

Is there such a thing as multitasking for corporate organizations? Performance feedback on multiple goals

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Preface

I present to you my master thesis *Performance feedback on multiple goals* which contains an analysis of inconsistent feedback on multiple goals concerning R&D search. This relation is moderated through an analysis of several compositions of the Board of Directors. I have done this research to finish my master's degree in business administration at the Radboud University in Nijmegen, with a specialization in Strategic Management. After working for six months on this project I can proudly say that I am finished.

From the first thesis meeting, I knew that I wanted to study the social and sustainability side of corporate organizations. My supervisor directed me to the literature on the theory of organizational behavior, to look into performance feedback theory. There I found the topic that I wanted to investigate: how organizations have to perform on financial and nonfinancial goals simultaneously.

Writing this master thesis was a challenging time for me, which has brought me many ups and downs. Now I can say that I am finished and proud of the study that I have written. I want to thank my supervisor for challenging me and supporting me to make my own choices regarding the research. Further, I want to thank my family and friends for supporting me, listening, and motivating me.

Glennys Govaerts

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Abstract

The existence of goals has been a central premise in the study of management research. Over the past decades, it has become increasingly relevant for corporate organizations to include nonfinancial goals in the organizational strategy. While performance feedback theory has given a lot of attention to single goal assessment, often a financially related one, the multiple goal perspective has received little attention. In addition, the board is the most important corporate decision-making body that is responsible for interpreting feedback on organizational goals. Board diversity has become an emerging research topic to investigate the way it influences strategic decision-making. To fill these theoretical gaps, this research looks at inconsistent feedback on multiple goals regarding R&D search and if this relation is influenced by board diversity. By using a Regression Analysis, this research was able to examine the effects of these dependence relationships. The results indicate that interpreting inconsistent feedback has a short-term effect on increasing R&D search. In addition, the results show that this relation is influenced by several board compositions. Namely, the number of female, independent, and industry-specific skills directors present. In sum, the composition of the board has a significant effect on how to interpret inconsistent feedback on multiple goals.

Keywords: Performance feedback theory, Board of Directors, Multiple goals, financial goal, nonfinancial goal, R&D search

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Is there such a thing as multitasking for corporate organizations?

Performance feedback on multiple goals

Over the past decades, it has become increasingly important for organizations to focus on social and sustainability goals next to financial goals. The report of the international resource panel, which reports on the latest scientific, technical, and socio-economic findings around global resource use, makes this clear by showing the need for a radical reduction in the use of resources to achieve environmental and socio-economic goals (Litvineko et al. 2022). Authorities worldwide have been pushing to establish regulations and guidelines for productions and services to be more sustainable (Qu et al. 2022). Due to the fast industrial developments, sustainability issues are becoming a major issue for businesses, governments, and society (Qu et al.2022). Hence, corporate organizations are actively called upon to go beyond the simple financial goals and embrace an active commitment to social, environmental, and governmental issues (Nicolò et al. 2021).

The existence of organizational goals has long been a central premise in management research. Firms are using aspiration levels to guide strategic decision-making regarding organizational goals (Audia & Greve, 2021 p. 8). The theory of performance feedback is a key component of Cyert and March's (1963) 'A behavioral theory of the firm'. The literature defines performance feedback theory as a 'routine-based, history-dependent, and target-oriented activity that regulates the behavior of organizations (Yang, 2021). It handles the question of whether organizations respond to failure by making changes and when they do not (Audia & Greve, 2021 p. 8). Aspiration levels consist of a goal and point of comparison that is used to evaluate the performance of corporate organizations which indicates that corporate organizations measure performance feedback by assessing the discrepancy between aspiration levels and current performance (Yang, 2021). Building on the work of Cyert & March (1963) scholars have widely considered the role of performance feedback in organizational behavior (Blagoeva et al. 2020).

The argument that corporate organizations measure their performance relative to their aspirations and thereby influence strategic-decision making is consistent with many studies. In determining when and how they should respond to changes, decision-makers of corporate organizations must interpret the feedback they receive on performance (Joseph & Gaba, 2015). Investing in R&D is seen as a consequential organizational behavior of evaluating feedback on performance goals (Lv et al. 2019). R&D investments are seen as an important source of competitive advantage, crucial for the long-term success of an organization. However, there are risks involved because the payoff of R&D investments tends to be distant and most projects do show a low likelihood of success (Bravo & Reguera-Alvarado, 2017).

The Board of Directors is often responsible for interpreting the performance outcomes of the organization and making strategic decisions (Joseph & Gaba, 2015). It lies within the responsibility of the board to align firm behavior with the pressures from stakeholders (Naciti, 2019). Therefore the board has to put social and sustainability goals on the agenda (Naciti, 2019). The composition of the board plays a fundamental role when it comes to determining organizational behavior and strategic decision-making (Cucari et al. 2018). Directors influence the strategic decision-making process that is taken by boards. Decision-making by the board is a cognitive process that is influenced by the demographic factors of board members. In addition, directors also contribute resources to boards in the form of knowledge, guidance, advice, liaisons with important stakeholders, maintaining external relations, and assisting in strategy formulation. Therefore, diversity in directors can bring new resources which may influence the decision-making process (Islam et al. 2022).

While research into performance feedback theory and the Board of Directors has significantly advanced our understanding of how organizational goal setting is related to organizational behavior, recent discussions have highlighted an unresolved discussion in this line of argument. Although earlier studies have focused on the effects of single performance goals, recent studies have suggested that decision-makers have to make use of multiple reference points simultaneously (LV et al. 2019). Audia & Greve (2021 p. 14) write that studying multiple goals should become more central in the study of performance feedback. The presence of multiple goals implies that there are at least two aspiration levels to be considered. Consequently, multiple aspirations have to be considered which makes that

inconsistency is introduced in evaluating realized performance on multiple goals (Lucas et al. 2018). If these goals differ in terms of performing above or below the aspirations set, decision-makers are confronted with inconsistent feedback (LV et al. 2019). Therefore, the nature of performance evaluation becomes a relevant issue. But this part of feedback on performance levels has not received much conceptual attention. Therefore, authors have called upon studies on how organizations deal with contradictory performance feedback (Lucas et al. 2018).

Additionally, Harjoto (2018) writes that diversity in boards has been seen as a ‘double-edged’ sword that can lead to more creative solutions for the group, as well as less cohesion within the board that can prevent good strategic decision-making. On the one hand, board diversity can enhance performance because a diverse group brings a greater pool of different perspectives, knowledge, skills, and abilities. They also have more access to information outside the group. On the other hand, people are more likely to favour in-group members. Out-group members are often seen as less trustworthy and less cooperative than in-group members. In addition, people are often more attracted to those who are like themselves.

Recognizing that board diversity has either a positive or negative influence on the interpretation of feedback and therefore organizational behavior is not enough to produce an answer with practical and theoretical relevance. Therefore, I aim to answer the following question; ‘*What factors of the board react to inconsistent feedback on multiple performance goals?*’ To address this question, the present study develops a research that can give us insight into the interpretation of inconsistent feedback on multiple goals by the board. I put out my argument to an empirical test using data on several characteristics of board members and I look at the discrepancy between the performance and aspiration between a financial and nonfinancial goal to look at inconsistent feedback leading to R&D search. My empirical analysis lends support to the theoretical claim, showing that different characteristics of board members have different effects on the interpretation of inconsistent feedback. By demonstrating this, this study makes three contributions to the extant literature.

First, I address the gap that is now present in the literature on performance feedback theory regarding the multiple goals perspective. Martínez-Noya & Garcí-Canal (2021) write that it has become central that corporate organizations have to pursue a wide range of different financial and nonfinancial

goals. However, most research in the behavioral theory of the firm has focused on analyzing the role of only a single goal, a financial goal. Considering the role of nonfinancial performance, as a second goal, can give performance feedback theory new insights into the behavior of the corporate organization. Thus, the present study contributes to the literature by examining performance feedback on multiple goals instead of a single goal as in the classic literature on performance feedback theory.

Second, the study considers not one but several characteristics of board members to look at board diversity. Given that directors influence the decision-making and strategic actions, I examine how the directors influence the interpretation of inconsistent feedback in relation to R&D search.

Naciti (2019) argues that there currently exists a gap between a firm's sustainability practices and the board composition. Because this study takes a nonfinancial organizational goal the study can add insights into organizational behavior toward nonfinancial goals.

Third, Lucas et al (2018) write that most of the variance of R&D intensity can be attributed to the differences across industries. This study takes on a random sample of different kinds of industries to explore organizational behavior toward R&D search. Therefore, I can add to the debate that R&D intensity can depend on other factors than industry-specific factors. I take a different view to examine R&D search in the light of inconsistent feedback. The literature has specifically called for studies on how organizations deal with contradictory performance feedback because this part of performance feedback has not yet received much attention (Lucas et al. 2018). This study adds to the literature by examining inconsistent feedback on multiple goals in relation to R&D search.

Theory and hypothesis

Performance feedback theory

The theory of performance feedback is a key component of Cyert and March's (1963) 'A Behavioral Theory of the firm'. Organizational learning is an important research topic when studying organizations because learning capabilities are the basis for the strategic advantages obtained by corporate organizations. Within the study of organizational learning, performance feedback theory brings on a target-oriented nature of organizational learning by claiming that such targets – defined as organizational goals – are a crucial factor regarding organizational change. Research guided by performance feedback examines two highly recurring organizational processes: the way organizations examine whether the performance is satisfactory and how these examinations influence the strategic decision-making. Although this theory has been investigated for more than fifty years, organizational research continues to be highly influential as evidenced by a growing body of empirical work and still expanding its key arguments (Audia & Greve, 2021 p. 3).

The theory holds its primary interest in how the evaluation of performance leads to different types of organizational change. Thereby, the attitude the organizations hold towards risk is an important factor for organizational change. Risk-taking has an orientation toward goal setting: the perception organizations have toward risk-taking highly depends on if the organization is performing above or below an aspiration level. Aspiration levels can be defined as the border between success and failure that is perceived by the organization. The height of the aspiration level differs per corporate organization and the history and interpretation of performance level by the board of the corporate organization (Audia & Greve, 2021 p. 10).

When a corporate organization performs above the set aspiration level, it can be seen as a sign that the organization's strategy, routines, and structures are in line with the demands of the organization's environment, indicating that no radical changes are necessary. However, when an organization is performing below the aspiration level that has been set, it gives an implication of a

mismatch between the organization's strategy, routines, and structure and the demands placed on it by the organization's environment, and results in changes that have to be made. Thus, the relation between the strategy, routines, structure, and the demands of the corporate organization will result in organizational changes being made (Lv et al. 2019).

For each performance goal, an aspiration level is set. Organizations can set two different kinds of aspirations: historical and social aspiration levels. This is depending on which reference point an organization chooses to compare the performance of the organization to. Setting a historical aspiration, an organization looks at internal self-comparison which is associated with the experience of the firm. Whereas social aspirations take on a more external outlook. Organizations look at their peers operating in the same industry and how they perform compared to them. Both kinds of aspiration levels can be used to interpret the feedback on performance goals (Shou et al. 2020).

R&D investments are an important source of competitive advantage for an organization's critical long-term success. R&D investments bring several risks because the benefits tend to be distant and there is a low likelihood of success (Brave & Reguera-Alvarado, 2017). Performance feedback theory argues that R&D investments is a consequential organizational behavior of evaluating the performance along with aspiration levels (Lucas et al. 2018). Organizations tend to increase search behavior when there is a case of the performance below the aspiration level (Ye et al. 2021). Firms embrace the performance below aspiration levels through problemistic search which is defined as a process in which the firm re-evaluates its strategy, routines, and structures and formulates several solutions to better serve the demands of the environment (Lucas et al. 2018). Consequently, there exists an increase in R&D search to increase the performance of the organization, even if this entails taking a risk by investing in R&D. However, when firms are performing above the aspiration level, they tend to be less motivated to change and improve the organization search behaviors which leads to a more reduced-risk oriented behavior (Ye, Yu et al. 2021). All possible actions that can place an organization below the aspiration level would be avoided and as firms go above aspiration levels they can embrace change by dedicating more resources to slack (Martínez-Noya & García-Canal, 2021). Thus, feedback on performance goals lead to adaption in several organizational aspects, such as adjustment of the aspiration levels, changes in willingness to take risks, and problemistic search behavior.

The most studied type of search behavior is technological search behavior which is about allocating the organization's resources to R&D activities. Evaluating how the risk tolerance of organizations changes along the performance of organizations, studies have analysed this from two aspects. On the one hand, receiving negative feedback on performance goals will reduce the opportunity cost of risk-taking. Compared to receiving positive performance feedback, the opportunity cost for R&D or strategic adjustments when there is a case of negative feedback is lower; on the other hand, performance below aspirations will threaten the existing reputation and external legitimacy of organizations. Firms must rebuild the legitimacy of the organization through R&D and innovation activities. Therefore, the behavioral theory of the firm predicts that negative feedback on performance will trigger problemistic searches which positively impacts the R&D search (LV et al. 2019).

Audia & Greve (2021) have expanded the literature on performance feedback theory. They propose a new perspective that deals with the influence of multiple goals that organizations face nowadays. In addition, they write that organizational action is driven by goals from which the aspirations are the minimally acceptable performance to which the performance of goals adapts over time. The organization's external environment has a crucial influence on the behavior of organizations. The recognition of these effects has led top directors to be concerned with satisfying goals that reflect multiple logic. Hence, organizations face complex environments which are characterized by the coexistence of various goals.

Multiple goals can be prioritized by the board in two ways. The first way takes on a problem-solving orientation, this means that when goals, that are high in the goal hierarchy, perform below the aspiration level a search for new solutions is taken and change is implemented. The second behavior towards multiple goals takes on self-enhancement orientation. This indicates that the board gives priority to goals on which performance is more favorable. They ignore the goal hierarchy, when another goal of lesser importance is showing high performance, it gains increased attention from the top management. This can lead to decreased responsiveness to low performance on goals that are high in the goal hierarchy. For example, in environments in which firms confront both a market logic and a sustainability logic, they have greater latitude to form favorable assessments of performance when market goals are not met

by shifting attention to the sustainability goal. Organizations operate in dynamic environments with behavior that can change over time, so the prioritization can also change over the years.

Much of the empirical research on responsiveness to performance feedback is about a single goal. It is only recently that research has started to tackle the issue of how organizations respond to performance on multiple goals. The presence of multiple goals implies that there are at least two aspiration levels to be considered. A direct consequence is that inconsistency is introduced in evaluating realized performance (Lucas et al 2018). Inconsistent performance feedback means that the information available to the organization to evaluate its performance and determine whether to engage in adaptive behavior contains internal contradictions. These internal contradictions matter because they make it hard to come to a consistent conclusion about whether the organization is achieving a level of performance that compares favorably to its goals. For instance, a firm might have increased its market share yet saw the value of its sales decline in a given year. On the one hand, this firm might conclude that demand happened to be lower than usual in the current year, while it creases in market share shows its strategy is the right one. On the other hand, this firm might interpret the situation as one in which the market is becoming less interested in the current product range offered by the industry at large. In the latter situation, a firm would probably increase its R&D efforts seeking to develop products that better meet changed demands, while in the former situation, a firm would not re-evaluate its R&D efforts (LV et al. 2019). In sum, multiple goals of organizations can lead to receiving inconsistency in feedback because they cannot always converge at the same performance level.

Multiple goals

A defining feature of any corporate organization is the set of goals it pursues. These organizational goals can be highly varied. Some – such as profit maximization or social responsibility – capture the overall contribution organizations make. Others identify the contribution that distinct subunits make to the overall outcomes of the organization. Firms have goals set by founders and stakeholders, and these are associated with the economic role and social identity of the corporate organizations in society. Corporate organizations use these goals to guide their strategic decision-making process (Audia & Greve pa. 5).

Although it is well-known that firms must pursue a wide range of financial and nonfinancial goals, and behaviors are guided by different aspirations, most research in behavioral theory of the firm has focused on analyzing only the role of financial performance measured on an organization's decision-making (Martínez-Noya & García-Canal, 2021). That is why the emerging literature on organizational goals seeks to explore the multitude and effects of nonfinancial goals (Richards, 2022).

Corporate sustainability is about expanding the financial bottom line into a triple bottom line, which indicates that environmental, social, and corporate governance aspects are included in the goal setting of the corporate organizations. Because the business environment has become more competitive and corporate social responsibility is becoming a relevant business strategy, firms are investing in their search for better nonfinancial strategies (Prudêncio et al. 2021). Corporate organizations are required to go beyond the simple profit-making aspects, including their report information on several nonfinancial dimensions that have an impact on the value creation processes (Nicolò et al. 2021).

United Nations (2015) requires the collaboration of companies in pursuing sustainability goals and ensuring transparency in financial markets. The nonfinancial Reporting Directive (NFRD), Directive 2014/95/EU, is considered one of the most important actions that the institutions of the European Union (EU) have taken toward achieving nonfinancial goals. The aim of the NFRD is to contribute to more transparency in the capital market and to achieve better sustainability goals. Nonfinancial reporting disclosure is therefore considered to be an effective response to several external

challenges and pressures that are rising from stakeholders, regulators, investors, and citizens (Cosma et al. 2021).

ESG has been mentioned for the first time in 'whocareswins2005 conference report', in which institutional investors and regulators emphasized the importance of ESG factors in asset management and financial research. Since then, the metrics of ESG evolved and many countries around the world started promoting this framework for sustainable finance (Khaled et al. 2021). The performance on sustainability goals has been widely measured in the literature using Environmental, Social, and Governance (ESG) scores. ESG practices and disclosures form new accountability measures that reflect a commitment to nonfinancial goals. Thereby creating value for the firm's investors, stakeholders, and society. ESG scores provide users with available data regarding a company's sustainability performance (Khaled et al. 2021).

Following this global trend, there have been attempts by scholars to examine the impact of ESG factors on the portfolio selection process for achieving better sustainability goals. On the one hand, the global financial crisis of 2007 – 2008 has marked the important central role of corporate social responsibility on financial markets and, therefore, on the world economy in general. On the other hand, the current challenges on issues such as climate change, pollution, and the waste of natural resources have led to increasing attention to global sustainability topics (Cesarone et al. 2022). Veenstra & Ellemers (2020) writes that the set of ESG ratings and benchmarks not only gives a standard by which the performance of businesses can be monitored and compared by external stakeholders. They also can be defined as a set of goals within the organization that guide the priorities organizations set and the actions they have to take to achieve these organizational goals. ESG indicators inform organizations on the outcomes that are considered crucial and specify what is expected from them by external stakeholders, they can provide organizations with tools and inspiration highlighting what specific nonfinancial topics and targets to focus on to improve their nonfinancial performance. This way, ESG ratings shape the nonfinancial goals of businesses in providing a direction toward the activities they invest in and focus their attention on. In sum, the nature and content of ESG ratings and benchmarks have to potential to serve as a compass, showing organizations where they stand and what they should be doing to improve their performance on nonfinancial goals.

In recent years, the debate surrounding the relationship between socially responsible behavior of corporate organizations and financial outcomes has been gaining increasing attention in management and business ethics studies (Phan et al. 2020). These investigations have not yet produced consistent results (Fatemi et al. 2015; Phan et al. 2020). Existing literature has highlighted that the current level of corporate engagement for environmental management is insufficient for harming the environment. Consequently, a higher level of corporate engagement in sustainable practices is necessary. However, relatively little is known about the processes that lead to increased corporate actions fostering sustainable practices. To better understand the reasons for such kinds of processes, the learning process of businesses on corporate sustainability is necessary (Hörisch et al. 2020).

Hu et al (2019) have investigated how firms respond to feedback about their social performance. They write that corporate social performance below aspiration can threaten the legitimacy and survival of the company. If the firm fails to achieve its corporate social performance objectives, the organization will attempt to search for solutions which leads to a problemistic search. Past performance is a crucial element in the behavioral theory of the firm and strategic decision-making. Past performance can be linked to the intrinsic ability inside the organization and therefore provides a criterion for organizations to adapt to the external environment. Moreover, past performance gives an evaluation of an organization's past operational and managerial activities as well as a basis for future strategy settings where past performance can be related to the process of strategic decision-making.

Board of Directors

The argument that an organization's performance relative to the aspiration level influences the strategic decision-making is in line with many studies and observations of organizations. Decision-makers must interpret the performance outcome in determining when and how they should respond to changes (Joseph & Gaba, 2015). Nicolò et al. (2021) write that it is within the responsibility of the Board of Directors to create a well-structured and accountable internal control system that is capable of reflecting a transparent and reliable flow of information and operations for a firm. The board is presented as the most important decision-making body that holds responsibility for managers' behaviors and addresses the interests of different stakeholders through the implementation of strategies and policies that embrace both financial and nonfinancial issues. However, the level of effectiveness and efficiency with which the board pursues these responsibilities strictly depends on the bundle of capabilities, skills, experiences, and perspectives that are provided by the director's operating on the board.

The literature on the board and corporate governance have placed a primary focus on the governance structures and the firm's financial practices, which has been the primary interest of stakeholders for decades. However, in recent years, environmental, social and sustainability issues have been raised as an important issues by both shareholders and stakeholders. How firms respond to these sustainability-related issues raised by shareholders and stakeholders, and how a firm's governance structure plays a role in these new topics are emerging research topics (Naciti, 2019). The ability of companies to pursue social and sustainability goals is critical but it is not an easy task. Internalizing the nonfinancial goals requires adapting business models and strategies for aligning them (Cosma et al. 2021). The board plays a central and primary role when it comes to this issue. It is essential to promote corporate governance practices that contribute to achieving a company's sustainability and overcoming corporate short-termism (Cosma et al. 2021). The implementation of social and environmental strategies requires good corporate governance planning for which boards must start to define and implement policies and strategies (Naciti, 2019).

The existence of a diversified board can have a positive influence on the debate concerning firms' strategic policies (Prudêncio et al. 2021). Directors can influence critical strategic decisions taken by the board. Decisions are cognitive and influenced by the demographic factors of the board members. Additionally, directors bring different resources to the boards in the form of knowledge, guidance, advice, liaisons with stakeholders, maintaining external relations, and assistance in the formulation of strategies. Therefore, diversity in the directors operating on the board is presumed to bring a better variety and distinctiveness to the board which influences the strategic decision-making of the board (Islam et al. 2022). However, only a proper composition of the board, such that input and insights from all relevant sources have been taken into account, may bring reduced uncertainty, enhance information exchange, and increase access to resources (Midavaine et al. 2016).

On the one hand, diversity can enhance board performance because the members of a diverse team can bring a better pool of different perspectives, knowledge, skills, and abilities to look at solutions and solve problems. Additionally, people in diverse groups have wider access to information outside the group. More information networks, along with greater cognitive resources, increase the ability for complex problem-solving. On the other hand, categorization into groups can lead to in-group and out-group bias. People are more likely to favor in-group members and perceive out-group members as less trustworthy, dishonest, and less cooperative than their in-group members. On top of that, people are generally more attracted to those who are similar to themselves. Diversity can harm group process and the performance through negative attitudes toward individuals who are dissimilar and infrequent communication among members of a diverse team (Harjoto, 2018). Hence, there remains a debate on whether board diversity can positively or negatively affect board effectiveness. This study examines several characteristics of directors operating on the board to influence the interpretation and strategic decision-making of organizational goals.

