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# The value of personality

- Using algorithms and econometrics to analyze CEO conscientiousness and its impact on M&A performance

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**Abstract**
Even after years of extensive and rigorous research, there is still a puzzling question relating to why managers keep engaging in M&A activities in spite of their tendency to destroy value for the shareholders of the acquiring firm. By seeking explanations in personality psychology, we examine the relationship between CEO conscientiousness, short-term stock market reactions and CEO acquisitiveness. With the help of modern personality assessment, we use an algorithm to analyze 17,842 transcribed quarterly earnings calls and generate personality scores for 838 CEOs of acquiring firms in the S&P Composite 1500® index. Additionally, these CEOs are associated with our sample of 1,371 completed M&A transactions announced between the years 2006 and 2018. By employing several regressions, we conclude that the Big Five personality trait conscientiousness, which is associated with self-discipline, attentiveness to detail, risk aversion and a focus on long-term goals, has a positive impact on acquirer short-run cumulative abnormal returns. We also conclude that CEO conscientiousness has a significant and negative impact on M&A bid premiums, meaning that CEOs ranking highly in this trait pay lower bid premiums. All in all, we find that the new insights offered in the cross section between personality psychology and corporate finance have been fruitful and represent a promising platform for future research to build on.

**Keywords:** M&A performance, CEO acquisitiveness, Big Five personality traits, Conscientiousness

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# 1. Introduction

> *...our appetite is..., we're ravenous. I'm very hungry. We are hunting. We have knife and fork in hand, but I don't want to get food poisoning, and we're not going to be gluttons. And I'm amazed, quite honestly, at some of the stupid pricing that I continue to see out there. Our pipeline is very full. It's very active. And I continue to be stunned at some of the valuations that are out there. We're going to continue to remain disciplined, but we're very active here.*[1]
>
> - Max H. Mitchell
> President, CEO & Director at Crane Co.

Mergers and acquisitions (M&A)[2] constitute one of the most prominent and well researched areas within the field of corporate finance, frequently exploring both long run post-acquisition performance as well as short-run performance following M&A announcements (Jensen & Ruback, 1983; Asquith, Bruner & Mullins, 1983; Agrawal, Jaffe & Mandelker, 1992; Hackbarth & Morellec, 2008). From the acquirer's perspective, the rationales for engaging in M&A activities are diverse and many, but ultimately revolve around the overarching goal of creating additional shareholder value (Subrahmanyam, 2007). In this regard, M&A can be utilized as an opportunity to realize synergies by integrating two firms, gain access to unique know-how or technologies and to identify firms with significant future prospects and then help them develop their business to improve performance (Sirower & Sahni, 2006; Marks & Mirvis, 2010).

However, despite these logical rationales for engaging in M&A, there is a strong and well substantiated consensus among researchers that a majority of M&A activities destroy value for shareholders in the acquiring firm and fail to generate abnormal returns, while almost all of the financial gain goes to the shareholders of the target (Jensen & Ruback, 1983; Roll, 1986; Hayward & Hambrick, 1997; Moeller, Schlingemann & Stulz, 2005; Bargeron, Schlingemann, Stulz & Zutter, 2008; Betton, Eckbo & Thorburn; 2008; Eckbo, 2009; Alexandris, Antypas & Travlos, 2017). In the long run, there is a general tendency of post-acquisition underperformance, although the evidence is mixed and ambiguous (Jensen & Ruback, 1983; Agrawal, Jaffe & Mandelker, 1992; Rau & Vermaelen, 1998; Eckbo & Thorburn, 2000). Moreover, previous research has also found a negative long-term impact of M&A transactions on operational profitability (Ravenscraft & Scherer, 1988; Bruner, 2004; Bogan & Just, 2009). Yet, in the last three years, firms have spent more than $8.23 trillion on M&A deals in the U.S. alone (Bloomberg, 2019). With this in mind, the question that follows naturally is why managers keep engaging in M&A activities given this high likelihood of destroying shareholder value?

Although the Board of Directors' approval is required in financing- and investment decisions like M&A, top executives such as the Chief Executive Officer (CEO), play a significant role in decision-making processes considering that successful implementation of change is essential for

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[1] Source: Q4 2016 Earnings call (2017-01-31), © S&P Global Market Intelligence.

[2] Even though there are separate and distinct definitions of mergers and acquisitions, the terms will be used interchangeably throughout this thesis.

organizations to be able to succeed in today's business environment (Hayward & Hambrick, 1997; Chatterjee & Hambrick, 2007; Higgs, 2009; Graham, Harvey & Puri, 2013). Consequently, there has been a growing interest in how, and to what extent, leaders and their behavioral characteristics contribute to or hinder the successful implementation of change (Hambrick, 2007; Higgs, 2009), which for instance can be achieved by engaging in M&A activities (Aktas, de Bodt, Bollaert & Roll, 2016). Although a CEO's execution skills and general ability quite unsurprisingly have been shown to impact firm performance (Kaplan, Klebanov & Sorensen, 2012), the puzzling question still remains; why do managers keep engaging in M&A activities when a majority of such transactions tend to destroy shareholder value?

To explain this phenomenon, researchers in corporate finance have historically mainly relied on agency theory and the principal-agent conflict founded on the assumption of rationality as the main cause of this behavior (e.g. Jensen, 1986; Morck, Shleifer & Vishny, 1990; Harford, 1999; Jensen, 2005). However, later literature that opens up for managerial irrationality has been borrowed from the field of psychology in order broaden the explanatory domain (Roll, 1986; Aktas *et al.*, 2016). In particular, behavioral psychology has proven increasingly helpful in this regard by studying how psychological and sociological factors, such as behavioral characteristics of CEOs, can be linked to their decision-making process and the financial performance of firm activities; a hybrid field referred to as behavioral (corporate) finance (Fanto, 2001; Subrahmanyam, 2007). Notably, empirical evidence suggests that CEOs exhibit behavioral biases such as hubris, overconfidence and narcissism which may influence their decision-making process, not least in M&A transactions (Roll, 1986; Fanto, 2001; Chatterjee & Hambrick, 2007; Baker, Pan & Wurgler, 2012; Baker & Wurgler, 2013; Malmendier and Tate, 2008; Graham *et al.*, 2013; Chatterjee & Hambrick, 2011).

As the previous discussion suggests, past studies in this field have so far mainly investigated how managerial *biases* affect M&A performance, while only a few have focused on personality *traits*. The latter are said to be more psychologically stable over time compared to behavioral biases (Mairesse, Walker, Mehl & Moore, 2007; Funder, 2012). In the field of personality psychology, one of the most prominent and well-merited models is the Big Five personality traits model (Goldberg, 1993; Hofstede & McCrae, 2004; Bono & Judge, 2004; Judge, Piccolo & Kosalka, 2009). This model essentially divides the human personality into five overarching personality traits comprising *extraversion*, *emotional stability*, *agreeableness*, *conscientiousness* and *openness to experience* (Judge, Bono, Ilies & Gerhardt, 2002).[3] Although the Big Five personality traits model has been frequently used in leadership and work psychology literature (e.g. Judge *et al.*, 2002; Judge *et al.*, 2009), it has not yet been widely incorporated or used in (behavioral) corporate finance (Gow, Kaplan, Larcker & Zakolyukina, 2016; Malhotra, Reus, Zhu & Roelofsen, 2018).

In addition, the samples used in behavioral corporate finance studies have so far been rather small, outdated and limited to specific industries, or have been based on proxies that are not able to accurately capture what they intend to capture. As an example, inadequate and incomplete proxies have often been used to measure certain CEO behavioral biases (cf. Chatterjee & Hambrick, 2007; 2011; Malmendier & Tate, 2008). In regard to the field of psychology overall, one commonly cited

[3] The Big Five personality traits are explained in greater detail in subsection *2.2 Big Five personality traits model*.

drawback of quantitative studies is their inability to explore and explain the underlying reasons of certain behavior. However, with the progress of modern personality assessments based on the Big Five model and the improved availability of data (Mairesse *et al.,* 2007; Kaiser & Overfield, 2010), it is now possible to quickly analyze and quantify the personality of individuals as a spectrum using software. The impact and connection between personality traits and different performance metrics can subsequently be studied further using econometrics.

With this background in mind, this thesis aims to contribute to existing M&A research by presenting new empirical results that merge corporate finance with personality psychology. More specifically, we will do this by shedding light on the relationship between acquirer CEO *conscientiousness*, short-term stock market reactions associated with M&A announcements, and CEO acquisitiveness which refers to CEOs' tendency to pay high or low premiums as well as their propensity to initiate M&A transactions (i.e. deal frequency). Moreover, the reason for why this thesis focuses on the Big Five personality trait *conscientiousness* in particular, is that it has not been previously researched in an M&A context as far as we are aware. We also believe that this is one of the most interesting personality traits to study in this context since research in the field of work psychology has shown that it is strongly correlated with leadership emergence and effectiveness, thoroughness, attentiveness to detail, an analytical mindset, risk aversion, as well as a drive to pursue and achieve long-term goals (Goldberg, 1993; Judge *et al.*, 2002; Bono & Judge, 2004; Judge *et al.*, 2009; DeRue, Nahrgang, Wellman & Humphrey, 2011). Moreover, we also believe that the empirical evidence and associated analysis presented in later sections will be of particular relevance and interest to investors, practitioners within M&A, researchers in the field of behavioral corporate finance, as well as in behavioral- and personality psychology. Furthermore, this study distinguishes itself in the sense that it focuses on a positive personality trait, as opposed to negative biases which have been frequently studied previously.

The disposition of the thesis is as follows. First, we begin by presenting previous literature and research in the fields of corporate finance, M&A, behavioral psychology and personality psychology. Second, we present and elaborate on the adopted research methodology used for hypothesis testing, followed by a discussion about limitations. Third, the empirical results are presented followed by an analysis and discussion including some suggestions for further research. Lastly, we briefly recap the study's background, main findings and present the conclusions.

# 2. Literature Review

There are three commonly cited motivations for M&A in past research, namely i) creation of synergies so that the new combined entity generates more value than each separate company does by itself (Hayward & Hambrick, 1997; Moeller *et al.*, 2005; Marks & Mirvis, 2010), ii) poor target company management and agency conflicts stemming from the principal-agent relationship between managers and shareholders (Fama, 1980; Jensen, 1986; Eisenhardt, 1989; Hayward & Hambrick, 1997; Dhir & Mital, 2012), and iii) acquiring firm managerial biases, ranging from managerial hubris, overconfidence (Roll, 1986; Malmendier & Tate 2005; 2008) and narcissism (Chatterjee & Hambrick, 2007; 2011) to judgemental anchoring (Baker *et al.*, 2012) and herd behavior (Martynova & Renneboog, 2008). Thus, it can be observed that the motivations and rationales for engaging in M&A activities are derived from several different academic fields, with traditional corporate finance and behavioral psychology representing the most prominent ones; something which will be elaborated on in the following subsections. In order to achieve a logical progression of the following literature review, we begin by providing the reader with a comprehensive background outlining how behavioral psychology came to be used in M&A research, before finally diving deeper into personality psychology and the personality trait conscientiousness more specifically.

## 2.1 The transition to behavioral psychology in M&A research

### *2.1.1 Agency theory and the rationality assumption*

Considering that financial contracting and incentives represent two essential aspects of corporate finance, *agency theory* has for a long time been helpful in explaining managerial actions (Jensen, 1986; Agrawal & Mandelker, 1987). Agency theory originally stems from the notions presented in Adam Smith's book called *An Inquiry into the Nature and Causes of the Wealth of Nations* published in 1776 and the idea of ineffective management in firms with non-owner managers (agents) who are hired to manage the owners' (i.e. the principals') investments. Rational agents make decisions that best serve their own private interest while simultaneously having to respond to the needs and wishes of the principal, in turn giving rise to agency conflicts (Ross, 1973; Eisenhardt, 1989; Baker & Wurgler, 2013). As Jensen (1986) highlights, this conflict causes agency costs to arise when the agent chooses to pursue their own interests and take actions that go against shareholder value maximization. In past research, agency theory has been widely used to explain poor performance of firms' top management, who have their own private incentives which may not be in line with the maximization of shareholder value (Jensen & Meckling, 1976). Because of this, they risk engaging in value destroying M&A activities to achieve personal gains (Agrawal & Mandelker, 1987; Jensen, 1986; Harford, 1999). For example, there is empirical evidence for "empire building", i.e. a phenomenon where top managers engage in M&A transactions primarily to make the firm grow in size, which in turn increases their private compensation and ability to consume perquisites (Jensen & Meckling, 1976; Harford, 1999). Another example of the agency conflict can be seen whenever CEOs and top management, considering that they are unproportionally exposed to one single source of income, engage in diversification strategies with the main purpose of diversifying their own personal wealth (cf. Jensen, 1986). This kind of self-serving agent behavior is also exemplified by managerial entrenchment (e.g. the exaggerated investment in assets that complement and require manager-specific skills) which makes it costly for shareholders to replace the managers (cf. Shleifer & Vishny, 1989). A final example of the principal-agent conflict is illustrated in top managers' preferences to finance projects, such as M&A activities, using internally generated free cash flows in order to avoid being scrutinized by capital markets; something which inevitably would follow when raising new capital from capital providers outside the firm (Jensen, 1986; Harford, 1999). However, managers may be inclined to raise funds by issuing equity when the firm's stock is overvalued in order to take advantage of a temporary mispricing by the financial market (Shleifer & Vishny, 2003; Jensen, 2005). On a similar theme, it has been observed that firms which exhibit certain financial conditions, such as a large cash reserve and a high debt capacity, are more likely to initiate "low-benefit" and even value destroying M&A activities (Jensen, 1986).

Despite its historical prominence, agency theory has also been frequently criticized by researchers in the field of psychology and sociology for its unrealistic assumptions of complete individualistic utility and economic rationality (Davis, Schoorman & Donaldson, 1997) As a result, this criticism has spurred new ways of thinking about managerial incentives, actions and motivations as researchers set out to find new explanations for why managers, as well as investors and financial markets, were not behaving as traditional theory stated they should; something which ultimately led to the creation of the relatively new hybrid field of behavioral finance (Shleifer, 2000; Baker & Wurgler, 2013).

Behavioral finance draws on behavioral psychology[4] and largely evolved from the ideas of Daniel Kahneman and Amos Tversky, who criticized expected utility theory and subsequently introduced psychological factors as new explanations for irrational behavior in decision-making processes (e.g. Kahneman & Tversky, 1979). The field also received increased attention and influence around the time of the dot-com bubble when investors had a seemingly unconstrained, and to some extent irrational, appetite for investments in high-tech firms in the internet sector (Baker & Wurgler, 2013). Behavioral *corporate* finance further challenges and relaxes the underlying rationality assumptions of the traditional (corporate) finance discipline by introducing assumptions of investor- and managerial irrationality (just like in behavioral finance overall), and biases in the decision-making process relating to a firm's financing- and investment decisions (Baker & Wurgler, 2013). More specifically, Baker and Wurgler (2013) point out that managerial irrationality encompasses and highlights the different behavioral- and judgmental biases found in behavioral psychology that can affect decision-making processes. Some of the identified biases that have been investigated in past research include, but are not limited to; CEO hubris, overconfidence, narcissism, anchoring bias, herd behavior and confirmation bias among others. All in all, these identified behavioral biases can be said to represent new explanations and insights as to why managers may not in fact behave in accordance with classical finance theories.

[4] Behavioral psychology is the study of how human behavior relates to the mind. Furthermore, behavioral psychology is also founded on the idea that behavior is the result of conditioning which stems from interaction with one's environment which in turn shape our actions (Watson, 1913).

### 2.1.2 Managerial biases

**CEO hubris and overconfidence**

Seeing that two of the main motivations for M&A takeovers, i.e. creation of synergies and agency issues, could not fully explain the underlying reasons for poor M&A performance, Richard Roll conducted one of the first studies on both managerial overconfidence and optimism which subsequently led to the development of the *hubris hypothesis* in his influential 1986 paper; a hypothesis which quickly became recognized and acknowledged within the field of behavioral corporate finance and M&A (Hayward & Hambrick, 1997; Hietala, Kaplan & Robinson, 2003; Malmendier & Tate, 2005; 2008; Bogan & Just, 2009; John, Liu & Taffler, 2011; Ben-David, Graham & Harvey, 2013). The hubris hypothesis focuses on the behavior of the individual decision maker in the acquiring firm and sets out to explain why the acquirer engages in M&A activities and in many cases chooses to pay a substantial premium for the target firm (Roll, 1986). Not surprisingly, researchers have discovered that acquirer firm CEOs who are characterized by hubris tend to overestimate the potential realizable synergies, thereby paying unjustifiably high premiums for the target firms and ultimately destroy more firm value compared to other CEOs (Hayward and Hambrick, 1997; Malmendier and Tate, 2005, 2008). However, since the hubris hypothesis is not yet extensively supported by empirical evidence (Hayward & Hambrick, 1997; Dhir & Mital, 2012), researchers successively shifted their focus towards overconfidence instead (e.g. Hayward & Hambrick, 1997; Malmendier & Tate, 2008).

Notably, the concepts of hubris and overconfidence have been used almost interchangeably in past literature (John *et al.*, 2011), and one could also argue that the two concepts draw certain parallels to agency theory (e.g. to Jensen, 1986) when trying to explain poor M&A performance. Whereas agency theory hypothesize that the agent acts in his or her own interest (Jensen, 1986; Harford, 1999), the concepts of hubris and overconfidence assume that agents which are influenced by these biases may still act in the best interest of shareholders but that they overestimate their ability to realize the synergies and potential gains resulting from the M&A transaction, in turn overpaying for the target firm (Malmendier & Tate, 2008; Heaton, 2012). As Roll (1986, p. 214) puts it: "Management intentions may be fully consistent with honorable stewardship[5] of corporate assets, but actions need not always turn out to be right". Malmendier and Tate (2008) investigated whether overconfident CEOs were more likely to engage in M&A activities compared to other CEOs and in their results, they found that if overconfident CEOs had access to internal financing, they would in turn be more likely to engage in M&A transactions. Thus, they empirically emphasized the link between corporate assets, behavioral biases and decision making. In addition, CEO overconfidence has also been linked to excessive risk taking and diminished risk perception, especially when this bias is combined with a convex compensation scheme (Gervais, Heaton & Odean, 2011). Although the presence of hubris and overconfidence

[5] While agency theory assumes that managers are bound to exhibit a selfish and egocentric behavior, a contrasting view is presented by the *stewardship theory* which states that managers will act in accordance with the interests of their organization by embracing a role as committed, cooperative, loyal and responsible stewards of the corporate assets over which they have control, instead of pursuing their own interests (Davis *et al.*, 1997). In other words, although agency theory and stewardship theory are founded on the same rationality assumption, they have diverging views on managerial values and the resulting outcome in terms of managerial actions (Davis *et al.*, 1997).

can provide some explanations, these biases do not provide the comprehensive picture of why M&As often fail (Garbuio, Lovallo and Hornet, 2011).

### *CEO narcissism*

In early psychology theory, Sigmund Freud (1914; 1957) argued that narcissism is an essential part of every human being from day one and that it manifests itself as self-admiration and a tendency to view others as an extension of one's self. According to Zhu and Chen (2015), the literature in psychology and strategic management highlights that corporate managers in particular are characterized by narcissism in their personalities; behavioral tendencies which seem to be especially prevalent among CEOs, thus emphasizing the importance of CEO narcissism for organizational outcomes (Chatterjee & Hambrick, 2007; 2011). This could be due to the fact that individuals characterized by high levels of narcissism generally are highly self-confident, excessively optimistic, enthusiastic and have a strong desire for prestige, attention and praise (Emmons, 1987). In conjunction with each other, these attributes consequently help narcissistic individuals to perform well and rise in the ranks within their company (Maccoby, 2003; Zhu & Chen, 2015).

Furthermore, research has shown that high levels of narcissism translates into excessive self-admiration and a need to confirm that one is superior to everyone else (Chatterjee & Hambrick, 2007; 2011). The underlying characteristics associated with a narcissistic personality can in turn induce a behavior where highly narcissistic CEOs choose to engage in corporate activities that are dramatic, visible, bold, lead to admiration, attract significant attention and tend to generate either substantial gains or losses; outcomes which could result from large M&A transactions for example (Chatterjee & Hambrick, 2007). In other words, narcissism is prominently associated with risk-taking behavior as well as hubris (Chatterjee & Hambrick, 2007; 2011). However, as opposed to a personality trait which constitutes a psychological construct that is stable over time, narcissism should instead be viewed as a dynamic personality dimension that is affected or augmented by the environment and the specific situation (Morf & Rhodewalt, 2001).

Finally, Maccoby (2003) and Higgs (2009) also elaborate on the notion that narcissism is associated with both negative and positive characteristics by pointing out that narcissism constitutes a fundamental requirement for effective leadership and can be linked to productiveness, while also representing a threat due to the associated risk-taking behaviors. Narcissists are said to be productive and beneficial to their organizations since they contribute with a strong sense of vision and do not shy away from assuming a leadership role in steering the organization towards new objectives and directions.

### *Other managerial biases*

In addition to CEO hubris, overconfidence and narcissism, there are also many other, less frequently studied managerial biases that are still worth mentioning. For instance, confirmation bias make CEOs look for and hold on to information that supports a view already held, which is then believed to be more important than other pieces of information that may go against this view; something which has also been observed in an M&A context (Bogan & Just, 2009; Garbuio *et al.*, 2011). Another observed managerial bias is herd behavior, which means that managers in some situations tend to act in the same way as other participants in their business environment or in the financial market (Martynova & Renneboog, 2008; Garbuio *et al.*, 2011). Moreover, anchoring bias is an additional bias that can be described as the human tendency to rely too heavily on the first piece of information that one comes across (Tversky & Kahneman, 1974), hence resulting in skewed estimates which in turn affect the decision-making process in many different contexts, not least in M&A (Baker *et al.*, 2012; Baker & Wurgler, 2013; Garbuio *et al.*, 2011). In regard to M&A specifically, research has shown that both herd behavior and anchoring play a significant role since the abnormal returns observed on M&A deals taking place in times of high M&A deal activity tend to be lower or even negative compared to abnormal returns associated with deals announced in times of decreased M&A activity (Goel & Thakor, 2009; Martynova & Renneboog, 2008; Garbuio *et al.*, 2011).

Additionally, CEOs may also be influenced by additional biases as well, such as i) their escalation of commitment where resources are continuously invested into the acquisition to avoid regret (Haunschild, Davis-Blake & Fichman, 1994; Baker & Wurgler, 2013), ii) their feelings, which can play a more prominent role than logical reasoning in their risk-taking behavior (Chatterjee & Hambrick, 2011), and iii) an illusion of control which is often analyzed in conjunction with the biases of overconfidence and optimism (Thompson, 1999; Baker & Wurgler, 2013).

### 2.2 Big Five personality traits model

By integrating behavioral, temperamental, emotional and mental attributes, the concepts and notions established in personality psychology, and personality traits research specifically, can be viewed as tools to extend the ideas presented previously in behavioral corporate finance studies; something which in turn enables new insights, explanations and perspectives. Personality traits can be defined as stable construct of thought patterns, behaviors and emotions that remains fairly consistent over time and across different situations (Allport, 1961; Mairesse *et al.,* 2007; Roberts & Jackson, 2008).

