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Performance effects of groupthink in the boards of directors of JSE listed companies

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Performance effects of groupthink in the boards of directors of JSE listed companies

A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Management in Finance and Investment by:

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Abstract

Board members serving on corporate boards are expected to act objectively and in good faith. Even if the intention is such, cognitive biases are at play which may serve to alter the decision-making process of a board of directors as well as its comprising members. A specific group of cognitive biases – assembled under the banner of the term “groupthink” – are an example of one such phenomenon resulting therefrom. While groupthink is understood in terms of technical composition and sociological presentation, the mechanisms by which groupthink impacts firm performance have not been isolated and understood, and therefore cannot be purposefully affected. This study aimed to lay the groundwork for research into understanding fully the mechanisms by which groupthink affects performance of the boards of Johannesburg Stock Exchange (JSE) listed companies as well as, subsequently, the firms which they serve. The study aimed to execute this by measuring quantitatively the presence of groupthink-linked proxies in the boards of JSE listed companies and thereafter correlating said proxies to firm performance measures – including, but not limited to, financial performance. Multiple statistically significant correlations were found to exist, encouraging the researcher’s hypothesis that groupthink has a statistically significant and material effect on the boards of JSE listed companies as well as, consequently, the firms which they serve.

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1. Introduction and motivation

1.1. Background

Board effectiveness is a key topic in the world of corporate finance and corporate governance. Boards execute decisions which affect huge numbers of people and concern massive amounts of money – ergo, a lack of board effectiveness would be expected to result in negative valuation effects for a given firm. One therefore would expect that such responsibility is accompanied by fair and critical thinking. While this may be the ultimate intention in most companies; deviations from fairness, objectivity – both conscious and unconscious – as well as cognitive biases play an increasing role in board decisions (Mthanti & Ojah, 2016).

Cognitive biases are a form of heuristics in which the brain utilizes pre-conceived algorithms to solve problems faster than if each problem were approached from scratch. In many ways, our actions are decided in major part by preconceived sets of views. One psycho-social construct which is of primary interest and of critical importance here is the concept of groupthink. According to Sims (1992), groupthink is a driving factor which underlies biased behavior.

Groupthink is a term first used by psychologist Irving Janis (Janis, 1972) and is described by Barnea (2020) as the loss of thinking independence due to members of a group striving – above all else – for unanimity. This overrides their motivation to consider alternative points of view and may contribute to a decision being taken which is not in the best interests of the firm, and often is to the contrary of the individuals' personal isolated points of view.

Barnea (2020) describes examples of the presence of groupthink in the corporate world – especially in the context of value destruction. He cites the cases of Swissair, Marks and Spencer (M&S), as well as Volkswagen as examples of occasions in which

groupthink was the cause of corporate governance failures and value destruction in the respective firms.

Current research has focused on the link between diversity and value accretion; however, no study has focused on the mechanics responsible for the observed outcomes. Therefore, this work is proposing that proxies may be used to isolate the possible underlying causes for the outcomes observed. A simple example of said strategy explaining the mechanics underlying a given outcome would be the exclusive composition of a board along race or gender lines decreasing innovation and thereby reducing capital investment. This scenario would be toxic to a firm to which research and development of new technologies is critical. Furthermore, uniform thinking patterns may entrench or promote discriminatory labor or procurement practice, thus resulting in poor operational efficiency.

A final example considers a situation in which a board comprised exclusively, or in majority, of a set of executives promoted internally. A similar case could be made for a board comprised of individuals all in an advanced age bracket. Intuitively, this environment would foster inertia in terms of innovation and creativity due to generational thought patterns, and introduce bias to the individuals of the group, which would be consolidated by groupthink processes. This would result in a potential deficiency in the areas of innovation and research and development (R&D), causing low product differentiation. This – unarguably – would have a negative effect on sales growth, especially in firms who traditionally have depended on innovative products and product differentiation as key sales promotion metrics and sources of the firms' value propositions.

Consequently, groupthink's potential for value destruction is not a trivial or transient problem affecting only small groups, but rather one which stands at the forefront of corporate decision-making failings, and therefore demands research scrutiny.

1.2. Problem statement

One would expect that the responsibility of serving on a firm's board is accompanied by fair, diversely rich, and critical thinking. While the ultimate intention of board members in most companies may be to pursue objectivity, the relevant research problem is that deviations from fairness and objectivity – both conscious and unconscious – as well as cognitive biases, play an inherent role in board decisions – a view corroborated by Maharaj (2008) and Mthanti and Ojah (2016). As such, the channels through which these metrics cause deviations in objectivity and productive thinking need to be identified, measured, and addressed. Denied the insights of this research, firms would be more susceptible to unconscious exposure to potentially destructive groupthink tendencies without means by which to mitigate said risk. Large, publicly listed firms often are the vehicles of savings for multitudes of individuals who are financially invested therein. The potential failure of these companies would have dire and far-reaching consequences for society at large, who are heavily invested in said companies in the form of pension funds, equity stocks, and by other means (Ensor, 2018).