First, although there is a growing body of work on the link between gender diversity and board effectiveness, the literature remains inconclusive about board gender diversity and board effectiveness. Some studies provide evidence of positive relationships whereas other studies find no link and, at times, a negative link (Li & Chen, 2018; Jiang et al. 2021). Nicolo et al (2021) have investigated the role that gender diversity plays on boards in strengthening corporate governance mechanisms and fostering

higher ESG disclosures. They find that men and women have different personalities, socio-cultural backgrounds, leadership styles, expertise, and expectations. Which, if adequately combined, may improve the discussion quality and thereby the de decision-making process within the board. The study adds the perception that female directors tend to be more sensitive to social, environmental, and ethical issues. And, in addition, tend to be more attentive to addressing stakeholders' interests than their male counterparts. Women often have more educational backgrounds linked to nonfinancial issues and are more prone to act ethically and avoid violating social and environmental policies than male directors.

Noticeably, most studies about gender diversity focus on the individual in the group and how the individual is affected by being part of the group. Fewer gender diversity studies have focused on the question of how gender diversity in a group can influence the organization. Some reported that women are better capable of playing a monitoring and advisory role on the board while others report that women behave differently from men in risky situations (Almore et al. 2019). Female directors tend to be more conservative and are more likely to build up a strict compliance culture that might stifle innovation compared to male directors. R&D requires room for experiments and failure and therefore intensive monitoring from the board which may deter managers from engaging in innovative activities because it often tends to go wrong. Female directors tend to create strict compliance culture within a firm which inhibits the innovation experiments. In addition, a supportive board is necessary to engage in supportive experiments which have a chance of failure. Firms with more intensive monitoring from the board can prohibit managers to engage in R&D because they perceive the pressures from intense monitoring as a threat and can become risk-averse (Chen et al. 2021).

Therefore, I expect that the greater the inconsistency between the financial and nonfinancial goals the greater the R&D intensity which is negatively influenced if there is high board gender diversity present.

H1: The presence of gender diversity on the board has a negative influence on interpreting inconsistent feedback resulting in R&D search

Second, Independent directors are defined as directors who do not have any business or family relationship with the organization, which makes them immune to any conflict of interests with the organization. Because they are not under the direct control of management, they can better represent the interests of the shareholders. Independent directors play a central role in speaking out in line with the law and upholding minority stakeholders' interests. (Mishra, 2020). In addition, independent directors are expected to provide new insights concerning environmental and social stakeholders, contrary to the classic models that focus exclusively on financial performance (Naciti, 2019).

However, because they are independent, they have inexperience with the business industry and the organization which can also be a handicap for the improvement of the board's effectiveness since they need to have a significant understanding of important corporate strategies (Reguera-Alvarado & Bravo, 2017). The lack of the necessary expertise or knowledge that is required of independent directors can explain why higher board independence does not lead to an increase in firm performance. On top of that, independent directors can also be associated with indifference because these directors can feel less motivated and therefore do not increase their involvement (Reguera-Alvarado & Bravo, 2017).

Huse et al. (2020) write that independent directors with external directorship may influence the board in detecting potential opportunities by providing information about environmental events and trends about potential research trajectories. Therefore R&D uncertainty can be reduced. Independent directors can bring a significant understanding of potential actions and outcomes and the ability to cope with problems and challenges that can come along with R&D projects. Because of their external directorship, independent directors are best at observing and identifying the best business practices first-hand. In addition, they can share their knowledge and experiences with boards and support them in developing potential R&D practices to address solutions for strategic and management problems. Independent directors can facilitate access to external financial resources, reducing R&D expenditures. Therefore, I expect that the greater the inconsistency between the financial and nonfinancial goals, the bigger the R&D search which is positively influenced if independent directors are present on the board.

H2: Independent directors on the board have a positive influence on interpreting inconsistent feedback resulting in R&D search

Third, Faleye et al. (2018) argue that directors with industry-specific expertise provide a better understanding of the risk and reward profiles of the firm's industry. These kinds of directors provide a better connection to the key industry players which can increase access to important information about industry-specific opportunities. Industry-specific opportunities can provide the board with better oversight of strategic decision-making regarding R&D spending. When directors have better expertise in the industry it facilitates better advising that fosters investments in suitable R&D projects. On top of that, other directors may be more likely to accept advice from perceived experts. However, directors with industry-specific expertise can also be blinded by the familiarity of the industry, it can prevent the organization to reinvent the industry through ground-breaking and potentially disruptive innovation.

But the decision for R&D investment requires specialized knowledge and a considerable understanding of technological and competitive risks. Therefore, the uncertainty of this decision-making can be reduced by obtaining additional information and gaining a better understanding of the industry. Directors with industry-specific skills can contribute to this because they possess information and knowledge of the opportunities and constraints that exist in the industry and are better able to provide the board with exact information about new technologies and challenges that the firm may come to face. Therefore, I expect that the greater the inconsistency between the financial and nonfinancial goals the bigger the R&D search which is positively influenced if there are directors with industry-specific skills present on the board.

H3: Directors on the board with industry-specific skills have a positive influence on interpreting inconsistent feedback resulting in R&D search

Fourth, literature on board tenure has shown a mixed correlation with board effectiveness. Long board tenure indicates that a board can be better at performing its tasks. These directors are better at managing management because they are less susceptible to peer pressure and less likely to be controlled by managers. (Livnat et al, 2021). On top of that, long-tenured board members are better at advising, because a longer tenure allows them to learn more about the operations of the organization and thereby

understand more about its unique economic, environmental, and financial reports (Livnat et al. 2021). Reguera-Alvarado & Bravo (2017) add to this argument by implying that experiential knowledge is crucial for board members to effectively contribute toward the strategic growth of the organization.

However, long board tenure has also a way of harming the effectiveness of the board. Seasoned board members can become friendlier with managers over time which can make them lose their ability to examine the managers' actions objectively. Board members who have not been on the board for such a long time can consider the firm as if they are an outsider and can perhaps better examine what the organization is supposed to do differently compared to its past or peers (Midavaine et al. 2016). In addition, long board tenure can result in less openness to outside information and an increased commitment to a certain perception of the organization, including its opportunities and challenges and resistance to major changes. These directors tend to resist strategic changes and new ideas and therefore they may tend to be reluctant against R&D strategies (Bravo & Reguera-Alvarado, 2017). Therefore, I expect that the greater the inconsistency between the financial and nonfinancial goals the bigger the R&D search which is negatively influenced by long board tenure.

H4: directors with a *Long board tenure* have a *negative influence on interpreting inconsistent feedback resulting in R&D search*

The hypotheses formulated in the previous section are presented in the conceptual framework below. The conceptual model demonstrates the moderating effect I expect the different board characteristics to have on the direct relationship between the interpretation of inconsistent feedback on R&D search.

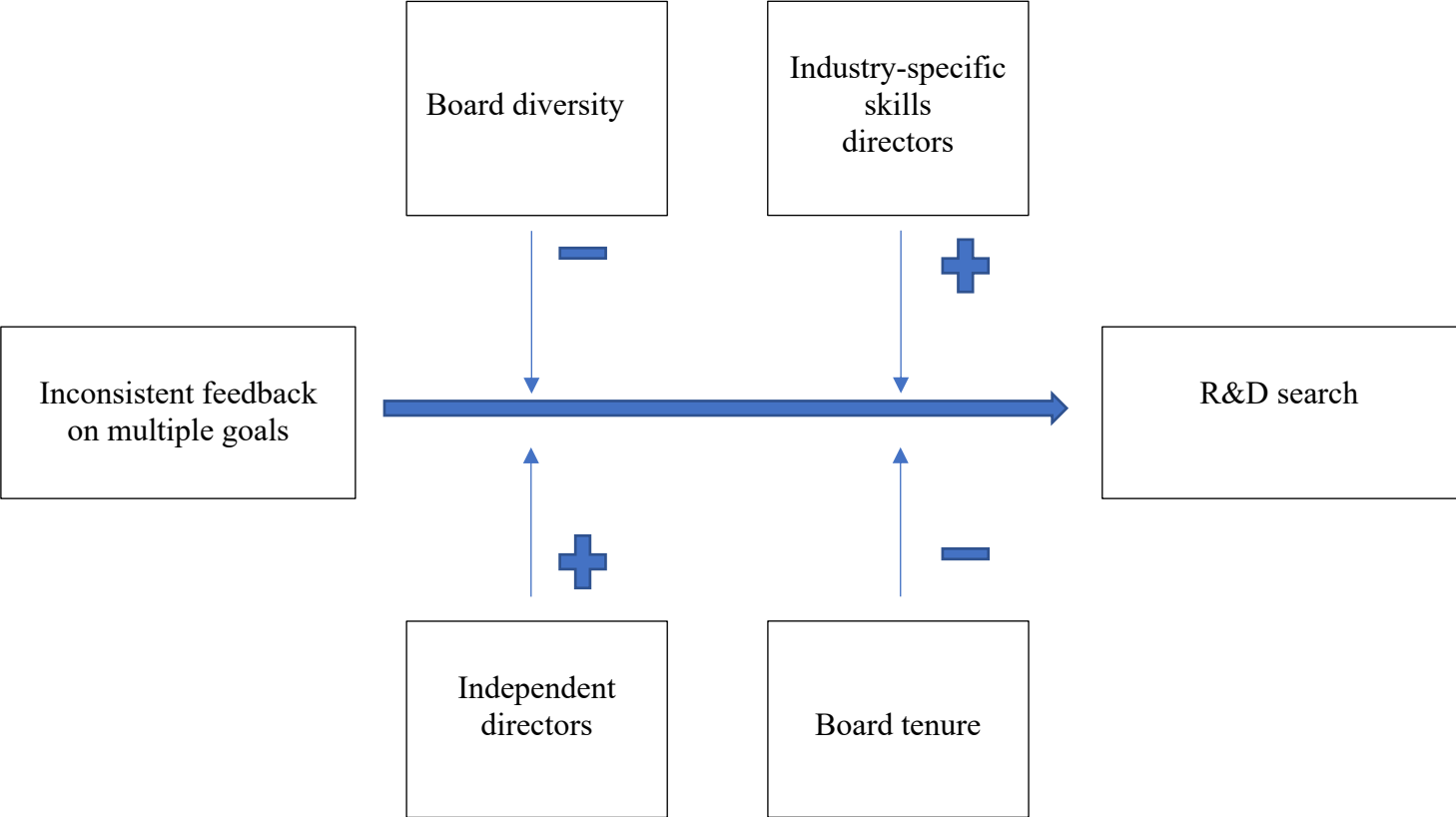


Figure 1. Conceptual model

Methodology

Data collection and measures

The data used to test the hypothesis consists of a sample of 167 listed firms. The sample is random, meaning from different countries and industries, collected from the Thomas Reuters Eikon database for corporate organizations which have reporting on all the variables studied in the present study. From that, a sample has been drawn for the years 2017 – 2020.

The present study makes use of secondary data, meaning that all information is retrieved from a database. The Thomas Reuters Eikon database is an open-technology solution for financial markets professionals, providing access to industry-leading data, insights, and exclusive and trusted news. It lets you securely share and connect with trusted contacts in 30 000+ firms across 180+ countries (Refinitiv Eikon, 2022). The present study looks at inconsistent feedback on multiple goals about R&D intensity, moderated by characteristics of board directors within a time frame from 2017 to 2020. The reason for this choice is that this time frame considers the effect of the EU directive 2014/EU/95 as was mentioned in the ‘multiple goals’ chapter. The EU directive 2014/EU/95 requires to include nonfinancial statements in their annual reports onwards (Green finance platform, 2021). This EU directive makes the study of reporting on nonfinancial goals easier and better comparable across corporate organizations.

Measures

Independent variables

The independent variable of the present study is the feedback on performance on multiple goals, which is divided into financial and nonfinancial organizational goals. Table 1 gives a short overview of the independent variables for this study. The financial goal is measured as Return on Assets (ROA). Return on assets is the measure tracked most closely by both organizations and their competitors which makes

it ideal to study and often used in previous studies on performance feedback (LV et al. 2019; Blagoeva et al. 2020). ROA is measured as the ratio of net income to total assets (Blagoeva et al. 2020).

The second independent variable is the nonfinancial organizational goal. The present study makes use of the ESG pillar score to measure the nonfinancial organizational goal. The ESG pillar score is a relative sum of the category weights; environmental, social, and, governmental. The Eikon database calculates a combined score – which is called the pillar score – for each of these dimensions. All scores can vary between a value from 0 to 100. The higher a company’s scores on these pillars, the higher its nonfinancial performance (Refinitiv Eikon, 2022). In the present study, the three ESG pillar scores are used as a combined score together to form the nonfinancial variable. Appendix B gives a further specification of what factors are included to calculate the ESG pillar score.

Variable	Definition	Measurement score
ROA	Net income to total assets	Ratio
ESG score	combined score of environmental, social and governmental scores	Ratio

Table 1: Overview of dependent variables

The present study will follow the measures from Chen (2008) to calculate the aspiration levels of organizations. To calculate the feedback, the discrepancy between actual performance and aspiration, the aspiration levels have to be calculated first. Aspiration is calculated as a weighted combination of past performance at $t - 1$ (weight 0.6) and past performance at $t - 2$ (weight 0.4). because firms tend to rely more on recent performance levels when forming their aspirations (Chen, 2008). When the aspirations are calculated, I know what level the organization wants to achieve which I can compare to the actual performance of the organization. The discrepancy between both levels counts for the feedback that organizations receive on their performance. Negative feedback is the absolute difference between the firm’s past performance and the aspiration level when the performance was below the aspiration. Positive feedback is the absolute difference between the firm’s past performance and aspiration level when the performance accounts for the aspiration (Chen et al. 2008).

This study intends to measure inconsistency between the feedback levels on multiple organizational goals. Therefore, the present study has to look at the discrepancy between the feedback received on both goals. The difference stands for the inconsistency of performing on both organizational goals. The larger the difference, the larger the inconsistency. For this, a new coefficient has been made that stands for the variable 'inconsistent feedback'. Appendix D shows the actual calculation of both variables.

Dependent variable

Following earlier studies, I measure R&D search as the ratio of R&D spending to sales which is defined as R&D intensity (Chen, 2008; Blagoeva (2020); Lucas et al. (2018); Lv et al (2019)). Thus, the outcome variable represents the extent to which R&D investments relative to firm size were increased or decreased. This study takes on two outcome variables for which the same hypotheses are tested. It measures R&D intensity for the years 2019 and 2020. Therefore, this study can better examine the short-term effect of inconsistent feedback. Both years can be compared to examine the effect. Appendix C shows the calculation for both variables

Moderating variables

The present study looks at several characteristics of directors on the board to influence the direct relation between interpreting inconsistent feedback concerning R&D intensity. The expectation holds that the variables of the board influence R&D intensity through an interaction effect with inconsistent feedback. This study examines boards with female directors, directors with industry-specific skills, independent directors, and tenure of directors. Table 2 gives a short overview of these variables. First, gender diversity is given as the percentage of female directors present on the board. To calculate the exact number of female directors this percentage is multiple with the board size. The same holds for the second and third variables. The fourth variable, board tenure, is measured in the years that directors are present on the board. This measure stays the same as it was retrieved from the database. Appendix D shows the actual calculation of these variables

Variable	Definition	Measurement score
Gender diversity	Females directors on the board	Number of female directors on the board
Specific skills	Directors with a strong financial background or specific skills industry specific	Number of directors with specific skills on the board
Independent board members	Independent board members reported by the company	Number of independent directors on the board
Average board tenure	average number of years each board member has been on the board	Measured in years

Table 2: overview board characteristics

Control variables

To account for alternative explanations, I include a comprehensive set of control variables. I included several variables for corporate organizations and boards that can affect R&D search and/or the performance feedback variables. Two control for firm I included firm size and firm growth in the analysis (Blagoeva (2020); Martínez-Noya & Garcí-Canal (2021)). Firm size is measured as the Total Assets of the firm whereas firm growth is measured as the sales growth (Blagoeva, 2020). To allow me to better isolate the effect of the board variables I included board size to control for this effect measured as the number of directors on the board. Because larger board can have access to more resources and support for corporate investments (Hsu et al. 2020).

Reliability and validity

The Thomas Reuters Eikon database is a leading global provider of financial and nonfinancial information. The database provides flexibility around how data is consumed and used. It makes it easy to cross-reference data and connect data (Refinitive Eikon, 2021). Therefore, it can be said that the data retrieved from this database is reliable. The same data is available to other researchers who wish to investigate the same variables. Because the database is so widely used, the standard of reporting makes

it suitable to generalize the variables which make the use of this database valid and the study easily reproducible.

Data analysis

The present study aims to examine the influence of inconsistent feedback on multiple goals resulting in organizational change influenced by several characteristics of board directors. To analyse this, the present study makes use of a Multiple Regression analysis. Multiple regression analysis is a statistical technique that is used to analyse the relationship between a single dependent and multiple independent variables. It represents a wide range of dependence relationships. Using regression analysis, the use of moderation can provide additional effects beyond the direct relationship between independent and dependent variables (Hair et al. 2019 p. 290). Two critical assumptions of the multiple regression analysis are that there is a minimum sample requirement of 50 and preferably 100 observations and all variables must be of a metric measurement level. Both requirements are met since this study makes use of 167 observations all of metric measurement levels.

The present study takes on two outcome variables; R&D intensity in 2019 and in 2020. This can increase the interpretation of the effect of inconsistent feedback and the board characteristics. The aspiration level and the actual performance on the financial and nonfinancial goals are measured for the year 2018, which includes the performance levels of 2016 and 2017 in the calculation. To check the robustness of the moderation effect, the board variables are tested as a direct effect and within the interaction effect with inconsistent feedback. Because the outcome variable is tested for two different years on the same hypotheses, the results sections discussions that hypotheses with 'a' for the year 2019 and 'b' for the year 2020.

Research ethics

The present study only makes use of secondary data. The use of only secondary data can be seen as a limitation for this study, certain information about corporate organizations cannot be available which

reduces the sample size of the study. Thome (1998) writes that the use of secondary data can raise difficulties for confidentiality, informed consent, nonmaleficence, and fidelity for the present study. Therefore, I address these concerns before conducting the analysis. First, the data that is used to construct the database comes from sources that are widely accessible to the public which does not cross the confidentiality of using this information. The same datasets have often been used by other researchers which makes informed consent not applicable for this study. This study mentions the names of the organizations as less as possible so the confidentiality can stay intact as much as possible. Fidelity may be an ethical issue for this research because this research only uses secondary data so there may be a distance between the original data source and the researcher. This research does not imply nonmaleficence because it aims to be informative and beneficial for organizations.

Results

Before conducting the regression analysis, the missing values in the dataset must be identified. There are two missing value which makes the study continue with a sample 164 variables (see appendix E). This is far below the maximum number of values that can be missing from a dataset. As can be seen in appendix E The data consists of some outliers. After detecting and deleting the worst outliers the data consist of 156 samples, so 8 of the worst outliers are deleted. There is still a case of outliers but they are not deleted to manage the reliability of the research. The same dataset will be used for both outcome variables. This way the outcome of both models can be compared. Appendix E. shows that not all variables are normally distributed. Therefore, the variable 'inconsistent feedback' and 'Log' have been transformed to SQRT and Log respectively. There has to be a check for multicollinearity, looking at appendix G and H there is no case of damaging multicollinearity for both outcome variables. The highest value for R&D intensity 2019 is VIF (2.676) and tolerance (.995) and for R&D intensity 2019 VIF (2.284) and tolerance (.995) which are acceptable multicollinearity numbers.

The regression analysis holds assumptions that have to be met to interpret the outcome of the analysis (presented in appendix E). First, the linearity of the phenomenon is measured second the constant variance of error terms. Both assumptions can be checked by looking at the scatterplot (appendix F). There seem to be no signs of linearity and homoscedasticity because the dots are evenly spread around the diagonal line with no clear pattern for both outcome variables and the variances along the line remain similar as you move along the line. Third, the independence of error terms has to be checked by looking at the standardized predicted value because the variables are standardized, the means have to have a value of 0.0 and a standard deviation of 1.000 which is the case for both outcome variables. Fourth, the normality of the error term distribution can be checked by looking at the histograms and normal probability plots. I can state that the histogram is quite normally distributed except for some outliers. The normal probability plot also shows a quite normal distribution.

When conducting the regression analysis I used the ‘enter’ method within SPSS to build 4 blocks. These blocks represent the four different models I tested for the variance for both R&D intensity 2019 and R&D intensity 2020. Model 1 estimates a specification including only control variables; Model 2 adds the direct effect of inconsistent feedback; model 3 adds the board variables as a direct effect; Model 4 adds four interaction terms of inconsistent feedback and board variables - the core variable of interest. Table 3 specifies the meaning of each interaction effect that is used in the analysis. I mean-centered the variables before calculating the interaction effect.

Interaction	Variable
Interaction effect 1	Inconsistent feedback * gender
Interaction effect 2	Inconsistent feedback * independent directors
Interaction effect 3	Inconsistent feedback * specific skills
Interaction effect 4	Inconsistent feedback * board tenure

Table 3: overview interaction effects

Table 4 presents, means, standard deviations, and pairwise correlations among the variables. Board size (-.193 $p < .05$) and Total Assets (-.323, $P < .001$) correlate negatively with R&D intensity 2019 from which board size is a small correlation and total assets medium. Sales growth (.357, $p < .001$), inconsistent feedback (.283, $p < .001$), specific skills (.254, $p < .001$), interaction 3 (.305, $p < .001$) show a positive correlation with R&D intensity 2019. Board size (-.159, $p < .05$), Total assets (-.252, $p < .001$), Independent directors (-.163, $p < .05$), interaction 1 (-.177, $p < .005$), interaction 2 (-.383, $p < .001$), interaction 4 (-.158, $p < .05$) show a negative correlation with R&D intensity 2020. From which interaction 2 show a medium correlation. The rest shows a small correlation. Inconsistent feedback (.233, $P < .001$), specific skills (.258, $p < .001$), interaction 3 (.457, $p < .001$) show a positive correlation with R&D intensity 2020. From these correlations, interaction 3 shows a medium correlation and the rest small. Most of the correlations between the independent variables appear to be small or medium. There are a few strong correlations between the independent variables themselves; interaction 2 and interaction 1 (.701 $p < .01$), interaction 3 and interaction 1 (-.504), interaction 3 and interaction 2 (-.538) and between

gender and board size (-.571, p). All correlations do not show a sign of multicollinearity. It may be interesting to note that the control variables, board size total assets, and sales growth, show a significant correlation with either or both outcome variables. This suggests that the control variables also play a role in the investigated relation. In addition, I included the board characteristics as the main effect and in the interaction effect but it shows that mostly the interaction effects correlate with the outcome variables. So as was hypothesized there is probably a case of a moderating effect.

