The effect of top management team compensation heterogeneity on organizational ambidexterity

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Abstract

Using upper echelons theory as theoretical foundation, I examine the effect of the heterogeneity of top management team (TMT) compensation arrangements on organizational ambidexterity (OA). Three different heterogeneity measures were used: the Herfindahl-Hirschman index (HHI), the coefficient of variation (CV) and the Gini index. OA is conceptualized as the simultaneous pursuit of exploitation and exploration. I find that the heterogeneity of TMT compensation arrangements has a negative effect on OA. Moreover, the heterogeneity of TMT long-term compensation arrangements has a negative effect on OA, whereas the heterogeneity of TMT short-term compensation arrangements has no effect on OA. Furthermore, I find that the heterogeneity of TMT compensation arrangements has a negative effect on exploration, whereas the results of the heterogeneity of TMT compensation arrangements and its effect on exploitation only revealed a negative, significant relationship for the Gini index and insignificant results for the other heterogeneity measures. Overall, my findings suggest that TMT compensation heterogeneity has a negative effect on OA and specifically, these negative effects could be explained by the effect of TMT long-term compensation heterogeneity on OA and the negative effect of TMT compensation heterogeneity on exploration.

Keywords: Organizational ambidexterity, exploitation, exploration, compensation arrangements, top management team, upper echelons theory, heterogeneity, innovation
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Introduction

In 1976, Robert Duncan first coined the term ‘ambidextrous’ in the organizational context, arguing that firms need to shift their structures to initiate and execute innovation. 15 years later, in his seminal paper on organizational learning, March (1991) examined the relation between the exploitation of old certainties and the exploration of new possibilities in organizational learning. In the footsteps of March (1991), a vast amount of research on this relation and balance between exploitation and exploration, also known as organizational ambidexterity (OA), has emerged (O’Reilly & Tushman, 2013; Raisch & Birkinshaw, 2008; Simsek, 2009). Scholars in several research streams have made efforts to further the understanding of the concept of OA, its antecedents, performance outcomes, environmental factors and other moderators (Raisch & Birkinshaw, 2008). Research has identified structural-, conceptual- and leadership-based antecedents of OA (Gibson & Birkinshaw, 2004; Raisch & Birkinshaw, 2008). Moreover, Recent research has found evidence for antecedents of OA at the firm (e.g. Jansen, van den Bosch, & Volberda, 2006), business unit (e.g. Yitzhack Halevi, Carmeli, & Brueller, 2015), and senior manager and board level (e.g. Heyden, Oehmichen, Nichting, & Volberda, 2015; Jansen, George, Van Den Bosch, & Volberda, 2008; Oehmichen, Heyden, Georgakakis, & Volberda, 2017).

Notably absent from the discussion on the antecedents of OA, however, are incentive structures, such as characteristics of the pay packages of members of the top management team (TMT). These pay packages, also known as compensation arrangements, cannot only be distinguished by the level of pay or the percentage of variable pay, but also by specific design characteristics such as the time horizon (e.g. Gopalan, Milbourn, Song, & Thakor, 2014; McGuire, Oehmichen, Wolff, & Hilgers, 2017). This thesis focuses on the heterogeneity of compensation arrangements within TMT’s as an antecedent of OA. Fredrickson, Davis-Blake and Sanders (2010) have done similar research before, but they examined firm performance as an organizational outcome of TMT compensation heterogeneity, and found a negative relationship between the two. The effect of TMT compensation heterogeneity on OA has, to my knowledge, not been researched yet. The goal of this thesis is to address this gap and to introduce TMT compensation heterogeneity as an important antecedent of OA. This research is grounded in upper echelons (UE) theory. In the view of UE theory, the organization is a reflection of its top executives and their characteristics, and the functioning of the TMT has far greater potential for predicting organizational outcomes than the characteristics of the chief executive officer (CEO) alone (Hambrick & Mason, 1984). Moreover, it is worthwhile to examine the TMT, since executive work is invariably shared, and relational compensation patterns among executives can be expected to affect the functioning of the senior group (e.g., Baron and Pfeffer 1994, Siegel and Hambrick 1996). Therefore, I examine the entire TMT instead of just the CEO. There are several reasons why researching the relationship between TMT compensation heterogeneity and OA from the UE perspective is highly relevant. Firstly, prior research has shown that there can be a high level of compensation heterogeneity between members of the TMT. For example, Hayward and Hambrick
(1997) found large pay gaps between the CEO and the next highest paid executive, mostly ranging between 30 and 50 percent, but sometimes even exceeding 100 percent. However, theory and research addressing diversity-as-disparity in organizations, such as compensation heterogeneity, is surprisingly rare (Harrison & Klein, 2007). Secondly, as Geletkanycz and Sanders (2012) noted, progress notwithstanding (e.g., Carpenter Geletkanycz, & Sanders, 2004; Finkelstein, Hambrick, & Cannella, 2009; Wowak & Hambrick, 2010), further exploration of compensation from a UE perspective is worthwhile, since much remains to be learned about how individual and group-level differences impact compensation’s efficacy. Thirdly, as Nielsen (2010) highlighted, little research within UE theory uses OA as an organizational outcome.

My contribution to literature is twofold: Firstly, I add to the literature of TMT compensations arrangements by focusing on compensation heterogeneity and OA as an organizational outcome, which, to my knowledge, has not been done before. Secondly, I contribute to UE theory by examining TMT heterogeneity and using OA as an organizational outcome. Furthermore, my research can be of value for practitioners, because I provide them with empirical insight in the effect that TMT compensation heterogeneity can have on OA within their firms.

**Research question**

The aforementioned literature gap and goal of this research have led to the development of the following research question:

**RQ:** What is the relationship between the heterogeneity of top management team compensation arrangements and organizational ambidexterity?
Literature review

In this literature review, I provide a short overview of the current state of the literature and theory used in this thesis, which results in the development of the hypotheses and the conceptual model. The literature review has four components: a short overview of the literature on OA, an explanation of the term heterogeneity within the TMT compensation context, the use of UE theory as the theoretical foundation of this empirical analysis, and the hypothesis development.

Organizational Ambidexterity

In his groundbreaking paper on organizational learning, March (1991) states that firms need to continuously exploit existing knowledge to deliver short-term productivity. At the same time, firms need to explore new knowledge and ideas to ensure future viability. March (1991) identified that exploitation is captured by terms such as “refinement, choice, production, efficiency, selection, implementation, and execution” (March, 1991, p. 71), whereas exploration is captured by terms such as “search, variation, risk taking, experimentation, play, flexibility, discovery and innovation” (March, 1991, p. 71). This interplay between exploitation and exploration has been defined in literature as organizational ambidexterity (OA), and a vibrant field of research on OA has sparked to life (O’Reilly & Tushman, 2013; Raisch & Birkinshaw, 2008; Simsek, 2009). There is, however, ambiguity concerning the definition of OA (Simsek, 2009). In general, the concept of OA has developed into a term that refers to the ability to do two things at the same time – for example exploitation and exploration, efficiency and flexibility, or alignment and adaptability (Gibson & Birkinshaw, 2004). Simsek (2009) has provided an overview of possible definitions of OA. To avoid ambiguity about the definition of OA in this research, I use the following definition:

“OA refers to the ability of an organization to both explore and exploit—to compete in mature technologies and markets where efficiency, control, and incremental improvement are prized and to also compete in new technologies and markets where flexibility, autonomy, and experimentation are needed” (O’Reilly & Tushman, 2013, p. 2).