1.3. Hypotheses

The following relevant hypotheses are stated in the positive form.

H_1: Groupthink – measured by representative proxies – is present in the boards of listed companies on the JSE.
H_2: Groupthink has negative valuation effects associated with its presence if present. in the boards of listed companies on the JSE.

1.4. Significance of the research

This research is designed to understand the nature of groupthink among the boards of listed companies on the JSE. In-so-doing, the author will be able to postulate the presence or absence of groupthink in their boards as well as the degree of variation in valuation effects realized therefrom. Furthermore, this study will seek to understand the channels by which groupthink affects company performance and provide a foundation for such research in South Africa. If the hypotheses listed above are not rejected, then this study will provide a quantitative framework to understand the prevalence and manifestations of groupthink as well as any associated negative valuation dynamics, upon which appropriate action may be researched and taken.

1.5. Outline of the remainder of the report

Chapter 2 explores the literature concerned with the underlying motivations and themes of this research. It opens by describing groupthink as a construct as well as delving into the underlying supportive biases to which it may be linked. It moves on to discuss the potential effects of the presence of groupthink, while thereafter breaking down the demographic proxies potentially by which groupthink tendencies may be measured. Chapter 2 concludes with a review of performance effects which may be mapped onto the demographic proxies in order to ascertain performance effects of groupthink on firms.

Chapter 3 describes the research methodology utilized to measure the aforementioned performance effects of groupthink on firms – providing motivation therefor. Chapter 3 concludes by delineating the assumptions, limitations, and delimitations associated with this research, as well as ethical considerations of this study.

Chapter 4 presents the results of the research as well as the path the researcher took when presented with the initial results in order to glean a deeper insight into the data. The constitution of the data as well as descriptive statistics are presented for both the demographics and performance metrics, and the means by which the two sets of metrics are hypothesized to interact are tabulated. Normality tests as well as inferential statistics then are presented in an attempt to justify the hypotheses of the study. Summative statistical tables then are offered to clarify the findings of the research.

Chapter 5 concludes the research report by summarizing the study's final results, important caveats associated with this research, as well as suggesting potential future research.

2. Literature review

Groupthink, at its core, is a cumulative construct described by Barnea (2020) as being influenced heavily by the cognitive biases of anchoring, confirmation bias, reactance bias, as well as choice-supportive bias.

On a high level, anchoring – also referred to as focalism – refers to the cognitive bias whereby an individual relies too heavily on a single piece of information. This is of particular importance for board decisions in a groupthink context as the group may be biased to assign too much value to the initial idea or piece of information. Confirmation bias refers to the psychological tendency of individuals to search for, favor, and/or integrate information which confirms a previously held belief or point of view – often to the exclusion of more objectively correct information. Reactance bias reflects a natural tendency to go against a novel point of view presented which disagrees with the one already favored. Choice-supportive bias describes the human tendency to positively affirm the outcome of one's choice despite the possible realization that other options may have provided better outcomes than the option chosen.

In a board setting, a dominant board member or the board chairman would usually convey their opinion in an opening statement. This idea may be assigned too much importance by other members of the board due to anchoring bias, and ideas presented thereafter may not be afforded equal weighting. This effect would be amplified by both positive psychological reinforcement by way of confirmation bias as well as negative psychological reinforcement by way of reactance bias. The board member may justify why the idea is correct and refute any idea which does not agree with his own. Post-hoc, choice supportive bias would ensure that whichever choice was taken would be self-reaffirmed as correct – regardless of whether it was reached objectively. This situational deviation from objectivity is exacerbated by a lack of diversity in the boardroom. People from the same background – personal and/or professional culture – may be more susceptible to groupthink (Kamalnath, 2018).

Other cognitive biases which may be present and play a large part in bandwagon-effect groupthink-type behavior include the availability heuristic as well as conformity bias. The availability heuristic describes a phenomenon in which people tend to make decisions based on information available to them at the moment of decision-making, to the exclusion of other possibly relevant, yet not immediately available information. This may be found in board members who are not necessarily affected by other groupthink proxies, but do not have sufficient information to refute a widely held opinion or prevailing opinion among other board members. As such, these board members concur with what has already been presented by their colleagues.