Table 4
Descriptive Statistics and Correlations

	Mean Statistic	Std. deviation	1	2	3	4	
R&D intensity 19	.1333	.4236	1				
R&D intensity 20	.2523	1.8858	.511**	1			
Board size	10.06	3.096	-.193*	-.159*	1		
Total Assets	6.7170	.8143	-.323**	-.252**	.452**	1	
Sales growth	.1123	.2286	.357**	-.245**	.009	-.053	1
Inconsistent feedback	2.3467	1.1516	.238**	.233**	-.153	-.228**	.101
Gender	2.13	1.1568	-.082	-.071	.571**	.347**	.004
Independent directors	6.5782	3.2594	-.068	-.163*	.485**	.341**	.076
Specific skills	.06	.036	.254**	.258**	-.617**	-.412**	.060
Board tenure	7.24	2.769	-.066	-.067	-.006	-.101	.004
Interaction effect 1	-.0481	-.0481	-.071	-.177*	-.016	.182*	.191*

Interaction effect 2	-.1151	4.0393		-.146	-.384**	-.027	.135	.267**
Interaction effect 3	.0099	.0521		.305**	.457**	-.172*	-.338**	-.086
Interaction effect 4	.4839	3.030		-.077	-.158*	.048	.114	.033

Descriptive statistics and correlations continued

	6	7	8	9	10	11	12	13	14
R&D intensity 19									
R&D intensity 20									
Board size									
Total Assets									
Sales growth									
Inconsistent feedback	1								
Gender	-.027	1							
Independent directors	-.031	.484**	1						
Specific skills	.243**	-.393**	-.300**	1					
Board tenure	-.152	-.053	.081	.074	1				
Interaction effect 1	-.289**	-.124	-.064	-.119	.058	1			
Interaction effect 2	-.090	-.053	-.077	-.111	-.021	.701**	1		
Interaction effect 3	.336**	-.085	-.095	.395**	-.103	-.504**	-.538*	1	
Interaction effect 4	-.251**	.056	-.022	-.140	-.178*	.135	.246**	-.139	1

*<.05

*<.001

Model 1 for R&D intensity in 2019 (see table 5) shows that the control variables; total assets (b = -.130, p < .05) and sales growth (b = .623, p < .05) have a significant effect and the effect of board size is not significant at all (p = .334). The same holds for R&D intensity 2020 (see table 6) where ‘total

assets' ($b = -.582, p < .05$) and 'sales growth' ($b = -2.150, p < .05$) show a significant effect and board nonsignificant ($p = .585$).

The addition of the direct effect 'inconsistent feedback', in Model 2, is itself not significant ($p = .106$) and changes nothing to the significance of the control variables for R&D intensity 2019. However, looking at R&D intensity 2020, the direct effect shows a significant effect ($b = .379, p < .05$) for which the two control variables 'total assets and sales growth' are once again significant and board size not.

With the addition of the board variables as a direct effect, I look at model 3 which shows for R&D intensity in 2019 no significant effect other than total assets and sales growth. Looking at model 3 for R&D intensity 2020 only the board variable 'specific skills' ($b = 11.584, p < .05$) shows a positive significant effect. This makes hypothesis 3b questionable because a negative influence was hypothesized. However, appendix F shows that the F change for model 3 is not significant which makes the interpretation of 'specific skills' as a direct effect questionable.

In model 4 the hypotheses, inconsistent feedback, and Board variables in an interaction effect, are tested. Model 4 for outcome variable R&D intensity 2019 shows significant results for interaction 1 ($b = .063, p < .05$) and interaction 2 ($b = -.037, p < .05$). As interaction 1 shows a positive direction, it can be said that the interpretation of inconsistent feedback with more female directors (gender diversity) positively influences R&D intensity in 2019 for which hypothesis 1a can be accepted. However, interaction 2 shows a negative direction which implies that the more independent directors the less R&D intensity. Therefore, it can be stated that hypothesis 2a is rejected. Interaction 1 and 2 show no significant effect. Therefore, hypotheses 3a and 4a can be rejected because there is no relation. Model 4 for outcome variable R&D intensity 2020, shows that interaction 1 ($B = .392, p < .01$), interaction 2 ($B = -.177, P < .05$) and interaction 3 ($B = 10.104, p < .05$) have a significant effect. Total assets do not have a significant effect anymore ($p = .141$) where it earlier, looking at model 1 until three, did. Interaction 1 has a positive B value which indicates that hypothesis 1B can be accepted. Interaction 2 show a negative B value which indicates that hypothesis 2b can be rejected and interaction 3 has a positive B value which indicates that hypothesis 3b can be accepted.

Thus, for both outcome variables hypothesis, 1 can be accepted. For both outcome variables

hypothesis, 2 can be rejected. This is because a positive influence was hypothesized while there is a negative significant effect. Hypothesis 3a can be rejected because the analysis shows no significant effect. Hypothesis 3b can be accepted because the effect shows a positive significant value. Hypothesis 4 can be rejected for a and b because the analysis shows no significant effect. Table 7 summarizes the acceptance/rejection of the analysis.

Looking at the standardized coefficients of the significant effects for outcome variable R&D intensity 2019 (appendix G) sales growth (Beta = .391) explains the most, then interaction 2 (Beta = -.346), then Feedback * Fender (Beta = .228) and then Total asset (Beta = -.205). when interpreting the standardized coefficients for outcome variable R&D intensity 2020 (appendix H), I can state that interaction 2 (beta = -.367) explains the most, then interaction 1 (Beta = .309), then interaction 3 (Beta = .267), then sales growth (beta = -.204) and then inconsistent feedback (Beta - .173).

Table 5
Results OLS regression model of R&D intensity 2019

Variable	Model 1	Model 2	Model 3	Model 4
Constant	1.040 (.256)	.871 (.275)	.888 (.346)	.823 (.337)
<i>Controls</i>				
Board size	-.010 (.011)	-.009 (.011)	-.008 (.014)	-.013 (0.14)
Total assets	-.130* (.042)	-.122* (.042)	-.127* (.044)	-.106* (.043)
Sales growth	.623** (.131)	.603** (.131)	.596** (.132)	.709** (.134)
<i>Feedback</i>				
Inconsistent feedback		.045 (.028)	.033 (.029)	.041 (.030)
<i>Board variables</i>				
Gender			.017 (.024)	.022 (.024)
Independent directors			.002 (.011)	-.001 (.011)
Specific skills			1.127 1.109	.301 (1.130)
Board Tenure			-.013 (.011)	-.011 (.011)
<i>Interaction term</i>				
Interaction term 1				.063* (.029)
Interaction term 2				-.037* (.012)
Interaction term 3				.771 (.802)
Interaction term 4				.004 (.011)
R2	.213	.227	.240	.316
Adj. R2	.198	.206	.199	.258
F	13.735**	11.074**	5.815**	5.498**
N	156	156	156	156

a. Figures in parentheses are the standard errors of the coefficients

*p < .05

**p < .01

Table 6
Result OLS regression model R&D intensity 2020

Variable	Model 1	Model 2	Model 3	Model 4
Constant	4.702 (1.225)	3.277 (1.291)	2.074 (1.606)	1.633 (1.474)
<i>Controls</i>				
Board size	-.028 (.052)	-.020 (.050)	.055 (.067)	.011 (.061)
Total assets	-.582* (.200)	-.511* (.197)	-.449* (.203)	-.281 (.190)
Sales growth	-2.150** (.628)	-2.321** (.615)	-2.338** (.613)	-1.692* (.586)
<i>Feedback</i>				
Inconsistent feedback		.379* (.130)	.314* (.133)	.299* (.131)
<i>Board variables</i>				
Gender			.069 (.113)	.101 (.105)
Independent directors			-.045 (.052)	-.064 (.048)
Specific skills			11.584* (5.146)	4.458 (4.947)
Board Tenure			-.047 (.052)	-.036 (.049)
<i>Interaction term</i>				
Interaction term 1				.392* (.125)
Interaction term 2				-.177** (.052)
Interaction term 3				10.104* (3.511)
Interaction term 4				-.016 (.046)
R2	.133	.179	.214	.370
Adj. R2	.166	.158	.172	.318
F	7.764**	8.245**	5.016**	7.010**
N	156	156	156	156

a. Figures in parentheses are the standard errors of the coefficients

*p < .05

**p < .01

Figures three to seven allow us to gain more insights into the significant interaction effects that are the focal point of this study. With the interaction plots, there can be an examination of whether the levels of one factor influence performance across the level of the other factor. I plotted low inconsistent feedback as one SD below the mean and high inconsistent feedback as one SD above the mean. Looking at the interaction effects for the variable ‘gender’ with ‘inconsistent feedback’. For both figures, it can be stated that there is a case of crossover effect disordinal interaction. The direction of change is different and the order is different as well. For R&D intensity 2019, figure 3, the difference is minimal whiel the statistical analysis showed a significant result. There is a slight case of crossover effect that R&D intensity increases slightly with a higher number of female directors on the board with high values of inconsistent feedback. For R&D intensity 2020 there seemingly is a difference. Figure 4 shows that the slope for a board with a low number of female directors there is an increase from 1 to 1.75, so there is an increase of 0.75. for the slope with a board with a high number of women there is an increase from 0.5 until 2.75, so there is an increase of 2.25. The difference in R&D intensity between low and high inconsistent feedback is dictated by the number of female directors present. R&D intensity increases across a high value of inconsistent feedback with a high value of women on the board for high values of inconsistent feedback. Therefore I can expect a positive relationship for both years where the year 2020 shows a bigger difference for the interaction.

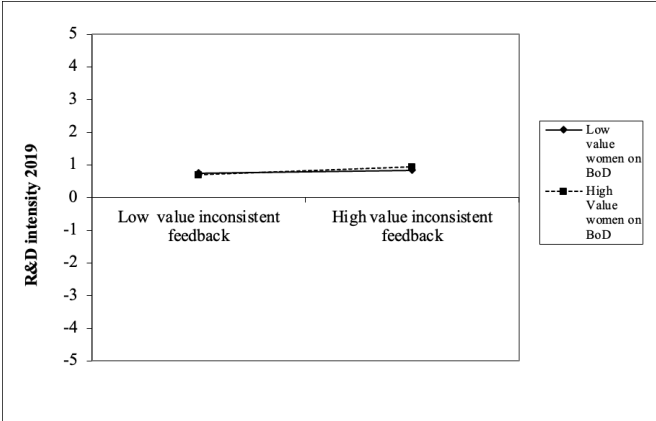


Figure 3

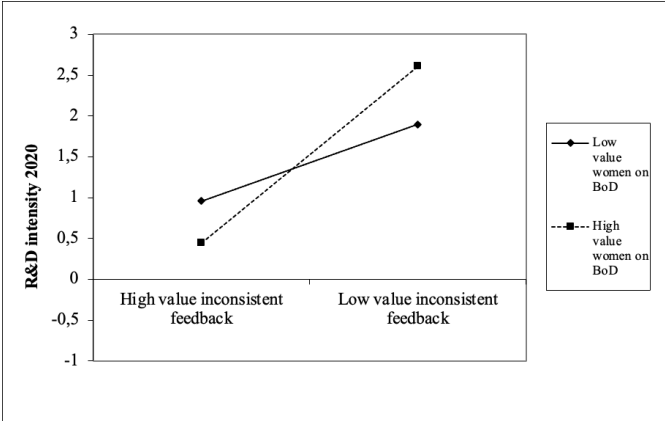


Figure 4

Figures 4 and 5 show the effect of the third moderator variable ‘Independent directors’. Figure 5 shows a minimal crossover effect while figure 6 shows a bigger difference between both factors. For R&D intensity 2019 there is a minimal change when it comes to the interpretation of the high and low value of inconsistency of the feedback on multiple goals depending on the number of independent directors on the board. Figure 5 shows that the small change indicates that boards with a low value of independent directors show an increase in R&D intensity for high values of inconsistent feedback. However, this effect is minimal while the statistical analysis shows a significant interaction. Figure 6 shows an increase of 2.25 for boards with a low number of independent directors from 0.5 to 2.75 while boards with a low number of directors show a decrease, of 0.5, from 1.5 to 1. Thus, the difference in R&D intensity between low and high values of inconsistent feedback is dictated by boards with a high and a low number of independent directors. Boards with a high value of independent directors show a small change in R&D intensity while boards with a low number of independent directors show a significant increase in R&D intensity with high values of inconsistent feedback. Where the year 2020 shows a bigger difference for the interaction.

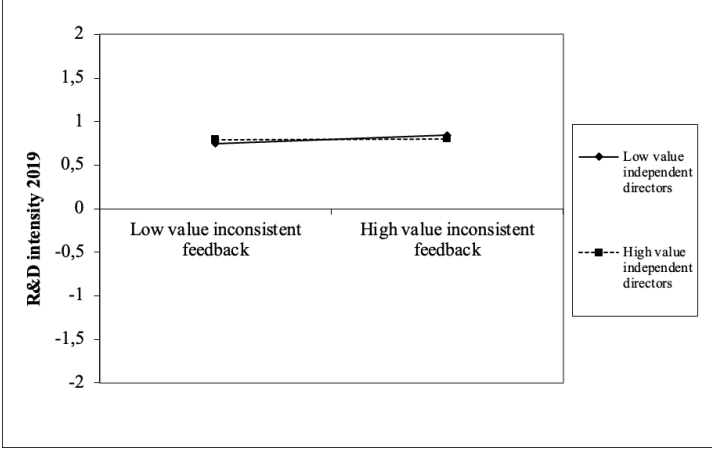


Figure 5

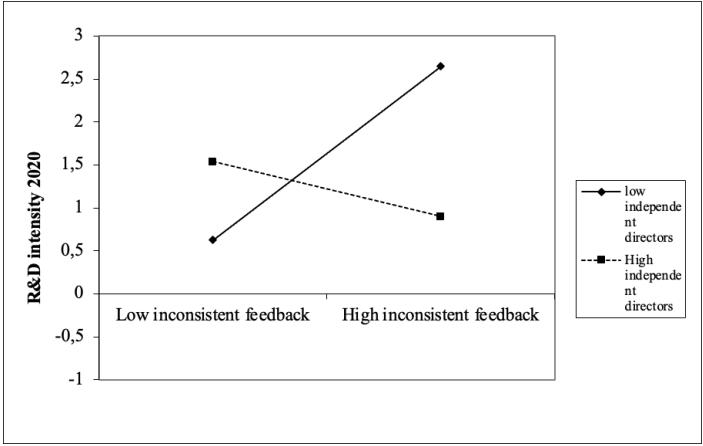


Figure 6

Figure seven shows the effect of the moderator variable ‘specific skills.’ It shows a crossover effect. Boards with a high number of directors with specific skills start at -7 until 18, indicating an increase of 11. And boards with a low value of directors with industry-specific skills show an increase of 1. Thus, boards with a low value of directors with specific skills do not show a huge difference while boards with a high number of directors with specific skills do who a big difference. The difference in R&D intensity between the low and high value of inconsistent feedback is dictated by if you have a board with a low number or a board with a high number of directors with specific skills. Boards with a high number of independent directors show a high increase in R&D intensity with high values of inconsistent feedback.

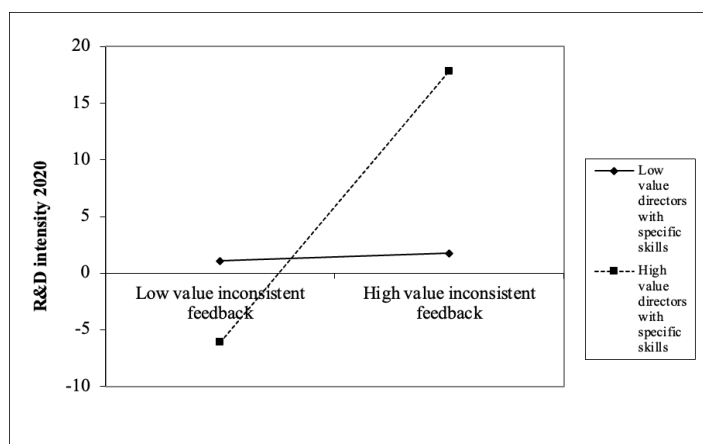


Figure 7

Hypothesis	Independent variable	Dependent variable	Results
Hypothesis 1a	Inconsistent feedback Gender	R&D intensity 19	Accepted
Hypothesis 1b	Inconsistent feedback Gender	R&D intensity 20	Accepted
Hypothesis 2a	Inconsistent feedback Independent directors	R&D intensity 19	Rejected
Hypothesis 2b	Inconsistent feedback Independent directors	R&D intensity 20	Rejected
Hypothesis 3a	Inconsistent feedback	R&D intensity 19	Rejected

	Specific skills		
Hypothesis 3b	Inconsistent feedback Specific skills	R&D intensity 20	Accepted
Hypothesis 4a	Inconsistent feedback Board tenure	R&D intensity 19	Rejected
Hypothesis 4b	Inconsistent feedback Board tenure	R&D intensity 20	Rejected

Table 7: overview of hypothesis

Conclusion

Corporate organizations have always been required to perform well on financial organizational goals. However, during the past decades, the requirement to perform on nonfinancial goals has grown in relevance. Corporate organizations must include social and sustainability goals to perform well in society. This leads to a multiple goal perspective which is still an emerging research topic in the literature on performance feedback theory. Firms are not able to always perform to the same level on both goals which leads to inconsistency in the feedback that organizations receive on their goals. In addition, the board plays a crucial role in interpreting the feedback on organizational goals. It carries the responsibility of strategic decision-making regarding the strategies of the firm. Therefore, which kind of directors are present on the board can influence the strategic decision-making process of the board. How several characteristics of directors influence the interpretation of inconsistent feedback about R&D intensity is the central element of this research. To achieve this, the following research question has been formulated: *'How do organizations react to inconsistent feedback on financial and nonfinancial-financial performance goals?'* To answer this question, four hypotheses have been developed and a multiple regression analysis was conducted. Two models with two different outcome models were created. On these outcome variables, the same hypotheses are tested to eventually compare the results on both outcome variables.

I argue that the interpretation and strategic decision-making about inconsistent feedback on financial and nonfinancial goals does depend on the types of directors that are present on the board. The results show that inconsistent feedback does positively affect R&D search in 2020. The bigger the inconsistency the more R&D search. So there is a short-term effect of receiving inconsistent feedback where the organization initiated a problemisitic search to solve the inconsistency. In sum, when there is a high inconsistency between feedback on a financial and nonfinancial organizational goal there is an initiate for more R&D search.

Looking at the board, several characteristics of directors influence interpreting inconsistent feedback between financial and nonfinancial goals. For the year 2019, so one year after receiving the feedback, the results already showed that female directors have a positive influence on

R&D intensity when the board received inconsistent feedback. The same holds for two years (2020) after receiving inconsistent feedback: female directors show to have a positive influence on receiving inconsistent feedback leading to an increase in R&D search. This is not in line with the expectation of the study. The study expected a negative correlation between female directors and receiving inconsistent feedback leading to R&D search while the results show a positive correlation. The same holds for the presence of independent directors on the board. Independent directors negatively influence the relation between interpreting inconsistent feedback leading to R&D search for both years 2019 and 2020 while the study had argued for a positive correlation. Looking at the other variable, directors with industry-specific skills only have an effect two years after receiving the feedback (2020). Directors with industry-specific skills positively influence the relation between interpreting inconsistent feedback leading to an increase in R&D search as was expected. Board tenure holds no significant influence on the relation between interpreting inconsistent feedback and R&D intensity. Therefore, how many years directors are present on the board does not matter when a corporate organization has to decide whether to invest more or less in R&D when it comes to receiving inconsistent feedback.

The interaction plots show that the interaction effects are bigger for the year 2020. The year 2019 shows a slight difference while the year 2020 shows a big difference for female directors, independent directors, and directors with industry-specific skills. Therefore, the interactions can be better interpretable for the year 2020.

This study has also included several control variables which shown to influence the interpretation of inconsistent feedback leading to R&D intensity. The growth of a firm matter for the R&D search. Firm growth, calculated as sales growth, has shown a significant positive effect in 2019 and a significant negative effect in 2020. Thus, the matter of how much a firm grows matters for the level of R&D intensity. In addition, firm size which was calculated as total assets has also shown to significantly influence R&D intensity. Both for the years 2019 and 2020 firm size has shown a negative relation with R&D intensity. Thus, the larger the firm the less R&D search. The control variable 'board size' has shown no significant relation with R&D search for both years. Thus, the R&D search does not only depend on the relation between inconsistent feedback on financial and nonfinancial goals moderated by several characteristics of the board, it also depends on the firm size and growth.

In sum, looking at the short-term effect of receiving feedback on multiple goals: a financial and nonfinancial one. In the short-term, after receiving the feedback, there is a significant trigger for an increase in R&D search. The bigger the inconsistency the bigger the R&D intensity. This relation is influenced by the strategic decision-making of the board. The presence of female, independent, and industry-specific skills directors influence how the inconsistent feedback is interpreted and thus the R&D search. Overall, these findings suggest further implications and implications for future studies.

Discussion

By demonstrating that board diversity influences the interpretation of inconsistent feedback on financial and nonfinancial goals leading to R&D search, the present study contributes to the view of organizational behavior. This line significantly advances our understanding of different board composition that influences the interpretation of inconsistent feedback concerning R&D search. The present study makes a relevant theoretical contribution to the literature in several ways. First, Audia & Greve (2021) have shed light on the literature gap that is currently existing when it comes to performance feedback on multiple goals. This study adds to this research gap by examining performance feedback on multiple goals for R&D search. In addition, because the second goal is nonfinancial the study also contributes to the literature by examining the behavior of organizations toward nonfinancial goals which has gained increasing attention in the literature over the past few decades.

Second, How inconsistent feedback between performance goals relates to R&D is a topic that still needs to receive conceptual attention. This study adds to the literature by examining the relationship between inconsistent feedback on performance goals and R&D search. It shows a significant relationship between inconsistent feedback on performance goals in relation to R&D search.

Third, board diversity is an emerging research topic in the literature on the Board of Directors. Most studies have examined one aspect of board diversity whereas this study takes on four director characteristics. In addition, this study also adds to the literature by showing the relation between the board composition and the interpretation of inconsistent feedback.

The findings have important implications for corporate organizations. This study indicates that the composition of a board relates to the interpretation of (inconsistent) feedback. Therefore, as a corporate organization, it is crucial to consider board diversity when it comes to establishing the composition of the board. This way, an organization can influence the direction by choosing the directors present on the board. Female directors, independent directors, and directors with industry-specific skills can bring new insights to the table which are important for the functioning of the board. The study implicates that gender diversity and the presence of directors with specific skills have a positive effect on interpreting inconsistent feedback leading to more R&D search whereas independent directors negatively affect this relation. These insights are important for boards to consider when structuring the directors. This research also indicates that long or short board tenure does not affect the interpretation of inconsistent feedback concerning R&D intensity. In addition, corporate organizations have to be aware of the fact that performance on multiple goals is increasing in relevance and have to be considered regarding the examination of the feedback on organizational goals. This study has shown that the bigger the inconsistency between financial and nonfinancial goals the more increase in R&D search for the short-term. Thus, feedback on nonfinancial financial goals affects R&D search which organizations have to consider regarding their strategic decision-making.

This research has several limitations. First, this study only makes use of secondary data, retrieving the data from databases. The use of secondary data can be harmful to the reliability and validity of this research. In addition, the data is about what companies are reporting by themselves. It must be considered that this research does not have insights into the corporate organizations themselves but only what they report to the world.