The notion that a balance between exploitation and exploration strategies will lead to superior performance is central to ambidexterity theory (Sirén, Kohtamäki, & Kuckertz, 2012). Some researchers within the field of OA have examined the place the TMT holds within their literature stream. Cao, Simsek and Zhang (2010) argued that exploitation and exploration are likely to gravitate executives’ attention to one rather than both, resulting in an imbalance between them, given that they are self-reinforcing, often to each other’s exclusion (Levinthal & March, 1993; March, 1991). Therefore, a key point in previous research is that executives need to consider rich and diverse information to avoid such managerial myopia, thereby enabling ambidexterity (Lubatkin, Simsek, Ling, & Veiga, 2006; Smith & Tushman, 2005; Tushman & O’Reilly, 1997) Furthermore,
ambidexterity is largely driven by TMT’s “internal processes that enable them to handle large amounts of information and decision alternatives and deal with conflict and ambiguity” (Tushman & O’Reilly, 1997, p.23). Lubatkin et al. (2006) found evidence for this claim, showing that ambidexterity, specifically among small- to medium-sized enterprises (SMEs), places a premium on the process that encourages the sharing of strategic information, along with a platform for reconciling contradictory information via collaborative behaviour and joint decision making within a TMT.

**Heterogeneity**

Heterogeneity is a central term in this thesis. To explain why I decided to use the term heterogeneity and what it means, the use of the term diversity within relevant research has to be addressed first. The term diversity refers to the distribution of differences among the members of a unit with respect to a common attribute, X, such as tenure, ethnicity, conscientiousness, task attitude, or pay (Harrison & Klein, 2007). Diversity is a unit-level, compositional construct. Thus, in describing the diversity of a given attribute within a unit (e.g., a group), one describes the unit as a whole, not a focal member's differences from other members (Harrison & Klein, 2007). In the literature a variety of labels are used, often interchangeably, to refer to diversity – including dispersion, heterogeneity, dissimilarity, disagreement, divergence, variation, and inequality, or their opposites homogeneity, similarity, agreement, consensus, convergence, and equality (Harrison & Klein, 2007). A distinction can be made between different types of diversity. Diversity as separation refers to differences in position or opinion among members and reflects horizontal distance along a single continuum in a particular attitude or value (Nielsen, 2010). Diversity as variety represents differences in kind or category, primarily on information, knowledge or experience among unit members (Nielsen, 2010). Diversity as disparity indicates differences in concentration of valued social assets or resources such as pay and status among group members (Harrison & Klein, 2007; Nielsen, 2010). Disparity reflects possession: the distribution of how much of a socially valued commodity each unit member has (Harrison & Klein, 2007).

Even though the construct being researched here fits the definition of diversity as disparity, in consultation with my thesis supervisor, I decide to refer to the construct being researched as heterogeneity instead of diversity or disparity. This decision is made because the term diversity can be misinterpreted as diversity as separation or diversity as variety, and the term disparity may be interpreted as just referring to individual pay gaps, instead of the overall heterogeneity of TMT compensation arrangements. In the following, I strive to use the term heterogeneity to avoid ambiguity about the construct being examined in this thesis. However, because synonyms are used interchangeably in prior research, I also make use of the previously mentioned synonyms of heterogeneity. Likewise, I strive to use the term compensation, but in accordance with prior research, the word pay is also used to refer to compensation.
Upper echelons theory

Upper echelons (UE) theory is used as the theoretical lens of this research. In the following, I provide an explanation of UE theory and the motivation for placing this empirical analysis within the UE research field. One of the early signs of theoretical interest in TMT’s can be traced back to the behavioral theory of the firm, according to which decision makers are often unable to make economically rational decisions, because they are boundedly rational and must act in a social context of multiple and conflicting goals (March & Simon, 1958). Hambrick and Mason (1984) were inspired by the behavioral theory of the firm and developed the UE perspective.

Hambrick and Mason introduced the UE perspective in 1984. The central reasoning of UE theory is that TMT executives' experiences, values, and personalities greatly influence their interpretations of the situations they face and, in turn, affect their choices (Hambrick, 2007). In other words, the cognitive base and values a strategic decision maker brings to the, often complex, decision he/she has to make, creates a screen between the situation and his/her eventual perception of it (Hambrick & Mason, 1984). Hambrick and Mason (1984) emphasize observable managerial characteristics as indicators of the givens that a manager brings to an administrative process, such as his/her financial position. Hambrick and Mason (1984) argued that compensation, and the financial position it affords, serves as a major determinant of the strategic choices made by executives, because it shapes how managers filter, value and process information (Geletkanycz & Sanders, 2012).

Carpenter (2000) was among the first to demonstrate that pay affects executive behavior, supporting the link between compensation and strategic choice that Hambrick and Mason (1984) proposed (Geletkanycz & Sanders, 2012). Moreover, in support of the UE perspective, Carpenter and Sanders (2002) found that CEO pay influenced TMT member pay, but it was TMT pay that predicted future firm performance. Based on the UE perspective by Hambrick and Mason (1984), I argue that TMT compensation heterogeneity influences OA within the firm.

To continue, the motivation for the choice of using UE theory in this study is captured by Geletkanycz and Sanders (2012). They state that numerous theories can be applied to the topic of executive compensation, but the perspective of UE contributes uniquely to the topic of executive compensation, because it is difficult to appreciate the structure and composition of pay packages, much less their determinants and ensuing implications, without insight into top executives’ experiences, activities and interests. Furthermore, it is fitting to research compensation from the UE perspective, because, as Fredrickson et al. (2010) noted, a well-functioning executive team increases the likelihood that a firm will formulate and implement strategy successfully (Hambrick, 1995), and compensation is one factor that can facilitate or impede team functioning (Carpenter & Sanders, 2002; Hambrick, 1995).

There are different views to be recognized on the place that compensation exactly holds within UE theory. In the original view of Hambrick and Mason (1984), compensation was considered to have a direct role in shaping strategy. However, in the updated model of the UE perspective that Carpenter
et al. (2004) proposed, compensation is seen as a moderator between the effects of executive personal attributes and strategic choices. Wowak and Hambrick (2010) presented another view, asserting that compensation arrangements form executive behaviors, which in turn form organizational outcomes, and both of these relationships are moderated by executive characteristics.

Hypothesis development
To develop my hypothesis, I consider prior research on TMT compensation heterogeneity and organization outcomes. As supported by above models, compensation is often seen as a factor that affects executives’ strategic choices and ultimately, firm performance (e.g., Devers Cannella, Reilly, & Yoder, 2007; Finkelstein et al., 2009). In general, Bloom and Michel (2002) observed that research on pay dispersion and its performance outcomes has yielded mixed results: In some cases, more dispersed pay distributions have been positively related to performance outcomes, whilst in other cases, greater dispersion has been negatively related to performance outcomes. These opposing views on compensation and its outcomes can be explained by two opposing views on the antecedents of compensation. Siegel and Hambrick (2005) asserted that some compensation structures reflect and directly contribute to unity of effort, while other compensation profiles signify and exacerbate conditions of group fragmentation – harmful rivalries, jealousy and envy, and piecemeal and parochial behavior. Geletkanycz and Sanders (2012) made a similar argument, stating that on the one hand compensation heterogeneity is positive in the sense that they lead to competition and elevated effort (e.g. Lazear & Rosen, 1981). On the other hand, mounting evidence of a negative link with firm performance outcomes suggest that compensation heterogeneity also inspires team dysfunction.