During the early 1980s and 1990s, Goldberg (1990; 1993) coined the concept of "Big Five Factors" as a way to bring together the findings of independent researchers conducting personality studies under a common umbrella (cf. Thurstone, 1934; Allport & Odbert, 1936; Cattell, 1947; Norman, 1963; McCrae & Costa, 1987). In essence, the Big Five personality traits model is a taxonomy of several distinct personality traits and the model is particularly based on the so-called Lexical Hypothesis. The hypothesis states that the most relevant differences among individuals are in fact encoded in language and that these differences, in turn, are more likely to be expressed as a single word the more important they are; a statement which has also been supported by rigorous research (Goldberg, 1990; 1993; De Raad & Mlačić, 2017). That being said, the Big Five personality trait model has also been subject to criticism over the years due to its rather broad categorization of personality traits (Goldberg, 1993; Jackson & Roberts, 2017). In addition, there has also been a discussion relating to how many traits there should really be (cf. Cattell, 1947; Cattell, 1963; Eysenck, 1992). Yet, the model has prevailed and is today considered to be one of the most prominent, well merited and acknowledged personality traits models within the field of psychology (Goldberg, 1993; Hofstede & McCrae, 2004; Bono & Judge, 2004; Judge *et al.*, 2009; Soto, 2019). Note that the model never aimed to reduce personality differences to only five fixed traits or dimensions, but instead aspired to represent personality at a broader level and each trait also comprises an extensive number of different personality characteristics (Jackson & Roberts, 2017).

Moreover, the model has proven to be helpful and applicable across cultures as well (Hofstede & McCrae, 2004).

The five overarching personality traits mentioned in the Big Five model comprise; i) *extraversion* vs. introversion, ii) *emotional stability* vs. neuroticism, iii) *agreeableness* vs. disagreeableness, iv) *conscientiousness* vs. unconscientiousness, and v) *openness to experience* (Goldberg, 1990). Furthermore, the model also establishes how these traits translate to certain behavioral characteristics depending on whether an individual is characterized by a low or high score in a particular Big Five trait. The Big Five traits are summarized further in Table 1 below.

**Table 1.** Summary of the Big Five personality traits
This table provides a summary of the Big Five personality traits and the behavioral characteristics associated with each personality trait, depending on its strength (high or low). Source: Goldberg (1993) and Mairesse *et al.* (2007). Authors' own visualization.

| Traits | High | Low |
|---|---|---|
| Agreeableness (vs. Disagreeable) | Friendly/kind, cooperative, trusting, warm | Antagonistic, fault-finding, hostile, selfish, distrusting |
| Conscientiousness (vs. Unconscientiousness) | Self-discipline, organized, thorough, reliable | Inefficient, careless, negligent, unreliable |
| Emotional stability (vs. Neuroticism) | Calm, unemotional | Insecure, anxious, moody, temperamental |
| Extraversion (vs. Introversion) | Sociable, assertive, playful, talkative, high activity level | Aloof, reserved, shy, silent, passive |
| Openness to experience | Intellectual, insightful, imaginative, curious, creative | Shallow, unimaginative, imperceptive |

Several studies have examined how the Big Five traits relate to each other and to behavioral biases, some of which were mentioned previously in subsection *2.1.2 Managerial biases*. In a study by Judge *et al.* (2009), the authors divide the personality traits and biases into two groups, namely "bright side" and "dark side" traits, and subsequently study both their positive and negative effects. The former of the two groups comprises all Big Five traits, self-evaluations, intelligence and charisma, while the latter includes narcissism, hubris, dominance and Machiavellianism. Notably, individuals with high conscientiousness, extraversion and emotional stability may be more inclined to try to get ahead, something which can also be said about individuals characterized by narcissism, hubris, dominance and Machiavellianism, while individuals ranking high in extraversion and agreeableness may be characterized by a desire to get along (Barrick, Stewart & Piotrowski, 2002). Research has also established the presence of a positive relationship between overconfidence and the Big Five traits agreeableness, extraversion and conscientiousness (Zaidi & Muhammed, 2012). Additionally, narcissistic individuals are sometimes referred to as "disagreeable extraverts" seeing that they rank highly in extraversion and low in agreeableness (Paulhus, 2001).

The Big Five relationships have also been tested more formally through correlation analysis and content analysis. For instance, Judge *et al.* (2002) found that the Big Five traits had multiple correlation of $R = 0.53$ with leadership emergence and $R = 0.39$ with leadership effectiveness. In terms of content analysis, Chatterjee and Hambrick (2007) point out that some researchers have studied biographies to assess the personality dimensions of executives. This was done in order to detect connections between a CEO's personality and the dynamics of the top management team (cf. Peterson, Smith, Martorana & Owens, 2003).

That being said, due to the inherent complexity associated with modelling something as qualitative as personality traits, the replicability of studies in this field has come to be questioned (e.g. studies connecting the Big Five traits and different outcome variables), just like the quantitative association between the Big Five traits (cf. Viswesvaran & Ones, 2000; Simmons, Nelson & Simonsohn, 2011). However, in a recent study conducted by Christopher Soto (2019), there is in fact empirical evidence of a high success rate in replicability of previous studies. The author found that in 87% of the replication attempts, the coefficients were statistically significant while also having a direction that was identical to the original study being replicated. In 77% of the cases, the magnitude of the coefficient was at least as strong as previously reported.

### 2.3 Conscientiousness in past research

In the previous section, the Big Five personality traits model was presented in broad terms. However, since this study focuses on conscientiousness specifically, we will now discuss specific trait in more depth and highlight its connection to leadership and decision-making.

Roberts *et al.,* (2009, p. 369), defined conscientiousness as "the propensity to follow socially prescribed norms for impulse control, to be goal directed, to plan, and to be able to delay gratification". Moreover, Judge *et al.* (2009) emphasize that individuals ranking high in conscientiousness tend to be cautious and analytical, why they tend to be risk averse and less willing to innovate. Additionally, conscientious individuals are also more likely to resist change and delay crucial decision-making processes since they have a need to collect convincing evidence that supports their own preferences or stance before any action is taken. Thus, it is not surprising that Herrmann and Nadkarni (2014) also find that CEO conscientiousness is negatively associated with the initiation of strategic change, in line with the discussion by Judge *et al.,* (2009). Highly conscientious leaders may even be threatened by organizational change and unsettling or turbulent circumstances; situations in which they experience stress as deadlines approach or whenever they face an extensive workload, thus forcing them to go against their urge to follow strict and organized procedures (Judge *et al.*, 2009). In turn, these particular behavioral characteristics of conscientious individuals could translate to poor organizational performance, missed chances to invest in new business opportunities, or failure to take advantage of organizational resources (Judge *et al.*, 2009). On the other hand, in the case that a highly conscientious CEO in fact does implement strategic change, this will tend to affect firm performance positively (Herrmann & Nadkarni, 2014). Moreover, Bartley and Roesch (2011) argue that "the persistent, self-regulating, and goal/achievement-oriented aspects of C [conscientiousness] should allow individuals to allocate their resources appropriately so as to (a) focus their efforts on eliminating stressors or (b) continue to focus on and work toward their goals without allowing the stressors to interfere with their achievements. Repeatedly overcoming stressors should contribute to the development of more experienced, skilled copers" (p. 82). This is corroborated by Penley and Tomaka (2002) who show that conscientiousness is positively correlated with perceived and active coping ability, as well as negatively correlated with perceived stress and fear. The authors also concluded that conscientiousness is positively correlated with total positive emotion, compassion, happiness, hope and pride.

Further, Judge *et al.* (2009) point out that conscientious individuals on average tend to be attentive to detail and their work overall, while highly conscientious individuals may even develop into perfectionists who hold on to procedures and policies. On a more positive note, Jackson and Roberts (2017) argue that conscientious individuals are also characterized by the ability to have self-control, i.e. the ability to resist impulses, think before acting and to avoid being reckless or out of control. By extension, a high level of self-control associated with high conscientiousness also translates to an ability to defer immediate short-term gain and gratification, in order to achieve more long-term goals. However, conscientiousness is not only associated with self-control, but also with sub traits such as grit, perseverance, ambition and work ethic (Almlund, Duckworth, Heckman and Kautz, 2011), and with sensation seeking (Zuckerman, 2007). Grit, in particular, constitutes one of the more recently developed psychological constructs and is defined as the ability to maintain interest in order to achieve long-term goals, why it is conceptually similar to the sub traits of perseverance, ambition and self-control (Duckworth & Quinn, 2009). Unsurprisingly, research has shown that there is a remarkably high correlation[6] between grit and conscientiousness; not least given the tendency of individuals that are characterized by both traits to strive towards goals and achievements (Duckworth & Quinn, 2009).

Moreover, Gow *et al.* (2016) assert that both outcome- and reward-oriented cultures are likely to appeal to CEOs ranking high in conscientiousness due to the connection between conscientiousness and a high level of ambition. Further, the authors also explain that the first type of culture is characterized by high expectations and norms for personal achievement while the latter emphasizes rewards for performance, thereby illustrating the link between the characteristics associated with conscientiousness and performance. That being said, a high or excessive level of conscientiousness may also lead to narrow fields of vision, a selective perception bias, as well as rigidity, inflexibility and the prioritization of immaterial details at the expense of goals that could be deemed more important. Hence, conscientiousness can also be negatively associated with performance, adaptability and strategic flexibility. In turn, cultures that are associated with innovation, risk-taking and inventiveness are less likely to attract highly conscientious CEOs. This is also in line with the fact that conscientiousness is negatively associated with firm growth and that men with lower levels of conscientiousness are particularly affected by incentives (Almlund, Duckworth, Heckman & Kautz, 2011; Gow *et al.*, 2016). In sum, Gow *et al.* (2016) point out that the relationship between conscientiousness and performance seems to be ambiguous, but that it is expected for conscientious CEOs to be less attracted to innovative firms, e.g. those with higher R&D expenditures.

On the theme of leadership, DeRue *et al.* (2011) carried out a meta-analysis which echoed that leader traits and behavior explain approximately one-fourth of the variance in leader effectiveness and also concluded that conscientiousness together with extraversion explain a majority of this variance, hence representing persistent predictors in this regard. Moreover, conscientious leaders promote ethical leadership with high moral obligations (Kalshoven, Den Hartog & De Hoogh, 2011) while also having high job performance (Barrick & Mount, 1991; Hogan & Ones, 1997). Among all of the Big Five traits, conscientiousness is the most strongly correlated with job performance, being about half as predictive as IQ (Barrick & Mount, 1991). Also, the importance of conscientiousness does not vary with job complexity (Barrick & Mount, 1991). On a more

[6] Duckworth and Quinn (2009) reports a correlation between grit and conscientiousness of 0.77 and 0.73 at the 1% significance level, with the use of two distinct measures of grit.

general note, research has also shown that women tend to score higher in conscientiousness than men (Keiser, Sackett, Kuncel & Brothen, 2016).

### 2.4 Hypotheses development

As the literature review has illustrated, there are extensive research relating to managerial biases of top executives and their impact on M&A abnormal returns, as well as about the Big Five personality traits and their association with leadership. However, what the literature review also reveals, is that the Big Five model has not yet been extensively used in a corporate finance context, much less in an M&A context specifically. With this is mind, this thesis seeks to fill research gap by studying how CEO conscientiousness affects (different aspects of) M&A performance.

Judge *et al.* (2009) point out that conscientious individuals tend to be attentive to detail and their work overall, while highly conscientious individuals may even develop into perfectionists who hold on to procedures and policies. This is further supported in "work psychology" studies where the behavioral trait of conscientiousness has been frequently studied. Results from these studies have shown that individuals ranking high in this trait are both detail and goal oriented, exhibit strong integrity, high job performance, self-discipline and promote ethical leadership with high moral standards (Bono & Judge, 2004; Hogan & Ones, 1997; Barrick & Mount, 1991; Kalshoven *et al.,* 2011). As one would expect, a CEO's execution skills and general ability have been shown to impact firm-performance (Kaplan *et al.*, 2012); aspects which logically share similarities with the characteristics of self-discipline and goal orientation which can be linked to conscientiousness. Moreover, Judge *et al.* (2009) further emphasize that highly conscientious individuals oftentimes are cautious, analytical and by extension more risk averse, more likely to resist change and delay critical decision-making processes, as well as less willing to innovate. These behavioral characteristics predominantly stem from conscientious individuals' need to collect compelling evidence in support of their own preferences before any action is taken. Notably, such individuals may even be threatened by organizational change. In essence, this empirical evidence suggests that conscientious individuals may be afraid of engaging in activities that entail corporate change, such as M&A deals, for the previously stated reasons. However, on the other hand, one could logically argue that highly conscientious individuals might engage in such activities if they have enough time to gather all the compelling evidence needed to justify this type of corporate action and become convinced that the resulting outcome would add value. This view is also echoed by Herrmann and Nadkarni (2014) who found that strategic change implemented by highly conscientious CEOs translates into a positive impact on firm performance, even though a conscientious CEO is less likely to initiate such change processes in the first place.

Furthermore, as was presented in the literature review, it has been found that acquirer firm CEOs who are characterized by the biases of hubris and overconfidence, tend to overestimate the potential synergies they could extract and realize, thereby paying unjustifiably high premiums for their target firm's and ultimately destroy more value than other CEOs (Roll, 1986; Hayward and Hambrick, 1997; Malmendier and Tate, 2005; 2008). Considering that highly conscientious managers are significantly more risk averse than managers characterized by hubris or overconfidence and require more information before taking action, one would expect that the carefully selected actions that in fact are taken by conscientious managers after extensive consideration would add, as opposed to destroy, value for the firm's shareholders and consequently lead to a positive short-term market reaction by investors upon announcement. Hence, the first hypothesis is stated as follows:

**$H_1$: There is a positive relationship between CEO conscientiousness and short-run stock market reactions**

In addition to the previous discussion, Jackson and Roberts (2017) point out that conscientious individuals are also characterized by the ability to have self-control, inhibit impulses, think before acting and to avoid being reckless or out of control. Hence, highly conscientious CEOs should have an enhanced ability to maintain self-control in M&A processes as well and remain goal oriented, why they logically should be able to prevent the payment of an excessively optimistic bid premium. That said, it is important to acknowledge and emphasize that a high bid premium does not necessarily reflect overpayment but could instead also be interpreted as an indication of greater expected realizable synergies. However, in the case that the acquiring firm overestimates the magnitude of these synergies or its ability to realize them, it is also more likely to pay an unjustifyingly high premium for the target firm and destroy shareholder value as a result (Sirower & Sahni, 2006). Further, capitalizing on their urge to collect extensive evidence, risk aversion and their attention to detail before taking action, conscientious CEOs should logically be inclined to carry out a longer due diligence process prior to engaging in M&A activities. Additionally, highly conscientious CEOs are less likely to initiate change processes (Herrmann & Nadkarni, 2014). With this in mind, the second and third hypotheses relates to CEO acquisitiveness and are stated as follows:

**$H_2$: There is a negative relationship between CEO conscientiousness and M&A bid premiums**

**$H_3$: There is a negative relationship between CEO conscientiousness and M&A deal frequency**

# 3. Methodology

### 3.1 Research objective

As outlined in previous sections of this thesis, we aim to identify and analyze how CEO conscientiousness affects short-term stock market reactions (measured through short-term cumulative abnormal returns), as well as CEO acquisitiveness in terms of M&A bid premiums and M&A deal frequency. The study takes an American perspective by looking at M&A deals involving firms in the S&P Composite 1500® index, as well as their respective CEOs. The specified hypotheses are tested using a quantitative methodological approach combining an event study and several cross-sectional regressions.

### 3.2 Sample and data collection

In psychology research overall, a common approach to data collection has been to conduct surveys, experimental studies, in-depth interviews and in some instances, self-report surveys (Cuttler, 2017). However, in terms of studies in the field of finance and corporate finance these approaches are less used, even if the researcher aims to study managerial behavior and decision-making (Graham *et al.*, 2013). One explanation for this methodological difference, is that the response rate of surveys sent out to busy managers risk being too low (Hambrick, 2007; Gow *et al.,* 2016), just like the validity. Instead, research in (corporate) finance have tended to use large archival data sets and proxies. In this study, archival data of completed and initiated[7] M&A deals, stock prices and acquirer CEOs were collected, together with transcripts of quarterly earnings calls held by each acquirer firm CEO in the sample. However, note that only the Q&A sessions were extracted from these transcripts for the purpose of CEO personality analysis (see subsection *3.3 Measuring CEO personality traits* for a more thorough discussion).

In terms of completed M&A deals, the final sample used in this study consists of 1,371 completed transactions between the years 2006 and 2018, which were retrieved from the Bloomberg database. The sampled M&A deals are associated with 749 listed acquirer firms in the S&P Composite 1500® index which is comprised of the S&P 500®, S&P MidCap 400® and S&P SmallCap 600® indices. Together, these three indices cover approximately 90% of the total U.S. market capitalization (S&P Capital IQ, 2019). Additionally, the Bloomberg database was used to retrieve stock market data used to compute the cumulative abnormal returns. Note that financial institutions and other firms in the financial sector such as banks, investment funds, venture capital firms and insurance firms have been excluded[8] intentionally from the sample, which is consistent with past studies (e.g. Fama & French, 1992). The motivation for this choice is that firms in the financial sector are subject to high and strict regulation standards that in turn restrict the CEO's autonomy to pursue and engage in M&A activities (Lucey, Plaksina & Dowling, 2013).

[7] Initiated M&A deals, matched with the sample of CEOs, were only used to generate the dependent variable M&A deal frequency and amounts to 2,967 transactions in total. Among those transactions, 2,881 are classified as completed while the rest are distributed over pending, proposed, terminated or withdrawn. The reason why all available transactions could not be used in the final sample, is because of missing values due to unannounced information, hence making the sample narrower.

[8] By using Fama and French's 12 industry classifications, the industry code 11 (Money, Finance, SIC codes: 6000-6999) is excluded.

Additionally, in order to filter out relevant M&A deals, a cut-off point regarding deal size was used, where M&A deals amounting to less than 5% of the acquirer's market capitalization were excluded since the transaction needs to be significant enough to require the CEO's active participation; a choice which is also in line with previous studies (cf. Moeller *et al.,* 2005; Malmendier & Tate 2005; 2008; Yim, 2013). Moreover, any M&A deals involving the acquisition of remaining shares outstanding in a subsidiary were also excluded from the sample. Lastly, only M&A transactions resulting in a change of control from the target to the acquirer (i.e. a transaction of more than 50% of equity and associated votes) were included in the sample, in line with past research (cf. Moeller *et al.,* 2005; Malmendier & Tate, 2008; Levi, Li & Zhang, 2014).

Once the M&A deals had been identified and selected in to the sample, the acquirer firm CEOs were also identified and included if they had been the CEO of the acquiring firm for more than two years prior to the observed M&A announcement. This tenure criterion was applied in order to ensure that the CEOs included in the sample had reached a steady state in terms of psychological factors; something which may affect firm performance in accordance with the life cycle theory of leadership[9] (Hersey & Blanchard, 1996). By ensuring that the tenure of the CEO is not too short, we also ensured that a sufficient number of earnings calls could be retrieved and used as input for accurate personality assessment (see subsection *3.3 Measuring CEO personality traits*). This is key when analyzing an individual's personality traits since such an analysis requires a large amount of information as a foundation (Funder, 2012). Further, whenever an acquiring firm had multiple CEOs at the time of an acquisition, i.e. "co-CEOs", the transaction was excluded from the sample. Information about the acquirer CEOs was retrieved from the BoardEx and Bloomberg databases, while other data concerning firm-specific control variables was retrieved from Bloomberg, CRSP and Compustat.

As a basis for analyzing the Big Five personality traits of 838 unique acquirer CEOs, we retrieved and manually cleaned 17,842 transcripts of quarterly earnings calls (and hence Q&A sessions) from the S&P Capital IQ database. Please refer to the subsection for a description of the manual cleaning process. All earnings calls with no participating financial analysts were excluded from the sample and on average, 21 earnings calls were collected per CEO.

### 3.3 Measuring CEO personality traits

In order to be able to incorporate and utilize the personalities of all acquirer firm CEOs as explanatory variables in the regression models later on (see subsection *3.6.1 Regression design*), the personality traits first had to be analyzed and quantified along the Big Five dimensions. As outlined in the previous subsection, we started off by downloading transcripts of earnings calls[10] in which the acquirer firm CEO summarizes their respective company's quarterly earnings and answers

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[9] When a leader takes on a new task, he or she will initially become overwhelmed with new information and feelings of insecurity, even though he or she has previous experience and possesses the required skill-set for the job. However, after a while, the leader will mature and more effectively form, and be formed by, his or her employees. The life-cycle theory of leadership is today referred to as situational leadership (Hersey & Blanchard, 1996). On the same theme, as pointed out by Green, Jame and Lock (2018), a CEO's personality could be more distinct and discernable during the first years, hence also during the first earnings calls (which are included in the personality assessment).

[10] According to Frankel, Johnson and Skinner (1999, p. 137), a conference call is usually 45-65 minutes long, consisting of "a 15-20-minute presentation by management, followed by a 30-45-minute question and answer session in which a moderator assigns questions to the management team."

questions asked by financial analysts. However, as a basis for personality analysis, only spoken language from the Q&A sections was used due to the fact that this section of an earnings call is unscripted (i.e. it represents improvised spoken language), why a CEO's personality traits are bound to come forward with greater clarity compared to in more scripted scenarios (Matsumoto, Pronk & Roelofsen, 2011). After removing the presentation section from each transcript, we subsequently erased all transcribed speech relating to individuals other than the acquirer CEO (e.g. questions asked by analysts and responses given by other executives or board members). This was done in order to ensure that the CEO personality analysis would be accurate and free from distortions.

Although past research focusing on computational content analysis has used CEO letters as a basis for analyzing behavioral biases in a CEO context (Liu, Taffler & John, 2009; Brennan & Conroy, 2013), this type of formal letters can arguably be viewed as a scripted, and thus suboptimal, product of not only the CEO's input, but perhaps also of the collaboration between other top executives and departments such as legal or marketing. During the Q&A session of an earnings call on the other hand, participating analysts get an opportunity to ask questions which are oftentimes rather direct and hard for the CEO to anticipate (Chatterjee & Hambrick, 2007; Matsumoto et *al.*, 2011), hence causing a more stressful situation that forces the CEO to improvise, reveal emotion and disclose information that they otherwise would have kept to themselves (Frankel *et al.*, 1999; Matsumoto *et al.*, 2011; Mayew & Venkatachalam, 2012). In addition, Gow *et al.* (2016) point out that one advantage of analyzing earnings calls is that the variations in speech patterns could be attributable more directly to personality differences since the circumstances of the speech is narrowed down in this context; something which cannot be said about normal day-to-day conversations where the context of speech may vary to a larger extent. This holds true even if the context of an earnings call is rather formal by nature. All things considered, the Q&A section of an earnings call arguably constitutes an appropriate and beneficial context in which a CEO's personality is revealed.