Second, the skewness and kurtosis of the observed variables were an ongoing problem in this research. For future research, it may be interesting to conduct a research that does not contain the problem of a high skewness and kurtosis.

Third, this research makes use of a sample of 156 corporate organizations. An interesting direction for future research is that a researcher makes use of a larger data sample to make the observations more generalizable. The researcher can also choose to measure this sample over a larger time frame and make use of two points to measure performance feedback and look if there is an

explanation between them. In addition, the researcher can also choose to specify this to a particular industry. This industry can, for example, have high R&D search.

The result of this study implicates several future directions of research. This study has looked at the outcome, R&D intensity, for two years. Both years gave different outcomes, in two years after receiving the feedback the effect of inconsistent feedback was bigger. Future studies can look into the explanation of this finding. What time frame do organizations need to improve their R&D search after receiving inconsistent feedback. To add, this study has only looked at the short-term effect of R&D search whereas future studies can also look at the long-term effect of inconsistent feedback on R&D search. A potential research topic can be to investigate when the R&D search affects the feedback that the organization receives. In addition, this study has looked at inconsistent feedback by calculating the distance between the feedback on both goals. Future studies can investigate the negative and positive aspects of inconsistent feedback. Thus, when one goal performs above the aspiration level and when one goal performs below the aspiration level. Another research direction is that future studies can take on a qualitative approach to investigate the 'why'. The qualitative approach can give more insights into the process of the interpretation of feedback and what kind of strategic decisions can lead.

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Appendices

Appendix A – Master thesis planning

Months	Planning & deadlines
January	Thesis meeting 1: January 19 th Reading into topics
February	Thesis meeting 2: February 2 th - Define thesis topic Thesis meeting 3: February 25 th - First draft introduction Workshop database: February 25 th - Introduction workshop into the use of databases
March	Thesis meeting 4: March 17 th - First draft literature review Deadline research proposal: March 25 th
April	Thesis meeting 5: march 30 th - Feedback research proposal Process feedback research proposal Database workshop: April 14 th Database workshop: April 26 th - During the workshops the process of data retrieval from the data bases will be done. After these processes I can start running my own database for the research
May	Run the data analysis Write chapter data analysis
June	Write Conclusion/Discussion Submission Final draft: June 13 th

Appendix B - ESG

Pillars	Categories	Themes
Environmental	Emission	Emissions
		Waste
		Biodiverstiy
		Environmental management systems
	Innovation	Product innovation
		Green revenues, research and development (R&D) and capital expenditures (CapEx)
	Resource use	Water
		Energy
		Sustainable packaging
		Environmental supply chain
Social	Community	Equally important to all industry groups, hence a median weight of five is assigned to all
	Human rights	Human rights
	Product responsibility	Responsible marketing
		Product quality
		Data privacy
	Workforce	Diversity and inclusion
		Career development and training
		Working conditions
Health and safety		
Governance	CSR strategy	CSR strategy
		ESG reporting and transparency
	Management	Structure (independence, diversity, committees)
		Compensation
	Shareholders	Shareholders rights
		Takeover defenses

(Refinitiv Eikon, 2021)

Appendix C – R&D intensity

NAME	S2019	S2020	RD2019	RD2020	RDintensity19	RDintensity20
AAC TECHNOLOGIES HDG.	20306112	19308457	1629339	1827248	0,080238846	0,094634595
ABB LTD N	27777258	24337993	1189830	1037030	0,042834682	0,042609512
ABBVIE	33266000	45804000	5407000	6181000	0,162538327	0,134944546
ACADIA PHARMACEUTICALS	339076	441755	240385	319130	0,708941358	0,722414008
ACCELERATE DIAGNOSTICS	9297	11165	25345	21255	2,72614822	1,903716973
ACCENTURE CLASS A	43215013	44327039	799734	870611	0,01850593	0,019640631
ACER	234285354	277112477	2571756	2382649	0,010977024	0,00859813
ACERINOX 'R'	4753878	4668488	12035	17283	0,002531617	0,003702055
ACI WORLDWIDE	1258294	1294322	146573	138293	0,116485495	0,106845901
ACRUX	5286	3845	16040	10640	3,034430571	2,767230169
ACTIVISION BLIZZARD	6489000	8086000	998000	1150000	0,153798736	0,142221123
ACUITY BRANDS	3672700	3326300	74700	82000	0,02033926	0,024652016
ADDEX THERAPEUTICS	2834	3879	12449	10361	4,392731122	2,671049239
ADIDAS	23640000	19844000	152000	130000	0,00642978	0,006551099
ADP	4700000	2137000	83000	49000	0,017659574	0,02292934
ADVANCED ENERGY INDS.	788948	1415826	101503	143961	0,128656134	0,101679867
AECI	24799000	24111000	64000	65000	0,002580749	0,002695865
AERIE PHARMACEUTICALS	69888	83138	91378	74007	1,307491987	0,89017056
AEROJET ROCKETDYNE HDG.	1981500	2072700	65100	55800	0,032853899	0,026921407
AGFA-GEVAERT	2239000	1709000	147000	95000	0,06565431	0,055588063
AGILENT TECHS.	5163000	5339000	404000	495000	0,07824908	0,092713991
AGIOS PHARMACEUTICALS	117912	203196	410894	367470	3,48475134	1,808450954
AINSWORTH GAME TECH.	234344	149396	40428	41192	0,172515618	0,27572358
AIR PRDS.& CHEMS.	8918900	8856300	72900	83900	0,008173654	0,009473482
AIR WATER	801493000	809083000	2859000	3422000	0,003567093	0,00422948
AIRBUS	70478000	49912000	3358000	2858000	0,047646074	0,057260779
AIXTRON	259627	269247	54861	58287	0,21130699	0,216481521
AKZO NOBEL	9276000	8530000	64000	45000	0,006899526	0,005275498
ALARMCOM HOLDINGS	502363	618003	114443	152147	0,227809373	0,246191362
ALBANY INTL.'A'	1054132	900610	37569	35347	0,035639749	0,039247843
ALFA LAVAL	46517000	41468000	1077000	1030000	0,023152826	0,02483843
ALIBABA HLTH.INFO.TECH.	5940303	10749109	255311	283212	0,042979457	0,026347486
ALIGN TECHNOLOGY	2406796	2471941	157361	175307	0,065381943	0,070918764
ALLEGION	2854000	2719900	54700	54400	0,019166083	0,020000735
ALLISON TNSM.HOLDINGS	2698000	2081000	154000	147000	0,057079318	0,070639116
ALPEK DE CV	119685000	113989000	40000	74000	0,000334211	0,000649185
ALPS ALPINE	851332000	810570000	32886000	3,8E+07	0,038628878	0,046469768
ALSP.HLTHCR.SLTN.	1771677	1502700	254509	206061	0,143654289	0,137127171

ALSTOM	8072000	8201000	237000	246000	0,029360753	0,029996342
ALTERITY THERAPEUTICS	109	17	12983	10098	119,1100917	594
ALTium	241709	283437	25854	32802	0,106963332	0,115729421
AMAZON.COM	280522000	386064000	35931000	4,3E+07	0,128086211	0,110707033
AMBUJA CEMENTS	271035500	245161700	8000	5300	2,95164E-05	2,16184E-05
AMCOR	13233630	18600762	89547	145166	0,006766624	0,007804304
AMETEK	5158557	4540029	161900	158900	0,031384746	0,034999776
AMICUS THERAPEUTICS	182237	260886	286378	308443	1,571459144	1,182290349
AMKOR TECH.	4052650	5050589	137638	140727	0,033962469	0,027863483
AMNEAL PHARMACEUTICALS A	1626373	1992523	188049	179930	0,115624768	0,090302596
AMPHENOL 'A'	8225400	8598900	234200	260700	0,028472779	0,030317831
AMS-OSRAM AG	1885265	3504000	261180	423000	0,138537553	0,120719178
ANALOG DEVICES	5991065	5603056	1130348	1050519	0,188672298	0,187490362
ANDRITZ	6673896	6699584	114973	100959	0,017227269	0,015069443
ANGLO AMERICAN	23351470	23909804	83649	95169	0,003582173	0,003980334
ANGLO AMERICAN PLATINUM	99551000	137790000	192000	208000	0,00192866	0,001509544
ANHEUSER-BUSCH INBEV	46816140	40863824	260343	258008	0,005560967	0,006313849
ANSELL	2097356	2407544	17070	21335	0,008138819	0,008861728
ANSYS	1515892	1681297	298210	355371	0,196722458	0,211367177
APERAM	4240000	3624000	20000	18000	0,004716981	0,004966887
APPLE	260174000	274515000	16217000	1,9E+07	0,062331363	0,068309564
APTARGROUP	2859732	2929340	82800	92500	0,028953762	0,031577079
ARB	443959	465428	13014	12043	0,029313518	0,025875109
ARCELIK	31941773	40872483	99713	122077	0,003121711	0,002986777
ARCELORMITTAL	63175710	46432796	269290	213554	0,004262556	0,004599206
ARCHER DANIELS MIDLAND	64691000	64355000	154000	160000	0,002380548	0,002486209
ARISTA NETWORKS	2410706	2317512	462759	486594	0,191959949	0,209963961
ARISTOCRAT LEISURE	4397400	4139100	500400	497900	0,113794515	0,120291851
ARKEMA	8738000	7884000	249000	241000	0,028496223	0,030568239
ARMSTRONG WORLD INDS.	1038100	936900	14800	14700	0,014256815	0,015690042
ASAHI GROUP HOLDINGS	2089048000	2,028E+09	12828000	1,3E+07	0,006140596	0,006504215
ASIAN PAINTS	193415200	202112500	872600	836300	0,004511538	0,004137795
ASM INTERNATIONAL	1124660	1328122	90543	107716	0,080506998	0,081103995
ASML HOLDING	11820000	13978500	1553700	1579900	0,131446701	0,113023572
ASSA ABLOY B	94029000	87649000	3566000	3902000	0,03792447	0,044518477
ASSOCIATED BRIT.FOODS	15824000	13937000	30000	31000	0,001895854	0,002224295
ASTEC INDUSTRIES	1169613	1024400	27214	22100	0,023267525	0,021573604
ASTELLAS PHARMA	1306348000	1,301E+09	2,09E+08	2,2E+08	0,15974457	0,172369763
ASTRA AGRO LESTARI	1,7453E+10	1,881E+10	11713000	1,1E+07	0,000671127	0,000608442
ASTRAZENECA	19062680	20594371	4159016	4715111	0,218175828	0,228951445
ATLAS COPCO A	103756000	99787000	2839000	2786000	0,027362273	0,027919468
AU OPTRONICS	268791694	270955381	9809587	1E+07	0,036495127	0,037962258
AURUBIS	10763299	12428542	15880	15154	0,001475384	0,00121929

AUTODESK	3274300	3790400	851100	932500	0,259933421	0,246016252
AUTOLIV	8547600	7447400	386800	354700	0,045252469	0,04762736
AVANOS MEDICAL	697600	714800	37700	34900	0,054042431	0,048824846
AVECHO BIOTECHNOLOGY	4238	385	166	188	0,03916942	0,488311688
AVI	13150900	13209700	89600	33600	0,006813222	0,002543585
AXON ENTERPRISE	530860	681003	100721	123195	0,189731756	0,180902287
AYALA	264906534	193622435	45069	207649	0,000170132	0,001072443
BAE SYSTEMS	18305000	19277000	224000	228000	0,012237094	0,011827567
BAJAJ AUTO	302499600	298277600	3923500	4080400	0,012970265	0,013679874
BAKER HUGHES A	23838000	20705000	687000	595000	0,028819532	0,02873702
BALCHEM	643705	703644	11377	10332	0,017674245	0,014683562
BANG AND OLUFSEN	2838000	2036000	182000	165000	0,064129669	0,081041257
BAODING TIANWEI BAOBIAN ELEC.'A'	3517765	4084569	161737	205390	0,045977204	0,050284375
BAOSHAN IRON & STL.'A'	292057463	284436497	7585168	7355566	0,025971492	0,025860134
BARCO NEW	1082570	770083	119389	102610	0,110282938	0,133245377
BARNES GROUP	1491118	1124391	16000	16949	0,010730204	0,015073938
BARR (AG)	279000	255700	1100	1100	0,003942652	0,004301916
BARRY CALLEBAUT	7309036	6893146	30029	32170	0,004108476	0,004666955
BASF	59316000	59149000	2158000	2086000	0,036381415	0,035266868
BASILEA PHARMACEUTICA 'R'	134381	127629	102662	97410	0,763962167	0,763227793
BAYER	43545000	41400000	5342000	7126000	0,12267769	0,172125604
BBMG 'H'	89519156	107063602	232889	269153	0,002601555	0,002513954
BCE	23964000	22883000	109000	47000	0,004548489	0,002053926
BEKAERT (D)	4322450	3772374	61963	49857	0,014335157	0,013216346
BELDEN	2131278	1862716	94360	107296	0,044273905	0,05760191
BELIMO N	692680	661226	30216	53772	0,043621874	0,081321666
BELL EQUIPMENT	7823169	6690277	34433	34808	0,004401413	0,005202774
BERKELEY ENERGIA	0	0	1278	983	#####	#####
BIC	1949431	1627910	35200	25700	0,018056551	0,015787114
BIDVEST GROUP	77152384	76542581	1407	1919	1,82366E-05	2,5071E-05
BILFINGER BERGER	4326900	3461000	14200	8100	0,003281795	0,002340364
BIO-RAD LABORATORIES 'A'	2311659	2545626	196710	227798	0,085094731	0,089486044
BIOGEN	14377900	13444600	2272700	3984600	0,158068981	0,296371778
BIOMARIN PHARM.	1704048	1860455	715007	628116	0,419593227	0,337614186
BIOMERIEUX	2674800	3118200	374300	398800	0,139935696	0,127894298
BIONOMICS	4029	247	8977	5828	2,228096302	23,5951417
BLACKBAUD	900423	913219	106164	100146	0,117904585	0,109662633
BLACKBERRY (NYS)	1183652	1379144	284129	326221	0,240044371	0,236538752
BLOCK A	4713500	9497578	670606	881826	0,14227347	0,092847461
BLUEBIRD BIO	44674	250734	582413	587956	13,03695662	2,344939258
BLUESCOPE STEEL	12573100	11324200	26100	22100	0,00207586	0,001951573
BMW	104210000	98990000	4066000	3333000	0,039017369	0,033670068
BOEING	84818000	58656000	3219000	2476000	0,03795185	0,04221222

BOLIDEN ORD SHS	49936000	56321000	730000	737000	0,014618712	0,013085705
BORGWARNER	10168000	10165000	413000	476000	0,040617624	0,046827349
BOSS (HUGO)	2884056	1945843	62616	55767	0,021711109	0,028659558
BOSTON SCIENTIFIC	10735000	9913000	1174000	1139000	0,1093619	0,114899627
BOUYGUES	37929000	34694000	63000	62000	0,001660998	0,001787053
BP	217642423	139554585	284564	256878	0,001307484	0,001840699
BRADY NONVOTING A	1160645	1081299	45168	40662	0,038916292	0,03760477
BRASKEM PN SERIES 'A'	52323525	58543494	247730	250648	0,004734582	0,004281398
BRICKWORKS	918695	953404	2701	2413	0,00294004	0,002530931
BRISTOL MYERS SQUIBB	26145000	42518000	5845000	9519000	0,22356091	0,22388165
BRITISH AMERICAN TOBACCO	25877000	25776000	126000	121000	0,004869189	0,004694289
BROADCOM	22597000	23888000	4696000	4968000	0,207815197	0,207970529
BRUKER	2072600	1987500	187700	198000	0,090562578	0,099622642
BRUNSWICK	4108400	4347500	121600	125900	0,029597897	0,028959172
BT GROUP	23459000	22824000	643000	662000	0,027409523	0,029004557
BWX TECHNOLOGIES	1895052	2123516	17672	14189	0,009325338	0,006681843
CABOT	3337000	2614000	60000	57000	0,017980222	0,021805662
CALLAWAY GOLF	1701063	1589460	50579	46300	0,029733761	0,02912939
CAMPBELL SOUP	8107000	8691000	88000	92000	0,010854817	0,010585663
CANON	3593299000	3,16E+09	2,99E+08	2,7E+08	0,08307213	0,086168057
CANON MARKETING JAPAN	621134000	545060000	495000	426000	0,000796929	0,000781565
CARGOTEC 'B'	3683400	3263400	95100	93900	0,025818537	0,028773672
CARLISLE COS.	4811600	4245200	60900	54500	0,012656912	0,012838029
CARLSBERG B	65902000	58541000	133000	123000	0,002018148	0,002101092
CATERPILLAR	53800000	41748000	1693000	1415000	0,031468401	0,033893839
CERNER	5692598	5505788	509722	501694	0,08954119	0,091121198
CGG	1213682	772892	21114	32338	0,017396649	0,041840257
CGN POWER 'H'	69120719	79513676	1172567	1640246	0,016964045	0,020628477
CHEMRING GROUP	335200	402500	5000	4500	0,014916468	0,011180124
CHENG UEI PRECISION IND.	97820336	89552100	2442560	2386034	0,024969859	0,026644088
CHEVRON	140156000	94471000	500000	435000	0,003567453	0,004604588
CHIN.COMMS.CNUT.GP. 'H'	552542000	624495000	12592000	2E+07	0,022789218	0,032176399
CHIN.COMMS.SVS.'H'	117413089	122648944	3275915	3781598	0,027900765	0,030832699
CHINA CONCH VET.HOLDINGS	5813823	7440051	23767	35755	0,004088016	0,004805747
CHINA HISPD.TNSM.EQU.GP.	9722896	15368511	394961	512737	0,040621745	0,033362829
CHINA INTL.MAR.CTRS. (GP.) 'A'	85608731	93916815	1318744	1482573	0,015404317	0,015786023
CHINA MENGNIU DAIRY	89734450	85653252	232814	358675	0,002594477	0,004187523
CHINA MOLYBDENUM 'H'	67996388	112215062	268321	173583	0,003946107	0,001546878
CHINA MOTOR	32067972	30874600	1657444	1660284	0,051685339	0,053775077
CHINA OILFIELD SVS.'A'	31075838	28925315	932656	769253	0,030012256	0,026594455
CHINA PTL.& CHM.'A'	2763522000	1,908E+09	9395000	1E+07	0,003399647	0,005284939
CHINA RAILWAY CON.'A'	830452157	910324763	16527801	1,9E+07	0,019902171	0,020438807

Appendix D – Performance feedback

NAME	ESG2016	ESG2017	ESGAspiration18	ESG2018	ESGfeedback18
AAC TECHNOLOGIES HDG.	73,67	76,26	75,224	75,91	0,686
ABB LTD N	88,01	89,94	89,168	92,65	3,482
ABBVIE	74,89	79,35	77,566	75,11	-2,456
ACADIA PHARMACEUTICALS	18,46	28,41	24,43	24,31	-0,12
ACCELERATE DIAGNOSTICS	30,41	32,38	31,592	37,5	5,908
ACCENTURE CLASS A	78,16	81,93	80,422	77,27	-3,152
ACER	73,12	71,7	72,268	71,64	-0,628
ACERINOX 'R'	52,43	54,89	53,906	63,84	9,934
ACI WORLDWIDE	51,89	56,11	54,422	57,85	3,428
ACRUX	22,81	22,6	22,684	26,78	4,096
ACTIVISION BLIZZARD	53,14	44,08	47,704	51,9	4,196
ACUITY BRANDS	30,69	41,83	37,374	42,2	4,826
ADDEX THERAPEUTICS	7,31	12,48	10,412	17,89	7,478
ADIDAS	88,83	85,72	86,964	86,9	-0,064
ADP	72,05	66,37	68,642	75,64	6,998
ADVANCED ENERGY INDS.	30,36	35,72	33,576	32,55	-1,026
AECI	35,11	36,47	35,926	39,72	3,794
AERIE PHARMACEUTICALS	22,44	20,92	21,528	19,34	-2,188
AEROJET ROCKETDYNE HDG.	20,27	24,67	22,91	23,66	0,75
AGFA-GEVAERT	69,13	68,72	68,884	78,27	9,386
AGILENT TECHS.	88,55	87,67	88,022	89,49	1,468
AGIOS PHARMACEUTICALS	20,96	39,15	31,874	40,02	8,146
AINSWORTH GAME TECH.	36,72	36,13	36,366	36,49	0,124
AIR PRDS.& CHEMS.	73,32	79,05	76,758	84,88	8,122
AIR WATER	34,1	35,55	34,97	28,48	-6,49
AIRBUS	72,87	75,58	74,496	83,97	9,474
AIXTRON	45,23	51,66	49,088	54,23	5,142
AKZO NOBEL	75,47	70,42	72,44	77,65	5,21
ALARMCOM HOLDINGS	31,44	40,06	36,612	52,17	15,558
ALBANY INTL. 'A'	28,64	29,05	28,886	27,62	-1,266
ALFA LAVAL	79,75	81,51	80,806	89,46	8,654
ALIBABA HLTH.INFO.TECH.	10,87	36,04	25,972	39,51	13,538
ALIGN TECHNOLOGY	20,4	22,06	21,396	30,21	8,814
ALLEGION	37,21	46,67	42,886	59,56	16,674
ALLISON TNSM.HOLDINGS	28,49	38,14	34,28	34,02	-0,26
ALPEK DE CV	25,48	28,58	27,34	47,42	20,08
ALPS ALPINE	39,74	40,54	40,22	51,38	11,16
ALSP.HLTHCR.SLTN.	29,81	31,57	30,866	37,22	6,354
ALSTOM	85,84	84,25	84,886	89,93	5,044