Harrison and Klein (2007) stated that theoretically, this negative view highlights relative comparisons among unit members to suggest that heterogeneity, typically of pay but also of other valued assets or resources that connote prestige or power, leads to within-unit competition, suppression of voice, reduced (quality of) communication, and interpersonal undermining. Similarly, Hambrick (1995) suggested that differences among executives’ individual compensation schemes may become a centrifugal force, which pulls the team apart and thereby limits its collective effectiveness. Hambrick (1995) observed that most TMT’s are behaviourally fragmented and, as a consequence, integrated teams are likely to be rare, valuable, and difficult to imitate. Siegel and Hambrick (2005) argued that when the need for interdependence among senior executives is great, the drawbacks of pay inequality will be particularly pronounced, since a firm’s individualistic reward structure may create
pay disparity and, in turn, reduce peer collaboration by directing executives’ attention and corresponding behaviour to individual rather than interdependent activities. On the one hand, Siegel and Hambrick (2005) reasoned that executives who receive far more compensation than their peers may respond with condescension, indifference, and social distancing towards their seemingly less worthy counterparts. On the other hand, they reason that executives who receive far less pay than their peers may respond with an increase in invidious comparisons (Deutsch, 1985), increased jealousy (Barnard, 1938), and lower satisfaction (Pfeffer & Langton, 1993).

Overall, the ideas of Siegel and Hambrick (2005) are grounded in the arguments of researchers who defend the notion that compensation heterogeneity has a harmful effect on social functioning and group performance (e.g. Barnard, 1938; Hambrick, 1995; Lawler, 1989; Milgrom & Roberts, 1988; Pfeffer & Langton, 1993; Wageman & Baker, 1997). To illustrate with the reasoning of Hambrick (1995), a well-functioning team typically requires members to work together, rather than merely operating as a group of independent individuals and disparate pay among TMT members can lead to fragmentation within the team, with members working on their own priorities rather than firm-level needs. Likewise, in their study of diversity as disparity, Harrison and Klein (2007) observed that researchers commonly predict that status, power, or compensation heterogeneity incites competition, differentiation, and (resentful) deviance among some unit members (e.g., Bloom, 1999; Homans, 1961; Pfeffer & Langton, 1993). Compensation heterogeneity might also foster conformity, silence, suppression of creativity, and withdrawal (Hollander, 1958; Pfeffer, 1998; Pfeffer & Davis-Blake, 1992).

Fredrickson et al. (2010) found that compensation heterogeneity across the TMT is negatively related to firm performance, particularly when the compensation exceeded what could be justified by characteristics of the industry, firm, or team. According to Geletkanycz and Sanders (2012), this finding is consistent with observations that compensation heterogeneity is detrimental to social interactions. Therefore, in contexts requiring strong interdependence – which is often the case in TMT activity – pay disparities are contrary to firm interests (Henderson & Fredrickson, 2001). Moreover, scholars have discovered that pay dispersion is related to executive turnover (e.g. Bloom & Michel, 2002; Ridge, Hill & Aime, 2017; Wade, O’Reilly, & Pollock, 2006). In addition, Hayward and Hambrick (1997) found that TMT compensation heterogeneity is associated with higher acquisition premiums. Shaw, Gupta and Delery (2002) provided support for a more nuanced negative view, finding that pay compression is desirable, but only in the absence of individual incentive systems and when work is interdependent. Because of the arguments and findings above, I propose the following hypothesis:

**H1**: The heterogeneity of TMT compensations arrangements is negatively related to the achievement of organizational ambidexterity.
Conceptual model
The development of aforementioned hypothesis of this study through theoretical reasoning has led to the following conceptual model:

Figure 1: Conceptual model
Methods
The research on OA, the TMT and compensation arrangements is maturing, and UE can be considered as an elaborated and established theory. I have, however, identified a literature gap in the theoretical explanations by applying UE to the relationship between the heterogeneity of TMT compensation arrangements and OA. According to van Aken, Berends and van der Bij (2012), this calls for the use of a theory testing approach. In the following, I elaborate on the sample and data collection, the measures of the dependent variable, the independent variables and control variables and lastly, the method of data analysis.

Sample and data collection
I made use of secondary data from existing databases. Data on compensation was accessed through Compustat’s® ExecuComp, which is a product of Standard and Poor’s. Hambrick and Mason (1984) recommended using Standard and Poor’s annual directories of biographical data on officers of major firms and the information these directories contain on corporate officers’ backgrounds, their compensation, and shareholdings in research on the TMT. The sample used in this study contains data on the annual compensation of the top executives in US-based firms between 2006 and 2016. 2006 was chosen as the first year because of the 2006 enhanced benchmarking requirement of the US Securities and Exchange Commission (SEC) (Geletkanycz & Sanders, 2012), which changed the reporting requirements on some of the compensation variables in ExecuComp. The data on OA was accessed through a sample provided by the supervisor of this thesis. This sample is based on McKenny, Aguinis, Short and Anglin (2018) and computer-aided text analysis (CATA) as described in this article was used to obtain this sample. The OA sampling frame is based on the Management Discussion and Analysis (MD&A) statements of firms in four high-tech industries (SICs: 2834, 7370, 7372, 7373) (McKenny et al., 2018). The final sample was obtained by merging the sample from ExecuComp and the sample on OA. The final sample contained 228 firms.

Unit of analysis
According to Cyert and March (1963), the TMT conceptually can be defined as the CEO and those individuals who belong to the dominant coalition. I operationalize the TMT as the top executives as provided in the ExecuComp database, which also includes the CEO. This means that there are some differences in the size of TMT’s in the sample. The sample contains 1639 distinct TMT’s sorted by firm and year. The mean TMT size is 5.52 and the standard deviation of TMT size is 1.24. The minimum TMT size is 2 and the maximum TMT size is 12. Jackson et al. (1991) asserted that the potential for heterogeneity is greater for larger teams than for smaller teams. However, considering the mean in this sample and the small standard deviation, which indicate that outliers are rare, the decision was made to allow for different TMT size.
Dependent variable

Organizational Ambidexterity. In accordance with Heyden et al. (2015), I conceptualize OA as the simultaneous pursuit of exploitation and exploration, and I operationalize OA as the multiplicative of exploration and exploitation. The provided OA sample contains several distinct OA variables I could have used in the analysis (appendix I). Based on McKenny et al. (2018), I decided to use OA1 as the dependent variable in the main regressions. OA1 applies the MD&A sections of 10-K filings to measure the ambidexterity construct (McKenny et al., 2018). 10-K filings are utilized by executives to communicate information about the company, its strategy, financial performance and assumptions, recent activity, and forward-looking statements to current and potential investors (Clarkson, Kao, & Richardson, 1999). Like annual reports, 10-Ks are filed by publicly traded companies on an annual basis, which facilitates the collection of longitudinal data (McKenny et al., 2018). Moreover, OA1 is based on a data cleansing method using word stems as specified in McKenny et al. (2018), which was inspired by the ambidexterity dictionary using word stems developed by Uotila, Maula, Keil and Zahra (2009). Lastly, Wordstat is the text analysis software used to obtain OA1.