Over the years, researchers have increasingly adopted different software programs to analyze written and spoken language, employing techniques such as basic word frequency count developed in the 1950s, to more recently developed sophisticated computer-aided methods (Pennebaker & King, 1999). Research investigating the Big Five personality traits has commonly employed oblique rotational procedures in factor analysis applied on personality description questionnaires and dictionaries as means of estimating personality-descriptive terms (Goldberg, 1993; Mairesse *et al.*, 2007). Utilizing one of the more advanced and recent methods for personality assessment, the extracted transcribed spoken language was analyzed using a Java-based algorithm developed by Mairesse *et al.* (2007). By employing machine learning[11] based on 2,479 essays[12] (retrieved from Pennebaker and King [1999]) that connect linguistic features with personality traits and recorded conversation transcripts[13] (retrieved from Mehl, Gosling and Pennebaker [2006]), the algorithm

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[11] To train the algorithm in classification and regression modelling, Mairesse *et al.* (2007) utilized the Weka machine learning toolbox by Witten and Frank (2005).

[12] Essays were written by students at Southern Methodist University in Taos, New Mexico (U.S) (Pennebaker & King, 1999).

[13] Transcribed conversations captured from students at University of Texas in Austin (U.S) in everyday life (Mehl *et al.*, 2006).

has been taught by its developer to identify and quantify all of the Big Five personality traits. Based on each essay and conversation transcript, Mairesse *et al.* 2007 subsequently derived a set of linguistic features comprised of frequency counts of 88 word categories originating from the Linguistic Inquiry and Word Count (LIWC) tool developed by Pennebaker and King (1999). In addition, they also added 14 linguistic features from the MRC Psycholinguistic database developed by Coltheart (1981), which is based on statistics for 150,837 words, such as the frequency of use, as well as familiarity.

Furthermore, Mairesse *et al.* (2007) is also one of the very first studies to develop and apply an algorithm for automatic recognition of personality. As they point out, other studies that have been conducted in the field of personality psychology focus on the static classifications of personality based on self-reports (i.e. a personality trait has two static states; either conscientiousness or unconscientiousness). The algorithm developed by Mairesse *et al.* (2007) takes this classification one step further by employing continuous modelling techniques which accommodate both regression and ranking models[14], and allow for the quantification of personality traits into a continuous score ranging from 1 (low) to 7 (high) as illustrated below in Figure 1. According to Mairesse *et al.* (2007), this also enables the algorithm to be more accurate in the long run.

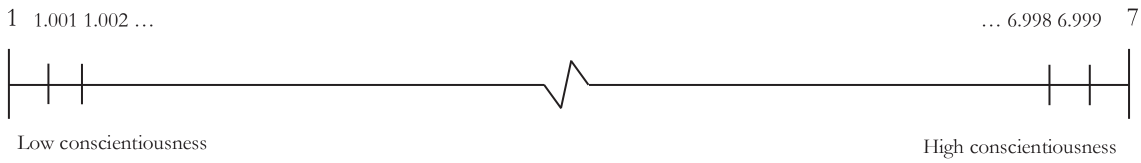


**Figure 1.** Continuous scale of personality scores as outputted by the algorithm

In order to verify that the scale utilized by Mairesse *et al.'s* (2007) personality recognizer is in fact continuous as opposed to discrete, we follow the methodology used by Chatterjee and Hambrick (2007) in their study of CEO narcissism. This validation was also implemented to ensure that personality traits constitute a gradual spectrum instead of a binary construct. To conduct this test, the sample of CEOs was divided into quartiles based on their respective personality score of conscientiousness, thereby creating four thresholds. Next, dummy variables were employed for each of the four CEO conscientiousness quartiles and subsequently used as control variables in one of the main regression models presented in subsection *3.6.1 Regression design*.[15] The regression results illustrate the coefficients for each quartile and hence how each of them affects the dependent variable. In Figure 2 below, the coefficients of each quartile for CEO conscientiousness are plotted in relation to the cumulative abnormal return (CAR) as dependent variable.[16]

[14] The use of ranking models in the context of personality analysis is fitting because of the argument that "by definition, personality evaluation assesses relative differences between individuals, e.g. one person is described as an extravert because the average population is not." (Mairesse *et al.*, 2007, p. 473).

[15] The personality score of conscientiousness is thereby replaced by the dummy variables for each quartile, where Q1 denotes the lowest quartile (i.e. a score from 1.053 to 2.891) and Q4 denotes the highest (i.e. a score from 4.185 and up to 6.494), based on the retrieved personality scores. The median serves as a borderline between Q2 and Q3 (i.e. 3.611).

[16] Note that CAR serves as an illustrative example of the continuous and gradual nature of the algorithm's output, and hence conscientiousness. The same results are also observed for the other dependent variables.

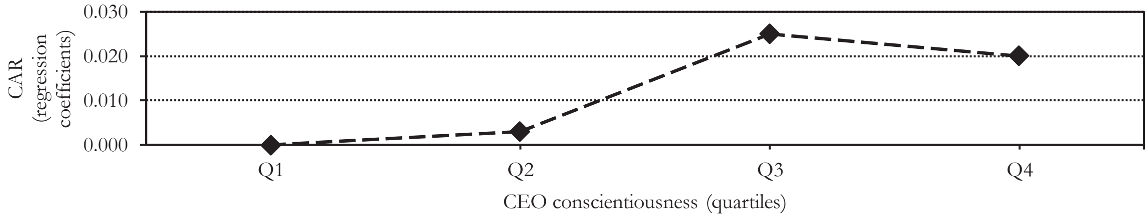


**Figure 2.** Relationship of CEO conscientiousness quartiles and CAR

As can be seen above,[17] the regression results confirm the continuous and gradual nature of the scale used for scoring personality traits in Mairesse *et al.*'s (2007) algorithm, and that the entire spectrum from low to high conscientiousness affects the dependent variable CAR used in this example.

On a more practical note, in regards to identifying the personality trait conscientiousness, it has been found that conscientious individuals tend to talk more frequently about their work, use words relating to communication (e.g. talk and share), use insightful word (e.g. think and know) as well as words with a larger number of letters, but also words that express positive feelings (e.g. happy and love) (Mairesse *et al.*, 2007). Contrariwise, individuals that swear frequently, talk about religion, have long utterance or talk very loudly (or with a high pitch) can be classified as unconscientious, while conscientious individuals tend to speak with varied voice intensity. Additionally, the set of LIWC features that are incorporated into the algorithm developed by Mairesse *et al.* (2007) have also been shown to produce the best regression for conscientiousness; something which in turn strengthens the validity of this study.

Moreover, past personality psychology research has shown that an individual's personality is maintained as a stable construct over his or her lifetime, although the more dramatic change in an individual's personality occurs prior to he or she turns 30 years old, while less change occurs between the age of 40 and 60 (Srivastava, John, Gosling & Potter, 2003; Gow *et al.*, 2016).[18] Consequently, it is viable to aggregate and use multiple transcripts of quarterly earnings calls taking place over the course of the CEO's tenure as a single input to the algorithm which in turn produces the personality scores. According to Mairesse *et al.* (2007), the more text inserted into the algorithm at once, the higher the reliability of the produced personality scores; why we have chosen to apply this approach. When the Q&A sections of several earnings calls are aggregated, event-specific factors that may influence the CEOs answers and tone (e.g. due to earnings volatility, etcetera) will be canceled out over time due to the large sample size. The same is also true for occasional one-word answers (e.g. "yes" or "correct", which CEOs may give to very short questions) that would have affected the algorithm's personality assessment if the sample would have been too small. Also, by introducing a cut-off point stating that the aggregated transcripts must contain at least

[17] Note that the first quartile functions as a baseline and that the change between for instance Q1 and Q2 is relative to this baseline.

[18] In the retrieved sample with 838 unique CEOs, the median (mean) CEO age is 57.042 (57.397) years with a standard deviation of 6.383 years at time of acquisition. The minimum (maximum) age at acquisition in the sample is 39.518 (84.200). The median (mean) CEO tenure is 5.529 (6.934) years at time of acquisition with a standard deviation of 4.91 years.

5,000 words per CEO[19] and by only including CEOs with a tenure of at least two years on a particular CEO position (i.e. eight earnings calls), the algorithm is provided with a large amount of data as a basis for assessing the CEOs' personalities. Further, the choice to conduct the study in an American context also helps to improve the reliability of the CEO personality traits analysis in the sense that the earnings calls are held mostly by native English speakers. In turn, there will be no, or only a negligible language barrier affecting the results; something which also can be said about cultural differences overall. Lastly, the choice to only focus on the American financial market is also motivated by, and consistent with, the fact that Mairesse *et al.* (2007) used material in American English as data input to train the algorithm using machine learning.

As a robustness test, the time period was also split in two (2006 to 2013 and 2014 to 2018) in order to test and validate the fact that CEO conscientiousness remains stable over time. This was also done to investigate whether or not any potential bias caused by the financial crisis may have caused the CEOs to respond to questions in a different and more reassuring way than usual, hence potentially affecting the algorithms personality assessment. After running two separate regressions, one for each time period, we can observe that the coefficient for CEO conscientiousness remains stable across models with different dependent variables.

In regard to further validity- and accuracy checks of the algorithm, a few important aspects should be highlighted to corroborate its credibility. Firstly, on a general level, it is worth pointing out that the algorithm has been empirically applied and validated independently in many different contexts and scenarios, ranging from social media (Lima & Castro, 2014) and HR-recruitment tools (Faliagka *et al.*, 2014) to earnings conference calls (Green *et al.,* 2018; Malhotra *et al.,* 2018). Secondly, considering that the Big Five personality traits model was designed to capture an individual's personality in broad and overarching terms, a conscientious individual is also bound to be influenced by the other four personality traits as well. In order to examine the correlations between all of the Big Five personality traits, a correlation matrix was constructed. This matrix is presented in Table 2 below.

**Table 2.** Pairwise correlations of Big Five personality traits
In this table, the pairwise correlations of the personality traits are presented. Significance tested using t-statistics. *, **, and *** denote significance at the 10%, 5%, and 1% level respectively.

| | Agreeableness | Conscientiousness | Emotional stability | Extraversion | Openness to experience |
|---|---|---|---|---|---|
| Agreeableness | 1 | | | | |
| Conscientiousness | 0.545*** | 1 | | | |
| Emotional stability | 0.456*** | 0.004 | 1 | | |
| Extraversion | -0.067** | 0.055** | 0.122*** | 1 | |
| Openness to experience | 0.352*** | 0.620*** | 0.023 | 0.112*** | 1 |

When compared to similar matrices generated by Gow *et al.* (2016) and Van Der Linden, Nijenhuis & Bakker (2010) the following is noted. First, we note that the results are similar to this study in most aspects, although there are a few discrepancies which we will know point out. In terms of significance, we find significance for all correlations except between emotional stability and conscientiousness, as well as emotional stability and openness to experience. Gow *et al.* (2016) do

[19] The average (median) number of words per CEO amounts to 18,414 (14,779).

on the other hand find significance for all correlation coefficients, meanwhile Van Der Linden *et al.* (2010) do not show their significance at all. Moreover, in terms of the direction of the correlations, we find a negative correlation between agreeableness and extraversion while Gow *et al.* (2016) find a positive correlation for these traits. As a concluding remark, it is important to point out and highlight that we have used an algorithm to obtain the personality score data while these studies have used other methods, why it is difficult to determine which set of correlations that is more correct than the other.

Furthermore, Mairesse *et al.* (2007) point out that the use of machine learning has improved the algorithm by modifying the weights assigned to certain linguistic features in the text being analyzed in order to achieve a better match with personality scores from both self-reports (i.e. text from the individuals themselves) and independent observers. The authors also tested the models' predictive power using texts from individuals who were not part of the initial training sample. The results showed that their "support vector machine model"[20] had the best performance across all of the Big Five personality traits. Two extracts from CEO transcripts can be found in Appendix 2, one of which illustrates a high conscientiousness score and vice versa.

### 3.4 Event study methodology

According to MacKinlay (1997) and Bruner (2004), event studies represent a common research method used to measure M&A performance. The event study approach examines the behavior of firms' stock prices in connection with corporate events such as M&A announcements (Kothari & Warner, 2007), which in turn can give an indication of how shareholders and the financial market in general perceive the transaction; that is, if it is deemed to be value adding or value destroying (Hackbarth & Morellec, 2008). If the M&A transaction is to be classified as value adding, the acquirer's stock price is expected to increase as a result of the transaction and vice versa.

Generally, the researcher chooses to study the stock market's reaction over a short or a long time horizon depending on the focus of the study (Agrawal *et al.,* 1992; Betton *et al.,* 2008). That being said, the methodology concerning long-run abnormal returns has historically been characterized by significant limitations (Fama, 1991), not least difficulties with isolating the specific part of the total effect on the stock price during a certain time window that stems only from the corporate event in question (Kothari & Warner, 2007). This is logical since there are many other reasons behind, and causes of, price fluctuations in the long run, which makes inferences from long horizon tests unreliable and inaccurate. Moreover, Kothari and Warner (2007) point out that the calculations of abnormal returns over long time-horizons are sensitive to the researchers' choice of model to be due to the fact that even small errors in the crucial risk adjustment can have a large impact on the calculation of abnormal returns over time periods longer than one year. In other words, there is no clear consensus as to which expected return model is correct, thereby making the long-term risk-adjustment process less straightforward. On the other hand, this stands in clear contrast to short-run event studies which are generally not plagued with such limitations or issues but are instead relatively problem-free since the price effect that only stems from the studied corporate event is more distinct and easily identifiable (Kothari & Warner, 2007). Besides the

[20] This is the model that has been optimized using machine learning and is utilized in this study to analyze Q&A sessions.

statistical differences, studies within M&A that analyze both short- and long-run two time periods have found that the short-run market reactions are "persistent and indicative of future returns" (Sirower & Sahni, 2006), hence a good approximation of the long-term value effect. With this discussion in mind, we chose to only study short-run cumulative abnormal returns.

The event-study timeline that will be utilized in this short-run event study is based on MacKinlay (1997) and Coutts, Mills and Roberts (1994) with the addition of some revisions, including the consideration of a "run-up" period (cf. Schwert, 1996). The consequence of taking a run-up period into consideration and excluding it, is that the estimation window more accurately reflects normal performance since the stock return observed in the run-up period prior to the M&A announcement has been said to result from insider trading due to leakage of information but also rumors and speculation in media (cf. Schwert, 1996; Eckbo, 2009). The event-study timeline is visualized in Figure 3 below.

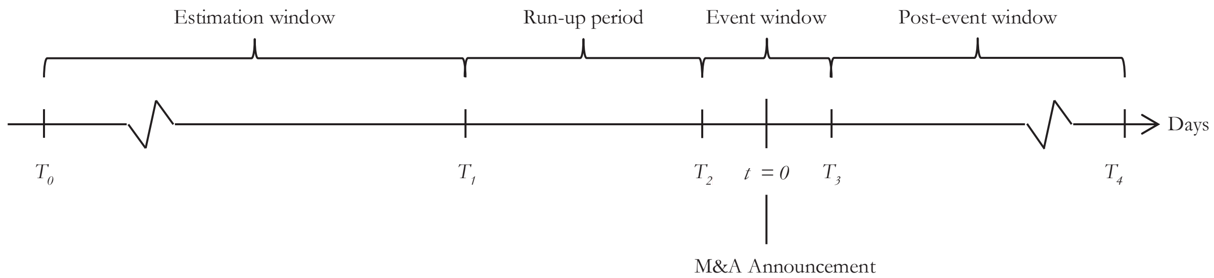


**Figure 3.** The event study timeline

When applying the event study methodology after having chosen the desired time period, there are usually several central assumptions that need to be imposed. Firstly, one must assume that the stock (abnormal) returns observed in the event window of the chosen event accurately reflect the economic impact of that particular event (MacKinlay, 1997). In other words, capital market efficiency must be assumed at least to some degree meaning that the market processes new pieces of information that become available through an (M&A) announcement (Delong & Deyoung, 2007), which is subsequently reflected in the stock price (Fama, 1970; Brown & Warner, 1980). Even though evidence concerning the inconsistency of the efficient market hypothesis (EMH) has emerged since Eugene Fama first introduced the theory in 1970, researchers in finance still view this theory as one of the most influential and important in the field and for the event study methodology (Kothari & Warner, 2007). Secondly, one must also assume that the event, i.e. the M&A announcement in this case, has not yet been factored into the stock price by the market (Cornett, Tanyeri & Tehranian, 2011).[21] With this in mind, measures were taken to ensure the robustness of the cumulative abnormal return calculation.[22]

[21] The assumption that the observed event has not previously been factored into the stock price was taken into consideration by creating a dummy variable that indicates if a CEO, during his or her tenure at the acquiring firm, has engaged in three or more M&A transactions prior to engaging in the observed transaction (see the control variable *CEO Experience*). If this is the case, investors may anticipate another announcement again shortly after the previous one, which is subsequently reflected in the stock price and vice versa. Data on M&A transactions was available back to the year 1996 and used when applicable.

[22] The market-adjusted return model (presented later in this subsection) is utilized to test the robustness of the cumulative abnormal return calculation.

Following MacKinlay (1997) as well as Kothari and Warner (2007), we carried out all the general steps that need to be completed in a typical event study. The abnormal returns observed during the chosen event window (-1, +1 trading days, where the event occurs at $t = 0$), is calculated by subtracting the "normal" benchmark return (which was estimated during the estimation window) from the acquirer's daily closing stock price. To elaborate, Hayward and Hambrick (1997) point out that positive abnormal returns suggest that equity investors have raised their expectations regarding the particular security's future returns, while a negative abnormal return indicates lower investor expectations. The data regarding the acquirer firm's daily stock price, dividends and stock splits, as well as the chosen stock market index between the years 2006 to 2018, was retrieved from the Bloomberg database. Moreover, a three-day event window is commonly used in event-studies that analyze short-term stock market impact of M&A announcements (Moeller *et al.*, 2005; Hackbarth & Morellec, 2008; Malmendier & Tate, 2008; Yim, 2013). In order to test the robustness of our results, other event windows are tested as well (i.e. -2, +2 days, -3, +3 days and -5, +5 days) since it is possible for information to be released prior to the official announcements (i.e information leakage). It is, however, worth pointing out that the larger the event window, the lower the power of the test statistics (Brown & Warner, 1985; MacKinlay, 1997); something that is also observed in this study since significance is lost when the event window is expanded beyond plus or minus two days around the event. Furthermore, considering that surrounding events might affect the stock price and associated variance around the event of interest, one additional filter was applied to exclude transactions relating to acquirer firms that release earnings announcements[23] during the selected event window from the sample (cf. Brown & Warner, 1985; MacKinlay, 1997). The abnormal return *(AR)* is calculated in accordance with Equation 1 below:

$$AR_{it} = R_{it} - E(R_{it} \mid X_t) \qquad \text{(Eq. 1)}$$

where $R_{it}$ is the return of stock $i$ at time $t$ and $X_t$ is the conditioning information for the "normal return model", measured through the market model as the market return.

There are several models that estimate the "normal return" $E(R_{it}|X_t)$. However, MacKinlay (1997) advocates the use of the *market model* since the benefits associated with a multifactor model, compared to one-factor models,[24] are rather limited. Furthermore, MacKinlay (1997) highlights that the marginal explanatory power for factors besides the market return is small, thus leading to a variance of the abnormal return that is quite similar to the variance that would result from employing the market model. The use of a two-factor model is only justified if, and when, the firms in the sample have common characteristics (e.g. belong to the same industry), which is not the case with the sample used in this study. Moreover, one-factor models are also advocated by Brown and Warner (1985) who argue that simple risk-adjustment approaches are rather effective in terms of detecting abnormal returns when conducting event studies with a short time horizon. In terms of additional assumptions, MacKinlay (1997) point out that the market model assumes that asset returns are jointly multivariate normal as well as independent and identically distributed over time, which is also assumed for other statistical models used in event studies. As a result of

[23] Data regarding earnings announcements was gathered from the same earnings call transcripts used to analyze CEO personality traits, i.e. transcripts retrieved from S&P Global Market Intelligence.

[24] MacKinlay (1997) does also discusses the use of the *constant mean return model*. However, the market model could be viewed as superior since it excludes "the portion of the return that is related to variation in the market's return" (p. 18), hence lowering the variance of the abnormal return and enabling the model to have a higher explanatory power.

this assumption regarding distribution, the market model can be correctly specified. Although this assumption can be viewed as somewhat strong, it does generally not cause any problems in practice since it is reasonable from an empirical standpoint. Inferences using the normal return models also tend to be robust even when this distributional assumption is relaxed or deviated from (MacKinlay, 1997). With this in mind, the market model was chosen for this study; a choice which is in line with past research (cf. Malmendier & Tate, 2008; Yim, 2013).

In the market model, a stable linear relation between the market index return, i.e. S&P Composite 1500®, and the firm's stock *i* is assumed (MacKinlay, 1997). The market model parameters (i.e. $\alpha_i$, $\beta_i$ and $\sigma^2_{\varepsilon_i}$) are estimated during the estimation window, which is a period prior to the event window, that represents "normal performance" (MacKinlay, 1997). By using the S&P Composite 1500® index, we ensure that the estimation of beta is more accurate since the stocks in this index are traded frequently. As a robustness test, we also used the Nasdaq Composite for comparison. The event window is excluded in this estimation in order to prevent the studied event to influence the "normal performance". The estimation window is set at 150 days and ends prior to the 30-day run-up period (i.e. -180, -30). While some past studies use longer estimation windows, it could be argued that acquirers make acquisitions relatively frequently, hence introducing noise when measuring "normal performance" with an extended estimation period (cf. Malmendier & Tate, 2008).[25] The market model for the stock *i* is defined in accordance with Equation 2 below:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \qquad \text{(Eq. 2)}$$
$$\text{Assuming: } E(\varepsilon_{it}=0)^{\text{A}} \text{ and } \operatorname{var}(\varepsilon_{it}) = \sigma^2_{\varepsilon_i}{}^{\text{B}}$$

where $R_{it}$ is the return on stock *i* at the *t*, $R_{mt}$ is the return on the market index (i.e S&P 1500®) at time *t*, the $\alpha_i$, $\beta_i$ and $\sigma^2_{\varepsilon_i}$ are the parameters of the market model and the $\varepsilon$ is the disturbance term.
[A] In an efficient market, the expected value of the disturbance term of the return on stock *i* cannot systematically differ from zero (Brown & Warner, 1985), hence having a mean of zero.
[B] The variance of the disturbance term is constant.

In order to determine the aggregated abnormal return to acquirer shareholders during the specified event window, the cumulative abnormal return was computed according to Equation 3 specified below. The rationale for aggregating abnormal returns is to overcome uncertainties regarding when the announcement and the associated information became available (in line with Fama, Fisher, Jensen & Roll, 1969). As Martynova and Renneboog (2006) point out, the market has partially priced the perceived value creation the M&A generates into the stock price prior to the day of M&A announcement. The null hypothesis is that the CAR is zero, meaning that there is no market reaction to the studied M&A announcement. However, note that the cumulative average abnormal return (CAAR) was used to test if CAR on average is significantly different from zero. The test was conducted using a t-statistic. The CAR for acquirer stock *i* is computed as follows:

[25] Malatesta and Thompson (1985) present a method on how to treat partially anticipated events when firms have a track-record of being active acquirers. However, in this study, we take other actions to ensure that the assumptions of event studies and the OLS market model estimators are fulfilled.

$$\mathrm{CAR}_i(t_2, t_3) = \sum_{t=t_2}^{t_3} \mathrm{AR}_{it} \qquad \text{(Eq. 3)}$$

where the $t_2$ and $t_3$ represent the event window -1 and +1 day around event.

