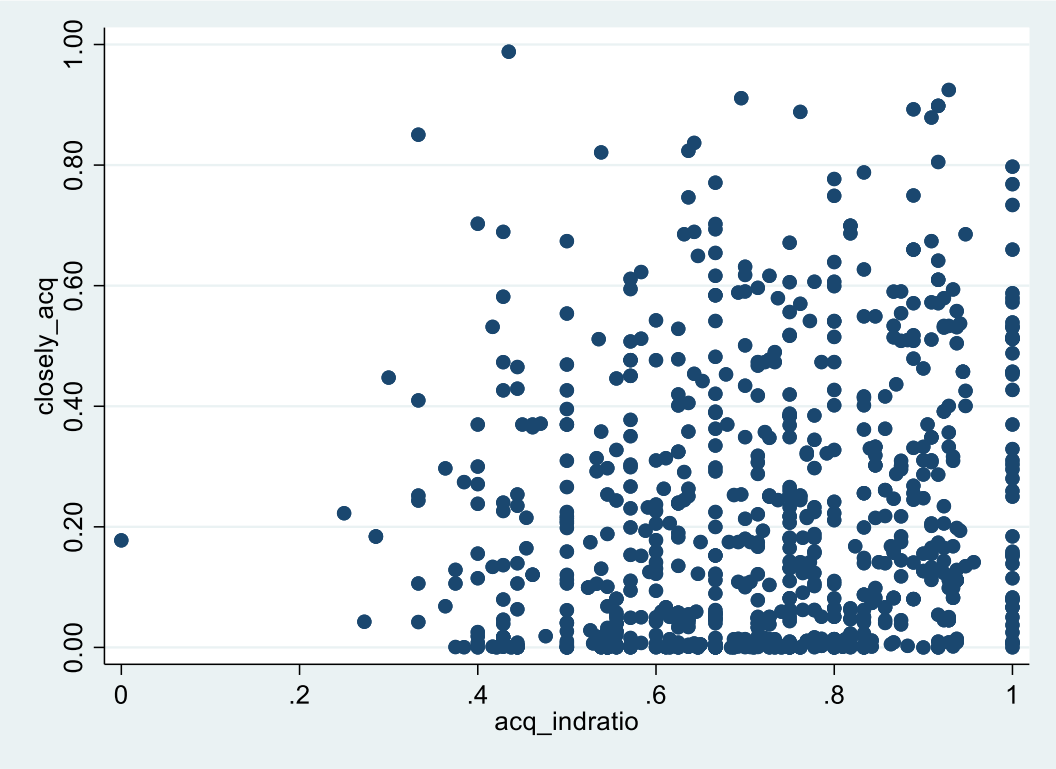
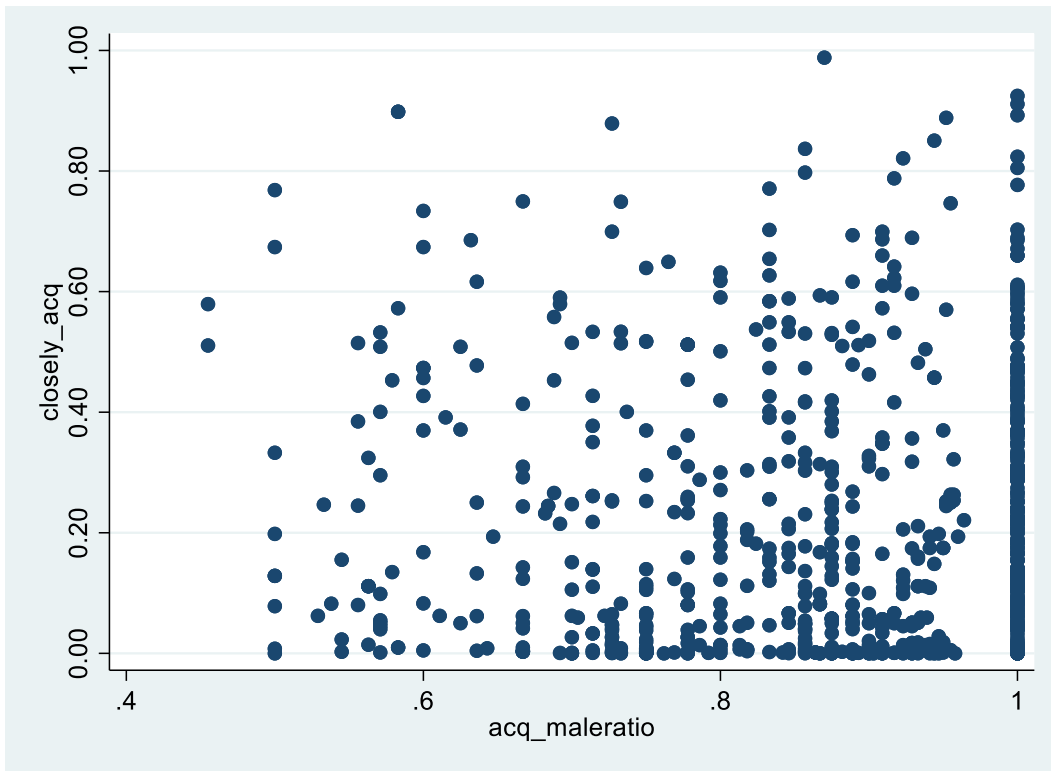*Figure 4- Scatter Plot of CLOSELY and IND*
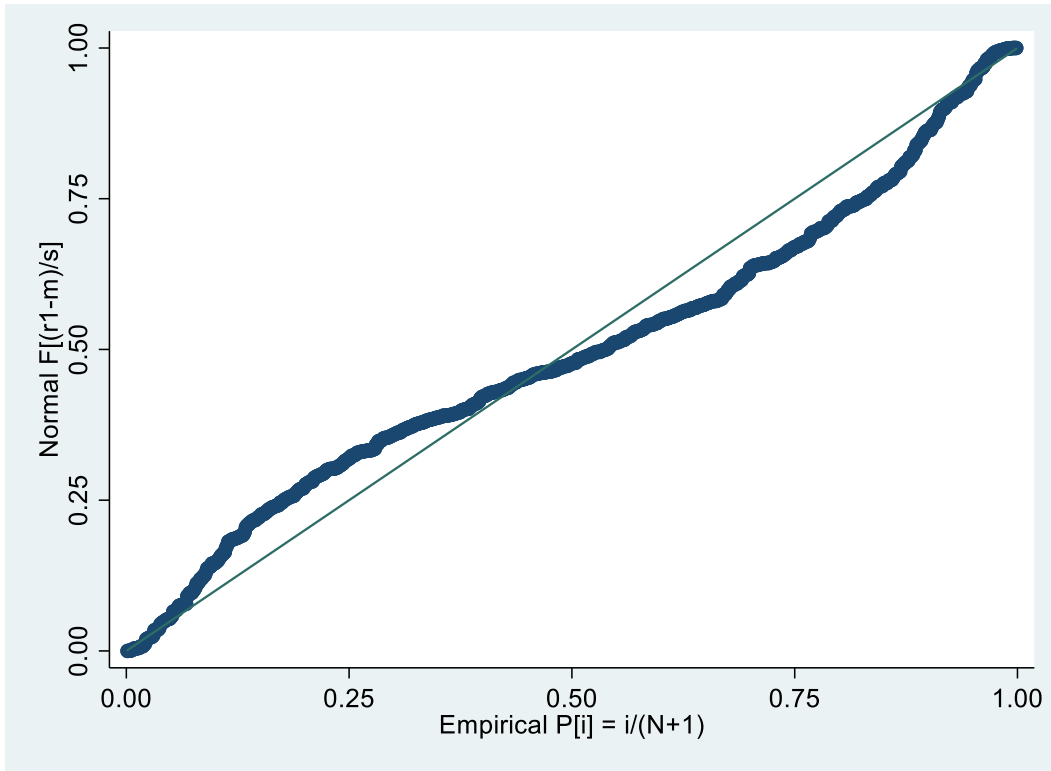