ALTERITY THERAPEUTICS	27,79	30,56	29,452	33,82	4,368
ALTIUM	21,8	33,17	28,622	31,81	3,188
AMAZON.COM	65,59	72,21	69,562	85,62	16,058
AMBUJA CEMENTS	78,33	77,69	77,946	74,45	-3,496
AMCOR	70,49	65,86	67,712	73,16	5,448
AMETEK	30,67	26,22	28	42,2	14,2
AMICUS THERAPEUTICS	30,17	34,47	32,75	43,03	10,28
AMKOR TECH.	34,55	36,52	35,732	34,59	-1,142
AMNEAL PHARMACEUTICALS A	28,46	26,85	27,494	27,43	-0,064
AMPHENOL 'A'	57,09	61,24	59,58	67,43	7,85
AMS-OSRAM AG	35,35	33,16	34,036	36,4	2,364
ANALOG DEVICES	70,46	71,88	71,312	77,36	6,048
ANDRITZ	55,07	63,63	60,206	71,71	11,504
ANGLO AMERICAN	79,87	75,33	77,146	81,56	4,414
ANGLO AMERICAN PLATINUM	76,19	76,88	76,604	82,41	5,806
ANHEUSER-BUSCH INBEV	52,31	56,49	54,818	58,38	3,562
ANSELL	63,62	69,01	66,854	74,33	7,476
ANSYS	53,74	43,84	47,8	46,03	-1,77
APERAM	80,8	82,26	81,676	90,9	9,224
APPLE	61,9	68,01	65,566	70,58	5,014
APTARGROUP	46,94	43,91	45,122	45,52	0,398
ARB	26	27,75	27,05	23,23	-3,82
ARCELIK	83,09	86,78	85,304	89,05	3,746
ARCELORMITTAL	84,98	82,56	83,528	82,14	-1,388
ARCHER DANIELS MIDLAND	55,84	78,63	69,514	76,56	7,046
ARISTA NETWORKS	32,76	41,99	38,298	45,01	6,712
ARISTOCRAT LEISURE	40,45	39,58	39,928	40,76	0,832
ARKEMA	69,77	78,43	74,966	80,91	5,944
ARMSTRONG WORLD INDS.	44,68	49,78	47,74	49,53	1,79
ASAHI GROUP HOLDINGS	79,94	76,93	78,134	76,69	-1,444
ASIAN PAINTS	46,99	39,89	42,73	45,89	3,16
ASM INTERNATIONAL	62,49	65,89	64,53	63,86	-0,67
ASML HOLDING	63,24	68,73	66,534	76,31	9,776
ASSA ABLOY B	61,52	62,76	62,264	63,22	0,956
ASSOCIATED BRIT.FOODS	75,64	75,73	75,694	75,47	-0,224
ASTEC INDUSTRIES	35,58	37,81	36,918	39,76	2,842
ASTELLAS PHARMA	85,15	85,05	85,09	86,32	1,23
ASTRA AGRO LESTARI	33,65	33,45	33,53	30,96	-2,57
ASTRAZENECA	89,38	93,71	91,978	94,37	2,392
ATLAS COPCO A	75,39	73,36	74,172	76,41	2,238
AU OPTRONICS	84	91,65	88,59	88,35	-0,24
AURUBIS	64,58	69,51	67,538	70,61	3,072
AUTODESK	82,41	81,63	81,942	79,81	-2,132

AUTOLIV	50,85	59,34	55,944	55,31	-0,634
AVANOS MEDICAL	52,47	45,74	48,432	53,64	5,208
AVECHO BIOTECHNOLOGY	19,16	26,54	23,588	21,15	-2,438
AVI	55,96	56,44	56,248	56,55	0,302
AXON ENTERPRISE	17,37	26,33	22,746	19,4	-3,346
AYALA	72,59	68,02	69,848	69,11	-0,738
BAE SYSTEMS	60,25	70,31	66,286	69,9	3,614
BAJAJ AUTO	33,33	24,67	28,134	24,64	-3,494
BAKER HUGHES A	71,93	81,64	77,756	83,94	6,184
BALCHEM	18,77	22,51	21,014	37,15	16,136
BANG AND OLUFSEN	36,85	40,65	39,13	41,25	2,12
BAODING TIANWEI BAOBIAN ELEC.'A'	22,77	26,38	24,936	23,7	-1,236
BAOSHAN IRON & STL.'A'	46,99	45,97	46,378	43,97	-2,408
BARCO NEW	53,82	64,65	60,318	70,56	10,242
BARNES GROUP	25,98	24,2	24,912	33,47	8,558
BARR (AG)	35,89	34,71	35,182	34,74	-0,442
BARRY CALLEBAUT	62,27	68,42	65,96	77,7	11,74
BASF	83,54	83,37	83,438	89,68	6,242
BASILEA PHARMACEUTICA 'R'	33,99	41,54	38,52	42,37	3,85
BAYER	82,61	84,09	83,498	88,94	5,442
BBMG 'H'	14	19,93	17,558	17,35	-0,208
BCE	64,55	68,39	66,854	72,88	6,026
BEKAERT (D)	46,36	50,78	49,012	51,84	2,828
BELDEN	29,26	40,48	35,992	39,36	3,368
BELIMO N	39,41	39,56	39,5	42,49	2,99
BELL EQUIPMENT	31,51	29,88	30,532	25,29	-5,242
BERKELEY ENERGIA	12,91	3,38	7,192	9,78	2,588
BIC	73,6	70,07	71,482	70,18	-1,302
BIDVEST GROUP	35,82	46,39	42,162	40,9	-1,262
BILFINGER BERGER	62,67	71,52	67,98	70,99	3,01
BIO-RAD LABORATORIES 'A'	36,73	45,35	41,902	39,22	-2,682
BIOGEN	73,89	76,58	75,504	80,09	4,586
BIOMARIN PHARM.	29,74	32,21	31,222	39,44	8,218
BIOMERIEUX	52,08	54,55	53,562	64,65	11,088
BIONOMICS	18,2	20,69	19,694	26,77	7,076
BLACKBAUD	35,08	49,15	43,522	39,24	-4,282
BLACKBERRY (NYS)	63,83	64,31	64,118	70,15	6,032
BLOCK A	23,84	23,56	23,672	28,48	4,808
BLUEBIRD BIO	21,05	25,94	23,984	29	5,016
BLUESCOPE STEEL	64,59	79,81	73,722	76,27	2,548
BMW	87,36	85,62	86,316	85,78	-0,536
BOEING	69,49	80,25	75,946	77,63	1,684
BOLIDEN ORD SHS	78,22	74,86	76,204	78,64	2,436

BORGWARNER	51,54	55,07	53,658	45,88	-7,778
BOSS (HUGO)	70,97	85,96	79,964	84,73	4,766
BOSTON SCIENTIFIC	71,63	77,48	75,14	77,31	2,17
BOUYGUES	60,99	63,46	62,472	67,4	4,928
BP	82,33	87,58	85,48	90,19	4,71
BRADY NONVOTING A	30,44	40,59	36,53	34,39	-2,14
BRASKEM PN SERIES 'A'	46,66	57,42	53,116	56,24	3,124
BRICKWORKS	25,17	29,13	27,546	39,83	12,284
BRISTOL MYERS SQUIBB	75,45	76,76	76,236	77,85	1,614
BRITISH AMERICAN TOBACCO	82,8	81,99	82,314	89,79	7,476
BROADCOM	38,71	31,51	34,39	36,31	1,92
BRUKER	37	34,67	35,602	32,94	-2,662
BRUNSWICK	59,8	62,7	61,54	69,52	7,98
BT GROUP	69,31	73,11	71,59	72,26	0,67
BWX TECHNOLOGIES	36,15	37,05	36,69	34,63	-2,06
CABOT	67,95	79,93	75,138	78,98	3,842
CALLAWAY GOLF	56,05	58,04	57,244	60,89	3,646
CAMPBELL SOUP	87,74	91,85	90,206	87,84	-2,366
CANON	67,82	72,22	70,46	73,07	2,61
CANON MARKETING JAPAN	17,25	15,78	16,368	21,21	4,842
CARGOTEC 'B'	56,48	60,08	58,64	73,03	14,39
CARLISLE COS.	29,52	24,65	26,598	32,17	5,572
CARLSBERG B	68,55	68,54	68,544	68,5	-0,044
CATERPILLAR	72,79	65,15	68,206	69,38	1,174
CERNER	26,56	31,58	29,572	30,63	1,058
CGG	66,21	67,99	67,278	69,76	2,482
CGN POWER 'H'	28,86	29,52	29,256	38,36	9,104
CHEMRING GROUP	39,36	44,37	42,366	44,13	1,764
CHENG UEI PRECISION IND.	33,47	36,65	35,378	33,43	-1,948
CHEVRON	76,97	87,83	83,486	84,56	1,074
CHIN.COMMS.CNUT.GP. 'H'	48,91	57,82	54,256	57,79	3,534
CHIN.COMMS.SVS.'H'	48,09	48,47	48,318	48,53	0,212
CHINA CONCH VET.HOLDINGS	29,08	56,39	45,466	52,4	6,934
CHINA HISP.D.TNSM.EQU.GP.	38,49	52,23	46,734	50,92	4,186
CHINA INTL.MAR.CTRS. (GP.) 'A'	49,89	49,54	49,68	51,75	2,07
CHINA MENGNIU DAIRY	42,01	49,33	46,402	53,68	7,278
CHINA MOLYBDENUM 'H'	39,6	73,18	59,748	79,03	19,282
CHINA MOTOR	25,95	29,05	27,81	31,43	3,62
CHINA OILFIELD SVS.'A'	56,25	62,04	59,724	59,66	-0,064
CHINA PTL.& CHM.'A'	41,68	44,55	43,402	48,69	5,288
CHINA RAILWAY CON.'A'	38,58	39,67	39,234	36,89	-2,344

NAME	RA2016	RA2017	ROAaspiration18	RA2018	ROAfeedback18
AAC TECHNOLOGIES HDG.	20,41	19,79	20,038	13,32	-6,718
ABB LTD N	5,04	5,96	5,592	5,59	-0,002
ABBVIE	11,37	8,81	9,834	10,33	0,496
ACADIA PHARMACEUTICALS	-69,32	-61,21	-64,454	-53,03	11,424
ACCELERATE DIAGNOSTICS	-59,74	-61,46	-60,772	-51,7	9,072
ACCENTURE CLASS A	23,8	17,72	20,152	19,02	-1,132
ACER	-2,77	1,86	0,008	2,05	2,042
ACERINOX 'R'	2,51	6,17	4,706	5,99	1,284
ACI WORLDWIDE	8,39	1,68	4,364	5,23	0,866
ACRUX	25,49	-0,48	9,908	-36,45	-46,358
ACTIVISION BLIZZARD	6,86	2,14	4,028	10,79	6,762
ACUITY BRANDS	11,62	11,79	11,722	12,78	1,058
ADDEX THERAPEUTICS	-137,45	-138,23	-137,918	-6,67	131,248
ADIDAS	7,86	8,04	7,968	12,01	4,042
ADP	4,87	5,39	5,182	4,92	-0,262
ADVANCED ENERGY INDS.	26,4	21,99	23,754	19,82	-3,934
AECI	5,95	7,09	6,634	6,72	0,086
AERIE PHARMACEUTICALS	-47,82	-53,32	-51,12	-80,15	-29,03
AEROJET ROCKETDYNE HDG.	2,11	0,53	1,162	7,2	6,038
AGFA-GEVAERT	3,43	1,88	2,5	-0,64	-3,14
AGILENT TECHS.	6,66	9,07	8,106	4,41	-3,696
AGIOS PHARMACEUTICALS	-38,2	-51,02	-45,892	-46,99	-1,098
AINSWORTH GAME TECH.	14,41	8,7	10,984	6,88	-4,104
AIR PRDS.& CHEMS.	3,99	16,99	11,79	8,5	-3,29
AIR WATER	3,76	3,86	3,82	3,94	0,12
AIRBUS	1,38	2,99	2,346	3,12	0,774
AIXTRON	-5,23	1,5	-1,192	9,38	10,572
AKZO NOBEL	7,12	5,87	6,37	39,9	33,53
ALARMCOM HOLDINGS	4,48	10,26	7,948	6,23	-1,718
ALBANY INTL.'A'	6	3,63	4,578	7,47	2,892
ALFA LAVAL	4,84	6,11	5,602	8,71	3,108
ALIBABA HLTH.INFO.TECH.	-13,82	-13,14	-13,412	-3,97	9,442
ALIGN TECHNOLOGY	15,92	15,14	15,452	21,54	6,088
ALLEGION	12,4	14,61	13,726	18,25	4,524
ALLISON TNSM.HOLDINGS	6,51	13,8	10,884	17,4	6,516
ALPEK DE CV	5,26	-4,66	-0,692	14,43	15,122
ALPS ALPINE	7,08	6,15	6,522	7,66	1,138
ALSP.HLTHCR.SLTN.	0,47	-3,47	-1,894	10,91	12,804
ALSTOM	14,06	2,52	7,136	3,73	-3,406
ALTERITY THERAPEUTICS	-20,46	-25,56	-23,52	-37,57	-14,05
ALTium	23,51	23,39	23,438	26,1	2,662

AMAZON.COM	3,63	3,34	3,456	7,61	4,154
AMBUJA CEMENTS	4,78	4,44	4,576	5,98	1,404
AMCOR	4,54	8,53	6,934	9,73	2,796
AMETEK	8,33	10	9,332	10,24	0,908
AMICUS THERAPEUTICS	-20,21	-32,79	-27,758	-46,76	-19,002
AMKOR TECH.	5,4	7,34	6,564	4,21	-2,354
AMNEAL PHARMACEUTICALS A	-24,22	-28	-26,488	3,47	29,958
AMPHENOL 'A'	10,91	7,68	8,972	12,82	3,848
AMS-OSRAM AG	8,37	4,39	5,982	3,76	-2,222
ANALOG DEVICES	12,29	6,12	8,588	8,11	-0,478
ANDRITZ	5,08	4,77	4,894	3,9	-0,994
ANGLO AMERICAN	3,67	6,91	5,614	7,39	1,776
ANGLO AMERICAN PLATINUM	1,85	3,19	2,654	8,53	5,876
ANHEUSER-BUSCH INBEV	1,88	4,54	3,476	2,96	-0,516
ANSELL	8,25	7,31	7,686	20,29	12,604
ANSYS	9,74	9,16	9,392	13,66	4,268
APERAM	5,65	8,24	7,204	7,5	0,296
APPLE	15,24	14,31	14,682	16,72	2,038
APTARGROUP	9,06	8,58	8,772	6,77	-2,002
ARB	17,09	16,12	16,508	15,01	-1,498
ARCELIK	11,6	7,82	9,332	7,45	-1,882
ARCELORMITTAL	3,51	7,2	5,724	7,2	1,476
ARCHER DANIELS MIDLAND	3,68	4,54	4,196	5,19	0,994
ARISTA NETWORKS	13,36	20,93	17,902	12,34	-5,562
ARISTOCRAT LEISURE	13,83	17,43	15,99	13,86	-2,13
ARKEMA	5,4	6,89	6,294	7,8	1,506
ARMSTRONG WORLD INDS.	6,2	9,85	8,39	11,65	3,26
ASAHI GROUP HOLDINGS	4,75	5,39	5,134	4,88	-0,254
ASIAN PAINTS	18,21	16,95	17,454	15,65	-1,804
ASM INTERNATIONAL	6,5	21,24	15,344	8	-7,344
ASML HOLDING	9,58	11,82	10,924	12,98	2,056
ASSA ABLOY B	7,95	9,45	8,85	3,12	-5,73
ASSOCIATED BRIT.FOODS	7,87	10,21	9,274	7,85	-1,424
ASTEC INDUSTRIES	6,96	4,44	5,448	-6,95	-12,398
ASTELLAS PHARMA	11,24	12,74	12,14	9,51	-2,63
ASTRA AGRO LESTARI	9,66	8,82	9,156	6,35	-2,806
ASTRAZENECA	6,79	5,92	6,268	4,79	-1,478
ATLAS COPCO A	11,6	14,4	13,28	97,06	83,78
AU OPTRONICS	2,29	8,13	5,794	2,88	-2,914
AURUBIS	3,55	8,74	6,664	6,85	0,186
AUTODESK	-10,85	-12,12	-11,612	-1,04	10,572
AUTOLIV	7,9	5,74	6,604	3,29	-3,314
AVANOS MEDICAL	3,02	4,7	4,028	3,9	-0,128

AVECHO BIOTECHNOLOGY	-78,53	-79,15	-78,902	-61,21	17,692
AVI	18,55	18,24	18,364	18,74	0,376
AXON ENTERPRISE	7,29	1,85	4,026	5,73	1,704
AYALA	4,17	4,25	4,218	4,08	-0,138
BAE SYSTEMS	5,3	4,62	4,892	5,05	0,158
BAJAJ AUTO	23,37	20,99	21,942	18,04	-3,902
BAKER HUGHES A	-12,06	0,03	-4,806	0,69	5,496
BALCHEM	6,63	9,93	8,61	8,67	0,06
BANG AND OLUFSEN	-6,69	-4,06	-5,112	3,39	8,502
BAODING TIANWEI BAOBIAN ELEC.'A'	4,17	3,72	3,9	-7,1	-11
BAOSHAN IRON & STL.'A'	4,37	6,36	5,564	7,14	1,576
BARCO NEW	1,27	2,59	2,062	7,72	5,658
BARNES GROUP	6,87	3,07	4,59	6,98	2,39
BARR (AG)	13,13	13,1	13,112	13,25	0,138
BARRY CALLEBAUT	5,69	7,17	6,578	7,72	1,142
BASF	6,3	8,57	7,662	6,3	-1,362
BASILEA PHARMACEUTICA 'R'	-12,35	-3,74	-7,184	-7,84	-0,656
BAYER	6,97	10,71	9,214	2,76	-6,454
BBMG 'H'	2,34	2,35	2,346	2,14	-0,206
BCE	7,52	6,96	7,184	6,53	-0,654
BEKAERT (D)	3,73	5,73	4,93	2,87	-2,06
BELDEN	5,38	3,89	4,486	5,57	1,084
BELIMO N	16,29	16,56	16,452	16,96	0,508
BELL EQUIPMENT	1,16	5,99	4,058	5,67	1,612
BERKELEY ENERGIA	-46,82	-38,86	-42,044	-5,36	36,684
BIC	10,47	12,61	11,754	7,94	-3,814
BIDVEST GROUP	123,26	12,13	56,582	8,6	-47,982
BILFINGER BERGER	6,59	-1,86	1,52	-0,24	-1,76
BIO-RAD LABORATORIES 'A'	1,12	3,36	2,464	7,78	5,316
BIOGEN	18,27	11,53	14,226	19,62	5,394
BIOMARIN PHARM.	-17,06	-2,29	-8,198	-1,04	7,158
BIOMERIEUX	6,78	8,55	7,842	8,64	0,798
BIONOMICS	-18,73	-5,5	-10,792	-30,88	-20,088
BLACKBAUD	3,82	4,8	4,408	3,4	-1,008
BLACKBERRY (NYS)	-2,22	-25,78	-16,356	11,92	28,276
BLOCK A	-16,3	-3,37	-8,542	-0,89	7,652
BLUEBIRD BIO	-24,85	-22,15	-23,23	-26,23	-3
BLUESCOPE STEEL	5,04	8,42	7,068	16,66	9,592
BMW	4,01	4,71	4,43	3,66	-0,77
BOEING	5,54	9,28	7,784	9,45	1,666
BOLIDEN ORD SHS	8,95	12,75	11,23	12,76	1,53
BORGWARNER	2,04	5,37	4,038	9,99	5,952
BOSS (HUGO)	11,69	14,19	13,19	14,13	0,94

BOSTON SCIENTIFIC	2,76	1,37	1,926	9,34	7,414
BOUYGUES	2,61	3,61	3,21	4,06	0,85
BP	0,42	1,47	1,05	3,64	2,59
BRADY NONVOTING A	8,28	9,77	9,174	9,05	-0,124
BRASKEM PN SERIES 'A'	3,02	11,27	7,97	8,21	0,24
BRICKWORKS	3,5	7,54	5,924	6,7	0,776
BRISTOL MYERS SQUIBB	15,32	3,59	8,282	15,45	7,168
BRITISH AMERICAN TOBACCO	14,54	42,88	31,544	5,01	-26,534
BROADCOM	-4,49	3,81	0,49	24,38	23,89
BRUKER	9,52	4,92	6,76	9,29	2,53
BRUNSWICK	10,04	5,34	7,22	8,17	0,95
BT GROUP	9,01	5,78	7,072	5,88	-1,192
BWX TECHNOLOGIES	14,62	10,46	12,124	15,48	3,356
CABOT	6,33	9,23	8,07	-2,33	-10,4
CALLAWAY GOLF	29,21	5,5	14,984	11,62	-3,364
CAMPBELL SOUP	8,07	12,4	10,668	3,79	-6,878
CANON	3,16	4,69	4,078	5,02	0,942
CANON MARKETING JAPAN	3,82	4,24	4,072	4,28	0,208
CARGOTEC 'B'	4,28	4,29	4,286	3,45	-0,836
CARLISLE COS.	6,8	8,3	7,7	12,52	4,82
CARLSBERG B	4,17	1,44	2,532	5	2,468
CATERPILLAR	0,88	2,06	1,588	9,24	7,652
CERNER	11,43	14,42	13,224	9,66	-3,564
CGG	-7,63	-7,22	-7,384	0,64	8,024
CGN POWER 'H'	4,02	4,68	4,416	3,96	-0,456
CHEMRING GROUP	3,39	2,23	2,694	-17,32	-20,014
CHENG UEI PRECISION IND.	1,39	2,06	1,792	1,12	-0,672
CHEVRON	-0,14	3,72	2,176	6,18	4,004
CHIN.COMMS.CNUT.GP. 'H'	3,22	3,45	3,358	3,12	-0,238
CHIN.COMMS.SVS.'H'	4,31	4,16	4,22	3,88	-0,34
CHINA CONCH VET.HOLDINGS	10,49	15,76	13,652	21,71	8,058
CHINA HISPD.TNSM.EQU.GP.	5,83	2,9	4,072	3,03	-1,042
CHINA INTL.MAR.CTRS. (GP.) 'A'	0,71	2,61	1,85	3,15	1,3
CHINA MENGNIU DAIRY	-0,88	4,42	2,3	5,78	3,48
CHINA MOLYBDENUM 'H'	2,65	3,87	3,382	5,76	2,378
CHINA MOTOR	5,16	6,59	6,018	5,67	-0,348
CHINA OILFIELD SVS.'A'	-11,98	1,46	-3,916	1,54	5,456
CHINA PTL.& CHM.'A'	3,58	3,62	3,604	4,2	0,596
CHINA RAILWAY CON.'A'	2,46	2,63	2,562	2,65	0,088

NAME	Inconsistent feedback
AAC TECHNOLOGIES HDG.	7,404
ABB LTD N	3,484
ABBVIE	2,952
ACADIA PHARMACEUTICALS	11,544
ACCELERATE DIAGNOSTICS	3,164
ACCENTURE CLASS A	2,02
ACER	2,67
ACERINOX 'R'	8,65
ACI WORLDWIDE	2,562
ACRUX	50,454
ACTIVISION BLIZZARD	2,566
ACUITY BRANDS	3,768
ADDEX THERAPEUTICS	123,77
ADIDAS	4,106
ADP	7,26
ADVANCED ENERGY INDS.	2,908
AECI	3,708
AERIE PHARMACEUTICALS	26,842
AEROJET ROCKETDYNE HDG.	5,288
AGFA-GEVAERT	12,526
AGILENT TECHS.	5,164
AGIOS PHARMACEUTICALS	9,244
AINSWORTH GAME TECH.	4,228
AIR PRDS.& CHEMS.	11,412
AIR WATER	6,61
AIRBUS	8,7
AIXTRON	5,43
AKZO NOBEL	28,32
ALARMCOM HOLDINGS	17,276
ALBANY INTL.'A'	4,158
ALFA LAVAL	5,546
ALIBABA HLTH.INFO.TECH.	4,096
ALIGN TECHNOLOGY	2,726
ALLEGION	12,15
ALLISON TNSM.HOLDINGS	6,776
ALPEK DE CV	4,958
ALPS ALPINE	10,022
ALSP.HLTHCR.SLTN.	6,45
ALSTOM	8,45
ALTERITY THERAPEUTICS	18,418
ALTIUM	0,526
AMAZON.COM	11,904
AMBUJA CEMENTS	4,9