Furthermore, the market-adjusted return model is utilized in order to control for any bias in the estimation window where past M&A activity[26] or other firm activities (e.g. the announcement of quarterly financial reports) could influence the results (cf. Moeller *et al.*, 2004; 2005). Hence, $\alpha$ is set to zero and $\beta$ to one, meaning that no estimation period is needed in this case. However, although the market-adjusted return model is used as robustness check of CAR, it is normally considered as inferior to the market model since it disregards the firm-specific risk profiles (Brown & Warner, 1980). As an additional robustness, the estimation period in the market model is set at 120 days, hence a shorter window to control for prior M&A activity.

## 3.5 Variables

### *3.5.1 Dependent variables*

In the *first* regression model, short-run three-day CAR from the event study will be used as the dependent variable.

The *second* regression model aims to explain how the main independent variable of conscientiousness and additional control variables affect the (initial) M&A bid premiums. Following Hayward and Hambrick (1997) as well as Chatterjee and Hambrick (2011), the bid premium is measured by subtracting the target's 4-week average stock price[27] prior to the M&A announcement from the initial bid price[28] and then dividing the difference by the 4-week average stock price. Initial bid premiums, as opposed final, are used since this measure is not distorted by external factors such as negotiations that may follow bid rejection and bid competition (Eckbo, 2009). The initial bid premium measure captures how much value the acquiring CEO and his or her management team, expect to capture from engaging in the M&A transaction. It also reflects their view of the target's value when replacing the incumbent management, hence eliminating the target's inefficiencies (Fama, 1980), as well as the acquirer's own perception of its ability to realize synergies (Hayward & Hambrick, 1997). However, as Eckbo (2009) reports, the initial and final bid premiums do not differ significantly.

While premiums are interesting from the acquiring firm's perspective, they can also be considered important from a post-acquisition performance perspective. Past research shows that a higher bid premium leads to lower acquirer returns obtained from the M&A deal, as well as higher operational and financial risks due to the fact that it may be difficult to recoup an excessive bid premium (Hayward & Hambrick, 1997; Marks & Mirvis, 2010; Chatterjee & Hambrick, 2011). The

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[26] In the retrieved sample, a CEO initiated on average (median) 2.173 (2) transactions per year during his or her tenure at the acquiring firm. Thus, it could be argued that to some extent, M&A activities are anticipated, hence warranting a relatively short estimation period of 150 days.

[27] Target stock price is adjusted for dividends and stock splits.

[28] The initial bid price in this case, is the very first bid offer in a M&A deal's transactional process. Hence, at the time of the initial bid, there are no additional bidders.

independent variable, bid premium (BP), was calculated in accordance with Equations 4 and 5 below:

$$\overline{P}_i = \frac{1}{n} \sum_{t=-20}^{-1} P_i \qquad \text{(Eq. 4)}$$

where $P$ is the stock price for target firm $i$, between the period $T_1$ and $T_2$ in the event study timeline. In this case, it is 20 trading days (i.e. four calendar weeks) prior to the M&A announcement up until one day before the event. $n$ denotes the number of trading days (i.e. 20). $\overline{P}_i$ represents the average 4-week stock price prior to the announcement for firm $i$, i.e. up until one day before the event.

$$BP_i = \frac{(B_i - \overline{P}_i)}{\overline{P}_i} \qquad \text{(Eq. 5)}$$

where $B_i$ is the initial bid price at announcement. If the acquirer offers to pay with stock (i.e. equity in the acquirer's firm), the bid price is determined by using a swap ratio in which the market value of the acquiring firm's stock offered *per* target share, at the time one day prior to the announcement (cf. Eckbo & Langohr 1989; Hayward & Hambrick, 1997).[29]

In addition, since the bid premium specified in Equation 5 is a result of a M&A process stretching over several months, a bid premium based on an 8-week and 12-week average of the target's daily stock price was utilized as a robustness check. By carrying out robustness checks using a bid premium based on the target's average stock price over a period longer than one month prior to the M&A announcement, we minimize the risk that the bid premiums are affected by anticipation effects (Eckbo, 2009). Further, the target's stock price one day prior the announced transactions will also be calculated in order to control the bid premium.

Since the bid premiums and market valuations tend to vary over time (Chatterjee & Hambrick, 2011) and across industries (Cantwell & Santangelo, 2002), not least prior to, during and after merger waves (Rhodes-Kropf, Robinson & Viswanathan, 2005; Martynova & Renneboog, 2008; Bouwman, Fuller & Nain, 2009), the bid premiums need to be normalized in order to account for these effects.[30] We do this adjustment by dividing the acquirer's $i$ bid premium by the industry median[31] bid premium in a given year. Industries are defined in accordance with Fama and French's

[29] Eckbo and Langohr (1989) use the acquirer's stock price on the last trading day before the offer *expires*. However, since a firm's management can only know the transactional value of a stock-exchange transaction in retrospect, the last stock price prior to the M&A announcement should logically better capture the underlying intentions and belief of the acquirer.

[30] As an example, if a CEO ranking high in conscientiousness offers a to buy the target company with a premium of 30% in a year with high market valuations, while a CEO ranking low in conscientiousness offers to buy another target company with a premium of 30% during low market valuations, the CEOs would be treated the same without the year adjustments. Further, the bid premiums observed would inevitably differ depending on whether a CEO ranking high in conscientiousness offers to buy a target in an industry with high competition and high market valuations, or in an industry with low competition and low market valuations (see Figure 4 and Table 5 in subsection *4.1 Descriptive statistics* for the bid premium's year and industry distribution).

[31] The dependent variables were adjusted for industry medians found in the retrieved sample, since the median better captures an industry's central tendencies without letting outliers influence and distort the adjustments. See Table 5 and Figure 4 in subsection *4.1 Descriptive statistics.* In regard to the control variables, we used financial data from firms in the CRSP US Common Stock representing 90% of the U.S. market capitalization (S&P Capital IQ, 2019), hence reflecting central tendencies in each industry. With this in mind, industry means were used to adjust for these central tendencies.

12 industry classifications[32]. As robustness tests, the unnormalized bid premium for firm *i* and the bid premium in year *y* will be utilized.

Lastly, in the *third* regression model, we analyze how CEO conscientiousness affects M&A deal frequency. The M&A deal frequency is a discrete variable that is defined as the number of *initiated* M&A transactions per year and CEO (in line with Levi *et al.,* 2014). Further, only transactions initiated after the first ten weeks of a CEO's tenure are included in order to ensure that the CEO was actually responsible for the proposed M&A transaction, and not the past CEO. The motivation for using initiated transactions for this analysis, as opposed to solely completed transactions, is to better capture the CEO's eagerness and willingness to acquire firms regardless of the transactional outcome. The following deal frequency measure captures how often an individual CEO tends to initiate a M&A transaction and will be used as a dependent variable in the third regression model. The formula describing the dependent variable deal frequency (DF) is specified below:

$$\mathrm{DF} = \sum_{i=1}^{n} \mathrm{M\&A}_{fcy} \qquad \text{(Eq. 6)}$$

where *n* is the number of M&A transactions. *f* denotes firm, *c* denotes the individual CEO and *y* denotes year.

As robustness, an alternative version of the deal frequency variable was calculated using no restrictions of tenure apart from being elected as CEO and a four-week tenure filter.

### *3.5.2 Main independent variable*

The main independent variable of interest throughout this study and all regression models is CEO conscientiousness. Any other explanatory variables have been designated as control variables which are specified and described in the following subsection.

### *3.5.3 Control variables*

A summary of all control variables and the associated definitions used in this study are presented in Appendix 1. First and foremost, since all of the Big Five personality traits influence each other (Mairesse *et al.*, 2007; Gow *et al.*, 2016; Green *et al.*, 2018), the other four traits apart from conscientiousness have also been included in all main regression models as control variables (i.e. extraversion, openness to experience, agreeableness and emotional stability). As previously highlighted in subsection *3.3 Measuring CEO personality traits*, the algorithm developed by Mairesse *et al.* (2007) produces a continuous score for each of the Big Five personality traits, ranging from 1 (low) to 7 (high).

In terms of other CEO-specific control variables, we controlled for *CEO age* as well as CEO *tenure* since younger CEOs has been found to acquire more often, and that acquisitiveness varies with age and tenure (cf. Chatterjee & Hambrick, 2007; Yim, 2013). In turn, it seems possible that

[32] Fama and French's 12 industry classifications is an alternative industry classification based on two-digit SIC codes. This classification system is therefore relatively broad which suits our data set. Further, a more extensive and specific classification system could have been used given a larger data sample. Industry definitions can be found at the link: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html (Retrieved 2019-05-30)

younger CEOs pursue M&A transactions due to the fact that such activities increase their personal compensation as a result of an increase in firm size in line with the theory of "empire-building" (Yim, 2013). Moreover, if a CEO is also chairman of the board, he or she is expected to have more formal power due to the board's responsibility to appoint, advise, monitor and compensate the CEO, hence spurring a conflict of interest and the possibility of agency issues (Masulis, Wang & Xie, 2007). To control for the effect of such issues, *CEO duality* was included as a control variable. In terms of gender, men generally tend to be more overconfident than females (Barber & Odean, 2001). It has also been found that firms with a greater fraction of female board directors initiate acquisitions less frequently and pay a lower bid premium (Levi *et al.,* 2014). Hence, gender seems to matter for M&A outcomes and is controlled for through the variable *CEO male*, defined as one for male and zero for female. Furthermore, control variables for the CEOs' educational background are included in line with past M&A research (Malmendier & Tate, 2008; Yim, 2013) in order to i) investigate the determinants of CEO conscientiousness (see subsection *3.6.2 Model misspecification and potential biases*) and ii) control for aspects that logically should affect managerial decision-making, and in turn corporate behavior and performance (cf. Bertrand & Schoar, 2003). Thus, the variables *CEO IvyLeague+*, *MBA*, *PhD* and *graduation with honor* are included as control. The control variables *CEO experience* was constructed to capture CEOs experience from past M&A transactions.

We also control for firm- and deal specific characteristics used in past M&A research. In regard to acquirer-specific control variables, past M&A literature has found that *leverage* (Masulis *et al.*, 2007), *resource availability* (Harford, 1999; Malmendier & Tate, 2008), *normalized cash flows* (Lang, Stulz & Walkling, 1991; Malmendier & Tate, 2008), *Tobin's Q* (Lang *et al.*, 1991; Moeller *et al.*, 2005; Malmendier & Tate, 2008), *firm size* (Asquith *et al.*, 1983; Moeller, Schlingemann & Stulz, 2004; 2005), equity valuations in terms of *book-to-market ratios* (Rau & Vermaelen, 1998; Jensen, 2005; Moeller *et al.*, 2005; Bouwman *et al.,* 2009), *profitability* (Bouwman *et al.,* 2009), and ownership structure (*free-float*)[33] (Masulis *et al.,* 2007) help to explain transactional outcomes such as acquirer's abnormal return, bid premiums and deal frequency.

For target-specific control variables, *firm size* (Hackbarth & Morellec, 2008; Levi *et al.*, 2014; Wann & Lamb, 2017), equity valuations in terms of *book-to-market ratios* (Bouwman *et al.,* 2009; Wann & Lamb, 2017), *profitability* (Levi *et al.,* 2014) and *target status* as public or private firm (Fuller, Netter & Stegemoller, 2002; Capron & Shen, 2007; Bargeron *et al.,* 2008; Betton *et al.,* 2008), have been frequently used to study M&A outcomes.

When it comes to deal-specific control variables, frequently used controls in past M&A research include *payment method* (Slusky & Caves, 1991; Kaplan & Weisbach, 1992; Fuller *et al.*, 2002; Moeller *et al.*, 2004), *relative deal size* (Asquith *et al.,* 1983; Moeller *et al.*, 2004; Masulis *et al.*, 2007; Bouwman *et al.,* 2009), expected *product synergies* (Morck *et al.,* 1990; Malmendier & Tate, 2008), *bid competition* (Slusky & Caves, 1991; Betton, Eckbo & Thorburn, 2009), *tender* offer (Eckbo & Langohr, 1989; Bhagat, Dong, Hirshleifer & Noah, 2005), whether the transaction is opposed by target

[33] Due to data limitations, the best proxy for ownership structure that we could obtain was free-float. Although this variable is not an optimal or holistic measure of ownership structure, it is nevertheless able to capture this aspect from one possible angle.

management (*hostile*) (Schwert, 2000) as well as *cross-border* (Moeller & Schlingemann, 2005; Hamberg, Overland & Lantz, 2013).

Lastly, two additional control variables *Correction for firm sample selection bias* and *Correction for CEO self-selection bias*, were employed as a correction for these biases (see subsection *3.6.2 Model misspecification and potential biases*).

## 3.6 Regression models

### *3.6.1 Regression design*

In order to analyze the impact of CEO conscientiousness on M&A performance and test the three hypotheses that were developed and presented in subsection *2.4 Hypotheses development*, we constructed and employed two OLS regression models and one negative binomial regression model. To determine the significance of regression coefficients, a two-tailed t-test was employed for the two OLS regressions while a two-tailed z-test was used for the negative binomial regression. Robust standard errors were used consistently in all regressions. To control for a wide range of factors that may explain some of the variation in the dependent variable, we include several firm- and deal-specific control variables as well as the other Big Five personality traits for each CEO. The different regression models are specified below.

#### *Model 1*

The following regression model is used to test $H_1$, where CEO conscientiousness is hypothesized to have a positive relationship with the three-day CAR:

$$\text{CAR}_i = \alpha_0 + \beta_1 \text{Conscientiousness}_i + \beta_i \text{X'}_i + \varepsilon_i \qquad \text{(Eq. 7)}$$

where $X'_i$ is the set of control variables for firm *i*. The control variables are defined in Appendix 1.

#### *Model 2*

The following regression model is used to test $H_2$, where CEO conscientiousness is hypothesized to have a negative relationship with the M&A bid premium:

$$\text{BP}_i = \alpha_0 + \beta_1 \text{Conscientiousness}_i + \beta_i \text{X'}_i + \varepsilon_i \qquad \text{(Eq. 8)}$$

where $X'_i$ is the set of control variables for firm *i*. The control variables are defined in Appendix 1.

#### *Model 3*

To test $H_3$, where CEO conscientiousness is hypothesized to have a negative relationship with M&A deal frequency, the following negative binomial regression model was used:

$$\ln(\text{DF}_{it}) = \alpha_0 + \beta_1 \text{Conscientiousness}_{it} + \beta_{it} \text{X'}_{it} + \varepsilon_{it} \qquad \text{(Eq. 9)}$$

where $X'_{it}$ is the set of control variables for firm *i*. The control variables are defined in Appendix 1.

The reason why a negative binomial regression was used to test the third hypothesis is that M&A deal frequency constitutes a discrete count variable with a mean (2.17) and variance (2.79) that are not equal, hence violating assumptions of both OLS and Poisson regressions (Levi *et al.,* 2014). In order to further motivate the use of a negative binomial model as opposed to a Poisson model, we applied a chi-bar-squared test (which accompanies the negative binomial regression output by default) in which we rejected the null hypothesis (at the 5% level) that the mean and the variance are the same thereby warranting the use of this model as opposed to a Poisson model. Furthermore, when plotting the discrete deal frequency variable in a histogram, we observe that the data visually follows a negative binomial distribution as opposed to a Poisson distribution.

### *3.6.2 Model misspecification and potential biases*

In order to further enhance the rigor of the regression models specified in the previous section, beyond the various robustness tests presented throughout sections *3. Methodology* and *4. Empirical results and analysis*, endogeneity issues as well as other potential model misspecification issues will now be analyzed and discussed.

#### *Omitted variable bias*

One of the main sources of endogeneity is the omitted variables bias, i.e. the risk of omitting variables that should actually have been included in the model (Bascle, 2008). According to Antonakis, Bendahan, Jacquart and Lalive (2014), this bias arises whenever explanatory factors that significantly correlate with the dependent variable are not included as explicit explanatory variables in the regression model. As a result, the effects of these omitted variables are concentrated in the error term which in turn will be correlated with one or several explanatory variables and cause endogeneity issues. As highlighted further in subsection *3.7 Limitations* which will follow after this one, it is difficult to control for exactly all variables that previously have been found to impact transactional outcomes, not least because of data and time limitations. In turn, there is a risk of having an omitted variable bias and an additional analysis is warranted. Following Oster (2017), we reduce the likelihood of this particular bias by running several regressions where new control variables were added successively. Omitted variable bias is less likely to be a problem if the main coefficient of interest (i.e. CEO conscientiousness) remains stable as a broad range of new control variables are added and R-squared increases significantly as a result. As could be observed in Table 6 in subsection *4.2 CEO conscientiousness and short-term stock market reactions* with CAR specified as the dependent variable, the coefficient of conscientiousness remains stable, while (adjusted) R-squared increases substantially as new controls are added. The same pattern could be observed for CEO acquisitiveness (M&A bid premium and M&A deal frequency), presented in Table 7 in subsection *4.3 CEO conscientiousness and acquisitiveness*. Hence, the result of this approach indicates that the models are less likely to be plagued by omitted variable bias.

#### *Firm Sample selection bias*

The sample selection criteria employed to create the sample of firms and CEOs in this study are stated in subsections *3.2 Sample and data collection* and *3.3 Measuring CEO personality traits*. These criteria ensure that firms and CEOs that do not meet the specified requirements are excluded from the final sample. However, by actively excluding certain firms and CEOs in the S&P Composite 1500® index from the final sample, there is an associated risk of having sample selection bias since the sample is not complete nor generated randomly. In turn, this would also mean that the likelihood of similar firms self-selecting into the sample is rather high (and in turn spurring the potential endogeneity bias) since M&A activities are initiated by firms on a voluntary basis (Kothari & Warner, 2007). This is further supported by Li and Prabhala (2007) who argue that decisions relating to corporate finance are not made randomly but are in fact thoughtful and deliberate decisions by a firm and their managers to self-select into choices and activities that are in line with their preferences.

Whenever self-selection bias is present in a non-random sample and not adjusted for in the estimation process, an OLS model will generate biased parameter estimates which in turn leads to understated standard errors and estimated significance levels that are overstated, hence leading the researcher to draw erroneous conclusions (Heckman, 1979; Li & Prabhala, 2007). To correct for this bias, Heckman (1979) presents a method where the full sample containing all listed firms in the specified time period and index is compared to the firms included in the non-random sample; such as the one used in this study. To do this comparison, a dummy variable was created and set to one if an acquirer is present in both samples (during the year of the M&A announcement), and zero otherwise. The generated dummy variable was subsequently specified as the dependent variable in a probit regression model where a selection of the acquirer firm-specific controls specified in subsection *3.5.3 Control variables* were employed as explanatory variables (see Appendix 3 for regression results), representing firms' financial characteristics. The acquirer firm-specific control variables employed in the probit regression include Leverage, Tobin's Q, firm size as defined by sales, book-to-market ratio, resource availability and normalized cash flow. The predicted values generated by the probit regression model presented in Appendix 3 constitute predicted probabilities that a firm listed on S&P Composite 1500® is also selected into the non-random subsample. These estimated values are subsequently used as a control variable in the regressions models presented in subsection *3.6.1 Regression design*, as a correction for sample selection bias.[34] After running the main regressions with this correction included, we can see if sample selection bias is present in the models by studying the associated significance of the coefficient. In Table 6 and 7, presented in subsections *4.2 CEO conscientiousness and short-term stock market reactions* and *4.3 CEO conscientiousness and acquisitiveness*, the correction for sample selection bias is significant to a varying extent depending on the model. This emphasizes the importance of this correction, since we would get inconsistent OLS estimators otherwise.

***CEO self-selection bias***

Furthermore, in an attempt to control and correct for a potential CEO self-selection bias, an additional explanatory variable was generated and added to the set of control variables (cf. Chatterjee & Hambrick, 2007). As previously discussed, outcome- and reward-oriented cultures are likely to attract highly conscientious CEOs due to their high level of ambition (Gow *et al.*, 2016). Thus, one could hypothesize that conscientious CEOs might be attracted to certain situations, activities and contexts which allow them to show off this personality trait and fulfill their own personal needs (e.g. by engaging in M&A transactions), which in turn means that there is a risk of facing additional endogeneity issues in the form of CEO self-selection.

[34] This variable is commonly referred to as the "Inverse Mills ratio" in past research (Li & Prabhala, 2007).

Following the methodology described by Chatterjee and Hambrick (2007), this was subsequently tested by analyzing the determinants of CEO conscientiousness using four OLS regression models. All models specify CEO conscientiousness as the dependent variable; however, the first model only uses the other Big Five personality traits as control variables while the second and third models also add the set CEO- and firm-specific control variables respectively. These variables are said to represent possible predictors of CEO conscientiousness and the regression results therefore indicate what firm characteristics that have a significant impact on this personality trait and in turn cause conscientious CEOs to self-select into the sample. The regression results are presented in Table 3 below. Note that we use four models for the sake of illustrating the determinants of CEO conscientiousness in a nuanced way, by adding control variables successively, both with and without the other personality traits included.

**Table 3.** Determinants of CEO conscientiousness

This table presents four regression models for the determinants of CEO conscientiousness. In the first regression model, only the other four other personality traits are used as control variables. In the second model, the CEO-specific control variables are added. The third model also includes acquirer firm-specific control variables which are measured at the fiscal year end prior to M&A announcement. The fourth model includes acquirer firm-specific control variables but excludes the other personality traits. All of the control variables are presented in subsection *3.5.3 Control variables* alongside their definitions in Appendix 1. In the regression results below, robust standard errors are in parentheses. Significance tested using t-statistics. *, **, and *** denote significance at the 10%, 5%, and 1% level respectively.

| **Variable** | **(1)** | **(2)** | **(3)** | **(4)** |
|---|---|---|---|---|
| Agreeableness | 0.818*** | 0.825*** | 0.821*** | |
| | (0.040) | (0.040) | (0.044) | |
| Emotional stability | -0.326*** | -0.328*** | -0.335*** | |
| | (0.029) | (0.030) | (0.033) | |
| Extraversion | 0.083*** | 0.0915*** | 0.077*** | |
| | (0.022) | (0.022) | (0.024) | |
| Openness to experience | 0.534*** | 0.537*** | 0.553*** | |
| | (0.027) | (0.026) | (0.029) | |
| CEO Age | | 0.007** | 0.007* | 0.008 |
| | | (0.003) | (0.003) | (0.005) |
| CEO Male | | -0.130* | -0.101 | -0.079 |
| | | (0.074) | (0.079) | (0.114) |
| CEO Tenure | | -0.014*** | -0.016*** | -0.016** |
| | | (0.004) | (0.004) | (0.007) |
| CEO Duality | | 0.012 | 0.026 | 0.001 |
| | | (0.036) | (0.038) | (0.057) |
| CEO Experience | | 0.058 | 0.077 | 0.021 |
| | | (0.049) | (0.052) | (0.070) |
| CEO IvyLeague+ | | -0.038 | -0.085* | 0.055 |
| | | (0.043) | (0.046) | (0.065) |
| CEO MBA | | -0.003 | -0.003 | 0.011 |
| | | (0.037) | (0.040) | (0.058) |
| CEO PhD | | -0.417*** | -0.418** | -0.272 |
| | | (0.146) | (0.164) | (0.343) |
| CEO GradHonors | | 0.031 | 0.040 | 0.041 |
| | | (0.051) | (0.055) | (0.092) |
| A: Leverage | | | -0.001 | 0.058*** |
| | | | (0.009) | (0.014) |
| A: Resource availability | | | 0.065*** | 0.053* |
| | | | (0.023) | (0.029) |
| A: Normalized cash flow | | | -0.338 | -0.499 |
| | | | (0.310) | (0.466) |
| A: Tobin's Q | | | 0.007 | 0.121** |
| | | | (0.034) | (0.057) |
| A: Firm size | | | 0.022 | 0.001 |
| | | | (0.014) | (0.022) |
| A: Book-to-market | | | -0.052 | 0.100** |
| | | | (0.032) | (0.049) |
| A: Profitability | | | 0.010** | 0.021*** |
| | | | (0.004) | (0.007) |
| Constant | -0.708*** | -0.957*** | -1.080*** | 2.793*** |
| | (0.146) | (0.250) | (0.307) | (0.388) |
| R-squared | 0.552 | 0.561 | 0.567 | 0.041 |
| Adj. R-squared | 0.551 | 0.556 | 0.560 | 0.028 |
| Observations | 1,371 | 1,371 | 1,211 | 1,211 |

The results from the first three regression models above indicate that all the other Big Five personality traits represent significant determinants of conscientiousness at the 1% significance level. In the second regression model, it can also be observed that CEO tenure and CEO PhD also represent significant explanatory variables for CEO conscientiousness at the 1% level, while CEO age and CEO male are significant at the 5% and 10% levels respectively. In the third model, we observe that control variables such as CEO age, CEO male and CEO PhD have decreased in significance or lost it altogether, while resource availability and profitability are significant at the 1% and 5% levels respectively. Lastly, in the fourth model, we observe that CEO age and CEO PhD have lost significance altogether, while acquirer leverage, Tobin's Q and book-to-market represent new significant predictors at the 1% and 5% levels. That being said, neither firm size nor Ivy League+ represent significant determinants of conscientiousness in the last model. These results are also the same when utilizing firm size defined as assets instead of sales, as well as the non-extended Ivy League instead of Ivy League+. As an example of how the results in Table 3 should be interpreted, we note in the fourth model that firms that exhibit a higher leverage or profitability in our sample will spur CEO conscientiousness and thereby attract CEOs who rank highly in this personality trait, in turn causing them to self-select into the sample.