Conformity bias – specifically the compliance variant which is relevant to this paper – is the least powerful variant and describes situations in which people make decisions which conform to a commonly held majority opinion, regardless of their own personal opinion. Importantly, compliance conformity bias is active in an environment where the individual is fully aware of his decision being made only for the sake of group compliance. This contrasts with the construct of groupthink in which the tendency to prioritize unanimity often is unconscious. Compliance conformity bias ideally should

be eliminated from boards and should not be considered present in this study, as members with alternative motives other than stakeholders' value creation or enhancement principally should not make board decisions. Unfortunately, as noted by van der Hoven and Ojah (2018), the sociality corollary is a factor regardless of the ethical composition of individual board members – thus implying that bias in some form impacts and is fused inherently to group decision making. With the rationale behind boards leading decision-making being that group decision-making is assumed to be more effective and inclusive than individual decision-making, any deviation from this assumption in practice needs to be remedied so as not to lose the desired efficiency gain.

In search of a remedy for the potentially destructive presence of groupthink, Kamalnath (2018) proposes that gender diversity may contribute to the mitigation of groupthink behavior in boards; and goes on to stipulate other forms of diversity including race, education, tenure, as well as professional background as potential mitigation factors against groupthink on corporate boards. This approach is in line with the King IV Code on Corporate Governance – owned by the Institute of Directors South Africa – which stipulates in principle seven that "*The governing body should comprise the appropriate balance of knowledge, skills, experience, diversity and independence for it to discharge its governance role and responsibilities objectively and effectively*." It appears that the benefits of incorporating diversity to nullify groupthink agree with the current prevailing opinion – that diversity supports value accretion. Unfortunately, the stipulations in the code are a requirement only at the time of listing on the JSE and are not an ongoing requirement that is subject to periodic reviews.

2.1. Board diversity – external vs internal representation

Board members who have been promoted to board positions internally after years of experience operating within the company culture may exhibit more groupthink tendency than those drafted in at board level externally. A board comprising a majority of individuals promoted internally may be susceptible to groupthink in terms of established company culture and/or informal bonds, and as such be pre-disposed to objective decision-making deficiencies. The same situation may also lend itself to an environment in which internally promoted individuals who have established informal bonds and/or friendship from decades of working together align with one another unconsciously in a groupthink context. While Willard-Kyle (2017) outlines evidence to refute the view that “great minds think alike”, Pillemer and Rothbard (2018) postulate that friendships at work have a material effect on factors such as decision-making – most relevantly in the area of personal preparedness to make independent decisions. This view is corroborated by Egebark and Ekstrom (2018) who utilize social media to conclude that friendship of varying degrees plays a material role in influencing otherwise objective action.

2.2. Gender diversity

Importantly, we are aware of meta-analysis by Post and Byron (2015) which suggests that the relationship between financial performance and gender – to the exclusion of all else – is disputed, however in combination with the full palette of proposed representative proxies, a material relationship is hypothesized to exist. This hypothesis is based on a wide base of research into gender diversity in particular and its effect on corporate performance. Taylor and Peens (2017) summarize the research on gender diversity and corporate performance as being inconclusive. Their research on the topic finds that there seems to be no performance impact of female representation on corporate boards in South Africa, despite research existing to the contrary – both positive (Bart & McQueen, 2013; Campbell & Vera, 2008; Khudzari &

Muhamad Sori, 2012; Liang, Lourie, & Nekrasov, 2020; Sabatier, 2015) – as well as negative (Boubaker, Dang, & Nguyen, 2014; Mirza, Mahmood, Andleeb, & Ramzan, 2012). Researchers have also concluded that the corporate environment native to the company and board itself may lend itself as a contributing factor to the effectiveness of female additions to corporate boards (Adams & Ferreira, 2009). Furthermore, especially in the South African environment of quota-based employment equity practices, Tokenism presents a potential stumbling block to understanding the true role of gender diversity on corporate boards.

Gender or racial board member selection criteria may be prioritized over other factors resulting in these groups being elected to corporate boards based not on their skill and experience but rather simply to satisfy the legislative hierarchy. Research seems to indicate that this proposition of Tokenism is not far-fetched, but rather represents a material factor to consider when investigating gender equality on corporate boards (Chapple & Humphrey, 2013; Ekadah, Wachudi, & Mboya, 2012; O'Reilly & Main, 2012). The inconclusiveness of the research specific to gender diversity may be hinting at an underlying relationship that does exist yet requires ancillary contributions to reveal its true manifestation.