Independent variable

Heterogeneity of TMT compensation arrangements. The independent variable in my study is the heterogeneity of TMT compensation arrangements. To construct this independent variable, two steps were taken. Firstly, the relevant compensation variables from ExecuComp were collected for each TMT member. Following prior operationalizations by Siegel and Hambrick (2005) and Ridge et al. (2017), each TMT’s compensation is defined as the sum of short-term and long-term compensation. The short-term compensation ExecuComp variables used are salary ($) and bonus ($). The ExecuComp variables used for long-term compensation are non-equity incentive plan compensation ($), grant date fair value of options granted ($ - as valued by company), grant date fair value of stock awarded under plan-based awards ($), and all other compensation ($). The absolute values with respect to total compensation are utilized. Secondly, the heterogeneity measures were applied to the compensation variables for each TMT.

An effective way of gauging compensation heterogeneity, or the degree to which compensation differs among TMT members who occupy the same hierarchical level, is to use a measure of inequality, or heterogeneity (Allison, 1978). Based on literature on heterogeneity measures (Allison, 1978; Harrison & Klein, 2007; Nielsen, 2010; Solanas, Selvam, Navarro, & Leiva, 2012) several measures of heterogeneity were considered for use in this study. I decided to use three different heterogeneity measures to compute the independent variable in three different ways: the Herfindahl-Hirschman index (HHI) (Hirschman, 1964), the coefficient of variation (CV) and the Gini index. These measures use the compensation of each individual within a certain TMT to compute an overall compensation heterogeneity score for that TMT on each compensation variable. The scores for each
TMT on each compensation variable were computed and sorted by firm and year. Thereafter, the overall heterogeneity score for each TMT was computed by taking the mean of the heterogeneity scores of all compensation variables. Appendix II, III and IV show the Stata code used to compute the independent variable for each heterogeneity measure.

The use of the HHI as the first heterogeneity measure was recommended by the supervisor of this thesis and is based on Cadman, Klasa and Matsunaga (2010) and Coles, Daniel and Naveen (2006). The HHI is normally used as an index of market concentration/heterogeneity, but because of its simplicity, I deemed it as fit to apply to TMT heterogeneity. The HHI was calculated by dividing the sum of the squared compensation by the squared compensation. The HHI can range from 0 to (n-1)/n, where 0 indicates absolute homogeneity, and the maximum value indicates absolute heterogeneity (Solanas et al., 2012). The CV is calculated by dividing the standard deviation of the TMT’s compensation by the mean compensation of the TMT (Solanas et al., 2012; Siegel & Hambrick, 2005) and captures the asymmetry that is fundamental to the conceptualization of diversity as disparity (Harrison & Klein, 2007), i.e. compensation heterogeneity. The CV can range from 0 to (n-1)^1/2, where 0 indicates absolute homogeneity, and where the maximum value is reached when all cases but one have zero values (Martin & Gray, 1971).

Since I am investigating compensation, I am dealing with continuous variables. Therefore, consistent with prior heterogeneity research (e.g. Fredrickson et al., 2010; Ridge et al., 2017; Siegel & Hambrick, 2005), the CV is applied. The CV is most commonly used for continuous variables (Nielsen, 2010) and is only appropriate for ratio scales (Bedeian & Mossholder, 2000). The use of a ratio scale applies to the variables in this study. Income is an example of a ratio scale that has a theoretically minimum value of 0 (Mueller, Schuessler, & Costner, 1977). The CV is accepted as the norm in the field and seldom do authors attempt to use an alternative measure of team heterogeneity (Nielsen, 2010).

The Gini index was computed with a user-written program in Stata called ‘ineqdeco’, based on prior work by He and Huang (2011). The Gini index is defined as the average of the absolute differences of all pairs of variate values in a sample, expressed in terms of units of the variate, thereafter divided by twice the arithmetic mean (Solanas et al., 2012). The score of the Gini index can range from 0 to 1/1-n (Harrison & Klein, 2007), where 0 occurs when all members of a group possess the same amount of an attribute, i.e. homogeneity, whereas its maximum value is obtained if only one individual possesses the maximum level of an attribute and the others have the minimum level of that characteristic, i.e. heterogeneity (Solanas et al., 2012). The same appropriateness for ratio scales as the CV applies to the Gini index (Allison, 1978).

Control variables
Consistent with relevant prior research, several control variables were included. Following Heyden et al. (2015) and Cao et al. (2010), I included firm size (log of total employees) as a control variable,
since larger firms have been shown to follow different strategic orientations (Tushman & Romanelli, 1985). Moreover, prior research found that firm size influences the mix of different pay components (Zenger & Marshall, 2000). In accordance with Heyden et al. (2015) and Fredrickson et al. (2010), R&D investments was included as a control variable, since R&D intensity affects executive pay (Henderson & Fredrickson, 1996). In addition, a dummy R&D investments missing was added to control for missing data on R&D investments. Consistent with McGuire et al. (2017), a year-dummy variable was included to control for year-specific effects. Two variables were incorporated to control for performance effects, since differences in financial performance could affect the strategic orientations of firms, and therefore organizational ambidexterity (Heyden et al., 2015). Moreover, Anderson, Banker, and Ravindran (2000) reported that firm performance is positively associated with the relative importance of incentives. Firstly, return on assets (ROA) based on net income was used as a control variable. Using ROA as a measure of firm performance is consistent with prior research (e.g. Bloom & Michel, 2002; Carpenter & Sanders, 2002; Fredrickson et al., 2010). ROA indicates the efficiency with which a firm employs its current asset base (Carpenter & Sanders, 2002). Secondly, based on Uotila et al. (2009), Tobin’s q is included as a market-based measure to control for performance effects. Tobin’s q gauges the degree to which the stock market values a firm relative to its replacement cost (Mehran, 1995). Lastly, industries are known to have different norms regarding executive compensation (Finkelstein & Hambrick, 1989). To control for industry effects, a dummy variable for the industry (e.g. Mihalache, Jansen, Van den Bosch, & Volberda, 2014) was applied, which specifies if the firms in the sample are either in services or manufacturing.

**Data analysis**

The data was analysed using the statistical software program Stata®. The statistical analysis had two main stages. Firstly, descriptive statistics were calculated to show means, standard deviations, minimum values, maximum values, and correlations between constructs. Secondly, ordinary least squares (OLS) regressions were conducted. According to Lewis (2007), hierarchical regression is the best to use when predictors in the research are chosen based on theory and past research, which is the case for this thesis. To avoid collinearity problems, three separate regressions were run, since the independent variable was computed three times using the three different heterogeneity measures. In order to test the strength of the effects of the independent variable on the dependent variable, the delta R-squared was computed. To do so, the regression analyses are first performed only including control variables, in order to test the significance of their effects on the dependent variable. Thereafter, the independent variables are added to the model. The R-squared of the regressions including only controls is subtracted from the R-squared of the regressions including the independent variables to calculate the delta R-squared.
Results

Table 1 displays the means, standard deviations and pairwise correlations of all variables included in this study, except the year and industry dummies. There is a high correlation between the TMT compensation heterogeneity calculated using the HHI and the CV (0.77). The correlation between the HHI and the Gini index is low (0.21). The correlation between the CV and the Gini index is moderate (0.57). The minimal value of the TMT compensation heterogeneity HHI is 0.15 and the maximum value of the HHI is 0.87. The minimal value of the TMT compensation heterogeneity CV is 0.03 and the maximum value of the CV is 2.11. The minimal value of the TMT compensation heterogeneity Gini index is 0.01 and the maximal value of the Gini index is 0.53. The only correlation that stands out is the one between R&D investments and R&D investments missing, but this is expected since R&D investments missing accounts for the missings of R&D investments. To check for multicollinearity problems, the variance inflation factors (VIF’s) were computed. A VIF of 10 and above indicates serious multicollinearity (Marquardt, 1970). All VIF’s were well below the cut-off point of 10 with a maximum VIF value of 3.05. The number of observations for the descriptive statistics and all regressions is 8511.