Next, once again in line with Chatterjee and Hambrick (2007), predicted scores of CEO conscientiousness were generated using the *significant* regression coefficients from the fourth model. This creates an instrumental variable that represents expected values of our independent variable of interest (Hambrick, 2007; Bascle, 2008), i.e. conscientiousness. These predicted values were subsequently used as a control variable to correct for CEO self-selection bias in the three main regression models presented in subsection *3.6.1 Regression design*. The reason for choosing the fourth model to carry out this correction, was that the predicted values generated by any of the first three models in Table 3 cause severe multicollinearity issues in the main regressions later on. This problem arises since all the other personality traits represent significant predictors of conscientiousness and are also included as standalone control variables in the main models. On the other hand, when using the fourth model to predict values of conscientiousness, we do not have problems with multicollinearity. In Table 6 and 7, presented in section *4. Empirical Results and Analysis*, the correction for CEO self-selection is significant to a varying extent depending on the model. This emphasizes the importance of this correction, since we would get inconsistent OLS estimators otherwise.

***Other potential model misspecification issues***

As indicated by the three hypotheses and regression models presented in subsections *2.4 Hypotheses development* and *3.6.1 Regression design* respectively, a linear relationship is assumed between the dependent and independent variables (including the personality traits). However, it is hard to completely dismiss the thought that there might be other forms of relationships at play among the variables due to inherently complex causality between (personality) psychology and M&A decisions. In turn, this introduces the possibility that more complex non-linear regression models potentially would be better suited to capture and model these underlying relationships among the dependent and independent variables.

Furthermore, when it comes to the event study methodology, researchers have argued that unless the use of OLS and its estimation parameters for the market model is followed by a misspecification analysis, the results should be viewed with skepticism (Coutts *et al,* 1994). In the seminal paper by Fama (1970) about tests of market efficiencies, Fama highlights the so called "bad-model problems" and argues that all models used to estimate expected returns are incomplete. However, these issues are on the other hand negligible in very short event windows due to the expected return being zero (Fama, 1970). This is also corroborated by Brown and Warner (1985), who argue that the issues associated with using the market model relates to the estimation of beta which tends to be biased; especially if the stock is thinly traded (Hackbarth & Morellec, 2008). However, this does not result in misspecification issues considering that the residuals for any stock add up to zero when estimating beta and alpha, and that any bias in beta is compensated by a bias in alpha (Brown & Warner, 1985). Thus, even though the market model has some inherent issues, it is still superior to other one-factor models and perform equally well to multifactor models (MacKinlay, 1997).

### 3.7 Limitations

In this section we will point out and discuss the identified main limitations of this study, which mostly relate to the methodological approach used.

First and foremost, one of the main limitations of this study is in regard to the validity of the algorithm used to calculate the scores for the Big Five personality traits. Even though the developer Mairesse *et al.* (2007) have validated the algorithm extensively just like other researchers (e.g. Lima & Castro, 2014; Faliagka *et al.*, 2014; Green *et al.*, 2018; Malhotra *et al.*, 2018), additional validation is warranted in the specific context studied (i.e. CEO speech in Q&A sessions of earnings calls). In this study, we have not been able to carry out our own validation of the algorithm per se, although much effort has been put in to ensure that the data used for the personality assessment is as rigorous and free from distortions and errors as possible; not least by prioritizing a thorough data management process. Additionally, the output correlations between the five personality traits have been successfully benchmarked against past research as explained in earlier sections. The output coefficients for each quartile of CEO conscientiousness also corroborate the fact that a higher personality score generally leads to a higher impact on the dependent variable in question. However, it is worth pointing out that although the algorithm has been trained using machine learning to make accurate personality assessments, the training was carried out based on data from the general population, why it has not been optimized for CEOs specifically. As Graham *et al.* (2013) highlight, CEOs do not tend to be like ordinary people, instead they are generally more optimistic and risk tolerant than the average individual. Hambrick (2007) further emphasizes that American CEOs as a group are homogenous to some extent, yet diverse at the same time when compared to ordinary people in terms of age, experience, education and socioeconomic background. These differences could potentially be accounted for by the developer in the future if the algorithm was to be trained further using input from CEOs specifically in addition to the already existing machine learning input. Furthermore, given the recent methodological progress in the academic field of psychology, where manually constructed proxies more and more start to be replaced with increasingly sophisticated algorithms and other types of computer software, it is important to consider how these can be validated overall. As we see it, there are a couple of ways to do this and corroborate the accuracy of such software. One way could be to conduct validation by utilizing the expertise of professionals, either psychologists or analysts within the studied field in question (Chatterjee & Hambrick, 2007). Another way could be to utilize a complementary internet-mediated research approach to gather extensive data to be used in validation of the algorithm(s). For instance, one could collect survey data indicating how people perceive CEOs based on interview extracts and then compare the responses to the algorithm's output. Lastly, the method of using videometric measurements is another option which is to be considered superior whenever the researcher faces difficulties accessing the individuals being studied. Many researchers admit that CEOs are difficult to access, hence making it challenging to gather sufficient and meaningful data through more common research methods (Hambrick, 2007). Because of this, validation could be done using videometric measurements, where video samples of CEOs are rated and subsequently used for validation as well as machine learning (cf. Hill, Petrenko, Ridge & Aime, 2019). That way, aspects of an individual's personality that are perceivable through visual and verbal cues could be analyzed together with linguistic cues. As of today, these aspects are oftentimes researched separately (cf. Mairesse *et al.,* 2007; Mayew & Venkatachalam, 2012; Hill *et al.,* 2019).

Furthermore, when researching topics such as M&A, which has already been researched extensively, it is difficult to include and account for all parameters that previously have been found to impact transactional outcomes. Given the scope of this study, a choice was made to not include aspects relating to behavioral biases such as CEO overconfidence or narcissism, since the methodological approach surrounding these proxies is still in its cradle. As a result, proxies tend to differ a lot between studies since there is no clear established consensus as to what proxies are to be viewed as superior. For example, it is hard to establish whether it is more correct to measure narcissism through the prominence of CEOs in press releases or the size of their photo in the annual report (cf. Chatterjee & Hambrick, 2007; 2011), or whether it is correct to measure overconfidence based on CEOs personal portfolio of executive options (cf. Malmendier & Tate, 2008). Due to these ambiguities, such control variables were simply excluded from this study. Although biases such as overconfidence and narcissism are said to represent temporary and situation dependent behaviors, we still acknowledge that they potentially could have offered yet another dimension to the personality traits analysis, making it more nuanced; but as we just pointed out, we chose not to include these aspects in this study.

Moreover, we had trouble obtaining data for private firms (i.e. targets in this case) due to limited availability, in turn leading to many observations being lost whenever target controls (apart from target status as either private or public) were included in the regressions. Additionally, although we had an ambition to control for several corporate governance related factors such as director independence, board size, ownership concentration and managerial ownership, we were once again unable to obtain the data required; not least as a result of a substantial and material amount of missing values. However, that being said, we were able to obtain data for free-float as a proxy for one aspect of ownership structure.

# 4. Empirical Results and Analysis

### 4.1 Descriptive statistics

Table 4 presents summary statistics of the independent variables used in this study. The sample consists of 1,371 completed M&A transactions announced between the years 2006 to 2018, involving 749 unique acquirer firms and 838 unique CEOs[35]. In Panel A, the summary statistics of CEO-specific variables are presented, consisting of CEO personality traits and other control variables. The mean and median of the personality traits indicate that the scores retrieved from the algorithm have a symmetric distribution with no or negligible skewness. Among the traits, it can also be observed that conscientiousness has the highest standard deviation while agreeableness has the lowest. In Panel B, the firm-specific control variables are presented for both acquirer and target firms. Due to the fact that only one quarter of the 1,371 transactions in the full sample involve a public target firm, many observations in the target firm-specific control variables are reported as missing. Hence, the sample shrinks to 363 transactions whenever target control variables are used. However, given that the M&A bid premium is measured using target stock prices, the target firm-specific control variables do not lead to the omission of as many observations in the second main regression model where the M&A bid premium constitutes our dependent variable. Additionally, the deal-specific control variables are presented in Panel C, and as can be seen, this variable category mainly comprises dummy variables with a min value of zero and a max value of one. These dummies are used as stand-ins for qualitative deal characteristics such as product synergies resulting from the M&A transaction and payment method.

Finally, summary statistics of the 17,842 earnings calls analyzed by the algorithm (Q&A sessions only) and distributed over 838 unique CEOs are presented in Panel D. On average, we have collected 21 transcribed earnings calls per CEO, while the average (median) word count per CEO during Q&A sessions amounts to 18,414 (14,779) words split in 955 sentences.

Furthermore, a correlation matrix illustrating the correlations between all control variables is presented in Appendix 4 for brevity. As can be seen, there was originally multicollinearity present among several independent variables, why measures were taken to mitigate and prevent this issue from interfering with our regression models. To do this, variables that exhibited a significant correlation above 0.30 were removed from the regression models. As can be seen in Appendix 4, CEO conscientiousness correlates with the other personality traits. However, when included in the regression models, CEO conscientiousness has an acceptable variance inflation factor (VIF) of around 3.1, while the regression models as a whole also exhibit a low and acceptable mean VIF score of around 1.5, in turn indicating that multicollinearity should not constitute a significant issue (cf. O'Brien, 2007). Moreover, we chose to control for the other four Big Five traits to minimize the risk of a misleading association between CEO conscientiousness and each dependent variable.

[35] Note that we have 845 observations for the personality traits although the number of unique CEOs is slightly lower. This is due to the fact that seven CEOs occur twice in the sample as a result of them being active in two companies during the sample time period. In these few instances where the same CEO occurred twice, we compared the scores for both personality assessments and observed that they were very similar, hence not constituting an issue.

**Table 4.** Sample summary statistics of independent variables

This table presents descriptive statistics for the CEO-, firm- and deal-specific control variables used in the regression models, as well as the earnings calls used for personality assessment. The table is divided into four panels. All control variables are presented in subsection *3.5.3 Control variables* alongside their definitions which can be found in Appendix 1. The firm-specific variables are measured at fiscal year-end prior to an observed M&A announcement, except the variable *Status* which is measured on the day of announcement. The acquirer and target industries are determined by their respective SIC-code and classified according to Fama and French 12 industry classification. The control variables specified below are unadjusted for year and industry.

**Panel A:** ***Summary statistics of CEO-specific variables***

| | | | Full sample (838 CEOs) | | | |
|---|---|---|---|---|---|---|
| **Variable** | **Obs** | **Mean** | **St. Dev** | **Min** | **Median** | **Max** |
| Conscientiousness | 845 | 3.547 | 0.971 | 1.053 | 3.611 | 6.494 |
| Agreeableness | 845 | 3.679 | 0.604 | 1.642 | 3.708 | 5.480 |
| Emotional stability | 845 | 3.210 | 0.734 | 1.234 | 3.241 | 5.540 |
| Extraversion | 845 | 3.701 | 0.818 | 1.081 | 3.687 | 6.977 |
| Openness | 845 | 3.725 | 0.798 | 1.238 | 3.726 | 6.964 |
| | | | | | | |
| CEO Age | 1,371 | 57.397 | 6.383 | 39.518 | 57.042 | 84.200 |
| CEO Male | 1,371 | 0.967 | 0.180 | 0 | 1 | 1 |
| CEO Tenure | 1,371 | 6.934 | 4.915 | 2.003 | 5.529 | 34.614 |
| CEO Duality | 1,371 | 0.523 | 0.500 | 0 | 1 | 1 |
| CEO Experience | 1,371 | 0.167 | 0.373 | 0 | 0 | 1 |
| CEO IvyLeague | 1,371 | 0.205 | 0.403 | 0 | 0 | 1 |
| CEO IvyLeague+ | 1,371 | 0.267 | 0.442 | 0 | 0 | 1 |
| CEO MBA | 1,371 | 0.424 | 0.494 | 0 | 0 | 1 |
| CEO PhD | 1,371 | 0.010 | 0.100 | 0 | 0 | 1 |
| CEO GradHonors | 1,371 | 0.095 | 0.293 | 0 | 0 | 1 |

**Panel B:** ***Summary statistics of firm-specific variables***

| | | | Full sample (749 acquirer firms) | | | |
|---|---|---|---|---|---|---|
| **Variable** | **Obs** | **Mean** | **Std. Dev** | **Min** | **Median** | **Max** |
| Acquirer | | | | | | |
| Leverage | 1,211 | 0.246 | 0.157 | 0 | 0,230 | 0.991 |
| Resource availability | 1,370 | 2.574 | 1.968 | 0.228 | 2,054 | 20.883 |
| Normalized CF | 1,370 | 0.132 | 0.080 | -0.763 | 0,127 | 0.536 |
| Tobin's Q | 1,370 | 1.798 | 0.877 | 0.593 | 1,603 | 15.426 |
| Firm size, Sales | 1,370 | 7.564 | 1.445 | 3.998 | 7,507 | 13.123 |
| Firm size, Assets | 1,370 | 7.759 | 1.435 | 4.540 | 7,612 | 13.395 |
| Book-to-market | 1,370 | 0.511 | 0.334 | -0.947 | 0,439 | 2.802 |
| Profitability | 1,370 | 0.058 | 0.071 | -0.705 | 0,058 | 0.409 |
| Free-float | 1,371 | 0.943 | 0.078 | 0.371 | 0,974 | 0.999 |
| Target | | | | | | |
| Firm size, Sales* | 398 | 6.400 | 1.783 | -0.109 | 6.403 | 11.097 |
| Firm size, Assets | 402 | 6.598 | 1.803 | 1.408 | 6.575 | 11.144 |
| Book-to-market | 339 | 0.556 | 0.678 | -3.706 | 0.446 | 6.025 |
| Profitability | 402 | 0.067 | 0.904 | -10.689 | 0.041 | 12.141 |
| Status** | 1,371 | 0.261 | 0.439 | 0 | 0 | 1 |

**Panel C:** ***Summary statistics of deal-specific variables***

| | | | Full sample (1,371 transactions) | | | |
|---|---|---|---|---|---|---|
| **Variable** | **Obs** | **Mean** | **St. Dev** | **Min** | **Median** | **Max** |
| Deal size, relative | 1,371 | 0.248 | 0.355 | 0.050 | 0.126 | 4.585 |
| Deal size, sales | 397 | 0.334 | 0.470 | 0.001 | 0.168 | 3.827 |
| All cash | 1,371 | 0.766 | 0.4245 | 0 | 1 | 1 |
| All equity | 1,371 | 0.039 | 0.193 | 0 | 0 | 1 |
| Product Synergies, all | 1,371 | 1.831 | 1.165 | 1 | 1 | 4 |
| Product Synergies, 4p | 1,371 | 0.151 | 0.358 | 0 | 0 | 1 |
| Product Synergies, 3p | 1,371 | 0.156 | 0.363 | 0 | 0 | 1 |
| Product Synergies, 2p | 1,371 | 0.066 | 0.249 | 0 | 0 | 1 |
| Product Synergies, 1p | 1,371 | 0.626 | 0.484 | 0 | 1 | 1 |
| Bid competition | 1,371 | 0.004 | 0.066 | 0 | 0 | 1 |
| Tender | 1,371 | 0.071 | 0.256 | 0 | 0 | 1 |
| Hostile | 1,371 | 0.003 | 0.054 | 0 | 0 | 1 |
| Cross-border | 1,371 | 0.262 | 0.440 | 0 | 0 | 1 |

**Panel D:** ***Summary statistics of earnings calls***

| | | | Full sample (17,842 earnings calls) | | | |
|---|---|---|---|---|---|---|
| **Variable** | **Obs** | **Mean** | **Std. Dev** | **Min** | **Median** | **Max** |
| Earnings calls | 17,842 | 21.115 | 11.116 | 4 | 21 | 48 |
| Word count | 845 | 18,414 | 13,591 | 5.096 | 14,779 | 145,296 |
| Sentences | 845 | 954.923 | 699.828 | 222 | 771 | 7,332 |

* Note that the MIN value is negative due to the use of natural logarithm of sales ($ Mil) below one.

** 363 transactions with public targets

In Table 5 below, we present sample summary statistics for the two dependent variables relating to CEO acquisitiveness, i.e. M&A bid premiums and M&A deal frequency. In terms of the former, the sample size is rather modest with 363 transactions which is explained by the fact that information is only available for public targets. Further, in Table 5, it can also be observed that a large proportion of transactions are clustered within the Business Equipment industry, while a few transactions took place in Consumer Durables. We can also observe that the mean bid premium fluctuates across industries and that Business Equipment is associated with some of the largest premiums. The median values are yet again less volatile since they are not driven by outliers, with a median bid premium in the range 26 to 37%. In comparison, the mean bid premium range between from 24 to 46%. The standard deviations range from 0.113 for Utilities to 0.521 for Other.

Switching focus to M&A deal frequency, the data set consists of 2,967 initiated M&A transactions which can be observed in Table 5. As indicated by the mean and median, we observe that the frequency of transactions is widely spread across industries with most transactions taking place in Business Equipment and Manufacturing. Moreover, we also observe that acquirer CEOs on average (median) initiate 2.173 (2) M&A transactions per year and that the standard deviations range from 1.135 for Consumer NonDurables to 1.973 for Telephone and Television Transmission.

**Table 5.** Sample summary statistics of CEO acquisitiveness

In this table, the two dependent variables M&A Bid Premium and M&A Deal Frequency are presented. The observations are categorized according to the acquirer's industry as determined by Fama and French 12 industry classifications. The industry code 11 (Money, Finance, SIC codes: 6000-6999) is excluded. The variable M&A deal frequency is specified as a discrete count measure. Note that the number of observations represents the total observations between the years 2006 to 2018, while the median, mean and standard deviation are presented on a yearly basis.

| | M&A Bid Premium | | | | M&A Deal Frequency | | | |
|---|---|---|---|---|---|---|---|---|
| **Industry** | **Obs** | **Median** | **Mean** | **Std. Dev.** | **Obs** | **Median** | **Mean** | **Std. Dev.** |
| 1 - Consumer NonDurables | 18 | 0.362 | 0.434 | 0.308 | 182 | 2 | 2.020 | 1.135 |
| 2 - Consumer Durables | 6 | 0.330 | 0.238 | 0.218 | 94 | 1 | 2.000 | 1.719 |
| 3 - Manufacturing | 43 | 0.283 | 0.350 | 0.315 | 482 | 2 | 2.152 | 1.560 |
| 4 - Oil, Gas, and Coal Extraction and Products | 16 | 0.283 | 0.357 | 0.230 | 132 | 1 | 1.760 | 1.272 |
| 5 - Chemicals and Allied Products | 10 | 0.321 | 0.305 | 0.136 | 93 | 1 | 1.860 | 1.262 |
| 6 - Business Equipment | 117 | 0.367 | 0.422 | 0.329 | 710 | 2 | 2.298 | 1.951 |
| 7 - Telephone and Television Transmission | 12 | 0.305 | 0.310 | 0.173 | 95 | 2 | 2.639 | 1.973 |
| 8 - Utilities | 13 | 0.256 | 0.244 | 0.113 | 70 | 1 | 1.667 | 1.426 |
| 9 - Wholesale, Retail, and Some Services | 30 | 0.277 | 0.372 | 0.384 | 276 | 2 | 2.281 | 1.733 |
| 10 - Healthcare | 50 | 0.321 | 0.344 | 0.258 | 409 | 2 | 2.464 | 1.893 |
| 12 - Other | 48 | 0.322 | 0.460 | 0.521 | 424 | 2 | 2.048 | 1.420 |
| Total | 363 | 0.322 | 0.388 | 0.346 | 2,967 | 2 | 2.173 | 1.669 |

Lastly, Figure 4 illustrates the mean and median 4-week bid premium on a year-by-year basis between 2006 and 2018. By comparing the mean and median, it can be observed that the data set of bid premiums contain outliers for certain years; something which was previously mentioned in subsection *3.5.1 Dependent variable*. Overall, we can see that the mean 4-week bid premium has fluctuated over the years and that certain patterns of abnormally high bid premiums are visible during, and following, the years of the financial crisis. The mean (median) bid premium has over the years fluctuated in the span between 25 to 60 (23 to 43) %.