2.3. Racial diversity

Racial diversity with respect to corporate representation exists within a similar paradigm as that of gender diversity. Tokenism – especially in the South African Broad-Based Black Economic Empowerment (B-BBEE) milieu – once again is a material concern when considering the presence and effect of racial diversity on an objectively selected corporate board (Vairavan & Zhang, 2020). Outside of the sociological motivations for the B-BBEE system, one can ask whether a business case exists for racial diversity in the context of firm performance enhancement. According to Smulowitz, Becerra, and Mayo (2018) a case seems to exist for racial diversity – at all levels incidentally – to be a value-adding principle to implement in the corporate

environment to aid in a firm's financial performance. The study was conducted on law firms in the United States of America. A threshold competency and similar formal education are required in order to participate in this environment may indicate that in environments which naturally are more homogenized with respect to other areas of the proxy approach proposed by this study, racial diversity may realise a higher relative contribution to a combined proxy approach for reducing groupthink when professional qualification and experience are less variable.

2.4. Diversity in professional background

Education and professional experience form a critical part of a person's cognitive reasoning and creative ability. Apart from the idea that individuals in similar professions as well as those who qualify in the same field tend to follow the same thought processes, cognitive biases play a part in maneuvering similarly qualified individuals into grouping together, often beyond a line of objectivity. This team-affiliation is referred to as the in-group bias or in-group favoritism. This sociological phenomenon compounds the similar thought process idea and results in groupthink-type behavior. While it is proposed that individuals qualified in the fields of science, technology, engineering, and mathematics (STEM) tend to improve firm performance, the pinnacle of performance enhancement is achieved when creatively inclined individuals are combined with more rigid physical science-based individuals. Ultimately, rigid mathematical and creative-background type approaches seem to integrate well to enhance the quality of the combined output. Once more, it appears that diversity in approaches – in this case stemming from less professional homogeneity – contributes to improved firm performance (Siepel, Camerani, & Masucci, 2019).

2.5. Term limit of board membership

Tenure appears to present itself as a material potential determinant for groupthink in the corporate environment. Enron Corporation is a clear example of how a toxic company culture can influence and negatively condition the ethics of its employees when exposed daily (Sims & Brinkmann, 2003). The longer an individual is exposed to a company culture, the more likely they are to be influenced by it. Tenure tends also to exhibit autocorrelative properties – in such that directors who have served for a long time on a given board tend to continue serving on that board as shareholders are satisfied with the board composition. This phenomenon is partly due to the fact that extended tenure appears to be associated with abnormal excess returns (Livnat, Smith, Suslava, & Tarlie, 2020). These theories – in addition to the recommendation of Kamalnath (2018) – drives the motivation for the inclusion of tenure as a proxy for groupthink.

2.6. Diversity and firm performance measures

While the proxies of race and gender have been researched at length individually in relation to their effect on firm performance, no research has sought to index groupthink in terms of the four proxies combined, as discussed above, with respect to firm performance. It is postulated that a greater degree of broad-spectrum diversity may succeed where individual proxies' diversity may have failed (Erhardt, Werbel, & Shrader, 2003).

According to Herciu and Șerban (2018), quantifying firm performance is difficult and depends on many factors – often including a degree of subjectivity. Nevertheless, one may analyze firms in terms of relative and absolute performance in an array of categories commonly associated with improved firm value and performance – namely market valuation, liquidity and insolvency risk, as well as profitability and efficiency

measures. Universal favorable standing within these metrics almost always reflects a firm which is profitable, sustainable, and in a promising position in terms of growth potential.

Research by Delen, Kuzey, and Uyar (2013) utilized factor analysis and decision-tree-algorithm-based comparative analysis to reduce the above-mentioned categories and inclusive metrics to confirm that one may use the Du Pont Identity to underpin quantitatively the notion of firm performance. As such, firm performance can be deconstructed into measures of profit margin, asset turnover, and leverage.

Delen et al. (2013) approached firm performance valuation in terms of financial ratios. The authors utilized return on equity (ROE) as well as return on assets (ROA) as dependent variables. They postulate that metrics critical to firm performance prediction in terms of ROE and ROA are comprised of the following:

- Earnings before tax to equity ratio
    - Earning before tax / Owners' equity
- Net profit margin
    - Net income / Sales
- Leverage ratio
    - Total liabilities / Total assets
- Debt ratio
    - Total liabilities / Owners' equity
- Asset turnover ratio
    - Sales / Total assets

These factors essentially provide insight into the firm's profitability relative to its sales revenues, its standing with respect to leverage and debt risk, as well as the ability of the company to use its assets efficiently to generate sales revenues. Furthermore, these metrics indicate a degree of control on behalf of the company to regulate their

costs and expenses, optimize leverage, and principally generate sales revenue (Delen et al., 2013). This view that ROE and ROA – in combination as well as their component parts – may serve as foundational principles concerning a firm's financial performance is corroborated by Sari (2020), citing them as factors that influence critically firm performance. In order to balance contemporary financial valuation with this research, especially in relation to the perspective mentioned above, the following metrics may represent a combination of short-term market valuation as well as accounting ratios intrinsic to the financial performance of a firm. Furthermore, metrics such as capital expenditure (capex), as well as sales growth are included in order to capture groupthink in terms of the presence or absence of creativity, innovation, ambition, effectiveness as well as risk appetite – together with the leverage ratio described above.