The results of the ordinary least squared (OLS) regressions for the hypothesis testing are displayed in table 2. All models contain the same control and dummy variables. All models have a significant F-statistic (P < 0.001). Model 1 shows the results for the regression performed using the heterogeneity of TMT compensation arrangements calculated with the HHI, model 2 shows the results of the CV and model 3 shows the results of the Gini index. Model 1 reveals a negative and significant relationship (β = -0.231, P < 0.001), R-squared = 0.0604, adjusted R-squared = 0.0585 and delta R-squared = 0.0024. Model 2 reveals a negative and significant relationship (β = -0.093, P < 0.001), R-squared = 0.0619, adjusted R-squared = 0.0600 and delta R-squared = 0.0040. Model 3 reveals a negative and significant relationship (β = -0.365, P < 0.001), R-squared = 0.0621, adjusted R-squared = 0.0602 and a delta R-squared = 0.0041. Hypothesis 1 predicted a negative relationship between the heterogeneity of TMT compensation arrangements and the achievement of OA. The results of all three regressions across all three heterogeneity measures show a negative relationship between the heterogeneity of TMT compensation arrangements and the achievement of OA. Thus, my hypothesis is supported. All control variables show a significant relationship with OA.
### Table 1: Descriptive statistics and correlation matrix

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>S.D.</th>
<th>Min</th>
<th>Max</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Organizational ambidexterity</td>
<td>0.43</td>
<td>0.48</td>
<td>0.00</td>
<td>3.61</td>
<td>1.00</td>
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<td></td>
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</tr>
<tr>
<td>2 TMT compensation heterogeneity HHI</td>
<td>0.34</td>
<td>0.10</td>
<td>0.15</td>
<td>0.88</td>
<td>-0.06</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 TMT compensation heterogeneity CV</td>
<td>0.87</td>
<td>0.33</td>
<td>0.03</td>
<td>2.11</td>
<td>-0.04</td>
<td>0.77</td>
<td>1.00</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4 TMT compensation heterogeneity Gini</td>
<td>0.27</td>
<td>0.09</td>
<td>0.01</td>
<td>0.53</td>
<td>-0.01</td>
<td>0.21</td>
<td>0.57</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Firm size (log)</td>
<td>2.03</td>
<td>0.23</td>
<td>0.83</td>
<td>2.56</td>
<td>0.22</td>
<td>-0.02</td>
<td>0.09</td>
<td>0.23</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 R&amp;D investments</td>
<td>9.44</td>
<td>4.34</td>
<td>0.00</td>
<td>16.24</td>
<td>0.05</td>
<td>-0.06</td>
<td>0.01</td>
<td>0.06</td>
<td>0.20</td>
<td>1.00</td>
<td></td>
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<tr>
<td>7 R&amp;D investments missing</td>
<td>0.11</td>
<td>0.31</td>
<td>0.00</td>
<td>1.00</td>
<td>0.05</td>
<td>0.02</td>
<td>-0.00</td>
<td>0.01</td>
<td>0.11</td>
<td>-0.75</td>
<td>1.00</td>
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</tr>
<tr>
<td>8 Tobin's q</td>
<td>2.82</td>
<td>1.89</td>
<td>0.42</td>
<td>16.30</td>
<td>0.02</td>
<td>-0.06</td>
<td>-0.10</td>
<td>-0.11</td>
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<td>0.05</td>
<td>-0.07</td>
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<tr>
<td>9 Return on assets (ROA)</td>
<td>5.98</td>
<td>15.85</td>
<td>-101.39</td>
<td>157.88</td>
<td>-0.00</td>
<td>-0.03</td>
<td>-0.02</td>
<td>0.01</td>
<td>0.08</td>
<td>-0.02</td>
<td>0.02</td>
<td>0.22</td>
<td>1.00</td>
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</table>

Notes: N= 8511. Year and industry dummies are not reported.

### Table 2: Main regressions on OA as dependent variable

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b (s.e.)</td>
<td>b (s.e.)</td>
<td>b (s.e.)</td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.507*** (0.050)</td>
<td>-0.531*** (0.049)</td>
<td>-0.554*** (0.049)</td>
</tr>
<tr>
<td><strong>Independent variable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMT compensation heterogeneity HHI</td>
<td>-0.231*** (0.044)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMT compensation heterogeneity CV</td>
<td></td>
<td>-0.093*** (0.014)</td>
<td></td>
</tr>
<tr>
<td>TMT compensation heterogeneity Gini</td>
<td></td>
<td></td>
<td>-0.365*** (0.054)</td>
</tr>
<tr>
<td><strong>Control variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size (log)</td>
<td>0.458*** (0.024)</td>
<td>0.474*** (0.024)</td>
<td>0.495*** (0.025)</td>
</tr>
<tr>
<td>R&amp;D investments</td>
<td>0.007*** (0.002)</td>
<td>0.007*** (0.002)</td>
<td>0.007*** (0.002)</td>
</tr>
<tr>
<td>R&amp;D investments missing</td>
<td>0.131*** (0.032)</td>
<td>0.130*** (0.032)</td>
<td>0.134*** (0.032)</td>
</tr>
<tr>
<td>Tobin's q</td>
<td>0.017*** (0.003)</td>
<td>0.016*** (0.003)</td>
<td>0.016*** (0.003)</td>
</tr>
<tr>
<td>Return on assets (ROA)</td>
<td>-0.001*** (0.000)</td>
<td>-0.001*** (0.000)</td>
<td>-0.001*** (0.000)</td>
</tr>
<tr>
<td>F-statistic</td>
<td>33.79***</td>
<td>34.80***</td>
<td>35.41***</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.060</td>
<td>0.062</td>
<td>0.062</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.0585</td>
<td>0.0600</td>
<td>0.0602</td>
</tr>
<tr>
<td>Observations</td>
<td>8,511</td>
<td>8,511</td>
<td>8,511</td>
</tr>
</tbody>
</table>

Notes: Robust standard errors in parentheses. Year and industry dummies are included but not reported.

*** p<0.01, ** p<0.05, * p<0.1
Robustness

To increase the robustness of the regression results, I performed the regressions with robust standard errors. Moreover, inspired by Cao et al. (2010), I ran additional regressions using the different OA dependent variables that were available in the sample, to check if this would reveal similar results as the main regressions: a negative and significant relationship between the heterogeneity of TMT compensation arrangements and OA. I had the option of using 7 different OA variables, which were different on three aspects. Firstly, the variable was based on either the company 10-K filings or just the MD&A section. Secondly, data cleansing was or was not applied and if it was, either data cleansing based on word stems or keyword-in-context analysis was applied. Thirdly, either Linguistic Inquiry and Word Count (LIWC) or Wordstat was used as the text analysis software (appendix I). OA1, based on McKenny et al. (2018), was used for the main regressions.