AMCOR	2,652
AMETEK	13,292
AMICUS THERAPEUTICS	29,282
AMKOR TECH.	1,212
AMNEAL PHARMACEUTICALS A	30,022
AMPHENOL 'A'	4,002
AMS-OSRAM AG	4,586
ANALOG DEVICES	6,526
ANDRITZ	12,498
ANGLO AMERICAN	2,638
ANGLO AMERICAN PLATINUM	0,07
ANHEUSER-BUSCH INBEV	4,078
ANSELL	5,128
ANSYS	6,038
APERAM	8,928
APPLE	2,976
APTARGROUP	2,4
ARB	2,322
ARCELIK	5,628
ARCELORMITTAL	2,864
ARCHER DANIELS MIDLAND	6,052
ARISTA NETWORKS	12,274
ARISTOCRAT LEISURE	2,962
ARKEMA	4,438
ARMSTRONG WORLD INDS.	1,47
ASAHI GROUP HOLDINGS	1,19
ASIAN PAINTS	4,964
ASM INTERNATIONAL	6,674
ASML HOLDING	7,72
ASSA ABLOY B	6,686
ASSOCIATED BRIT.FOODS	1,2
ASTEC INDUSTRIES	15,24
ASTELLAS PHARMA	3,86
ASTRA AGRO LESTARI	0,236
ASTRAZENECA	3,87
ATLAS COPCO A	81,542
AU OPTRONICS	2,674
AURUBIS	2,886
AUTODESK	12,704
AUTOLIV	2,68
AVANOS MEDICAL	5,336
AVECHO BIOTECHNOLOGY	20,13
AVI	0,074
AXON ENTERPRISE	5,05
AYALA	0,6
BAE SYSTEMS	3,456

BAJAJ AUTO	0,408
BAKER HUGHES A	0,688
BALCHEM	16,076
BANG AND OLUFSEN	6,382
BAODING TIANWEI BAOBIAN ELEC.'A'	9,764
BAOSHAN IRON & STL.'A'	3,984
BARCO NEW	4,584
BARNES GROUP	6,168
BARR (AG)	0,58
BARRY CALLEBAUT	10,598
BASF	7,604
BASILEA PHARMACEUTICA 'R'	4,506
BAYER	11,896
BBMG 'H'	0,002
BCE	6,68
BEKAERT (D)	4,888
BELDEN	2,284
BELIMO N	2,482
BELL EQUIPMENT	6,854
BERKELEY ENERGIA	34,096
BIC	2,512
BIDVEST GROUP	46,72
BILFINGER BERGER	4,77
BIO-RAD LABORATORIES 'A'	7,998
BIOGEN	0,808
BIOMARIN PHARM.	1,06
BIOMERIEUX	10,29
BIONOMICS	27,164
BLACKBAUD	3,274
BLACKBERRY (NYS)	22,244
BLOCK A	2,844
BLUEBIRD BIO	8,016
BLUESCOPE STEEL	7,044
BMW	0,234
BOEING	0,018
BOLIDEN ORD SHS	0,906
BORGWARNER	13,73
BOSS (HUGO)	3,826
BOSTON SCIENTIFIC	5,244
BOUYGUES	4,078
BP	2,12
BRADY NONVOTING A	2,016
BRASKEM PN SERIES 'A'	2,884
BRICKWORKS	11,508
BRISTOL MYERS SQUIBB	5,554
BRITISH AMERICAN TOBACCO	34,01

BROADCOM	21,97
BRUKER	5,192
BRUNSWICK	7,03
BT GROUP	1,862
BWX TECHNOLOGIES	5,416
CABOT	14,242
CALLAWAY GOLF	7,01
CAMPBELL SOUP	4,512
CANON	1,668
CANON MARKETING JAPAN	4,634
CARGOTEC 'B'	15,226
CARLISLE COS.	0,752
CARLSBERG B	2,512
CATERPILLAR	6,478
CERNER	4,622
CGG	5,542
CGN POWER 'H'	9,56
CHEMRING GROUP	21,778
CHENG UEI PRECISION IND.	
CHEVRON	2,93
CHIN.COMMS.CNUT.GP. 'H'	3,772
CHIN.COMMS.SVS.'H'	0,552
CHINA CONCH VET.HOLDINGS	1,124
CHINA HISP.D.TNSM.EQU.GP.	5,228
CHINA INTL.MAR.CTRS. (GP.) 'A'	0,77
CHINA MENGNIU DAIRY	3,798
CHINA MOLYBDENUM 'H'	16,904
CHINA MOTOR	3,968
CHINA OILFIELD SVS.'A'	5,52
CHINA PTL.& CHM.'A'	4,692
CHINA RAILWAY CON.'A'	2,432

Appendix D – Board characteristics

NAME	S2019	S2020	RD2019	RD2020	RDintensity19	RDintensity20
AAC TECHNOLOGIES HDG.	20306112	19308457	1629339	1827248	0,080238846	0,094634595
ABB LTD N	27777258	24337993	1189830	1037030	0,042834682	0,042609512
ABBVIE	33266000	45804000	5407000	6181000	0,162538327	0,134944546
ACADIA PHARMACEUTICALS	339076	441755	240385	319130	0,708941358	0,722414008
ACCELERATE DIAGNOSTICS	9297	11165	25345	21255	2,72614822	1,903716973
ACCENTURE CLASS A	43215013	44327039	799734	870611	0,01850593	0,019640631
ACER	234285354	277112477	2571756	2382649	0,010977024	0,00859813
ACERINOX 'R'	4753878	4668488	12035	17283	0,002531617	0,003702055
ACI WORLDWIDE	1258294	1294322	146573	138293	0,116485495	0,106845901
ACRUX	5286	3845	16040	10640	3,034430571	2,767230169
ACTIVISION BLIZZARD	6489000	8086000	998000	1150000	0,153798736	0,142221123
ACUITY BRANDS	3672700	3326300	74700	82000	0,02033926	0,024652016
ADDEX THERAPEUTICS	2834	3879	12449	10361	4,392731122	2,671049239
ADIDAS	23640000	19844000	152000	130000	0,00642978	0,006551099
ADP	4700000	2137000	83000	49000	0,017659574	0,02292934
ADVANCED ENERGY INDS.	788948	1415826	101503	143961	0,128656134	0,101679867
AECI	24799000	24111000	64000	65000	0,002580749	0,002695865
AERIE PHARMACEUTICALS	69888	83138	91378	74007	1,307491987	0,89017056
AEROJET ROCKETDYNE HDG.	1981500	2072700	65100	55800	0,032853899	0,026921407
AGFA-GEVAERT	2239000	1709000	147000	95000	0,06565431	0,055588063
AGILENT TECHS.	5163000	5339000	404000	495000	0,07824908	0,092713991
AGIOS PHARMACEUTICALS	117912	203196	410894	367470	3,48475134	1,808450954
AINSWORTH GAME TECH.	234344	149396	40428	41192	0,172515618	0,27572358
AIR PRDS.& CHEMS.	8918900	8856300	72900	83900	0,008173654	0,009473482
AIR WATER	801493000	809083000	2859000	3422000	0,003567093	0,00422948
AIRBUS	70478000	49912000	3358000	2858000	0,047646074	0,057260779
AIXTRON	259627	269247	54861	58287	0,21130699	0,216481521
AKZO NOBEL	9276000	8530000	64000	45000	0,006899526	0,005275498
ALARMCOM HOLDINGS	502363	618003	114443	152147	0,227809373	0,246191362
ALBANY INTL. 'A'	1054132	900610	37569	35347	0,035639749	0,039247843
ALFA LAVAL	46517000	41468000	1077000	1030000	0,023152826	0,02483843
ALIBABA HLTH.INFO.TECH.	5940303	10749109	255311	283212	0,042979457	0,026347486
ALIGN TECHNOLOGY	2406796	2471941	157361	175307	0,065381943	0,070918764
ALLEGION	2854000	2719900	54700	54400	0,019166083	0,020000735
ALLISON TNSM.HOLDINGS	2698000	2081000	154000	147000	0,057079318	0,070639116
ALPEK DE CV	119685000	113989000	40000	74000	0,000334211	0,000649185
ALPS ALPINE	851332000	810570000	32886000	3,8E+07	0,038628878	0,046469768
ALSP.HLTHCR.SLTN.	1771677	1502700	254509	206061	0,143654289	0,137127171
ALSTOM	8072000	8201000	237000	246000	0,029360753	0,029996342

ALTERITY THERAPEUTICS	109	17	12983	10098	119,1100917	594
ALTIUM	241709	283437	25854	32802	0,106963332	0,115729421
AMAZON.COM	280522000	386064000	35931000	4,3E+07	0,128086211	0,110707033
AMBUJA CEMENTS	271035500	245161700	8000	5300	2,95164E-05	2,16184E-05
AMCOR	13233630	18600762	89547	145166	0,006766624	0,007804304
AMETEK	5158557	4540029	161900	158900	0,031384746	0,034999776
AMICUS THERAPEUTICS	182237	260886	286378	308443	1,571459144	1,182290349
AMKOR TECH.	4052650	5050589	137638	140727	0,033962469	0,027863483
AMNEAL PHARMACEUTICALS A	1626373	1992523	188049	179930	0,115624768	0,090302596
AMPHENOL 'A'	8225400	8598900	234200	260700	0,028472779	0,030317831
AMS-OSRAM AG	1885265	3504000	261180	423000	0,138537553	0,120719178
ANALOG DEVICES	5991065	5603056	1130348	1050519	0,188672298	0,187490362
ANDRITZ	6673896	6699584	114973	100959	0,017227269	0,015069443
ANGLO AMERICAN	23351470	23909804	83649	95169	0,003582173	0,003980334
ANGLO AMERICAN PLATINUM	99551000	137790000	192000	208000	0,00192866	0,001509544
ANHEUSER-BUSCH INBEV	46816140	40863824	260343	258008	0,005560967	0,006313849
ANSELL	2097356	2407544	17070	21335	0,008138819	0,008861728
ANSYS	1515892	1681297	298210	355371	0,196722458	0,211367177
APERAM	4240000	3624000	20000	18000	0,004716981	0,004966887
APPLE	260174000	274515000	16217000	1,9E+07	0,062331363	0,068309564
APTARGROUP	2859732	2929340	82800	92500	0,028953762	0,031577079
ARB	443959	465428	13014	12043	0,029313518	0,025875109
ARCELIK	31941773	40872483	99713	122077	0,003121711	0,002986777
ARCELORMITTAL	63175710	46432796	269290	213554	0,004262556	0,004599206
ARCHER DANIELS MIDLAND	64691000	64355000	154000	160000	0,002380548	0,002486209
ARISTA NETWORKS	2410706	2317512	462759	486594	0,191959949	0,209963961
ARISTOCRAT LEISURE	4397400	4139100	500400	497900	0,113794515	0,120291851
ARKEMA	8738000	7884000	249000	241000	0,028496223	0,030568239
ARMSTRONG WORLD INDS.	1038100	936900	14800	14700	0,014256815	0,015690042
ASAHI GROUP HOLDINGS	2089048000	2,028E+09	12828000	1,3E+07	0,006140596	0,006504215
ASIAN PAINTS	193415200	202112500	872600	836300	0,004511538	0,004137795
ASM INTERNATIONAL	1124660	1328122	90543	107716	0,080506998	0,081103995
ASML HOLDING	11820000	13978500	1553700	1579900	0,131446701	0,113023572
ASSA ABLOY B	94029000	87649000	3566000	3902000	0,03792447	0,044518477
ASSOCIATED BRIT.FOODS	15824000	13937000	30000	31000	0,001895854	0,002224295
ASTEC INDUSTRIES	1169613	1024400	27214	22100	0,023267525	0,021573604
ASTELLAS PHARMA	1306348000	1,301E+09	2,09E+08	2,2E+08	0,15974457	0,172369763
ASTRA AGRO LESTARI	1,7453E+10	1,881E+10	11713000	1,1E+07	0,000671127	0,000608442
ASTRAZENECA	19062680	20594371	4159016	4715111	0,218175828	0,228951445
ATLAS COPCO A	103756000	99787000	2839000	2786000	0,027362273	0,027919468
AU OPTRONICS	268791694	270955381	9809587	1E+07	0,036495127	0,037962258
AURUBIS	10763299	12428542	15880	15154	0,001475384	0,00121929
AUTODESK	3274300	3790400	851100	932500	0,259933421	0,246016252

AUTOLIV	8547600	7447400	386800	354700	0,045252469	0,04762736
AVANOS MEDICAL	697600	714800	37700	34900	0,054042431	0,048824846
AVECHO BIOTECHNOLOGY	4238	385	166	188	0,03916942	0,488311688
AVI	13150900	13209700	89600	33600	0,006813222	0,002543585
AXON ENTERPRISE	530860	681003	100721	123195	0,189731756	0,180902287
AYALA	264906534	193622435	45069	207649	0,000170132	0,001072443
BAE SYSTEMS	18305000	19277000	224000	228000	0,012237094	0,011827567
BAJAJ AUTO	302499600	298277600	3923500	4080400	0,012970265	0,013679874
BAKER HUGHES A	23838000	20705000	687000	595000	0,028819532	0,02873702
BALCHEM	643705	703644	11377	10332	0,017674245	0,014683562
BANG AND OLUFSEN	2838000	2036000	182000	165000	0,064129669	0,081041257
BAODING TIANWEI BAOBIAN ELEC.'A'	3517765	4084569	161737	205390	0,045977204	0,050284375
BAOSHAN IRON & STL.'A'	292057463	284436497	7585168	7355566	0,025971492	0,025860134
BARCO NEW	1082570	770083	119389	102610	0,110282938	0,133245377
BARNES GROUP	1491118	1124391	16000	16949	0,010730204	0,015073938
BARR (AG)	279000	255700	1100	1100	0,003942652	0,004301916
BARRY CALLEBAUT	7309036	6893146	30029	32170	0,004108476	0,004666955
BASF	59316000	59149000	2158000	2086000	0,036381415	0,035266868
BASILEA PHARMACEUTICA 'R'	134381	127629	102662	97410	0,763962167	0,763227793
BAYER	43545000	41400000	5342000	7126000	0,12267769	0,172125604
BBMG 'H'	89519156	107063602	232889	269153	0,002601555	0,002513954
BCE	23964000	22883000	109000	47000	0,004548489	0,002053926
BEKAERT (D)	4322450	3772374	61963	49857	0,014335157	0,013216346
BELDEN	2131278	1862716	94360	107296	0,044273905	0,05760191
BELIMO N	692680	661226	30216	53772	0,043621874	0,081321666
BELL EQUIPMENT	7823169	6690277	34433	34808	0,004401413	0,005202774
BERKELEY ENERGIA	0	0	1278	983	#####	#####
BIC	1949431	1627910	35200	25700	0,018056551	0,015787114
BIDVEST GROUP	77152384	76542581	1407	1919	1,82366E-05	2,5071E-05
BILFINGER BERGER	4326900	3461000	14200	8100	0,003281795	0,002340364
BIO-RAD LABORATORIES 'A'	2311659	2545626	196710	227798	0,085094731	0,089486044
BIOGEN	14377900	13444600	2272700	3984600	0,158068981	0,296371778
BIOMARIN PHARM.	1704048	1860455	715007	628116	0,419593227	0,337614186
BIOMERIEUX	2674800	3118200	374300	398800	0,139935696	0,127894298
BIONOMICS	4029	247	8977	5828	2,228096302	23,5951417
BLACKBAUD	900423	913219	106164	100146	0,117904585	0,109662633
BLACKBERRY (NYS)	1183652	1379144	284129	326221	0,240044371	0,236538752
BLOCK A	4713500	9497578	670606	881826	0,14227347	0,092847461
BLUEBIRD BIO	44674	250734	582413	587956	13,03695662	2,344939258
BLUESCOPE STEEL	12573100	11324200	26100	22100	0,00207586	0,001951573
BMW	104210000	98990000	4066000	3333000	0,039017369	0,033670068
BOEING	84818000	58656000	3219000	2476000	0,03795185	0,04221222
BOLIDEN ORD SHS	49936000	56321000	730000	737000	0,014618712	0,013085705

BORGWARNER	10168000	10165000	413000	476000	0,040617624	0,046827349
BOSS (HUGO)	2884056	1945843	62616	55767	0,02171109	0,028659558
BOSTON SCIENTIFIC	10735000	9913000	1174000	1139000	0,1093619	0,114899627
BOUYGUES	37929000	34694000	63000	62000	0,001660998	0,001787053
BP	217642423	139554585	284564	256878	0,001307484	0,001840699
BRADY NONVOTING A	1160645	1081299	45168	40662	0,038916292	0,03760477
BRASKEM PN SERIES 'A'	52323525	58543494	247730	250648	0,004734582	0,004281398
BRICKWORKS	918695	953404	2701	2413	0,00294004	0,002530931
BRISTOL MYERS SQUIBB	26145000	42518000	5845000	9519000	0,22356091	0,22388165
BRITISH AMERICAN TOBACCO	25877000	25776000	126000	121000	0,004869189	0,004694289
BROADCOM	22597000	23888000	4696000	4968000	0,207815197	0,207970529
BRUKER	2072600	1987500	187700	198000	0,090562578	0,099622642
BRUNSWICK	4108400	4347500	121600	125900	0,029597897	0,028959172
BT GROUP	23459000	22824000	643000	662000	0,027409523	0,029004557
BWX TECHNOLOGIES	1895052	2123516	17672	14189	0,009325338	0,006681843
CABOT	3337000	2614000	60000	57000	0,017980222	0,021805662
CALLAWAY GOLF	1701063	1589460	50579	46300	0,029733761	0,02912939
CAMPBELL SOUP	8107000	8691000	88000	92000	0,010854817	0,010585663
CANON	3593299000	3,16E+09	2,99E+08	2,7E+08	0,08307213	0,086168057
CANON MARKETING JAPAN	621134000	545060000	495000	426000	0,000796929	0,000781565
CARGOTEC 'B'	3683400	3263400	95100	93900	0,025818537	0,028773672
CARLISLE COS.	4811600	4245200	60900	54500	0,012656912	0,012838029
CARLSBERG B	65902000	58541000	133000	123000	0,002018148	0,002101092
CATERPILLAR	53800000	41748000	1693000	1415000	0,031468401	0,033893839
CERNER	5692598	5505788	509722	501694	0,08954119	0,091121198
CGG	1213682	772892	21114	32338	0,017396649	0,041840257
CGN POWER 'H'	69120719	79513676	1172567	1640246	0,016964045	0,020628477
CHEMRING GROUP	335200	402500	5000	4500	0,014916468	0,011180124
CHENG UEI PRECISION IND.	97820336	89552100	2442560	2386034	0,024969859	0,026644088
CHEVRON	140156000	94471000	500000	435000	0,003567453	0,004604588
CHIN.COMMS.CNUT.GP. 'H'	552542000	624495000	12592000	2E+07	0,022789218	0,032176399
CHIN.COMMS.SVS.'H'	117413089	122648944	3275915	3781598	0,027900765	0,030832699
CHINA CONCH VET.HOLDINGS	5813823	7440051	23767	35755	0,004088016	0,004805747
CHINA HISP.D.TNSM.EQU.GP.	9722896	15368511	394961	512737	0,040621745	0,033362829
CHINA INTL.MAR.CTRS. (GP.) 'A'	85608731	93916815	1318744	1482573	0,015404317	0,015786023
CHINA MENGNIU DAIRY	89734450	85653252	232814	358675	0,002594477	0,004187523
CHINA MOLYBDENUM 'H'	67996388	112215062	268321	173583	0,003946107	0,001546878
CHINA MOTOR	32067972	30874600	1657444	1660284	0,051685339	0,053775077
CHINA OILFIELD SVS.'A'	31075838	28925315	932656	769253	0,030012256	0,026594455
CHINA PTL.& CHM.'A'	2763522000	1,908E+09	9395000	1E+07	0,003399647	0,005284939
CHINA RAILWAY CON.'A'	830452157	910324763	16527801	1,9E+07	0,019902171	0,020438807

Appendix E – Descriptive statistics

Figure 1. Missing value analysis

Statistics		Board size	Total Assets	Sales growth	Gender	Independent directors	Specific skills	Board tenure	Inconsistent feedback	R&D intensity 19
N	Valid	166	166	164	166	166	166	166	165	165
	Missing	0	0	2	0	0	0	0	1	1
Skewness		1.154	3.419	10.368	1.108	.857	1.370	1.016	5.363	12.564
Std. Error of Skewness		.188	.188	.190	.188	.188	.188	.188	.189	.189
Kurtosis		2.792	12.440	118.439	1.735	2.514	4.027	1.756	37.921	159.898
Std. Error of Kurtosis		.375	.375	.377	.375	.375	.375	.375	.376	.376
Minimum		3	3128.0000	-.8566	0	.00000	0	2	.0020	.0000
Maximum		24	304575824	12.4060	8	20.00000	0	19	123.7700	119.1101

Figure 3. Descriptive Statistics

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error	
Board size	159	3	24	10.06	3.096	1.198	.192	2.996	.383	
Total Assets	159	3128.0000	304575824	23682137.4	49781502.3	3.336	.192	11.792	.383	
Sales growth	157	-.7875	1.4708	.112313	.2285737	2.286	.194	14.120	.385	
Inconsistent feedback	158	.0020	34.0960	6.824658	6.7921011	2.099	.193	4.649	.384	
Gender	159	0	8	2.13	1.568	1.087	.192	1.796	.383	
Independent directors	159	.00000	20.00000	6.5781755	3.25948526	.847	.192	2.553	.383	
Specific skills	159	0	0	.06	.036	1.381	.192	4.314	.383	
Board tenure	159	2	19	7.24	2.769	1.058	.192	1.893	.383	
R&D intensity 19	158	.0000	3.4848	.133292	.4236270	5.869	.193	37.440	.384	
R&D intensity 20	158	.0000	23.5951	.252336	1.8858072	12.243	.193	152.303	.384	
Valid N (listwise)	156									