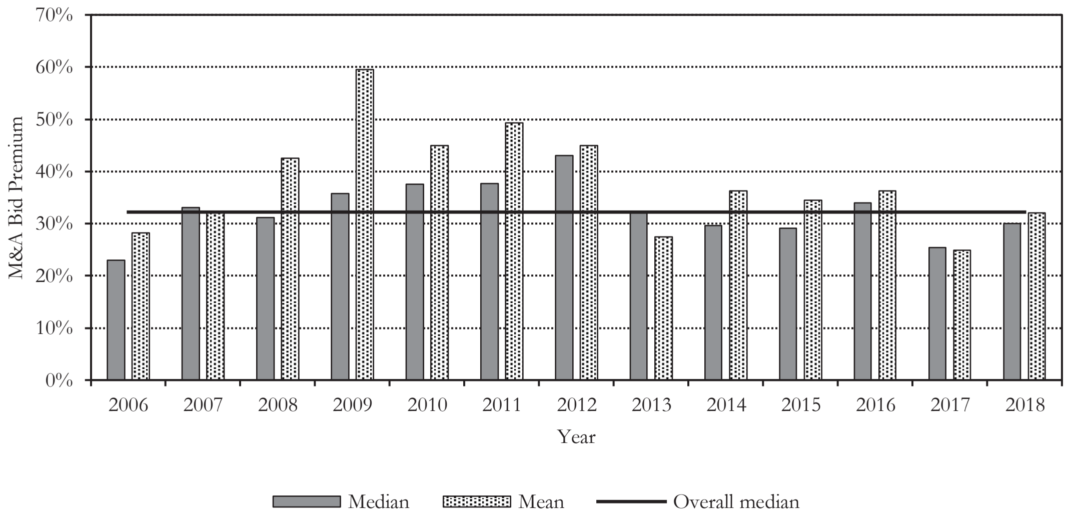


**Figure 4.** Graph of 4-week bid premium between 2006 and 2018

### 4.2 CEO conscientiousness and short-term stock market reactions

In Figure 5 below, the cumulative average abnormal return (CAAR) for M&A announcements in the sample is plotted. As can be seen, we find the CAAR to be positive, which is in line with the results presented by Moeller *et al.* (2004) and Alexandridis *et al.* (2017). Moreover, the CAAR is also statistically significant[36] at 1% level for the event window -1 to +1 day around the announcement, and the significance also stays robust when using the market-adjusted return model, when substituting market index to Nasdaq Composite, and when expanding the event window with one extra day before and after the announcement (i.e -2, +2) (at the 5% level).[37] On average, acquirer CAAR is positive following an M&A announcement and amounts to 1.08%. This contradicts some evidence found in previous M&A literature in the sense that the acquiring firms in our sample exhibit small, but statistically significant, abnormal returns in the short-run (cf. Jensen & Ruback, 1983; Bargeron *et al.,* 2008; Betton *et al.,* 2008; Eckbo, 2009). One explanation for the observed positive abnormal returns could be that we use a more recent time period compared to past M&A research, during which factors (such as corporate governance regulations, more efficient incentive structures etcetera) not investigated in this study have changed (cf. Alexandridis *et al.*, 2017).

[36] Significance tested using a t-statistic.

[37] Acquirer CAAR, which is at 1.08%, is statistically significant at the 1% level for the event window day -1 to day 1, even when utilizing a shorter event window of 120 days, the market-adjusted model and the substitution of market index (see Appendix 5). The acquirer CAAR for the event window day -2 to day 2 is 0.94% and statistically significant at the 5% level. However, it is not statistically significant for event windows beyond this one. CAAR is tested using t-statistics and 1,371 observations.

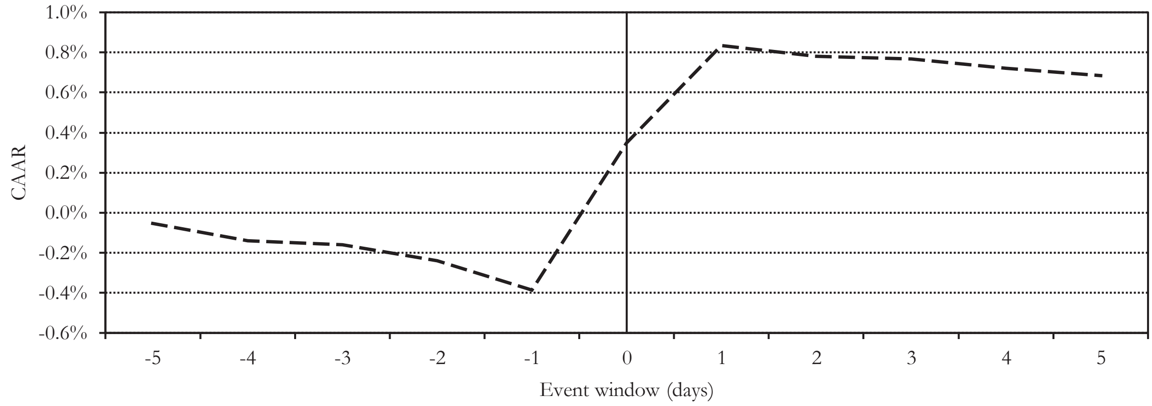


**Figure 5.** Graph of cumulative average abnormal return for M&A announcements. Event window -5 to 5. The cumulative average abnormal return is statistically significant at 1% and 5%, with event windows (-1;+1) and (-2;+2) respectively.

As previously hypothesized in the first hypothesis, $H_1$, CEO conscientiousness is expected to be positively associated with CAR since highly conscientious CEOs are said to be attentive to detail, goal oriented, self-disciplined as well as more risk averse and analytical, why they in turn require more compelling evidence and information before taking actions compared to their less conscientious counterparts. In turn, the M&A transactions that still are undertaken by highly conscientious acquirer CEOs should be more likely to add value to the shareholders of the acquiring firm. The regression results evaluating this hypothesis are presented in Table 6 below. Note that the reason why the first and second models have substantially more observations compared to the third and fourth model, is because of limited data availability for private target firms in terms of the target-specific control variables which are added in the last two models. Yet, as an indication of the robustness and consistency across the models, nearly all signs of the coefficients remain unchanged.

The first thing that can be observed in the regression results below in Table 6, is that the coefficient for CEO conscientiousness is significant at the 5% level in the main third model and at the 10% in the fourth model, while showing no significance in the second model where no target-specific controls are used. In regard to the third main model, the 5% significance of CEO conscientiousness remains robust when we rerun the regression using different variations of the dependent variable CAR[38] as well as control variables that have not been adjusted for industry effects. Moreover, note that the fourth model serves to illustrate the robustness of CEO conscientiousness when the other Big Five personality traits are not included in the model. We can observe that the coefficient for conscientiousness maintains significance, although at the 10% level in this case. Furthermore, the coefficient also indicates a stable and positive relationship between CEO conscientiousness and short-run CAR, hence confirming the first hypothesis. Regarding the magnitude of this impact, we observe that an increase by one unit in CEO conscientiousness leads to a 1.4% increase in CAR.

[38] We find that the results remain significant when employing a CAR that has been calculated using a shorter 120-day estimation window running from day -150 to day -30, the market-adjusted return model, as well as the Nasdaq Composite index instead of the S&P Composite 1500® index.

**Table 6.** Regression results for CEO conscientiousness and short-run CAR

In this table, four different OLS regression models with three-day CAR specified as the dependent variable are presented. In the first model, acquirer (A) firm and deal-specific control variables are utilized to test the effects of having no personality traits included in the model at all. In the second model, the personality traits are included, but still without any target-specific control variables except for target status. In the third model, which is regarded as the main regression model, target (T) firm-specific variables are included (except for target status). Lastly, in the fourth model, all personality traits apart from conscientiousness are excluded in order to test the model when only including the personality trait of interest. All control variables are presented in detail in subsection *3.5.3 Control variables* alongside their definitions which can be found in Appendix 1 and are adjusted for year and industry were applicable. The industry-adjusted control variables are measured as ratios, meaning that the firm-specific variables are divided by the industry mean. Robust standard errors are in parentheses. Significance tested using t-statistics. *, **, and *** denote significance at the 10%, 5%, and 1% level respectively.

| Variable | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Conscientiousness | | 0.002 | 0.014** | 0.006* |
| | | (0.004) | (0.006) | (0.003) |
| Agreeableness | | -0.009* | -0.020** | |
| | | (0.005) | (0.010) | |
| Emotional stability | | 0.004 | 0.000 | |
| | | (0.004) | (0.007) | |
| Extraversion | | 0.004 | 0.005 | |
| | | (0.003) | (0.005) | |
| Openness to experience | | 0.003 | -0.001 | |
| | | (0.004) | (0.006) | |
| CEO Age | 0.000 | 0.001 | 0.001 | 0.001 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| CEO Male | 0.007 | 0.005 | -0.014 | -0.017 |
| | (0.009) | (0.010) | (0.028) | (0.026) |
| CEO Duality | -0.005 | -0.005 | -0.008 | -0.007 |
| | (0.004) | (0.004) | (0.008) | (0.008) |
| CEO Experience | 0.004 | 0.001 | 0.007 | 0.010 |
| | (0.005) | (0.006) | (0.011) | (0.011) |
| CEO MBA | -0.006 | -0.009** | 0.005 | 0.001 |
| | (0.004) | (0.004) | (0.009) | (0.009) |
| CEO PhD | -0.028 | -0.031 | -0.049 | -0.050 |
| | (0.017) | (0.022) | (0.070) | (0.068) |
| CEO GradHonors | 0.004 | 0.003 | 0.004 | 0.002 |
| | (0.006) | (0.006) | (0.015) | (0.015) |
| A: Resource Availability | -0.003 | -0.003 | -0.002 | -0.002 |
| | (0.002) | (0.002) | (0.003) | (0.003) |
| A: Normalized Cash flow | 0.067** | 0.042 | -0.008 | -0.006 |
| | (0.031) | (0.033) | (0.061) | (0.064) |
| A: Tobin's Q | -0.010** | -0.018*** | -0.013 | -0.013 |
| | (0.004) | (0.005) | (0.009) | (0.009) |
| A: Firm size, sales | -0.006*** | -0.008*** | -0.012*** | -0.011*** |
| | (0.002) | (0.002) | (0.003) | (0.003) |
| A: Book-to-market | -0.001 | -0.003 | -0.005 | -0.006 |
| | (0.003) | (0.004) | (0.011) | (0.011) |
| A: Profitability | -0.000 | 0.000 | -0.000 | 0.000 |
| | (0.001) | (0.001) | (0.002) | (0.002) |
| A: Free float | 0.003 | 0.010 | -0.088 | -0.103* |
| | (0.026) | (0.028) | (0.059) | (0.057) |
| T: Book-to-market | | | 0.004 | 0.004 |
| | | | (0.004) | (0.004) |
| T: Profitability | | | -0.000 | -0.000 |
| | | | (0.000) | (0.000) |
| T: Status | -0.014** | -0.018*** | | |
| | (0.006) | (0.006) | | |
| All cash | -0.011* | -0.011* | 0.011 | 0.010 |
| | (0.006) | (0.006) | (0.011) | (0.011) |
| Deal size | -0.008 | -0.010 | -0.019 | -0.018 |
| | (0.009) | (0.010) | (0.015) | (0.015) |
| Product synergies, 4p | -0.001 | 0.007 | 0.018* | 0.016* |
| | (0.007) | (0.007) | (0.010) | (0.010) |
| Product synergies, 3p | -0.005 | -0.001 | 0.018* | 0.014 |
| | (0.006) | (0.006) | (0.010) | (0.010) |
| Competing bid | 0.018 | 0.018 | 0.019 | 0.022 |
| | (0.011) | (0.011) | (0.014) | (0.015) |
| Tender | 0.011 | 0.010 | -0.003 | -0.002 |
| | (0.008) | (0.008) | (0.009) | (0.009) |
| Hostile | 0.040 | 0.045 | 0.042 | 0.040 |
| | (0.026) | (0.029) | (0.034) | (0.037) |
| Cross-Border | 0.006 | 0.002 | -0.013 | -0.012 |
| | (0.005) | (0.005) | (0.009) | (0.009) |
| Correction for firm sample selection bias | -0.422** | -0.618*** | -0.550** | -0.576** |
| | (0.164) | (0.183) | (0.272) | (0.263) |
| Correction for CEO self-selection bias | | -0.017 | -0.041 | -0.037 |
| | | (0.013) | (0.029) | (0.028) |
| Constant | 0.100** | 0.187*** | 0.391*** | 0.349** |
| | (0.045) | (0.067) | (0.142) | (0.136) |
| | | | | |
| Observations | 1,349 | 1,190 | 305 | 305 |
| R-squared | 0.034 | 0.059 | 0.170 | 0.148 |
| Adjusted R-squared | 0.017 | 0.035 | 0.076 | 0.065 |

In line with the reasoning outlined in the hypothesis development, the intuitive logic behind these results is that conscientious individuals tend to be particularly attentive to detail, risk averse, analytical, have the ability to control short sighted impulses in order to achieve more long-term goals, as well as have the need to collect convincing evidence before any actions are taken (Roberts *et al.,* 2009; Judge *et al.,* 2009). Hence, when an action still is initiated (e.g. M&A which relates to strategic change), the outcome tends to be positive. This is also what we observe here in terms of a positive market reaction to M&A announcements by conscientious CEOs. Furthermore, in regard to the other personality traits, we observe a negative relationship between CEO agreeableness and short-run CAR which is significant at the 10% in the second model, and at the 5% level in the third model. This could potentially be explained by the fact that individuals ranking highly in agreeableness are generally more cooperative and trusting (Goldberg, 1993), perhaps even to the point where they choose to disregard the financial consequences of a potentially suboptimal deal and pursue it anyway in order to avoid conflict.

Moreover, in regard to the acquirer firm-specific control variables, the results show that the coefficient for acquirer Tobin's Q is significant at the 5% level in the first model and at the 1% level in the second model. Tobin's Q is said to represent an indicator of whether the business is overvalued or not (Malmendier & Tate, 2008), why the significant negative coefficients make intuitive sense since the interpretation is that as acquirer overvaluation increases, the acquirer short-run cumulative abnormal return decreases slightly indicating a negative reaction by the market. One explanation provided by Malmendier & Tate (2008) is that acquirer overvaluation is associated with CEO overconfidence, which investors perceive as negative. Additionally, it can be observed that the coefficient for acquirer firm size as measured by sales constitutes a significant predictor of CAR at the 1% level in all models, with a slightly negative relationship. This result is in line with Moeller *et al.* (2004) who find a negative relationship between acquirer CAR and acquirer firm size; something which is expected if large acquirers systematically overpay for their targets. By extension, this would also provide some evidence of the hubris hypothesis. This is also something which the Moeller *et al.* (2004) point out as being consistent with the presence of agency costs associated with managerial autonomy. It is worth pointing out that we also find the same results when substituting firm size in terms of book assets as opposed to sales, hence further supporting this conclusion.

In regard to the target-specific control variables, we can see that target status remains a significant predictor in both the first and second model. That being said, note that target status is not included as a control variable in the third and fourth model due to collinearity issues arising in these cases. However, the coefficient for target status is nevertheless significant at the 5% level in the first model and at the 1% level in the second model. Moreover, we observe that the direction of the coefficient is negative. That being said, since target status is a dummy variable set to one if the target is public, the results found in the first two models are consistent with Fuller *et al.* (2002) who find that the acquirer firm shareholders lose when purchasing a public firm and gain when buying a private. The results are also in line with Moeller *et al.* (2005) who find that the coefficient for target status was more negative when the target is public compared to private. Capron and Shen (2007) extend this analysis by highlighting that the limited availability of information on private targets leads to more value-creating opportunities in which private information can be taken advantage of, meanwhile the equity market (i.e. the market for corporate control) for public targets already functions as an asset valuation mechanism. However, this is not something we can confirm in this study.

In regard to the deal-specific control variables, we note that payment method all cash is negatively associated with acquirer CAR at the 10% significance level in the first and second model, while showing no significance at all in the third and fourth model. On the other hand, when controlling for payment method all equity instead of all cash, we find the coefficient to be insignificant in all four models. Hence, we cannot draw definite conclusions about the relationship between payment method and acquirer CAR. This is not surprising since the results in previous research also indicate an ambiguous and contradictory relationship between payment method and acquirer CAR. For instance, Moeller *et al.* (2004) and Fuller *et al.* (2002) find the highest acquirer abnormal returns when the payment method is equity or a mixed offer, although Moeller *et al.* (2004) find positive abnormal returns regardless of how the acquisition is financed. The authors also conclude that cash acquisitions have significantly lower abnormal returns compared to other payment methods; something which is at least partially in line with the negative coefficient for all cash payment found in the results for our first and second model. On the other hand, Kaplan & Weisbach (1992) find acquirer returns to be lower for acquisitions financed by stock than cash and debt, hence contradicting the results of the previously mentioned study.

Lastly, regarding the other deal-specific control variables, we find the coefficients for deal size (as percentage of acquirer market capitalization), competing bid, tender offer, and hostile transactions to be insignificant which means that we cannot draw conclusion about their impact on short-run acquirer CAR in this study. On the other hand, we do find strong expected product synergies to constitute a significant predictor of acquirer CAR at the 10% level in the third and fourth model, with a slightly positive coefficient. In turn, this indicates that the market reacts positively to announced M&A deals that are associated with a high level of expected product synergies; something which makes sense since this is bound to translate into the creation of new shareholder value as the synergies are realized. Furthermore, this is also in line with many prior studies have used diversification as a proxy for deal quality (cf. Morck *et al.,* 1990; Malmendier & Tate, 2008).

### 4.3 CEO conscientiousness and acquisitiveness

In this section, we present the results regarding the second and third hypotheses, $H_2$ and $H_3$, focusing on CEOs acquisitiveness in terms of their tendency to pay high or low bid premiums and propensity to initiate M&A transactions. In Table 7 below, the regression results for the dependent variables M&A bid premium and M&A deal frequency are presented. The analysis will focus on one dependent variable at a time where control variables are added successively. This was done to illustrate i) the effects when the other Big Five personality traits are included versus excluded and ii) the robustness as new controls are added in line with the discussion about omitted variable bias in line with the discussion about omitted variable bias. Furthermore, models 4 and 7 specifically serve the purpose of illustrating the robustness of conscientiousness as the other personality traits are excluded.

**Table 7.** Regression results for CEO conscientiousness and acquisitiveness

In this table, four different OLS regression models are presented together with three different negative binomial regression models. The OLS regressions specify M&A bid premium as the dependent variable while the negative binomial regressions specify M&A deal frequency. In the first model (1), acquirer (A) CEO, firm and deal-specific control variables are utilized to test the impact on the dependent variable without including any personality traits in the model at all. In the second model (2), the personality traits are included, but still without any target-specific control variables. In the third model (3), which is the main regression model, target (T) firm-specific variables are included as well. In the fourth model (4), the other traits apart from conscientiousness are excluded in order to test the model when only including the personality trait of interest. In the fifth model (5), acquirer (A) CEO and firm-specific control variables are utilized to test the effects of having no personality traits in the model at all. In the sixth model (6), the personality traits are included, but with no target or deal specific control variables. Lastly, in the seventh model (7), the other traits apart from conscientiousness are excluded in order to test the model when only including the personality trait of interest. Note that in the deal frequency variable, only one CEO observation per fiscal year is used and that the CEO-specific variables used are measured at the first transaction during each fiscal year. All control variables are presented in subsection *3.5.3 Control variables* alongside their definitions in Appendix 1 and are adjusted for year and industry effects were applicable. Robust standard errors are in parentheses. Significance tested using a t-statistic in the bid premium models and a z-statistic in the deal frequency models. *, **, and *** denote significance at the 10%, 5%, and 1% level respectively.

| | **M&A bid premium** | | | | **M&A deal frequency** | | |
|---|---|---|---|---|---|---|---|
| **Variables** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** |
| Conscientiousness | | -0.124 | -0.155** | -0.098* | | 0.027 | 0.027 |
| | | (0.077) | (0.077) | (0.055) | | (0.033) | (0.023) |
| Agreeableness | | -0.022 | 0.006 | | | -0.023 | |
| | | (0.121) | (0.124) | | | (0.047) | |
| Emotional stability | | 0.099 | 0.110 | | | -0.003 | |
| | | (0.100) | (0.099) | | | (0.035) | |
| Extraversion | | 0.024 | 0.007 | | | 0.012 | |
| | | (0.086) | (0.075) | | | (0.027) | |
| Openness to experience | | 0.084 | 0.106 | | | 0.015 | |
| | | (0.069) | (0.069) | | | (0.039) | |
| CEO Age | -0.011 | -0.013 | -0.012 | -0.012 | -0.001 | 0.002 | 0.002 |
| | (0.007) | (0.008) | (0.008) | (0.008) | (0.003) | (0.004) | (0.004) |
| CEO Male | 0.189 | 0.182 | 0.230 | 0.265 | 0.113 | 0.076 | 0.074 |
| | (0.161) | (0.200) | (0.210) | (0.183) | (0.090) | (0.092) | (0.092) |
| CEO Duality | 0.012 | 0.015 | -0.008 | -0.017 | 0.013 | 0.032 | 0.032 |
| | (0.106) | (0.104) | (0.099) | (0.099) | (0.040) | (0.042) | (0.042) |
| CEO Experience | -0.016 | 0.037 | 0.138 | 0.076 | 0.148*** | 0.147*** | 0.148*** |
| | (0.096) | (0.102) | (0.100) | (0.094) | (0.045) | (0.047) | (0.047) |
| CEO PhD | -0.360* | -0.467* | -0.491** | -0.419* | 0.258* | -0.248 | -0.233 |
| | (0.188) | (0.249) | (0.248) | (0.226) | (0.152) | (0.170) | (0.164) |
| A: Resource availability | 0.013 | 0.021 | 0.003 | -0.001 | -0.038* | -0.056*** | -0.057*** |
| | (0.045) | (0.049) | (0.045) | (0.047) | (0.022) | (0.020) | (0.020) |
| A: Normalized cash flow | 2.363*** | 2.496*** | 2.567*** | 2.476*** | -0.172 | -0.268 | -0.267 |
| | (0.811) | (0.906) | (0.948) | (0.923) | (0.272) | (0.313) | (0.313) |
| A: Firm size | -0.060* | -0.085** | -0.058 | -0.056 | 0.138*** | 0.142*** | 0.143*** |
| | (0.032) | (0.039) | (0.036) | (0.034) | (0.017) | (0.019) | (0.018) |
| A: Book-to-market | -0.025 | 0.031 | -0.042 | -0.039 | 0.074** | 0.045 | 0.051 |
| | (0.083) | (0.087) | (0.100) | (0.101) | (0.029) | (0.031) | (0.031) |
| A: Tobin's Q | -0.101 | -0.076 | -0.053 | -0.060 | 0.069** | 0.067 | 0.068 |
| | (0.072) | (0.087) | (0.094) | (0.089) | (0.034) | (0.042) | (0.042) |
| A: Profitability | -0.002 | 0.001 | 0.001 | 0.004 | 0.008** | 0.003 | 0.003 |
| | (0.013) | (0.016) | (0.018) | (0.017) | (0.004) | (0.005) | (0.005) |
| A: Free float | -1.097 | -1.136 | -1.028 | -0.854 | -0.243 | -0.261 | -0.285 |
| | (0.853) | (0.937) | (0.883) | (0.821) | (0.238) | (0.247) | (0.243) |
| T: Book-to-market | | | 0.176** | 0.176** | | | |
| | | | (0.083) | (0.087) | | | |
| T: Profitability | | | -0.003 | -0.004 | | | |
| | | | (0.002) | (0.002) | | | |
| All equity | -0.241** | -0.252** | -0.328** | -0.352*** | | | |
| | (0.117) | (0.126) | (0.128) | (0.134) | | | |
| Deal size | -0.256*** | -0.295*** | -0.237*** | -0.206** | | | |
| | (0.081) | (0.088) | (0.083) | (0.081) | | | |
| Product synergies, 4p | -0.062 | -0.025 | -0.022 | -0.021 | | | |
| | (0.126) | (0.126) | (0.124) | (0.126) | | | |
| Product synergies, 3p | -0.094 | -0.121 | -0.101 | -0.071 | | | |
| | (0.118) | (0.132) | (0.130) | (0.128) | | | |
| Competing Bid | 0.066 | -0.000 | 0.025 | 0.025 | | | |
| | (0.316) | (0.296) | (0.308) | (0.307) | | | |
| Tender | 0.023 | 0.027 | 0.013 | 0.030 | | | |
| | (0.095) | (0.112) | (0.114) | (0.110) | | | |
| Hostile | -0.494 | -0.539 | -0.680 | -0.698 | | | |
| | (0.363) | (0.423) | (0.481) | (0.466) | | | |
| Correction for firm sample | 5.545** | 5.940* | 5.553* | 5.343* | -3.658*** | -3.624** | -3.692*** |
| selection bias | (2.744) | (3.029) | (2.969) | (2.829) | (1.282) | (1.423) | (1.412) |
| Correction for CEO self- | | -0.250 | -0.097 | -0.150 | | 0.358** | 0.359** |
| selection bias | | (0.501) | (0.477) | (0.482) | | (0.151) | (0.148) |
| lnalpha | | | | | -3.556*** | -3.450*** | -3.449*** |
| | | | | | (0.659) | (0.612) | (0.611) |
| Constant | 2.656** | 3.566 | 2.427 | 3.007 | 0.057 | -1.393** | -1.380** |
| | (1.241) | (2.568) | (2.431) | (2.463) | (0.382) | (0.652) | (0.609) |
| Observations | 339 | 309 | 300 | 300 | 1,363 | 1,203 | 1,203 |
| R-squared | 0.099 | 0.128 | 0.172 | 0.160 | | | |
| Adjusted R-squared | 0.042 | 0.048 | 0.086 | 0.087 | | | |
| Pseudo R-squared | | | | | 0.036 | 0.040 | 0.040 |

As can be seen in the table above, when focusing on the models relating to M&A bid premium, we first and foremost note that CEO conscientiousness is significant[39] at the 5% level in the main third model and at the 10% level in the fourth model, while the other personality traits are insignificant in all models. Moreover, the coefficient for CEO conscientiousness is also consistently negative, indicating that a one unit increase in this personality trait leads to a 15.5% decrease in industry- and year adjusted bid premiums in the third model. Thus, we can confirm our second hypothesis, $H_2$, where CEO conscientiousness is hypothesized to be negatively associated with M&A bid premiums. The logic behind this result is fundamentally the same as outlined previously for the results relating to CAR. However, in the context of M&A bid premiums specifically, it could be argued that the negative association with conscientiousness can be explained particularly well by conscientious CEOs' ability to inhibit self-control and remain goal oriented, their urge to collect extensive and convincing evidence and their inherent risk aversion (Jackson and Roberts, 2017), something which should prevent the payment of an unjustifyingly high bid premium. In terms of the other CEO specific control variables, we find that PhD seems to be a significant predictor of M&A bid premiums in all four models indicating a stable negative relationship between the two. CEO PhD is significant at the 10% level in the first, second and fourth model and at the 5% in the main third model. However, apart from CEO PhD, we do not find significance for any other CEO-specific controls used in our models.