The results of the additional regressions between the heterogeneity of TMT compensation arrangements HHI and the different OA variables are the same as those of the main regressions for OA2 ($\beta = -0.416$, $P < 0.001$), OA3 ($\beta = -0.785$, $P < 0.001$), and OA6 ($\beta = -0.353$, $P < 0.001$). Furthermore, the HHI shows a positive and significant relationship for OA4 ($\beta = 0.798$, $P < 0.001$), OA5 ($\beta = 0.208$, $P < 0.05$) and OA7 ($\beta = 0.660$, $P < 0.001$). The results of the additional regressions between the heterogeneity of TMT compensation arrangements CV and the different OA variables are the same as those of the main regressions for OA3 ($\beta = -0.300$, $P < 0.001$) and OA5 ($\beta = -0.091$, $P < 0.05$). The CV shows a negative but insignificant relationship for OA2 ($\beta = -0.047$, $P > 0.05$) and OA6 ($\beta = -0.045$, $P > 0.001$), and a positive but insignificant relationship for OA4 ($\beta = 0.081$, $P > 0.05$) and OA7 ($\beta = 0.046$, $P > 0.05$). The results of the additional regressions between the heterogeneity of TMT compensation arrangements Gini index and the different OA variables are all the same as those of the main regressions: a significant negative relationship between the heterogeneity of TMT compensation arrangements and OA. In terms of sensitivity, the Gini is insensitive, revealing the same results for all different OA dependent variables. The HHI shows some sensitivity, but the different results can be explained, because the results for the OA’s based on MD&A’s are all the same as the results of the main regressions (OA2, OA3 and OA6), and the results for the OA’s based on 10-K’s are all different (OA4, OA5 and OA7). The results for the CV show some inconsistencies and therefore sensitivity. The results for OA3 and OA5 are the same, but these OA’s have little in common. The other differences are explainable, because data cleansing was not applied to OA2 and OA6, and OA4 and OA7 are both based on 10-K’s.

I also ran the regressions using two other independent variables: the heterogeneity of TMT short-term compensation arrangements and the heterogeneity of TMT long-term compensation arrangements. This is based on Sanders (2001a), who states that cash (e.g., salary and bonus) and long-term incentive forms of compensation have very different attributes and have been shown to differentially affect executive behaviors and strategic choices, and Siegel and Hambrick (2005), who conducted similar additional analyses, but only on short-term compensation, as a check of their results.
I used the main OA dependent variable (OA1) again for these regressions. The heterogeneity of TMT short-term compensation arrangements was constructed in the same manner as the main independent variable, but now the heterogeneity measures are only applied to the short-term compensation variables, which are salary ($) and bonus ($). Likewise, the heterogeneity of TMT long-term compensation arrangements was created using only the long-term compensation variables, which are non-equity incentive plan compensation ($), grant date fair value of options granted ($ - as valued by company), grant date fair value of stock awarded under plan-based awards ($), and all other compensation ($).

The results of the relationship between the heterogeneity of TMT short-term compensation arrangements and OA reveal a positive but insignificant relationship for the HHI ( $\beta = 0.025$, $P > 0.05$), a negative but insignificant relationship for the CV ( $\beta = -0.006$, $P > 0.05$), and a positive but insignificant relationship for the Gini index ( $\beta = 0.050$, $P > 0.05$). The results for the relationship between the heterogeneity of TMT long-term compensation arrangements and OA reveal a negative and significant relationship for the HHI ( $\beta = -0.252$, $P < 0.001$) the CV ( $\beta = -0.095$, $P < 0.001$) and the Gini ( $\beta = -0.287$, $P < 0.001$).

Lastly, I ran regressions where I used exploitation and exploration as the dependent variables. These exploitation and exploration dependent variables were constructed in the same way and based on the same sample as OA1. The heterogeneity of TMT compensation arrangements based on the three different heterogeneity measures was used again as the independent variable. Since I operationalize OA as the multiplicative of exploration and exploitation, in accordance with Heyden et al. (2015), I ran these additional regressions to see how exploitation and exploration were affected. The results of the relationship between the heterogeneity of TMT compensation arrangements and exploitation reveal a positive, but insignificant relationship for the HHI ( $\beta = 0.076$, $P > 0.05$), a negative, but insignificant relationship for the CV ( $\beta = -0.011$, $P > 0.05$), and a negative and significant relationship for the Gini index ( $\beta = -0.249$, $P < 0.05$). The results for the relationship between the heterogeneity of TMT compensation arrangements and exploration reveal a negative and significant relationship for the HHI ( $\beta = -0.126$, $P < 0.05$), the CV ( $\beta = -0.067$, $P < 0.001$) and the Gini index ( $\beta = -0.351$, $P < 0.001$). The Stata code of all the additional regressions has been provided to my thesis supervisor.
Discussion and conclusion

In this study, I investigated the effect of the heterogeneity of TMT compensation arrangements on OA from an UE perspective. The results confirm my hypothesis: there is a negative and significant relationship between the heterogeneity of TMT compensation arrangements and OA. The fact that all heterogeneity measures show the same results in the main regressions speaks in favor of the strength of the findings of this study. In the following, I first discuss the findings of the correlation matrix. Thereafter, I discuss the findings of the main and additional regressions.

The main independent variable in this study was computed in three different ways using the different heterogeneity measures. However, these three different computations are not all highly correlated. There are several possible explanations for the different correlations between the computations of the independent variable. Firstly, it could just be a case of different formulas yielding different results. A second explanation is that the HHI is usually applied as a measure of market concentration/heterogeneity (Cadman et al., 2010; Coles et al., 2006) and not explicitly found suitable for ratio variables, whereas the CV and the Gini are specifically suitable for ratio variables (Allison, 1978; Bedeian & Mossholder, 2000). Thirdly, the distribution of the minimum, maximum, mean and standard deviation of the heterogeneity measures could explain the difference in correlations. The mean, standard deviation and maximum value of the independent variable computed with the CV is higher than of the HHI and the Gini index, therefore the CV has a wider distribution. Moreover, the Gini index has a narrower distribution than the other heterogeneity measures. The difference in correlations between the heterogeneity variables could be explained by these differences in distributions.

Judging by the additional regressions ran with the heterogeneity of TMT short-term compensation and the heterogeneity of TMT long-term compensation, it seems like the negative relationship between the heterogeneity of TMT compensation arrangements and OA could primarily be explained by the effect of the heterogeneity of TMT long-term compensation arrangements, and not by the effect of the heterogeneity of TMT short-term compensation arrangements on OA. Moreover, the results of the additional regressions on exploitation and exploration could indicate that the negative relationship between the heterogeneity of TMT compensation arrangements and OA could be primarily explained by the effect on exploration within the OA construct, and not by the effect of the heterogeneity of TMT compensation arrangements on exploitation within the OA construct, since only the Gini index shows a significant effect on exploitation. These findings can be placed in the light of prior research in the field. Geletkanycz and Sanders (2012) observed that contemporary benchmarking practices are viewed as contributing to a general escalation in executive compensation (e.g., DiPrete, Eirich, & Pittinsky, 2010; Faulkender & Yang, 2010). Moreover, according to Siegel and Hambrick (2005) researchers have found that compensation differentials between hierarchical levels increase as one moves up the organization, with the CEO earning disproportionately greater pay than those executives directly beneath him/her (Lambert, Larcker, & Wiegelt, 1993; Leonard, 1990; Main,
O'Reilly, & Wade, 1993). This escalation in compensation can be explained the role of stocks in compensation arrangements. Cash pay may appear to be less risky and therefore preferable (Carpenter & Sanders, 2004), but research on pay practices seems to indicate that it has been more common for powerful executives to amass large amounts of stock option pay (Sanders, 2001b). Similarly, Murphy (1999) stated that high levels of total compensation are typically correlated with pay packages that have been skewed toward long-term incentives such as stock options. Furthermore, Martin, Wiseman and Gomez-Mejia (2016) found that when CEO’s have accumulated option wealth, they are more likely to invest in long-term strategic projects. The above supports the notion that an escalation of executive compensation and consequently an increased focus on long-term compensation, could lead to increased investments in long-term strategic projects. Therefore, this could explain my results as they suggest an overemphasis on long-term compensation arrangements and exploration, and an underemphasis on short-term compensation arrangements and exploitation.