Figure 4. Boxplot sales growth

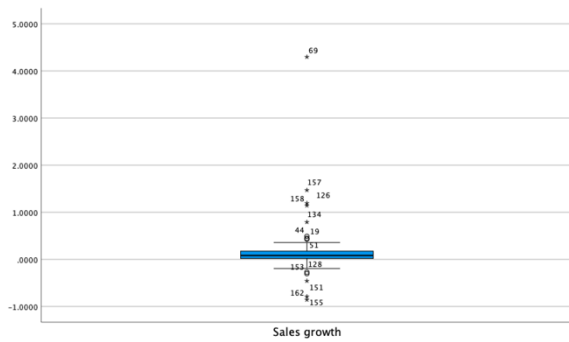


Figure 5. Boxplot Inconsistent feedback

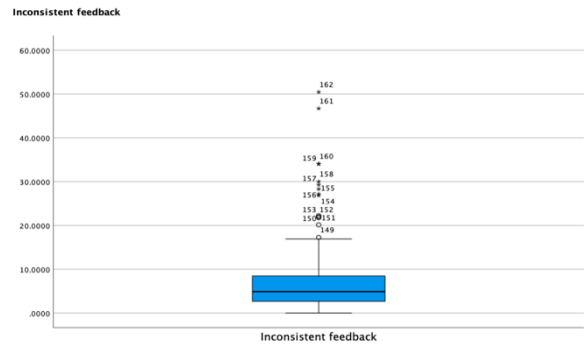


Figure 6. R&D intensity 2019

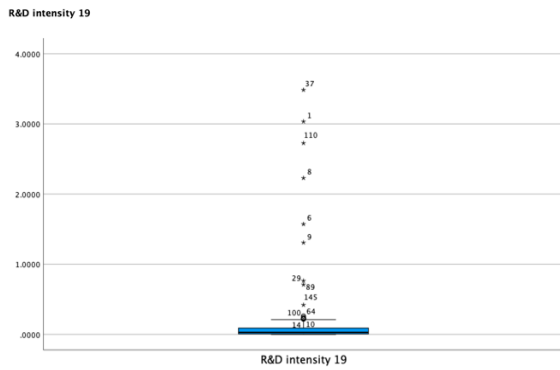


Figure 7. R&D intensity 2020

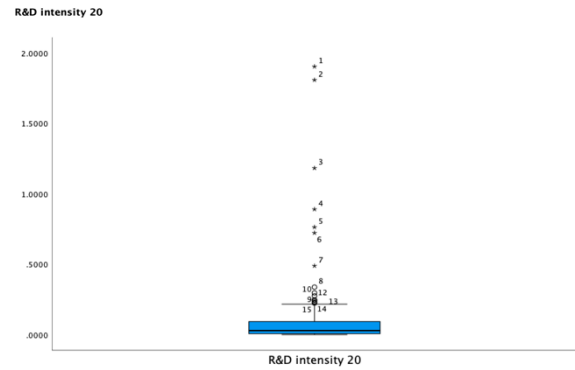


Figure 8. Descriptive statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Board size	159	3	24	10.06	3.096	1.198	.192	2.996	.383
TA_Log	159	3.50	8.48	6.7170	.81432	-.264	.192	.905	.383
Sales growth	157	-.7875	1.4708	.112313	.2285737	2.286	.194	14.120	.385
F_SQRT	158	.0447	5.8392	2.346695	1.1515531	.838	.193	.965	.384
Gender	159	0	8	2.13	1.568	1.087	.192	1.796	.383
Independent directors	159	.00000	20.00000	6.5781755	3.25948526	.847	.192	2.553	.383
Specific skills	159	0	0	.06	.036	1.381	.192	4.314	.383
Board tenure	159	2	19	7.24	2.769	1.058	.192	1.893	.383
R&D intensity 19	158	.0000	3.4848	.133292	.4236270	5.869	.193	37.440	.384
R&D intensity 20	158	.0000	23.5951	.252336	1.8858072	12.243	.193	152.303	.384
Valid N (listwise)	156								

Appendix F – Assumptions regression analysis

Figure 9. Scatterplot R&D intensity 2019

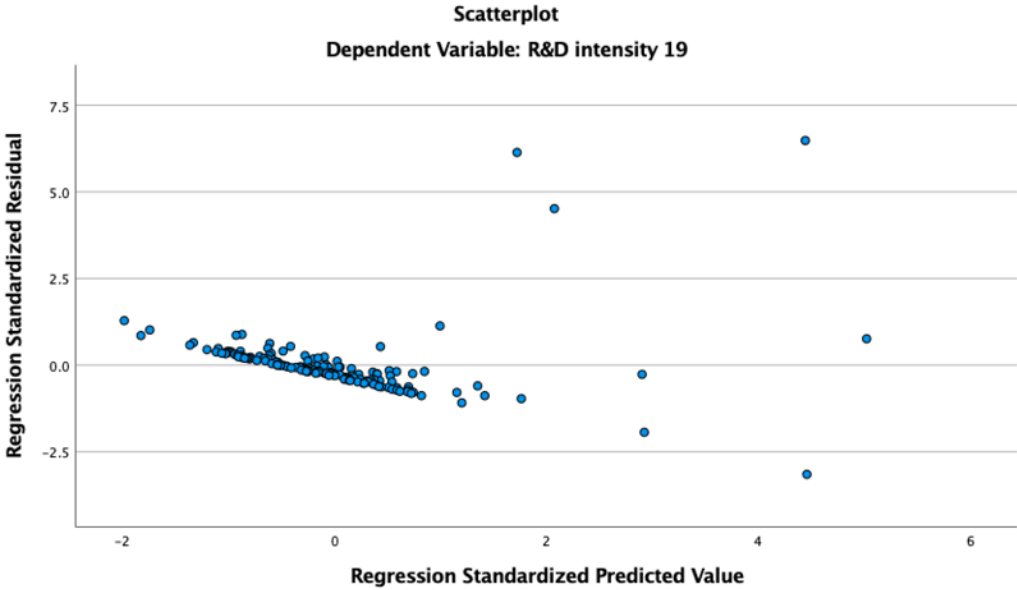


Figure 10. Scatterplot R&D intensity 2020

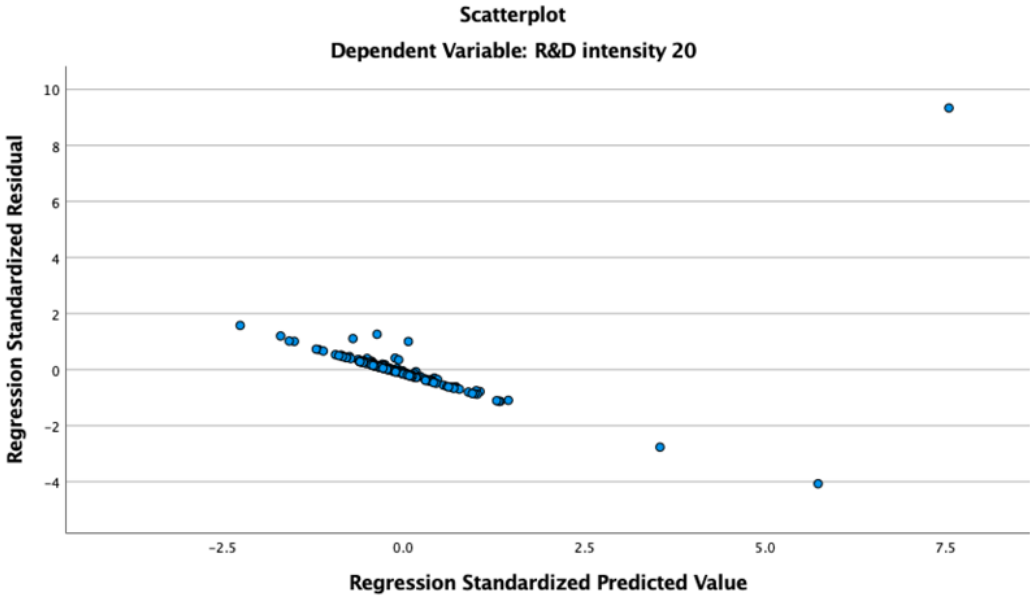


Figure 11. Residual statistics

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-.337141	1.298910	.126460	.2335350	156
Residual	-1.1280338	2.3210106	.0000000	.3438300	156
Std. Predicted Value	-1.985	5.020	.000	1.000	156
Std. Residual	-3.151	6.484	.000	.961	156

a. Dependent Variable: R&D intensity 19

Figure 12. Residual statistics

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-2.356639	8.957771	.249694	1.1545892	156
Residual	-6.3806787	14.6373711	.0000000	1.5053637	156
Std. Predicted Value	-2.257	7.542	.000	1.000	156
Std. Residual	-4.071	9.340	.000	.961	156

a. Dependent Variable: R&D intensity 20

Figure 13. Normal probability plot

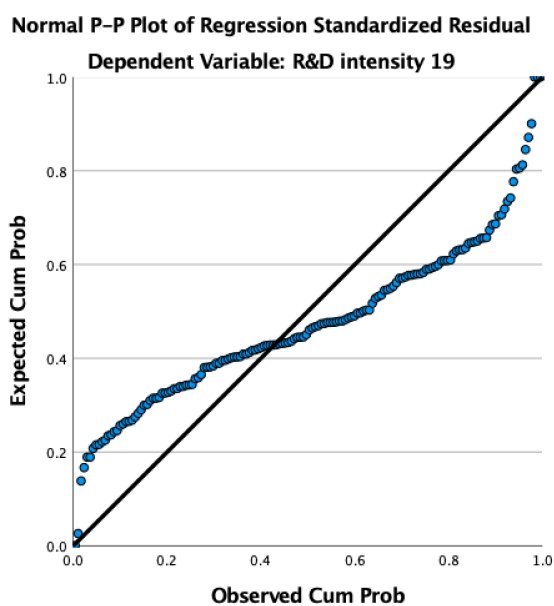


Figure 14. Normal probability plot

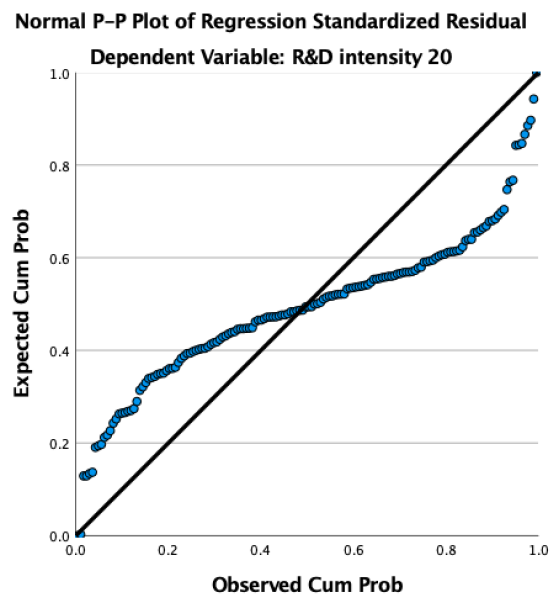


Figure 15. Histogram

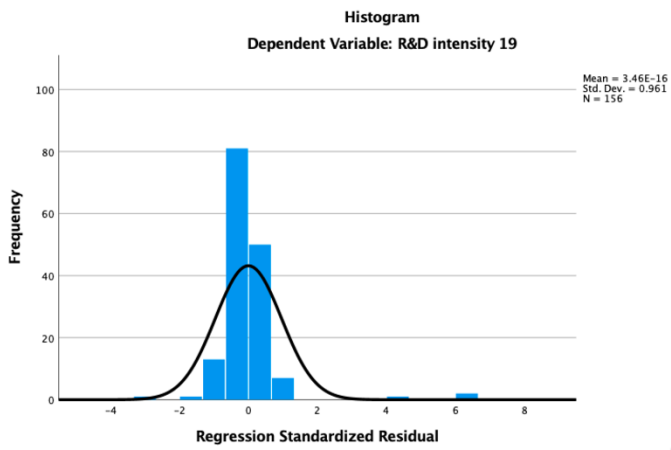
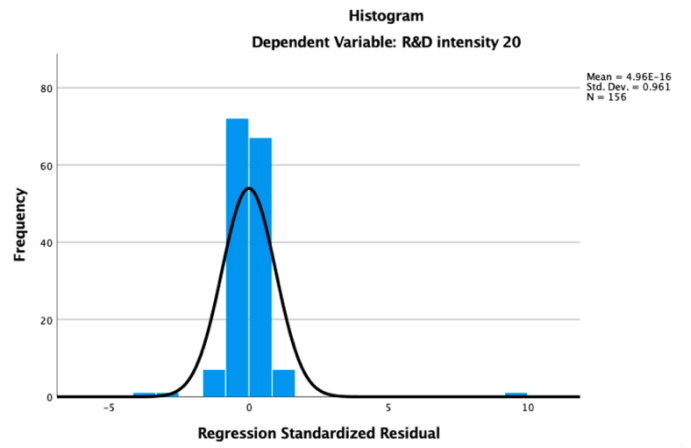


Figure 16. Histogram



Appendix G – Regression analysis R&D 2019

Figure 17. Correlations matrix

Correlations														
	R&D intensity 19	Board size	TA_Log	Sales growth	F_SQRT	Gender	Independent directors	Specific skills	Board tenure	Feedback_gender	Feedback_ID	Feedback_SK	Feedback_BT	
Pearson Correlation	R&D intensity 19	1.000	-.185	-.305	.356	.201	-.072	-.074	.229	-.057	-.035	-.155	.261	-.057
	Board size	-.185	1.000	.442	.010	-.124	.567	.486	-.616	-.016	-.069	-.053	-.153	.025
	TA_Log	-.305	.442	1.000	-.056	-.171	.328	.334	-.403	-.118	.107	.100	-.303	.074
	Sales growth	.356	.010	-.056	1.000	.101	.000	.071	.056	.007	.191	.267	-.086	.033
	F_SQRT	.201	-.124	-.171	.101	1.000	.012	-.012	.214	-.137	-.194	-.038	.281	-.203
	Gender	-.072	.567	.328	.000	.012	1.000	.478	-.392	-.060	-.190	-.082	-.061	.033
	Independent directors	-.074	.486	.334	.071	-.012	.478	1.000	-.310	.081	-.104	-.103	-.092	-.037
	Specific skills	.229	-.616	-.403	.056	.214	-.392	-.310	1.000	.089	-.085	-.106	.370	-.120
	Board tenure	-.057	-.016	-.118	.007	-.137	-.060	.081	.089	1.000	.034	-.035	-.089	-.197
	Feedback_gender	-.035	-.069	.107	.191	-.194	-.190	-.104	-.085	.034	1.000	.693	-.479	.063
	Feedback_ID	-.155	-.053	.100	.267	-.038	-.082	-.103	-.106	-.035	.693	1.000	-.559	.217
	Feedback_SK	.261	-.153	-.303	-.086	.281	-.061	-.092	.370	-.089	-.479	-.559	1.000	-.099
	Feedback_BT	-.057	.025	.074	.033	-.203	.033	-.037	-.120	-.197	.063	.217	-.099	1.000
Sig. (1-tailed)	R&D intensity 19	.	.010	<.001	<.001	.006	.185	.178	.002	.239	.334	.027	<.001	.242
	Board size	.010	.	.000	.450	.062	.000	.000	.000	.423	.196	.256	.028	.377
	TA_Log	.000	.000	.	.243	.016	.000	.000	.000	.071	.092	.108	.000	.180
	Sales growth	.000	.450	.243	.	.105	.499	.188	.244	.467	.008	.000	.144	.342
	F_SQRT	.006	.062	.016	.105	.	.440	.442	.004	.044	.008	.320	.000	.005
	Gender	.185	.000	.000	.499	.440	.	.000	.000	.228	.009	.155	.226	.343
	Independent directors	.178	.000	.000	.188	.442	.000	.	.000	.158	.098	.101	.125	.322
	Specific skills	.002	.000	.000	.244	.004	.000	.000	.	.135	.147	.094	.000	.068
	Board tenure	.239	.423	.071	.467	.044	.228	.158	.135	.	.339	.333	.135	.007
	Feedback_gender	.334	.196	.092	.008	.008	.009	.098	.147	.339	.	.000	.000	.218
	Feedback_ID	.027	.256	.108	.000	.320	.155	.101	.094	.333	.000	.	.000	.003
	Feedback_SK	.000	.028	.000	.144	.000	.226	.125	.000	.135	.000	.000	.	.109
	Feedback_BT	.242	.377	.180	.342	.005	.343	.322	.068	.007	.218	.003	.109	.
N	R&D intensity 19	156	156	156	156	156	156	156	156	156	156	156	156	156
	Board size	156	156	156	156	156	156	156	156	156	156	156	156	156
	TA_Log	156	156	156	156	156	156	156	156	156	156	156	156	156
	Sales growth	156	156	156	156	156	156	156	156	156	156	156	156	156
	F_SQRT	156	156	156	156	156	156	156	156	156	156	156	156	156
	Gender	156	156	156	156	156	156	156	156	156	156	156	156	156
	Independent directors	156	156	156	156	156	156	156	156	156	156	156	156	156
	Specific skills	156	156	156	156	156	156	156	156	156	156	156	156	156
	Board tenure	156	156	156	156	156	156	156	156	156	156	156	156	156
	Feedback_gender	156	156	156	156	156	156	156	156	156	156	156	156	156
	Feedback_ID	156	156	156	156	156	156	156	156	156	156	156	156	156
	Feedback_SK	156	156	156	156	156	156	156	156	156	156	156	156	156
	Feedback_BT	156	156	156	156	156	156	156	156	156	156	156	156	156

Figure 18. Variable entered/removed

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Sales growth , Board size, TA_Log ^b	.	Enter
2	F_SQRT ^b	.	Enter
3	Board tenure, Independent directors, Gender, Specific skills ^b	.	Enter
4	Feedback_BT, Feedback_gender, Feedback_SK, Feedback_ID ^b	.	Enter

a. Dependent Variable: R&D intensity 19

b. All requested variables entered.

Figure 19. Model summary

Model Summary ^e									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.462 ^a	.213	.198	.3722844	.213	13.735	3	152	<.001
2	.476 ^b	.227	.206	.3702858	.014	2.645	1	151	.106
3	.490 ^c	.240	.199	.3719818	.014	.657	4	147	.623
4	.562 ^d	.316	.258	.3579659	.075	3.934	4	143	.005

a. Predictors: (Constant), Sales growth , Board size, TA_Log

b. Predictors: (Constant), Sales growth , Board size, TA_Log, F_SQRT

c. Predictors: (Constant), Sales growth , Board size, TA_Log, F_SQRT, Board tenure, Independent directors, Gender, Specific skills

d. Predictors: (Constant), Sales growth , Board size, TA_Log, F_SQRT, Board tenure, Independent directors, Gender, Specific skills, Feedback_BT, Feedback_gender, Feedback_SK, Feedback_ID

e. Dependent Variable: R&D intensity 19

Figure 20. ANOVA

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.711	3	1.904	13.735	<.001 ^b
	Residual	21.067	152	.139		
	Total	26.777	155			
2	Regression	6.074	4	1.518	11.074	<.001 ^c
	Residual	20.704	151	.137		
	Total	26.777	155			
3	Regression	6.437	8	.805	5.815	<.001 ^d
	Residual	20.340	147	.138		
	Total	26.777	155			
4	Regression	8.453	12	.704	5.498	<.001 ^e
	Residual	18.324	143	.128		
	Total	26.777	155			

a. Dependent Variable: R&D intensity 19

b. Predictors: (Constant), Sales growth , Board size, TA_Log

c. Predictors: (Constant), Sales growth , Board size, TA_Log, F_SQRT

d. Predictors: (Constant), Sales growth , Board size, TA_Log, F_SQRT, Board tenure, Independent directors, Gender, Specific skills

e. Predictors: (Constant), Sales growth , Board size, TA_Log, F_SQRT, Board tenure, Independent directors, Gender, Specific skills, Feedback_BT, Feedback_gender, Feedback_SK, Feedback_ID

Figure 21. Coefficients table

Coefficients ^a												
Model		Unstandardized Coefficients		Standardized Coefficients		t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta				Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.040	.256			4.068	<.001					
	Board size	-.010	.011	-.078		-.969	.334	-.185	-.078	-.070	.804	1.244
	TA_Log	-.130	.042	-.251		-3.126	.002	-.305	-.246	-.225	.801	1.248
	Sales growth	.623	.131	.343		4.757	<.001	.356	.360	.342	.995	1.005
2	(Constant)	.871	.275			3.173	.002					
	Board size	-.009	.011	-.070		-.877	.382	-.185	-.071	-.063	.801	1.249
	TA_Log	-.122	.042	-.235		-2.916	.004	-.305	-.231	-.209	.789	1.268
	Sales growth	.603	.131	.332		4.606	<.001	.356	.351	.330	.986	1.014
	F_SQRT	.045	.028	.119		1.626	.106	.201	.131	.116	.959	1.043
3	(Constant)	.888	.346			2.566	.011					
	Board size	-.008	.014	-.057		-.527	.599	-.185	-.043	-.038	.448	2.234
	TA_Log	-.127	.044	-.245		-2.906	.004	-.305	-.233	-.209	.729	1.372
	Sales growth	.596	.132	.328		4.511	<.001	.356	.349	.324	.976	1.024
	F_SQRT	.033	.029	.087		1.137	.257	.201	.093	.082	.892	1.121
	Gender	.017	.024	.063		.680	.497	-.072	.056	.049	.610	1.640
	Independent directors	.002	.011	.019		.218	.828	-.074	.018	.016	.670	1.493
	Specific skills	1.127	1.109	.096		1.017	.311	.229	.084	.073	.575	1.740
	Board tenure	-.013	.011	-.084		-1.122	.264	-.057	-.092	-.081	.927	1.079
	(Constant)	.823	.337			2.444	.016					
Board size	-.013	.014	-.100		-.961	.338	-.185	-.080	-.066	.438	2.284	
TA_Log	-.106	.043	-.205		-2.458	.015	-.305	-.201	-.170	.687	1.456	
Sales growth	.709	.134	.391		5.301	<.001	.356	.405	.367	.881	1.135	
F_SQRT	.041	.030	.108		1.361	.176	.201	.113	.094	.766	1.306	
Gender	.022	.024	.081		.902	.369	-.072	.075	.062	.587	1.703	
Independent directors	-.001	.011	-.011		-.127	.899	-.074	-.011	-.009	.658	1.521	
Specific skills	.301	1.130	.026		.266	.790	.229	.022	.018	.512	1.952	
Board tenure	-.011	.011	-.074		-.994	.322	-.057	-.083	-.069	.867	1.154	
Feedback_gender	.063	.029	.228		2.218	.028	-.035	.182	.153	.452	2.211	
Feedback_ID	-.037	.012	-.346		-3.058	.003	-.155	-.248	-.212	.374	2.676	
Feedback_SK	.771	.802	.093		.962	.338	.261	.080	.067	.510	1.961	
Feedback_BT	.004	.011	.026		.341	.733	-.057	.029	.024	.833	1.200	

a. Dependent Variable: R&D intensity 19

Figure 22. Excluded variables

Excluded Variables ^a							
Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics	
						Tolerance	VIF
1	F_SQRT	.119 ^b	1.626	.106	.131	.959	1.043
	Gender	.081 ^b	.920	.359	.075	.671	1.491
	Independent directors	.031 ^b	.367	.714	.030	.741	1.350
	Specific skills	.101 ^b	1.089	.278	.088	.597	1.675
	Board tenure	-.092 ^b	-1.271	.206	-.103	.984	1.016
	Feedback_gender	-.085 ^b	-1.137	.257	-.092	.931	1.074
	Feedback_ID	-.250 ^b	-3.419	<.001	-.268	.901	1.109
	Feedback_SK	.226 ^b	3.050	.003	.241	.897	1.115
Feedback_BT	-.048 ^b	-.658	.512	-.053	.993	1.007	
2	Gender	.065 ^c	.739	.461	.060	.662	1.512
	Independent directors	.022 ^c	.257	.797	.021	.737	1.357
	Specific skills	.080 ^c	.858	.392	.070	.584	1.714
	Board tenure	-.075 ^c	-1.029	.305	-.084	.959	1.042
	Feedback_gender	-.062 ^c	-.813	.417	-.066	.888	1.126
	Feedback_ID	-.244 ^c	-3.343	.001	-.263	.899	1.113
	Feedback_SK	.208 ^c	2.713	.007	.216	.838	1.193
Feedback_BT	-.025 ^c	-.344	.731	-.028	.954	1.049	
3	Feedback_gender	-.040 ^d	-.511	.610	-.042	.834	1.199
	Feedback_ID	-.239 ^d	-3.163	.002	-.253	.851	1.175
	Feedback_SK	.194 ^d	2.367	.019	.192	.743	1.346
	Feedback_BT	-.041 ^d	-.534	.594	-.044	.896	1.116

a. Dependent Variable: R&D intensity 19

b. Predictors in the Model: (Constant), Sales growth, Board size, TA_Log

c. Predictors in the Model: (Constant), Sales growth, Board size, TA_Log, F_SQRT

d. Predictors in the Model: (Constant), Sales growth, Board size, TA_Log, F_SQRT, Board tenure, Independent directors, Gender, Specific skills