In regard to the acquirer firm-specific control variables, normalized cash flow seems to constitute an extremely important predictor of M&A bid premium, with a coefficient well over 2 in all models that is also consistently significant at the 1% level. This makes intuitive sense since a large (free) cash flow[40] makes it easier for CEOs to pay higher premiums for their targets (Lang *et al.,* 1991) and is also in line with the theory surrounding agency costs of free cash flows (e.g. Jensen, 1986; Harford, 1999). Moreover, we note that the coefficient for acquirer firm size as measured by sales is significant at the 10% level in the first model and at the 5% level in the second model, while being insignificant in the main third model, and fourth model in which the target firm-specific controls are added. However, the negative direction of the coefficient remains stable across all four models. We also get the same results when substituting the control variable firm size defined as sales with firm size defined as assets.

On the other hand, we do not find significance for acquirer book-to-market or Tobin's Q in any model concerning the bid premium. Hence, we cannot draw any conclusions regarding acquirers' valuation and this dependent variable. However, in regard to the target controls, we do find that target book-to-market actually does constitute a significant predictor at the 5% significance level for acquirer bid premiums in the main third model and in the fourth model. Thus, if the market

[39] Although these results are certainly interesting, we note that they are only valid for the industry- and year adjusted 4-week average bid premium since the coefficient for conscientiousness is not significant when another time period is used for the bid premium (e.g. 90-day average or 1-day average). Significance is also lost when using a non-adjusted bid premium.

[40] Note that our measure of cash flows differs compared to past studies (e.g. Hartford, 1999), since they use the Free Cash Flow measures while we use normalized cash flows based on earnings (see Appendix 1 for definition). That being said, Lang *et al.,* (1991) argue that simpler earnings and cash flow measures lead to more robust results than more sophisticated, yet noisy, cash flow measures.

valuation of the target decreases (or if book value of equity increases), the bid premium paid by acquirer increases.

Regarding the deal-specific control variables we observe that the coefficient for payment method all equity is significant at the 5% across the first three models and at the 1% level for the last model, as well as negatively associated with the acquirer bid premium. These findings are consistent with previous research which has shown that acquirers that pay for their targets using all cash also pay significantly higher premiums compared to acquirers that pay with equity (e.g. Slusky & Caves, 1991). Furthermore, it should be noted that deal size constitutes a significant predictor at the 1% in the first three models and at the 5% level in the last model, indicating a negative impact on the bid premiums paid by acquirers. As Hackbarth and Morellec (2008) highlight, this makes sense since a larger deal is much riskier for the acquirer compared to a small deal, not least since a larger transaction puts greater demands on the acquirer's ability to integrate the target into its own organizational structure and business system. This is necessary in order for the acquirer to be able to realize the synergies paid for, and a large target's organizational structure is inherently more complex than that of a smaller target.

Changing focus to M&A deal frequency, we previously argued in our third hypothesis, $H_3$, that there should be a negative relationship between CEO conscientiousness and deal frequency. This line of argumentation is based on the same logic presented for M&A bid premiums, with the addition of the fact that CEOs ranking highly in conscientious are less likely to initiate change processes compared to CEOs ranking lower in this trait (Herrmann & Nadkarni, 2014). However, when studying the results presented in Table 7 above, we note that none of the coefficients for any of the Big Five personality traits are significant, regardless of the model[41]. Consequently, we cannot draw any conclusions about the relationship between CEO conscientiousness and M&A deal frequency in this study. However, there are still some interesting observations that deserve to be highlighted nevertheless. For instance, we note that CEO experience unsurprisingly constitutes a significant predictor at the 1% level across all three models, with a positive coefficient. This means that deal frequency increases as the CEO becomes more experienced.

In regard to the acquirer firm-specific control variables, it can be observed that the coefficient for resource availability is significant at the 1% level in the main sixth model, and in the seventh model, as well as at the 10% level in the fifth model with a consistently negative direction. Just like CEO experience, we observe that acquirer firm size as measured by sales is significantly positive at the 1% level across all three models, indicating that the larger the acquirer, the higher the deal frequency. Moreover, it can also be observed that acquirer resource availability is significant at the 10% in the fifth model and at the 1% level in the sixth and seventh models, with a slightly negative coefficient across all three models.

As a final remark regarding the control variables, we note that the coefficients for acquirer book-to-market, Tobin's Q and profitability are positive and significant at the 5% in the fifth model only, when the personality traits are not included. When they are added in the sixth and seventh models, this observed significance is lost.

[41] The same results are also obtained when using 4-week and 0-week deal frequencies.

### 4.4 Discussion and suggestions for future research

In this subsection we will extend the analysis by discussing additional implications of our empirical results and provide inspiration for possible future studies that could be conducted to further increase our understanding of the relationships at play between personality psychology and corporate finance.

First, although behavioral corporate finance can be said to represent a response to what many researchers perceived as unrealistic assumptions of complete managerial rationality introduced in classical finance and agency theory, it still remains difficult and problematic to dismiss agency theory as inaccurate or wrong; even after having conducted this study. As we have highlighted in earlier sections of this thesis, this rationality assumption is in fact compatible with the empirical evidence relating to poor firm performance, for which agency theory provides an explanation from one point of view. So instead of asserting that agency theory is not valid in the real world, one would arguably be better off viewing the notions introduced in behavioral corporate finance and psychology as a contrasting and complementary approach that studies managerial decision-making under the assumption of human irrationality. That being said, although it is not viable to claim that one assumption is more correct than the other at the point of writing this thesis, our empirical results do (just like several other studies presented throughout this thesis) hint at the fact that there is inherent untapped explanatory power to be found in the cross section between personality psychology and corporate finance.

In regard to more practical implications, we argue that personality psychology can add new perspectives and offer additional explanatory dimensions to the results found in previous M&A research; something which is also supported in other studies where psychological factors have been used to add more depth to the analysis. For instance, Levi *et al.* 2014 found that firms with a larger fraction of female board directors tend to initiate fewer acquisitions compared to firms with a higher fraction of men, and that female board directors pay a lower acquisition premium when they actually do initiate a transaction. The researchers argue that overconfidence represents one explanation to these observations since females generally tend to be less overconfident than men. In other words, the explanation is not the gender per se, but is instead related to different psychological factors. Even though we did not account for the gender of board directors in this study, other personality psychology research has concluded that females are more conscientious than males (e.g. Kaiser *et al.*, 2016). However, since we on the other hand did find conscientiousness to be an influential trait on the CEO-level, it does not seem far-fetched to think that this is also a prominent personality trait among board directors, which could help explain why female board directors have a significant positive association with M&A performance in line with Levi *et al.* (2014).

Further, we also believe that personality traits research, as well as personality psychology overall, can serve well as a set of complementary explanations for transactional outcomes by providing an additional explanatory dimension, beyond the already observed situation specific behavioral biases such as hubris or overconfidence (cf. Roll, 1986; Malmendier & Tate, 2008). The fact that overconfidence is positively associated with the personality traits conscientiousness, agreeableness and extraversion (Zaidi & Muhammed, 2012), hints at the possibility that new perspectives and relationships could be established by further investigating the relationships at play between these psychological aspects and a dependent variable of the researcher's choice. By looking into how the situation-specific behavioral biases relate to the more stable personality traits, researchers will be able to uncover more holistic explanations for an (already) observed phenomenon. As an example, aspects and explanations relating to CEO narcissism could be nuanced further with the adoption of notions found in personality psychology. So instead of just stating that a CEO is a narcissist and that this behavioral bias affects transactional outcomes such as the bid premium (e.g. Chatterjee & Hambrick, 2007; 2011), personality psychology offers additional explanations given the empirical results indicating that a narcissistic CEO typically scores high in extraversion and low in agreeableness (Paulhus, 2001).

Additionally, since highly conscientious individuals are often more risk averse, less willing to innovate (Judge *et al.,* 2009) and less likely to initiate strategic change (Herrmann & Nadkarni, 2014), personality traits do by extension have consequences for corporate finance decision-making at its core. More specifically, given that investors and managers are said to have conflicting interests in line with agency theory (e.g. Jensen & Meckling, 1976), the diverging risk preferences will inevitably affect decision-making and by extension firm outcomes. Even if we did not find any significant relationships between CEO personality traits and M&A deal frequency in this study, past literature has found conscientious CEOs to delay strategic change (e.g. Herrmann & Nadkarni, 2014) and avoid innovative firms (e.g. Gow *et al.,* 2016). As a result, these behaviors will arguably affect which projects, and hence what associated risks, that will be accepted and undertaken by managers. These personality characteristics could in turn also affect what capital structure is chosen. With this in mind it becomes clear that a CEO's personality (as opposed to incentives alone) could reveal how he or she is bound to act in situation where the firm possesses excess cash flows, has to choose between multiple projects, or when investment- and financing decisions need to be made.

Finally, we will now conclude this section by presenting some suggestions for future research. Considering that the Big Five personality traits model is still relatively unexplored in a corporate finance context (Gow *et al.,* 2016; Green *et al.,* 2018), we believe that there are plenty of opportunities to conduct further studies in this area to shed more light on the various undiscovered relationships that may exist between personality psychology, top executives' decision-making and firm performance or transactional outcomes. For instance, we believe that there are plenty of opportunities to extend the research on personality traits to other topics and contexts within the domain of (corporate) finance, as well as within M&A more specifically. For example, it would be interesting to know more about the interplay between personality traits and corporate governance; something which future studies could try to explore. Furthermore, since we observe promising significant results relating to personality traits and stock market reactions, it seems reasonable to think that personality psychology can offer more explanatory power in this context than previously anticipated. In order to grasp the full extent to which personality traits affect CEO (and thus firm) behavior and decision-making, it would be interesting to redo our study with a longer time horizon to investigate how CEOs' personality traits affect long term post-acquisition abnormal returns or other metrics of firm performance. Additionally, the connection to other aspects such as financing and investment decisions could also be investigated further.

Arguably, short-term stock market reactions (CAR) is a direct indication of perceived long-term shareholder value-creation (Hackbarth & Morellec, 2008), yet, our study does not account for the actual value created over a longer period of time. Hence, a more long-term study could be carried out as a complement to the short-run perspective taken in this study, not least due to the presence of market frictions and other inefficiencies in the real world that are not explicitly accounted for in the short-run model (Shleifer & Vishny, 2003). Additionally, given the results in this study, it would also be interesting to further explore the relationship between CEO conscientiousness and M&A deal characteristics, not least its association with expected product synergies which could serve as a proxy for deal quality (Malmendier & Tate, 2008).

It is also entirely plausible that other dependent variables, beyond those that were chosen for this study, could capture the personality characteristics associated with conscientiousness (e.g. high risk-aversion, goal focus, attentiveness to details, an analytical mindset as well as a need to collect compelling evidence before any action is taken [Roberts *et al.,* 2009]) in different ways. For instance, these personality characteristics of conscientious CEOs could perhaps be reflected in the time spent on due diligence processes, hence capturing the same characteristics of conscientiousness through an alternative measurement.

In addition, M&A research have so far usually tended to only focus on the acquiring firm's CEO as the main subject of interest, hence neglecting the fact that at least two participating parties are required to tango (John *et al.,* 2011). So even though one might draw conclusions regarding the presence of certain relationships between acquirer firm CEOs personality traits and different aspects of M&A (e.g. value creation, acquisitiveness, etcetera), there are always multiple individuals to consider in every transaction, not least the target firm's CEO. By using the same research approach outlined in this study, data could be collected for public target firms and their associated CEOs, in order to capture additional aspects of negotiations as well as the cross section between the personality traits of target firm CEOs, M&A performance and decision-making.

A final suggestion for future research relates to the relationship between leadership effectiveness, productiveness and extreme versions of the Big Five personality traits. In line with the discussion by Kaiser and Overfield (2010), recent personality research indicate that counterproductive dispositions and values can help to enhance our understanding of the mechanisms and causes of effective or ineffective leadership. The authors point out that extreme versions of the Big Five personality traits, so called "dark-side" traits or dispositions, are said to spur counter productiveness since they disrupt relationships and distort one's judgement, for instance when managers are so conscientious that they are afraid to make mistakes. The leadership aspect in particular can also be directly connected to previous research on CEO narcissism in which researchers have concluded that a certain degree of these behavioral tendencies is actually beneficial for effective leadership as well as productivity, and a natural part of every human being, while an excessive level of narcissism leads to the exact opposite due to an exaggerated risk-taking behavior (Freud, 1914; 1957; Maccoby, 2003; Higgs, 2009). Also, given the complex and multifaceted associations between CEO personality traits and finance related aspects, future research could also try to develop more advanced models to capture these relationships in a more true-to-life way, for instance by assuming using non-linearity as opposed to linearity among the variables., for instance by assuming using non-linearity as opposed to linearity among the variable.

## 5. Summary and Conclusions

Over the years, mergers and acquisitions have come to represent one of the most well researched areas in the field of corporate finance. However, although the rationales for engaging in M&A activities revolve around the end-goal of creating additional shareholder, the consensus among researchers is that most M&A transactions destroy value for the shareholders in the acquiring firm. Consequently, researchers have recently started to take an increasing interest in the CEO as the subject of study in order to find new explanations for the puzzling question relating to why firms keep engaging in M&A transactions even though the established consensus is that they in most cases are value destroying.

For a very long period of time, agency theory served as the main explanation for poor acquiring firm performance, highlighting that these empirical observations were simply the result of a principal-agent conflict between the acquiring firm's shareholders and CEO. However, during later decades, researchers have come to question the associated assumption of complete rationality translating into self-serving business leaders by extension. As a result, they started to borrow other theories and notions found in the domains of behavioral psychology which introduces the assumption of human irrationality influencing a CEO's decision-making process. During the first pioneering steps in this new cross section, researchers initially focused on situation dependent behavioral biases such as CEO narcissism, hubris and overconfidence as explanations for poor M&A- and firm performance. However, more recently, a few researchers have also begun to explore the relationship between a CEO's personality traits, firm performance and transactional outcomes in the cross section between personality psychology and corporate finance; a research area which is still very much unexplored.

Using an algorithm developed by Mairesse *et al.* (2007) based on the prominent Big Five personality traits model to assess the personality of 838 unique acquirer firm CEOs, using 17,842 manually cleaned transcribed earnings calls, this study expands on pre-existing M&A research by being the first (as far as we are aware) to shed light on the relationship between CEO conscientiousness and M&A short-run cumulative abnormal returns, bid premiums and deal frequency. Based on our regression results, we conclude that there is a statistically significant positive relationship at the 5% significance level between CEO conscientiousness and short-run CAR, as well as between CEO conscientiousness and M&A bid premiums. These results can be explained by the fact that highly conscientious individuals tend to be attentive to detail, risk averse, goal oriented, analytical, self-disciplined, have the ability to control short sighted impulses, as well as have the need to collect convincing evidence before any actions are taken. In turn, the resulting outcome should be positive when a strategic action still is taken. This is observed particularly well in the positive relation between CEO conscientiousness and CAR resulting from M&A announcements, since this result indicates that the stock market perceives the M&A transactions to be value-adding. Additionally, the personality characteristics associated with conscientiousness should logically also prevent the payment of unjustifyingly high M&A bid premiums. On the other hand, we cannot draw any conclusions about the relationship between CEO conscientiousness and M&A deal frequency since no statistical significance is observed at any level.

On an ending note, we believe that the empirical results presented in this thesis have contributed to existing M&A research in the field of (behavioral) corporate finance by shedding light on the relationship between short-term stock market reactions, CEO acquisitiveness and CEO personality traits. In doing so, we also believe that the results can be viewed as a meaningful contribution to the fields of personality psychology and corporate finance and serve as a platform for future research to build on.

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# Appendix

**Appendix 1.** Summary and definitions of CEO-, firm-, and deal-specific control variables

In this table, the control variables used in the main regression models are presented alongside their measurement and data sources. The variables are primarily defined in line with conventional M&A studies, with some small deviations, see the asterisk (*) below the table for details. The control variables are adjusted for industry and year where applicable.

**Panel A:** ***CEO-specific variables***

| Variable | Measurement | Data source |
|---|---|---|
| CEO Agreeableness | A continuous scale ranging from 1 (low) to 7 (high) | S&P Capital IQ |
| CEO Emotional stability | A continuous scale ranging from 1 (low) to 7 (high) | S&P Capital IQ |
| CEO Extraversion | A continuous scale ranging from 1 (low) to 7 (high) | S&P Capital IQ |
| CEO Openness to experience | A continuous scale ranging from 1 (low) to 7 (high) | S&P Capital IQ |
| CEO Age | Number of years at time *t* since date of birth | BoardEx |
| CEO Male | Binary variable (male = 1; female = 0) | BoardEx |
| CEO Tenure | Number of years as CEO at the acquirer firm in a particular M&A transaction | BoardEx |
| CEO Duality | Binary variable (CEO and Chairman of the Board of Directors = 1; CEO only = 0. At time *t*.) | BoardEx |
| CEO Experience* | Dummy variable indicating if a CEO has engaged in at least three M&A transactions over the course of their tenure at firm *i* prior to the observed M&A transaction in the sample. | BoardEx & Bloomberg |
| CEO Ivy League(+)** | Binary variable (Ivy League University Plus = 1; all others = 0) | BoardEx |
| CEO MBA | Binary variable (Master of Business Administration [MBA] = 1; all others = 0) | BoardEx |
| CEO PhD | Binary variable (PhD = 1; all others = 0) | BoardEx |
| CEO Graduated with honor | Binary variable (graduated with honor = 1; all others = 0) | BoardEx |

**Panel B:** ***Firm specific control variables***

| Variable | Measurement | Data source |
|---|---|---|
| Acquirer: leverage*** | Total debt over total assets, divided by the average industry debt-to-asset ratio (FY prior transaction) | Bloomberg, CRSP & Compustat |
| Acquirer: resource availability*** | Current assets over current liabilities, divided by the average current ratio (FY prior transaction) | Bloomberg, CRSP & Compustat |
| Acquirer: normalized cash flow | Earnings before extraordinary items plus depreciation over total book assets (FY prior transaction) | Bloomberg |
| Acquirer: Tobin's Q | Total book value of assets plus market value of equity minus book equity, over book value of assets (FY prior transaction) | Bloomberg |
| Acquirer and target: firm size**** | The natural logarithm of revenues (FY prior transaction) | Bloomberg |
| Acquirer and target: book-to-market*** | Book value of equity to market capitalization, where market capitalization is equal to share price at YE times shares outstanding (FY prior transaction) | Bloomberg, CRSP & Compustat |
| Acquirer and target: profitability*** | Net income divided by total assets (Return on assets [ROA]), divided by the average industry ROA (FY prior transaction) | Bloomberg, CRSP & Compustat |
| Acquirer: free-float | Outstanding shares leen*ss restricted shares (i.e. shares held by company managements, promoters and government), divided by outstanding shares (FY prior transaction) | Bloomberg |
| Target: status | Binary variable (public = 1; private = 0) | Bloomberg |

**Panel C:** ***Deal specific control variables***

| Variable | Measurement | Data source |
|---|---|---|
| Payment method | Binary variable (all cash /equity = 1; all others = 0), operationalized with two dummy variables | Bloomberg |
| Deal size***** | Announced deal value divided by acquirer's market capitalization (FY prior transaction) | Bloomberg |
| Product synergies****** | 4-point product-relatedness scale (Acquirer and target 4-digit SIC code match = 4; Acquirer and target 2-digit SIC code match; Acquirer and target share same industry classification code = 2; Unrelated firms = 1), operationalized with four dummy variables | Bloomberg & S&P Capital IQ |
| Bid competition | Binary variable (competing bids = 1; all others = 0) | Bloomberg |
| Tender offer | Binary variable (tender offer = 1; all others = 0) | Bloomberg |
| Hostile | Binary variable (hostile offer = 1; all others = 0) | Bloomberg |
| Cross-border | Binary variable (acquirer firm not domiciled in U.S. = 1; all others = 0) | Bloomberg |

*(Continued on next page)*

**Appendix 1.** Summary and definitions of CEO-, firm-, and deal-specific control variables *(Cont'd)*

**Panel D:** ***Bias correction control variables***

| Variable | Measurement | Data source |
| --- | --- | --- |
| Correction for firm sample selection bias | See section *3.6.2 Model misspecification and potential biases* | N/A |
| Correction for CEO self-selection bias | See section *3.6.2 Model misspecification and potential biases* | N/A |

* Data was available back to the year 1996 and used when applicable. M&A transactions above five percent of acquirer's market capitalization (FY prior transaction).
** The Ivy League Universities comprise Harvard, Yale, Cornell, Columbia, University of Pennsylvania, Princeton, Dartmouth and Brown. Ivy League+, which also includes MIT and Stanford, will be used in the main model, while the traditional Ivy League will be used as robustness.
*** The industry metrics are retrieved from CRSP and Compustat, where the firms' SIC codes is categorized according to Fama and French's 12 industry classifications. The industry metrics are based on CRSP US Common Stocks. Monthly industry metrics matched to acquirer and target fiscal year-end.
**** Consistent with Malmendier and Tate (2008), firm size is measured by sales. However, since the sample consists of firms in many different industries and not solely of manufacturing firms, the natural logarithm of assets is used as a robustness check. Natural logarithm is used in order to avoid the absolute values to distort the regression results.
***** Consistent with Malmendier and Tate (2008) and Hackbarth and Morellec (2008), deal size is defined as a relative measure. However, an alternative measure of deal size is also used by taking the target revenue over acquirer's revenue (FY prior to the transaction). Due to data limitations of private targets, this variable is not used in the main regression models.
****** Based on Hayward & Hambrick's (1997) 4-point product relatedness (ordinal) scale but revised for the 2 points where Fama and French 12 industry classifications is utilized in order to determine commonalities. SIC Codes are mainly retrieved from Bloomberg but complemented with data from S&P Capital IQ.