This overemphasis on long-term compensation arrangements and exploration can further be explained by the relationship between compensation and executive risk-taking. The incorporation of risk marries UE and agency theory – in particular, the latter’s proposition that incentive-based compensation is effective because it increases managers’ willingness to take risks (Geletkanycz & Sanders, 2012). Moreover, Geletkanycz and Sanders (2012) noted that compensation affects the risk profile and performance demands placed on executives occupying UE ranks (e.g. Sanders, 2001a; Sanders & Hambrick, 2007). Stock options are argued to affect CEO risk-taking differently from equity ownership (Sanders, 2001a; Wiseman & Gomez-Mejia, 1998). This can be explained by the value of equity ownership reflecting readily accessible wealth including both upside and downside potential, whereas the value contained in unvested stock options is not immediately accessible (Devers, McNamara, Wiseman, & Arrfelt, 2008). Furthermore, because the acquisition of a stock option requires no initial investment and CEOs are under no obligation to exercise stock options when underwater (Lawler, 2000; Sanders, 2001a), stock options are argued to offer unlimited upside potential while limiting downside risk (Devers et al., 2008). Given the assumption of asymmetric risk, sizable stock option grants are argued to lead to greater CEO risk taking (Devers et al., 2008). This can be explained by the idea that executives are likely to frame their accumulated equity compensation as gains even though it is technically ‘at risk’ (McGuire et al., 2017). Prior findings uniformly support the idea that executive pay impacts decision making, and in the case of option-based pay, risk taking especially (Geletkanycz & Sanders, 2012). Furthermore, as established earlier, risk-taking is associated with exploration (March, 1991). Therefore, the significant effect of the heterogeneity of long-term compensation and its, in this case, negative effects on exploration and OA could be explained by the asymmetric risk associated with stock options and the relationship between stock options, executive risk-taking behavior and exploration.

To continue, the findings of this study fit in with prior research on the social comparisons TMT members make and behavioral integration within the TMT. As Ridge et al. (2017) have noted, a
growing body of literature highlights the notion that the distribution of compensation affects the behavior of TMT’s (e.g. Baron & Pfeffer, 1994; Carpenter & Sanders, 2002; Shaw et al., 2002; Siegel & Hambrick, 2005). In general, this line of inquiry argues that executives compare their compensation to referent others (Adams, 1965; Festinger, 1954) and that differences in compensation affect motivation and feelings of equity that, in turn, have important ramifications for how top management teams collectively respond to pay distributions (Ridge et al., 2017). The argument of Ridge et al. (2017) is the following: Large compensation heterogeneity within the TMT will likely lead to perceptions of inequity and deprivation among those members who are less well compensated within a group of similar individuals (Aime, Meyer, & Humphrey, 2010; Bloom, 1999; Bloom & Michel, 2002; Crosby, 1976; Pfeffer & Langton, 1993), creating impaired social relations and reduced behavioral integration within the team (Hambrick, 1995; Siegel & Hambrick, 2005). Behavioral integration has been shown to have direct positive effects on organizational performance (Hambrick, 1998; Li & Hambrick, 2005; Lubatkin et al., 2006). Prior arguments about the negative outcomes of compensation by Siegel and Hambrick (2005) and Geletkanycz and Sanders (2012), as established in the theoretical framework, support above reasoning by Ridge et al. (2017). According to Siegel and Hambrick (2005), some reward structures profiles signify and exacerbate conditions of group fragmentation – harmful rivalries, jealousy and envy, and piecemeal and parochial behavior. Moreover, according to Geletkanycz and Sanders (2012), evidence of a negative link with firm performance outcomes suggest that heterogeneity also inspires team dysfunction. Furthermore, as previously established, it is argued that ambidexterity is largely driven by TMT’s “internal processes that enable them to handle large amounts of information and decision alternatives and deal with conflict and ambiguity” (Tushman & O’Reilly, 1997, p.23).

Ridge et al. (2017), based on their findings, argued that firms should attempt to minimize feelings of deprivation created through compensation heterogeneity. The heterogeneity of TMT compensation arrangements creating impaired social relations and reduced behavioral integration could explain the negative effect on OA found in this study. The negative effect of TMT compensation heterogeneity might even by strengthened because of the four high-tech industries (SICs: 2834, 7370, 7372, 7373) (McKenny et al., 2018) that were used in this study. TMT interdependence is, namely, relatively great in technology-intensive industries because innovation is inherently disruptive to organizational routines, tending to require frequent negotiations and mutual adjustments among top executives (Siegel and Hambrick, 2005).

In this thesis, I have taken a UE perspective with a negative view, which is supported by my findings. However, as Fredrickson et al. (2010) observed, some articles, particularly those based on tournament theory, assert that compensation heterogeneity has positive effects because it promotes intra-team competition and provides an economic incentive that encourages the ‘cream to rise to the top’ of the rank-order tournament (Eriksson, 1999; Green & Stokely, 1983; Lazear & Rosen, 1981; Rosen, 1986). these scholars make the case that compensation heterogeneity is a result of a pay-for-
performance culture, in which members are differentially rewarded for their contributions and effectiveness, thus stimulating effort (e.g. Ehrenberg & Bognanno, 1990; Lazear & Rosen, 1981). In support of above reasoning, Gomez-Mejia and Balkin (1989) found that very narrow pay differentials may increase employees’ perceptions of unfairness and can lead to increased turnover. Shaw et al. (2002), again, provided a nuanced view, stating that pay dispersion will be associated with higher levels of workforce performance, but only when accompanied by formal individual incentive systems and independent work. However, Lazear (1989) provided refinement to the positive view, noting that such a model based on tournaments can also have negative consequences, as it can result in ‘hawkish’ behavior in the sense of willingness to attempt to actually undermine the efforts of other team members.

Managerial implications
In publicly held U.S. firms, the compensation committee of the board of directors typically sets the pay of the CEO and other TMT members, ultimately with the approval of the entire board (Lorsch, 1989). Therefore, the board of directors ultimately determines the level of TMT compensation heterogeneity (Fredrickson et al., 2010). With this in mind, the findings of this study especially have implications for the board of directors and specifically their willingness to stimulate OA within their firm, and the decisions they make on TMT compensation. Firstly, if boards want to stimulate OA within their firms, they should reduce the compensation heterogeneity within the TMT. Secondly, the results of the additional regressions on the heterogeneity of short-term TMT compensation arrangements and the heterogeneity of long-term TMT compensation arrangements indicate that if boards want to stimulate OA within their firms, they should specifically focus on reducing the long-term compensation heterogeneity within the TMT. Thirdly, the results of the additional regressions using exploitation and exploration as the dependent variables show that if boards want to specifically stimulate exploration within their firms, they should reduce the compensation heterogeneity within the TMT.