Figure 23. Collinearity Diagnostics

Collinearity Diagnostics ^a														
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions										
				(Constant)	Board size	TA_Log	Sales growth	F_SQRT	Gender	Independent directors	Specific skills	Board tenure	Feedback_generator	Feedback_ID
1	1	3.202	1.000	.00	.01	.00	.03							
	2	.741	2.080	.00	.00	.00	.96							
	3	.051	7.929	.06	.90	.02	.00							
	4	.006	22.506	.94	.09	.98	.01							
2	1	4.031	1.000	.00	.00	.00	.02	.01						
	2	.748	2.321	.00	.00	.00	.97	.00						
	3	.170	4.865	.00	.08	.00	.01	.76						
	4	.044	9.528	.07	.84	.04	.00	.16						
	5	.006	26.091	.93	.07	.95	.00	.07						
3	1	7.167	1.000	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	2	.777	3.038	.00	.00	.00	.95	.00	.01	.00	.00	.00	.00	.00
	3	.507	3.760	.00	.00	.00	.03	.02	.14	.02	.13	.01	.01	.01
	4	.191	6.128	.00	.00	.00	.00	.41	.14	.02	.01	.20	.20	.20
	5	.140	7.165	.00	.01	.00	.00	.30	.51	.02	.35	.00	.00	.00
	6	.108	8.155	.00	.01	.00	.01	.01	.08	.85	.09	.14	.14	.14
	7	.083	9.309	.01	.08	.02	.00	.19	.06	.06	.02	.58	.58	.58
	8	.024	17.228	.04	.88	.11	.00	.01	.05	.01	.27	.01	.01	.01
	9	.005	39.380	.95	.01	.87	.00	.06	.01	.02	.12	.07	.07	.07
4	1	7.234	1.000	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	2	2.252	1.792	.00	.00	.00	.01	.00	.00	.00	.00	.00	.06	.06
	3	.967	2.735	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00
	4	.802	3.003	.00	.00	.00	.42	.00	.02	.00	.01	.00	.01	.01
	5	.615	3.430	.00	.00	.00	.48	.00	.02	.00	.03	.00	.11	.02
	6	.342	4.600	.00	.00	.00	.00	.01	.12	.01	.08	.01	.28	.00
	7	.306	4.860	.00	.00	.00	.05	.05	.04	.00	.00	.02	.31	.59
	8	.142	7.144	.00	.00	.00	.00	.57	.04	.00	.03	.17	.10	.22
	9	.133	7.364	.00	.02	.00	.00	.00	.59	.08	.31	.07	.05	.07
	10	.105	8.293	.00	.01	.00	.01	.02	.05	.81	.12	.14	.00	.01
	11	.075	9.833	.01	.11	.02	.00	.27	.08	.06	.02	.49	.05	.02
	12	.022	17.993	.05	.85	.12	.01	.04	.03	.00	.33	.01	.01	.00
	13	.004	40.131	.94	.01	.86	.00	.04	.01	.02	.07	.09	.00	.00

a. Dependent Variable: R&D intensity 19

Appendix H – Regression analysis R&D 2020

Figure 24. Correlations

Correlations														
	R&D intensity 20	Board size	TA_Log	Sales growth	F_SQRT	Gender	Independent directors	Specific skills	Board tenure	Feedback_gender	Feedback_ID	Feedback_SK	Feedback_BT	
Pearson Correlation	R&D intensity 20	1.000	-.157	-.252	-.246	.232	-.070	-.165	.257	-.066	-.175	-.384	.467	-.156
	Board size	-.157	1.000	.442	.010	-.124	.567	.486	-.616	-.016	-.069	-.053	-.153	.025
	TA_Log	-.252	.442	1.000	-.056	-.171	.328	.334	-.403	-.118	.107	.100	-.303	.074
	Sales growth	-.246	.010	-.056	1.000	.101	.000	.071	.056	.007	.191	.267	-.086	.033
	F_SQRT	.232	-.124	-.171	.101	1.000	.012	-.012	.214	-.137	-.194	-.038	.281	-.203
	Gender	-.070	.567	.328	.000	.012	1.000	.478	-.392	-.060	-.190	-.082	-.061	.033
	Independent directors	-.165	.486	.334	.071	-.012	.478	1.000	-.310	.081	-.104	-.103	-.092	-.037
	Specific skills	.257	-.616	-.403	.056	.214	-.392	-.310	1.000	.089	-.085	-.106	.370	-.120
	Board tenure	-.066	-.016	-.118	.007	-.137	-.060	.081	.089	1.000	.034	-.035	-.089	-.197
	Feedback_gender	-.175	-.069	.107	.191	-.194	-.190	-.104	-.085	.034	1.000	.693	-.479	.063
	Feedback_ID	-.384	-.053	.100	.267	-.038	-.082	-.103	-.035	.693	1.000	-.559	.217	.063
	Feedback_SK	.467	-.153	-.303	-.086	.281	-.061	-.092	.370	-.089	-.479	1.000	-.099	.063
	Feedback_BT	-.156	.025	.074	.033	-.203	.033	-.037	-.120	-.197	.217	-.099	1.000	.026
Sig. (1-tailed)	R&D intensity 20	.	.025	<.001	<.001	.002	.191	.020	<.001	.207	.014	<.001	<.001	.026
	Board size	.025	.	.000	.450	.062	.000	.000	.000	.423	.196	.256	.028	.377
	TA_Log	.001	.000	.	.243	.016	.000	.000	.000	.071	.092	.108	.000	.180
	Sales growth	.001	.450	.243	.	.105	.499	.188	.244	.467	.008	.000	.144	.342
	F_SQRT	.002	.062	.016	.105	.	.440	.442	.004	.044	.008	.320	.000	.005
	Gender	.191	.000	.000	.499	.440	.	.000	.000	.228	.009	.155	.226	.343
	Independent directors	.020	.000	.000	.188	.442	.000	.	.000	.158	.098	.101	.125	.322
	Specific skills	.001	.000	.000	.244	.004	.000	.000	.	.135	.147	.094	.000	.068
	Board tenure	.207	.423	.071	.467	.044	.228	.158	.135	.	.339	.333	.135	.007
	Feedback_gender	.014	.196	.092	.008	.008	.009	.098	.147	.339	.	.000	.000	.218
	Feedback_ID	.000	.256	.108	.000	.320	.155	.101	.094	.333	.000	.	.000	.003
	Feedback_SK	.000	.028	.000	.144	.000	.226	.125	.000	.135	.000	.000	.	.109
	Feedback_BT	.026	.377	.180	.342	.005	.343	.322	.068	.007	.218	.003	.109	.
N	R&D intensity 20	156	156	156	156	156	156	156	156	156	156	156	156	156
	Board size	156	156	156	156	156	156	156	156	156	156	156	156	156
	TA_Log	156	156	156	156	156	156	156	156	156	156	156	156	156
	Sales growth	156	156	156	156	156	156	156	156	156	156	156	156	156
	F_SQRT	156	156	156	156	156	156	156	156	156	156	156	156	156
	Gender	156	156	156	156	156	156	156	156	156	156	156	156	156
	Independent directors	156	156	156	156	156	156	156	156	156	156	156	156	156
	Specific skills	156	156	156	156	156	156	156	156	156	156	156	156	156
	Board tenure	156	156	156	156	156	156	156	156	156	156	156	156	156
	Feedback_gender	156	156	156	156	156	156	156	156	156	156	156	156	156
	Feedback_ID	156	156	156	156	156	156	156	156	156	156	156	156	156
	Feedback_SK	156	156	156	156	156	156	156	156	156	156	156	156	156
	Feedback_BT	156	156	156	156	156	156	156	156	156	156	156	156	156

Figure 25. Variables Entered/Removed

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Sales growth, Board size, TA_Log ^b	.	Enter
2	F_SQRT ^b	.	Enter
3	Board tenure, Independent directors, Gender, Specific skills ^b	.	Enter
4	Feedback_BT, Feedback_gender, Feedback_SK, Feedback_ID ^b	.	Enter

a. Dependent Variable: R&D intensity 20

b. All requested variables entered.

Figure 26. Model Summary

Model Summary ^e									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.365 ^a	.133	.116	1.7839710	.133	7.764	3	152	<.001
2	.423 ^b	.179	.158	1.7413300	.046	8.535	1	151	.004
3	.463 ^c	.214	.172	1.7266240	.035	1.646	4	147	.166
4	.609 ^d	.370	.318	1.5672535	.156	8.854	4	143	<.001

a. Predictors: (Constant), Sales growth , Board size, TA_Log
b. Predictors: (Constant), Sales growth , Board size, TA_Log, F_SQRT
c. Predictors: (Constant), Sales growth , Board size, TA_Log, F_SQRT, Board tenure, Independent directors, Gender, Specific skills
d. Predictors: (Constant), Sales growth , Board size, TA_Log, F_SQRT, Board tenure, Independent directors, Gender, Specific skills, Feedback_BT, Feedback_gender, Feedback_SK, Feedback_ID
e. Dependent Variable: R&D intensity 20

Figure 27. ANOVA

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	74.127	3	24.709	7.764	<.001 ^b
	Residual	483.748	152	3.183		
	Total	557.875	155			
2	Regression	100.009	4	25.002	8.245	<.001 ^c
	Residual	457.867	151	3.032		
	Total	557.875	155			
3	Regression	119.634	8	14.954	5.016	<.001 ^d
	Residual	438.241	147	2.981		
	Total	557.875	155			
4	Regression	206.627	12	17.219	7.010	<.001 ^e
	Residual	351.249	143	2.456		
	Total	557.875	155			

a. Dependent Variable: R&D intensity 20
b. Predictors: (Constant), Sales growth , Board size, TA_Log
c. Predictors: (Constant), Sales growth , Board size, TA_Log, F_SQRT
d. Predictors: (Constant), Sales growth , Board size, TA_Log, F_SQRT, Board tenure, Independent directors, Gender, Specific skills
e. Predictors: (Constant), Sales growth , Board size, TA_Log, F_SQRT, Board tenure, Independent directors, Gender, Specific skills, Feedback_BT, Feedback_gender, Feedback_SK, Feedback_ID

Figure 28. Coefficients

Coefficients ^a												
Model		Unstandardized Coefficients		Standardized Coefficients		t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta				Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	4.702	1.225			3.839	<.001					
	Board size	-.028	.052	-.046		-.547	.585	-.157	-.044	-.041	.804	1.244
	TA_Log	-.582	.200	-.246		-2.913	.004	-.252	-.230	-.220	.801	1.248
	Sales growth	-2.150	.628	-.259		-3.426	<.001	-.246	-.268	-.259	.995	1.005
2	(Constant)	3.277	1.291			2.538	.012					
	Board size	-.020	.050	-.032		-.388	.698	-.157	-.032	-.029	.801	1.245
	TA_Log	-.511	.197	-.216		-2.596	.010	-.252	-.207	-.191	.789	1.268
	Sales growth	-2.321	.615	-.280		-3.772	<.001	-.246	-.293	-.278	.986	1.014
	F_SQRT	.379	.130	.220		2.922	.004	.232	.231	.215	.959	1.043
3	(Constant)	2.074	1.606			1.291	.199					
	Board size	.055	.067	.090		.823	.412	-.157	.068	.060	.448	2.234
	TA_Log	-.449	.203	-.190		-2.214	.028	-.252	-.180	-.162	.729	1.372
	Sales growth	-2.338	.613	-.282		-3.812	<.001	-.246	-.300	-.279	.976	1.024
	F_SQRT	.314	.133	.182		2.353	.020	.232	.190	.172	.892	1.121
	Gender	.069	.113	.057		.606	.545	-.070	.050	.044	.610	1.640
	Independent directors	-.045	.052	-.077		-.867	.387	-.165	-.071	-.063	.670	1.493
	Specific skills	11.584	5.146	.217		2.251	.026	.257	.183	.165	.575	1.740
Board tenure	-.047	.052	-.070		-.916	.361	-.066	-.075	-.067	.927	1.075	
4	(Constant)	1.622	1.474			1.101	.273					
	Board size	.011	.061	.018		.184	.854	-.157	.015	.012	.438	2.284
	TA_Log	-.281	.190	-.118		-1.479	.141	-.252	-.123	-.098	.687	1.456
	Sales growth	-1.692	.586	-.204		-2.889	.004	-.246	-.235	-.192	.881	1.135
	F_SQRT	.299	.131	.173		2.284	.024	.232	.188	.152	.766	1.306
	Gender	.101	.105	.084		.969	.334	-.070	.081	.064	.587	1.703
	Independent directors	-.064	.048	-.110		-1.342	.182	-.165	-.111	-.089	.658	1.521
	Specific skills	4.458	4.947	.084		.901	.369	.257	.075	.060	.512	1.952
	Board tenure	-.036	.049	-.052		-.734	.464	-.066	-.061	-.049	.867	1.154
	Feedback_gender	.392	.125	.309		3.128	.002	-.175	.253	.208	.452	2.211
	Feedback_ID	-.177	.052	-.367		-3.379	<.001	-.384	-.272	-.224	.374	2.676
	Feedback_SK	10.104	3.511	.267		2.878	.005	.467	.234	.191	.510	1.961
Feedback_BT	-.016	.046	-.026		-.355	.723	-.156	-.030	-.024	.833	1.200	

a. Dependent Variable: R&D intensity 20

Figure 29. Collinearity Diagnostics

Collinearity Diagnostics ^a																
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions												
				(Constant)	Board size	YA_Log	Sales growth	F_SQRT	Gender	Independent directors	Specific skills	Board tenure	Feedback_gender	Feedback_ID	Feedback_SK	Feedback_BT
1	1	3.202	1.000	.00	.01	.00	.03									
	2	.741	2.080	.00	.00	.00	.96									
	3	.051	7.929	.06	.90	.02	.00									
	4	.006	22.506	.94	.09	.98	.01									
2	1	4.031	1.000	.00	.00	.00	.02	.01								
	2	.748	2.321	.00	.00	.00	.97	.00								
	3	.170	4.865	.00	.08	.00	.01	.76								
	4	.044	9.528	.07	.84	.04	.00	.16								
	5	.006	26.091	.93	.07	.95	.00	.07								
3	1	7.167	1.000	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	2	.777	3.038	.00	.00	.00	.95	.00	.01	.00	.00	.00	.00	.00	.00	.00
	3	.507	3.760	.00	.00	.00	.03	.02	.14	.02	.13	.01	.01	.01	.01	.01
	4	.191	6.128	.00	.00	.00	.00	.41	.14	.02	.01	.20	.01	.01	.01	.01
	5	.140	7.165	.00	.01	.00	.00	.30	.51	.02	.35	.00	.01	.01	.01	.01
	6	.108	8.155	.00	.01	.00	.01	.01	.08	.85	.09	.14	.01	.01	.01	.01
	7	.083	9.309	.01	.08	.02	.00	.19	.06	.06	.02	.58	.01	.01	.01	.01
	8	.024	17.228	.04	.88	.11	.00	.01	.05	.01	.27	.01	.01	.01	.01	.01
	9	.005	39.380	.95	.01	.87	.00	.06	.01	.02	.12	.07	.01	.01	.01	.01
4	1	7.234	1.000	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	2	2.252	1.792	.00	.00	.00	.01	.00	.00	.00	.00	.00	.06	.06	.05	.01
	3	.967	2.735	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00	.00	.76
	4	.802	3.003	.00	.00	.00	.42	.00	.02	.00	.01	.00	.01	.01	.17	.01
	5	.615	3.430	.00	.00	.00	.48	.00	.02	.00	.03	.00	.11	.02	.10	.02
	6	.342	4.600	.00	.00	.00	.01	.12	.01	.08	.01	.28	.00	.38	.01	.01
	7	.306	4.860	.00	.00	.00	.05	.05	.04	.00	.00	.02	.31	.59	.05	.06
	8	.142	7.144	.00	.00	.00	.00	.57	.04	.00	.03	.17	.10	.22	.11	.03
	9	.133	7.364	.00	.02	.00	.00	.00	.59	.08	.31	.07	.05	.07	.10	.00
	10	.105	8.293	.00	.01	.00	.01	.02	.05	.81	.12	.14	.00	.01	.00	.00
	11	.075	9.833	.01	.11	.02	.00	.27	.08	.06	.02	.49	.05	.02	.00	.08
	12	.022	17.993	.05	.85	.12	.01	.04	.03	.00	.33	.01	.01	.00	.03	.01
	13	.004	40.131	.94	.01	.86	.00	.04	.01	.01	.02	.07	.09	.00	.00	.01

a. Dependent Variable: R&D intensity 20

Appendix I – Interaction plots

Figure 30. Interaction gender diversity

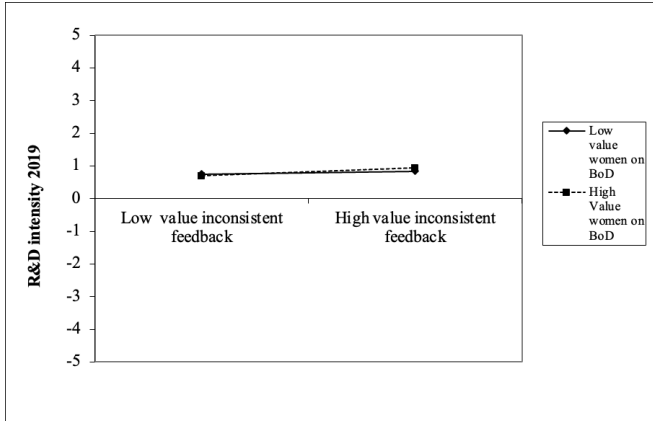


Figure 31. Interaction gender diversity

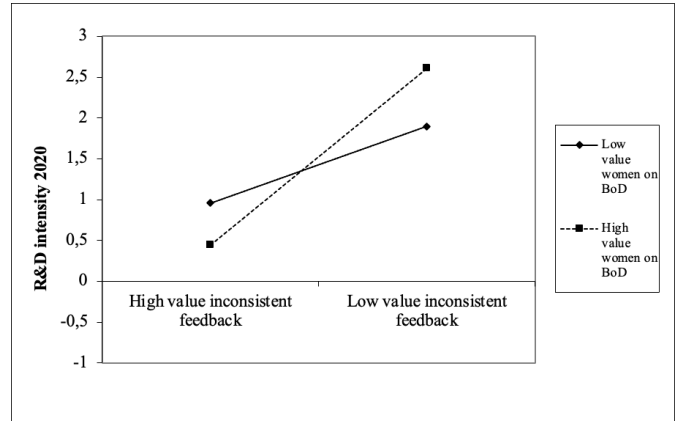


Figure 32. Interaction Independent directors

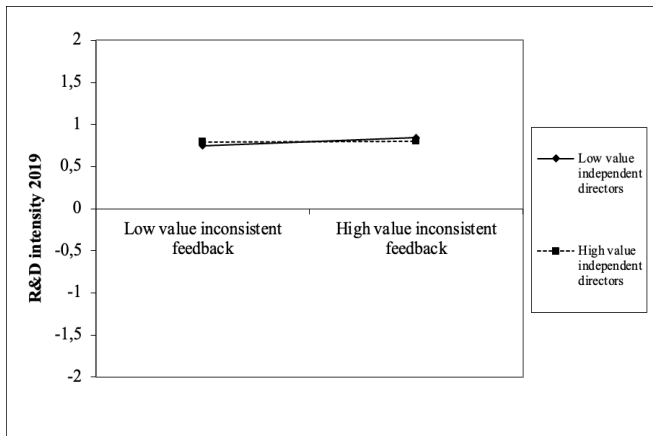


Figure 33. Interaction independent directors

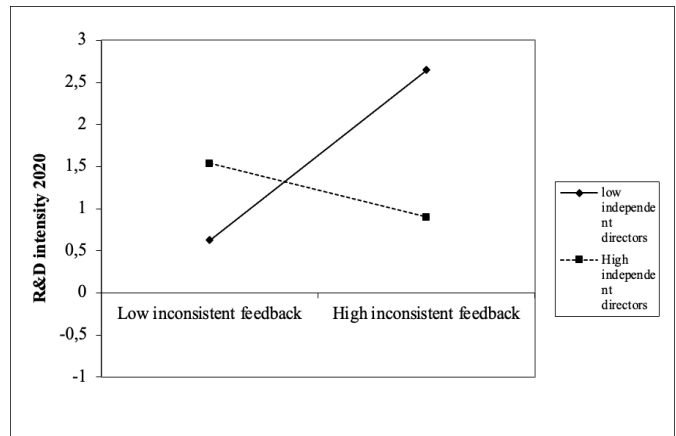


Figure 34. Interaction specific skills

Figure 35. Interaction specific skills

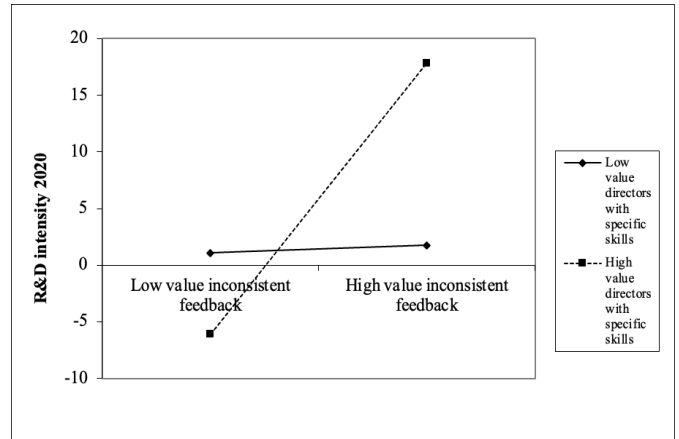
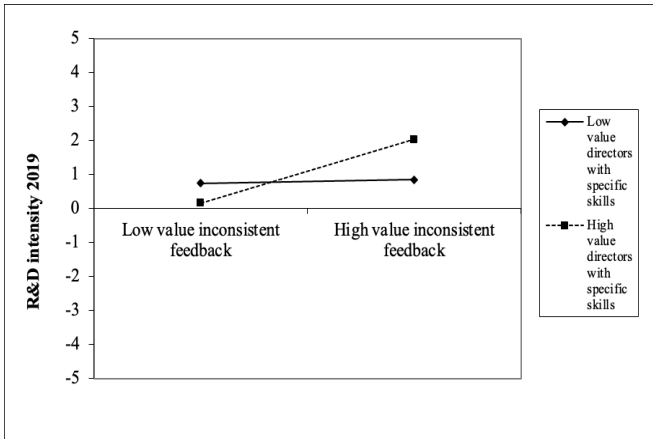


Figure 36. Interaction board tenure

Figure 37. Interaction board tenure