## **Appendix 2.** Example extracts from CEO transcripts

Below, there are two short extracts from transcribed earnings calls (Q&A sessions) used in our sample. The first extract serves as an example of the language spoken by one of the least conscientious CEOs in the sample (as calculated by the algorithm) while the second provides an example of the opposite, i.e. a CEO ranking highly in this personality trait. Mairesse *et al.,* (2007) point out that a high score in conscientiousness is associated with an overall positive tone in the language (i.e. words with a positive connotation are frequently used), a lack of swear words and words associated with anger (to name a few examples). Hence, a low conscientiousness score is associated with a negative language.

**Extract 1 (Low conscientiousness)**
*Larry Ellison*
Chairman of the Board and Chief Executive Officer*
Oracle Corporation

**Personality scores**

| Agreeableness | Conscientiousness | Emotional stability | Extraversion | Openness to experience |
|---|---|---|---|---|
| 2.436 | 1.089 | 2.798 | 3.730 | 2.178 |

**Transcript:** Earnings call Q1 2012, 2011-09-20.

/.../
"Let me add a little bit to that just so we're really clear. I don't care if our commodity x86 business goes to 0. We don't make any money selling those things. We have no interest in selling other people's IP. Commodity x86 includes Intel IP, Microsoft IP. We don't make money selling that. Sun sold that stuff, and we are phasing out that business. We have no interest in it whatsoever. We have interest in selling systems that include our IP. That's how we're going to drive the profitability of our overall hardware business, eventually. I think that's in fairly short order. Our engineered systems will be -- are growing at such a high rate that the overall hardware business top line will grow also. But what's really important is to continuously grow our margins in the hardware business and our profitability in the hardware business, so we can meet Safra's goal, which is getting back to our pre-Sun acquisition's overall profit margins. Next question?"
/.../


* At the time of the quarterly earnings call.

**Extract 2 (High conscientiousness)**
*Aaron Todd*
Director and Chief Executive Officer*
Air Methods Corporation

**Personality scores**

| Agreeableness | Conscientiousness | Emotional stability | Extraversion | Openness to experience |
|---|---|---|---|---|
| 4.184 | 6.494 | 3.414 | 4.694 | 5.917 |

**Transcript:** Earnings call Q4 2007, 2008-03-12

/.../
"Yeah. Great. Thanks for asking the question. I probably should have addressed it in my opening remarks. We are very pleased that Paul Tate has agreed to join us in management. Of course, he is resigning from his Board seat in order to facilitate the transition.

In the aftermath of the CJ acquisition, the demand on my time away from headquarters had increased quite a bit. We almost doubled the number of our hospital customer relationships. We want to make sure that they feel and indeed do have full access to the CEO of this corporation. And so I was spending a lot more time in developing those relationships and certainly just the greater scope of our operation is creating more opportunities for business development for possible M&A consolidation opportunities."
/.../


* At the time of the quarterly earnings call

**Appendix 3.** Probit regression results for firm sample selection bias

This table illustrates the results from the probit regression model used to predict probabilities for whether a firm is included in both the S&P Composite 1500® and our sample of M&A transactions. The dependent variable is a dummy variable set to one if an acquirer is present in both samples during the year of announcement, and zero otherwise. All control variables are presented in detail in subsection 3.5.3 Control variables alongside their definitions which can be found in Appendix 1. Robust standard errors are in parentheses. Significance tested using t-statistics. *, **, and *** denote significance at the 10%, 5%, and 1% level respectively.

| **Variable** | **(1)** |
|---|---|
| A: Leverage | 0.116*** |
| | (0.044) |
| A: Tobin's Q | -0.169*** |
| | (0.020) |
| A: Firm size, sales | -0.037*** |
| | (0.011) |
| A: Book-to-market | 0.000 |
| | (0.007) |
| A: Resource availability | -0.008 |
| | (0.010) |
| A: Normalized cash flow | -0.200** |
| | (0.099) |
| Constant | -0.754*** |
| | (0.103) |
| | |
| Observations | 13,787 |
| Pseudo R2 | 0.015 |

**Appendix 4**. Pairwise correlations of independent variables

In this table, the correlation coefficients and its significance are presented. Full definitions of the variables can be found in Appendix 1. The firm-specific variables are year and industry adjusted. Variables 15-24 are acquirer firm-specific control variables and variables 25-29 are target control variables. * denote significance at the 5%.

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) | (21) | (22) | (23) | (24) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) Consc | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| (2) Agree | 0.55* | 1 | | | | | | | | | | | | | | | | | | | | | | |
| (3) Emoti | 0.00 | 0.46* | 1 | | | | | | | | | | | | | | | | | | | | | |
| (4) Extra | 0.05* | -0.07* | 0.12* | 1 | | | | | | | | | | | | | | | | | | | | |
| (5) Openn | 0.62* | 0.35* | 0.02 | 0.11* | 1 | | | | | | | | | | | | | | | | | | | |
| (6) Age | 0.02 | -0.05 | -0.14* | -0.03 | -0.04 | 1 | | | | | | | | | | | | | | | | | | |
| (7) Gender | -0.01 | 0.05 | 0.05* | 0.06* | 0.00 | 0.04 | 1 | | | | | | | | | | | | | | | | | |
| (8) Tenure | -0.02 | 0.00 | -0.09* | 0.03 | 0.02 | 0.30* | 0.06* | 1 | | | | | | | | | | | | | | | | |
| (9) Duality | 0.00 | -0.02 | -0.08* | -0.04 | -0.02 | 0.12* | 0.09* | 0.09* | 1 | | | | | | | | | | | | | | | |
| (10) Exper. | 0.01 | -0.02 | -0.03 | 0.05 | -0.02 | 0.12* | 0.01 | 0.20* | 0.01 | 1 | | | | | | | | | | | | | | |
| (11) IvyL | 0.00 | 0.03 | 0.03 | -0.04 | 0.06* | -0.02 | 0.02 | -0.03 | 0.04 | -0.05 | 1 | | | | | | | | | | | | | |
| (11) IvyL+ | 0.04 | 0.07* | 0.02 | -0.03 | 0.08* | 0.02 | 0.04 | 0.00 | 0.07* | -0.01 | 0.84* | 1 | | | | | | | | | | | | |
| (12) MBA | 0.02 | 0.01 | 0.02 | -0.04 | 0.05 | -0.03 | 0.04 | -0.06* | 0.02 | 0.01 | 0.20* | 0.23* | 1 | | | | | | | | | | | |
| (13) PhD | -0.03 | -0.02 | -0.04 | 0.08* | 0.01 | 0.07* | 0.02 | 0.06* | 0.00 | -0.03 | 0.06* | 0.04 | 0.03 | 1 | | | | | | | | | | |
| (14) G.Honors | 0.02 | -0.02 | -0.04 | 0.01 | 0.04 | -0.09* | -0.01 | -0.01 | 0.01 | -0.01 | 0.08* | 0.06* | 0.02 | 0.17* | 1 | | | | | | | | | |
| (15) Lever. | 0.14* | 0.13* | -0.04 | 0.02 | 0.17* | -0.06* | 0.05 | 0.06* | 0.00 | 0.03 | 0.05 | 0.06* | 0.00 | -0.01 | 0.07* | 1 | | | | | | | | |
| (16) Res. A. | 0.04 | 0.02 | -0.04 | -0.03 | -0.03 | -0.03 | 0.02 | 0.07* | -0.05 | -0.03 | -0.01 | 0.00 | -0.05 | -0.02 | -0.04 | -0.10* | 1 | | | | | | | |
| (17) Norm. CF | -0.01 | -0.01 | 0.04 | 0.04 | 0.01 | 0.03 | 0.01 | -0.05 | 0.00 | -0.07* | -0.02 | -0.05 | -0.04 | 0.12* | 0.01 | -0.05 | 0.04 | 1 | | | | | | |
| (18) Q | 0.07* | 0.08* | 0.04 | 0.00 | 0.06* | -0.09* | -0.02 | 0.01 | -0.02 | -0.07* | -0.02 | -0.02 | 0.00 | 0.01 | 0.02 | 0.04 | 0.05 | 0.34* | 1 | | | | | |
| (19) Size, sal | -0.05* | -0.15* | 0.00 | 0.06* | -0.03 | 0.13* | -0.03 | -0.11* | 0.00 | -0.01 | 0.09* | 0.08* | 0.00 | 0.04 | 0.05 | -0.08* | -0.31* | 0.09* | -0.16* | 1 | | | | |
| (20) Size, ass | -0.05 | -0.10* | 0.04 | 0.00 | -0.04 | 0.11* | -0.04 | -0.08* | -0.02 | 0.01 | 0.11* | 0.09* | -0.01 | 0.03 | 0.07* | 0.01 | -0.27* | 0.00 | -0.18* | 0.90* | 1 | | | |
| (21) B/M | 0.05 | -0.02 | -0.13* | 0.06* | 0.12* | 0.01 | 0.04 | 0.02 | 0.00 | 0.11* | -0.01 | 0.00 | -0.03 | -0.01 | 0.08* | 0.05 | 0.04 | -0.24* | -0.49* | -0.06* | -0.05 | 1 | | |
| (22) Profitab. | 0.07* | 0.03 | 0.01 | 0.01 | 0.08* | 0.00 | 0.01 | -0.04 | 0.01 | -0.02 | 0.02 | 0.02 | -0.01 | 0.04 | 0.01 | 0.02 | 0.05* | 0.45* | 0.03 | 0.03 | -0.02 | 0.02 | 1 | |
| (23) FreeF | 0.07* | 0.05 | 0.07* | -0.09* | -0.02 | 0.08* | -0.03 | -0.11* | 0.03 | 0.02 | 0.03 | 0.06* | 0.05 | 0.00 | 0.02 | -0.03 | -0.08* | -0.02 | -0.07* | 0.21* | 0.23* | 0.00 | -0.02 | 1 |
| (25) Size, sal | -0.09 | -0.12* | -0.02 | 0.07 | 0.02 | 0.03 | -0.09 | -0.10* | 0.06 | -0.05 | 0.09 | 0.05 | -0.04 | 0.06 | 0.01 | -0.11* | -0.12* | 0.02 | -0.15* | 0.66* | 0.61* | -0.06 | -0.03 | 0.05 |
| (26) Size, ass | -0.05 | -0.08 | 0.03 | 0.01 | 0.00 | 0.03 | -0.08 | -0.13* | 0.04 | -0.07 | 0.10* | 0.06 | -0.04 | 0.11* | 0.09 | -0.07 | -0.12* | 0.07 | -0.08 | 0.68* | 0.72* | -0.10* | -0.01 | 0.11* |
| (27) B/M | 0.07 | 0.05 | 0.03 | 0.04 | 0.00 | -0.05 | 0.04 | 0.05 | -0.01 | -0.02 | -0.05 | -0.05 | 0.10 | -0.01 | -0.07 | -0.04 | 0.13* | -0.11 | -0.17* | -0.12* | -0.18* | 0.25* | 0.09 | -0.08 |
| (28) Profitab. | 0.02 | 0.04 | 0.01 | -0.04 | -0.03 | -0.07 | 0.00 | -0.06 | -0.09 | 0.00 | -0.10 | -0.10 | 0.01 | -0.01 | 0.01 | -0.03 | 0.02 | 0.03 | -0.04 | 0.07 | 0.06 | 0.10 | 0.09 | 0.07 |
| (29) Status | 0.05 | 0.03 | 0.02 | 0.02 | 0.01 | 0.02 | 0.01 | 0.07* | -0.06* | 0.02 | 0.01 | 0.01 | -0.02 | 0.02 | 0.00 | 0.04 | -0.05 | 0.08* | 0.05* | 0.30* | 0.32* | -0.07* | 0.04 | 0.12* |
| (30) All cash | 0.04 | -0.01 | -0.03 | -0.01 | 0.05 | 0.05 | -0.03 | 0.04 | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 | -0.03 | -0.02 | 0.04 | 0.02 | -0.04 | -0.07* | -0.06* | 0.06* | 0.02 | -0.03 |
| (31) All eq. | -0.01 | 0.02 | -0.02 | -0.08* | -0.07* | -0.02 | -0.03 | -0.02 | -0.05 | 0.00 | 0.01 | 0.00 | -0.03 | 0.02 | 0.00 | 0.00 | -0.01 | -0.06* | -0.03 | 0.07* | 0.10* | -0.01 | -0.05 | 0.04 |
| (32) D. Size% | -0.04 | 0.00 | 0.01 | 0.01 | 0.03 | -0.05 | -0.09* | -0.02 | -0.05 | 0.04 | 0.00 | -0.03 | 0.02 | 0.02 | 0.02 | 0.02 | -0.03 | 0.01 | -0.08* | 0.02 | 0.05 | 0.12* | -0.02 | 0.00 |
| (33) D. Size,sal | -0.02 | 0.04 | 0.01 | -0.05 | 0.04 | -0.10* | -0.08 | -0.05 | -0.07 | 0.04 | 0.00 | -0.05 | 0.01 | 0.02 | 0.05 | -0.02 | -0.01 | 0.01 | 0.00 | -0.15* | -0.13* | -0.02 | -0.07 | 0.00 |
| (34) PS, 4p | 0.11* | 0.06* | 0.00 | -0.01 | 0.05 | 0.01 | -0.01 | 0.01 | -0.03 | -0.02 | 0.03 | 0.01 | -0.03 | -0.02 | -0.02 | 0.06 | 0.06* | 0.05 | 0.03 | 0.12* | 0.16* | 0.02 | 0.03 | 0.08* |
| (35) PS, 3p | -0.05 | -0.01 | 0.01 | 0.07* | -0.01 | -0.03 | -0.01 | 0.02 | -0.03 | -0.01 | 0.01 | 0.02 | -0.01 | 0.06* | -0.01 | 0.05 | -0.08* | 0.03 | 0.07* | -0.01 | -0.03 | -0.01 | 0.01 | -0.04 |
| (36) PS, 2p | 0.06* | 0.03 | 0.01 | -0.05 | 0.03 | -0.01 | 0.02 | -0.01 | 0.05 | 0.05* | -0.01 | 0.00 | 0.06* | 0.00 | -0.03 | 0.04 | -0.03 | -0.01 | 0.03 | 0.06* | 0.03 | -0.06* | 0.04 | 0.03 |
| (37) PS, 1p | -0.07* | -0.05 | -0.01 | -0.02 | -0.05 | 0.02 | 0.01 | -0.02 | 0.02 | 0.00 | -0.02 | -0.03 | 0.00 | -0.03 | 0.04 | -0.10* | 0.03 | -0.06* | -0.09* | -0.11* | -0.11* | 0.03 | -0.05 | -0.05 |
| (38) Comp. | -0.06* | -0.04 | 0.01 | 0.01 | -0.04 | 0.00 | 0.01 | 0.00 | 0.02 | 0.03 | 0.02 | 0.01 | 0.03 | -0.01 | 0.02 | 0.01 | -0.02 | -0.02 | -0.03 | 0.08* | 0.07* | -0.01 | 0.00 | 0.02 |
| (39) Tender | 0.08* | 0.03 | 0.04 | 0.02 | 0.04 | 0.02 | -0.04 | 0.06* | -0.06* | 0.02 | 0.03 | 0.03 | -0.04 | -0.03 | 0.00 | 0.00 | -0.03 | 0.06* | 0.07* | 0.11* | 0.11* | -0.03 | 0.04 | 0.07* |
| (40) Hostile | -0.02 | 0.00 | 0.00 | -0.01 | 0.00 | 0.02 | 0.01 | 0.05 | 0.02 | -0.02 | 0.07* | 0.09* | 0.06* | -0.01 | -0.02 | 0.04 | -0.02 | -0.01 | -0.01 | 0.03 | 0.03 | 0.01 | 0.01 | 0.03 |
| (41) Crossb. | 0.05* | -0.03 | -0.02 | 0.02 | 0.03 | 0.02 | 0.02 | -0.03 | -0.01 | -0.02 | 0.04 | 0.06* | 0.06* | -0.04 | -0.04 | 0.02 | 0.03 | -0.02 | -0.04 | 0.01 | 0.01 | 0.00 | 0.03 | 0.01 |
| (42) Corr. SSb | -0.05* | 0.01 | -0.02 | -0.03 | -0.06* | -0.02 | 0.00 | 0.02 | 0.02 | 0.08* | -0.02 | -0.03 | -0.06* | -0.03 | -0.02 | 0.08* | 0.04 | -0.27* | -0.53* | -0.29* | -0.16* | 0.39* | -0.06* | -0.04 |
| (43) Corr. Cssb. | 0.19* | 0.12* | -0.05 | 0.03 | 0.20* | -0.19* | 0.02 | -0.29* | -0.04 | -0.04 | 0.05 | 0.05 | -0.01 | -0.03 | 0.10* | 0.73* | 0.17* | 0.19* | 0.19* | -0.14* | -0.10* | 0.26* | 0.41* | -0.05 |

*(Continued on next page)*

**Appendix 4**. Pairwise correlations of independent variables *(Cont'd)*

| Variables | (25) | (26) | (27) | (28) | (29) | (30) | (31) | (32) | (33) | (34) | (35) | (36) | (37) | (38) | (39) | (40) | (41) | (42) | (43) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (25) Size, sal | 1 | | | | | | | | | | | | | | | | | | |
| (26) Size, ass | 0,90* | 1 | | | | | | | | | | | | | | | | | |
| (27) B/M | -0,09 | -0,07 | 1 | | | | | | | | | | | | | | | | |
| (28) Profitab. | 0,06 | 0,11* | 0,17* | 1 | | | | | | | | | | | | | | | |
| (29) Status | 0,23* | 0,26* | 0,01 | -0,01 | 1 | | | | | | | | | | | | | | |
| (30) All cash | -0,42* | -0,41* | 0,11* | 0,08 | -0,21* | 1 | | | | | | | | | | | | | |
| (31) All eq. | 0,24* | 0,26* | 0,04 | -0,02 | 0,24* | -0,36* | 1 | | | | | | | | | | | | |
| (32) D. Size% | 0,37* | 0,38* | -0,08 | 0,00 | 0,25* | -0,30* | 0,24* | 1 | | | | | | | | | | | |
| (33) D. Size,sal | 0,43* | 0,38* | -0,02 | 0,00 | 0,17* | -0,38* | 0,37* | 0,66* | 1 | | | | | | | | | | |
| (34) PS, 4p | 0,11* | 0,14* | -0,02 | 0,05 | 0,37* | -0,15* | 0,12* | 0,23* | 0,13* | 1 | | | | | | | | | |
| (35) PS, 3p | 0,00 | 0,02 | -0,04 | -0,03 | 0,18* | -0,06* | 0,03 | 0,00 | -0,04 | -0,18* | 1 | | | | | | | | |
| (36) PS, 2p | 0,03 | 0,02 | 0,04 | -0,02 | 0,12* | 0,02 | -0,01 | -0,03 | -0,07 | -0,11* | -0,11* | 1 | | | | | | | |
| (37) PS, 1p | -0,14* | -0,18* | 0,04 | -0,01 | -0,47* | 0,15* | -0,10* | -0,15* | -0,05 | -0,55* | -0,56* | -0,35* | 1 | | | | | | |
| (38) Comp. | 0,02 | 0,01 | -0,03 | 0,00 | 0,11* | 0,01 | -0,01 | 0,01 | -0,03 | 0,00 | 0,03 | 0,03 | -0,04 | 1 | | | | | |
| (39) Tender | -0,20* | -0,17* | 0,03 | 0,01 | 0,47* | 0,09* | -0,04 | 0,00 | -0,10 | 0,17* | 0,10* | 0,06* | -0,23* | 0,11* | 1 | | | | |
| (40) Hostile | -0,06 | -0,07 | 0,09 | -0,01 | 0,09* | 0,03 | -0,01 | -0,02 | -0,05 | 0,05 | 0,01 | 0,04 | -0,07* | 0,20* | 0,20* | 1 | | | |
| (41) Crossb. | -0,22* | -0,24* | 0,30* | 0,16* | -0,06* | 0,11* | -0,09* | -0,08* | -0,20* | -0,08* | -0,04 | -0,05 | 0,12* | -0,01 | 0,02 | 0,03 | 1 | | |
| (42) Corr. SSb | -0,09 | -0,11* | 0,14* | -0,01 | -0,12* | 0,01 | 0,02 | 0,27* | 0,15* | -0,03 | -0,03 | -0,08* | 0,09* | -0,02 | -0,07* | 0,02 | 0,00 | 1 | |
| (43) Corr. Cssb. | -0,15* | -0,08 | 0,03 | 0,06 | 0,01 | 0,00 | -0,03 | 0,02 | -0,02 | 0,08* | 0,02 | 0,03 | -0,09* | -0,01 | 0,01 | 0,01 | 0,04 | -0,04 | 1 |

**Appendix 5.** Stock market reactions of M&A announcements

This table presents the acquirer firm's stock market reactions, measured as the cumulative average abnormal return. The market model is utilized for all event studies except for model [-1; 1][A], that utilizes the market-adjusted return model. Significance tested using a t-statistic and presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level respectively.

| | Event windows | | | | | | |
|---|---|---|---|---|---|---|---|
| | **[-1; 1]** | **[-2; 2]** | **[-3; 3]** | **[-5; 5]** | **[-1; 1][A]** | **[-1; 1][B]** | **[-1; 1][C]** |
| CAAR | 0.0108 | 0.0094 | 0.0091 | 0.0068 | 0.0108 | 0.0108 | 0.0108 |
| *t*-statistic | (3.1961)*** | (1.9882)** | (1.5358) | (0.8243) | (3.1952)*** | (3.2169)*** | (3.1905)*** |
| Observations | 1,371 | 1,371 | 1,371 | 1,371 | 1,371 | 1,371 | 1,371 |

[A] market-adjusted return model

[B] alternative index, Nasdaq Composite

[C] 120-day estimation window