Limitations and future research directions
This study has several limitations. Firstly, the fact that the data in ExecuComp is only based on US firms and was derived from firms exclusively in four high-tech industries (SICs: 2834, 7370, 7372, 7373) (McKenney et al., 2018) limits the generalizability of the findings. Secondly, this study only applies three selected heterogeneity measures. Thirdly, the fact that there are differences in team size could be seen as a limitation, since the potential for heterogeneity is greater for larger teams than for smaller teams (Jackson et al., 1991). Consequently, this study and its limitations open up several future research directions. In order to examine the generalizability of this study, future research can test if the findings on US firms also extend to other geographical locations. In addition, research has suggested that compensation systems in firms in the high-technology industry are distinct from those
in other industries (Balkin & Gomez-Mejia, 1987; Diaz & Gomez-Mejia, 1997). Therefore, future research should examine different industries than the four high-tech industries that have been examined in this study. Furthermore, the use of the three heterogeneity measures opens up more research potential. Firstly, the HHI, CV and Gini index could be used in different contexts. It would be interesting to see how these and other heterogeneity measures behave in different studies, as also suggested by Solanas et al. (2012). Secondly, other heterogeneity measures could be used to examine if these behave differently than the HHI, CV and Gini index. To continue, future research should standardize the TMT size to 5 to control for the effects of TMT size, since the mean TMT size is 5.52166, as similar studies have already done by using the top four highest-paid non-CEO executives and the CEO (Fredrickson et al., 2010; Siegel & Hambrick, 2005; Ridge et al., 2017). Furthermore, instead of employing UE theory as the theoretical lens, using other theoretical lenses, such as tournament theory, could lead to interesting insights. Lastly, researchers can utilize fixed and random effects and the Hausman test (Hausman, 1978) when using panel models in future research. Regressions with fixed or random effects using panel data can be run by using the command ‘xtreg’ in Stata (e.g. Fredrickson et al., 2010).


Clarkson, P. M., Kao, J. L., & Richardson, G. D. (1999). Evidence that management discussion and analysis (MD&A) is a part of a firm’s overall disclosure package. *Contemporary Accounting Research, 16*, 111-134.


## Appendices

### Appendix I: OA variables

<table>
<thead>
<tr>
<th>OA variable</th>
<th>Based on</th>
<th>Data cleansing</th>
<th>Text analysis software</th>
</tr>
</thead>
<tbody>
<tr>
<td>OA1</td>
<td>MD&amp;A</td>
<td>Word stems</td>
<td>Wordstat</td>
</tr>
<tr>
<td>OA2</td>
<td>MD&amp;A</td>
<td>-</td>
<td>Wordstat</td>
</tr>
<tr>
<td>OA3</td>
<td>MD&amp;A</td>
<td>Keyword-in-context analysis</td>
<td>Wordstat</td>
</tr>
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<td>10-K</td>
<td>-</td>
<td>Wordstat</td>
</tr>
<tr>
<td>OA5</td>
<td>10-K</td>
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<td>Wordstat</td>
</tr>
<tr>
<td>OA6</td>
<td>MD&amp;A</td>
<td>-</td>
<td>LIWC</td>
</tr>
<tr>
<td>OA7</td>
<td>10-K</td>
<td>-</td>
<td>LIWC</td>
</tr>
</tbody>
</table>

### Appendix II: Stata code calculation HHI

```stata
bys comp_id_ex year : egen SumSalary = total(Salary)
bys comp_id_ex year : egen SumBonus = total(Bonus)
bys comp_id_ex year : egen SumNonequity = total(Nonequity)
bys comp_id_ex year : egen SumAllothercomp = total(Allothercomp)
bys comp_id_ex year : egen SumOptions = total(Options)
bys comp_id_ex year : egen SumStocks = total(Stocks)

bys comp_id_ex year : egen SumSqrSalary = total(Salary^2)
bys comp_id_ex year : egen SumSqrBonus = total(Bonus^2)
bys comp_id_ex year : egen SumSqrNonequity = total(Nonequity^2)
bys comp_id_ex year : egen SumSqrAllothercomp = total(Allothercomp^2)
bys comp_id_ex year : egen SumSqrOptions = total(Options^2)
bys comp_id_ex year : egen SumSqrStocks = total(Stocks^2)

gen HHISalary = SumSqrSalary/(SumSalary)^2
ngen HHIBonus = SumSqrBonus/(SumBonus)^2
ngen HHINonequity = SumSqrNonequity/(SumNonequity)^2
ngen HHIALlothercomp = SumSqrAllothercomp/(SumAllothercomp)^2
ngen HHIOptions = SumSqrOptions/(SumOptions)^2
ngen HHISTocks = SumSqrStocks/(SumStocks)^2

gen row_HHI = rowmean (HHISalary HHIBonus HHINonequity HHIALlothercomp HHIOptions HHISTocks)
```
Appendix III: Stata code calculation CV

```stata
bys comp_id ex year : egen MeanSalary = mean(Salary)
bys comp_id ex year : egen MeanBonus = mean(Bonus)
bys comp_id ex year : egen MeanNonequity = mean(Nonequity)
bys comp_id ex year : egen MeanAllothercomp = mean(Allothercomp)
bys comp_id ex year : egen MeanOptions = mean(Options)
bys comp_id ex year : egen MeanStocks = mean(Stocks)

bys comp_id ex year : egen sdSalary = sd(Salary)
bys comp_id ex year : egen sdBonus = sd(Bonus)
bys comp_id ex year : egen sdNonequity = sd(Nonequity)
bys comp_id ex year : egen sdAllothercomp = sd(Allothercomp)
bys comp_id ex year : egen sdOptions = sd(Options)
bys comp_id ex year : egen sdStocks = sd(Stocks)

gen CVSalary = sdSalary/MeanSalary
gen CVBonus = sdBonus/MeanBonus
gen CVNonequity = sdNonequity/MeanNonequity
gen CVAllothercomp = sdAllothercomp/MeanAllothercomp
gen CVOptions = sdOptions/MeanOptions
gen CVStocks = sdStocks/MeanStocks

egen row_CV = rowmean (CVSalary CVBonus CVNonequity CVAllothercomp CVOptions CVStocks)
```

Appendix IV: Stata code calculation Gini index

```stata
ineqdeco Salary, by(num_idyear)
merge m:1 num_idyear using "GiniSalary.dta"
rename _merge _merge_GiniSalary
destory GiniSalary
rename Gini GiniSalary
destrio Bonus, by(num_idyear)
ineqdeco Bonus, replace
rename _merge _merge_GiniBonus
destory GiniBonus, replace
ineqdeco Nonequity, by(num_idyear)
rename _merge _merge_GiniNonequity
destory GiniNonequity
rename _merge _merge_GiniAllothercomp
destory GiniAllothercomp, replace
ineqdeco Options, by(num_idyear)
rename _merge _merge_GiniOptions
destory GiniOptions, replace
ineqdeco Stocks, by(num_idyear)
rename _merge _merge_GiniStocks
destory GiniStocks, replace
```