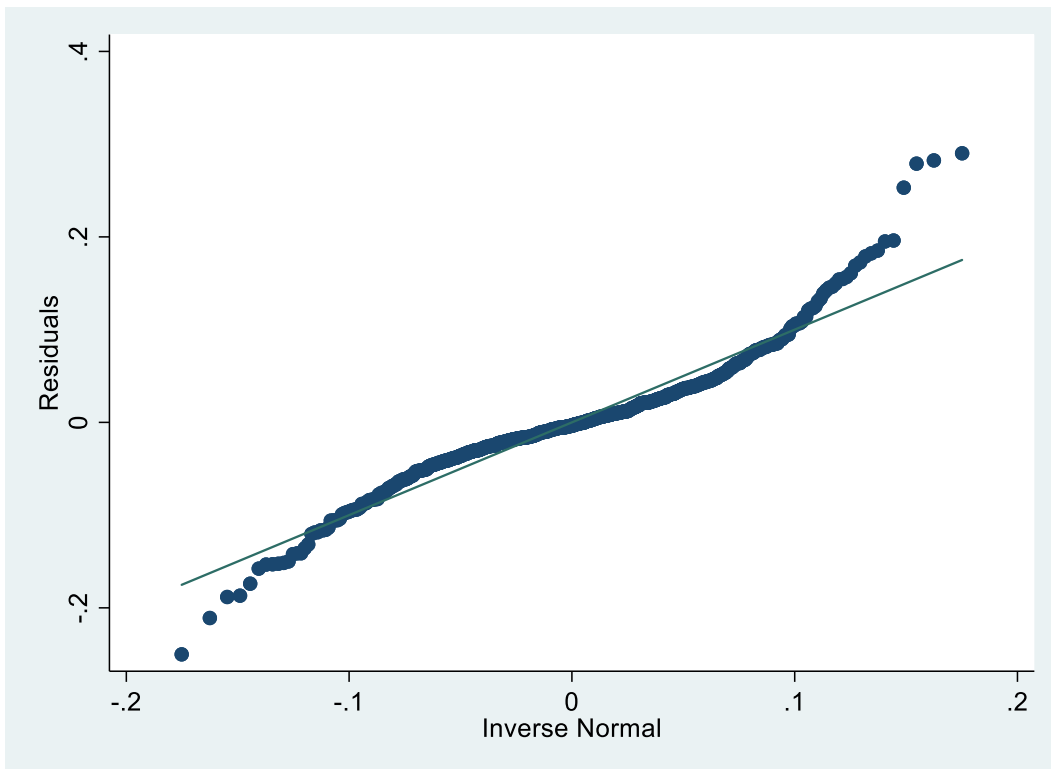
Figure 5 - Scatter Plot of CLOSELY and MALERATIO

Figure 6 - Probability-Probability Plot

Figure 7- Quantile-Quantile Plot