3. Methodology

3.1. Research design

Due to the nature of the data assembled and the outcome sought, the study research methodology is formulated around a quantitative approach. A positivist research paradigm with a realist ontology and an empiricist epistemology served as the basis for the research method. The study used empirical, and statistical foundations, to implement deductive logic and reductionist findings on a purposively selected sample of secondary data.

Drawing upon recommendations made by Kamalnath (2018), a combination of demographic proxies in the form of gender, race, academic qualification and professional affiliation, as well as duration of tenure, were utilized in order to ascertain the presence and degree of groupthink underpinned by cognitive biases explained in the introduction. This was complimented by standardized financial analysis metrics

representing short-term market valuation (Market capitalization and P/E ratio), selected recommendations by Delen et al. (2013) representing firm performance in terms of financial ratios (net profit margin, leverage ratio, asset turnover ratio, and return on assets), as well as logically motivated anecdotal representations of creativity, innovation, ambition, and strategic effectiveness (capex as a measure of total assets, sales growth percentage, as well as capex as a measure of sales growth). This approach was postulated to allow the researcher to investigate whether the phenomenon of groupthink – if present – had a materially positive or negative effect on companies' performance, leading to material firm value accrual or destruction. This was conducted with the intention of isolating pathways by which groupthink affects firm performance, as well as to understand the implications of groupthink on firm performance wholistically.

3.2. Data collection and data analysis

Firm employees' information was gleaned directly from companies' integrated reports and electronically available data, while the performance indicators were sourced from financial information website EquityRT – as well as company integrated reports where necessary. The researcher sought to correlate the presence of groupthink through groupthink-underpinning proxies elaborated antecedently, with performance deviations over a period of ten years. These variables are presented in appendix A. In some cases, both demographic and financial information were not available for the full stipulated 10-year duration, and as such the researcher set a limitation of a minimum of 5 years of relevant data availability before companies were disqualified from the study.

This methodology was adopted in an attempt to include as many of the top 100 companies by market capitalization listed on the JSE in 2019 as possible. The study's proposed 10-year duration was prescribed to avoid the macroeconomic shocks which occurred in 2008/2009 and 2019/2020. This approach was motivated by the author's

aim to avoid as much unattributable noise in the quantitative analysis as possible. The study's aim to collect data from 50 of the top 100 companies by market capitalization listed on the JSE in 2019 was based on the knowledge that complete and relatively reliable data would not be available for all companies. As such this anticipated shortfall would need to be identified and mitigated by means of forced exclusion. The shortfall indeed was proved to be correct as the researcher ultimately included 47 companies in the study after exclusions were forced to be made.

In order to measure groupthink, demographic proxies recommended by Kamalnath (2018) needed to be set up in a way that homogeneity was representative of groupthink. Raw data of race, gender, qualification, and tenure of company boards were collated in Microsoft Excel, and an arithmetic mean was computed for all demographic metrics. Thereafter, the researcher calculated the deviation from the mean for each demographic sub-category, and subsequently computed the summative mean deviation variance (MDV). This MDV represented a degree of homogeneity within each demographic sub-category and therefore served as a prevalence measure for each groupthink proxy. The higher the MDV value, the higher the degree of variation between the proxies' sub-groups and therefore a lower homogeneity presence. An MDV of zero depicted a perfectly diversified demographic metric, while higher values were indicative of increasing levels of homogeneity and ergo groupthink. The demographic MDV values then were compared against performance metrics described in section 3.1.

In addition to the afore-mentioned demographic variables, the average number of directors per company board over the study period was entered as a dependent variable. This was an additional investigation to understand the link between board size and groupthink predisposition.

IBM SPSS Statistics Package 26 was utilized for statistical analysis with a small amount of graphical content being generated in EViews 11. The data in Appendix D

were entered as continuous variables with the companies to which they were affiliated entered as nominal variables.

In order to extract meaningful outcomes from the data that were collected, a process had to be followed in which the data would be prepared and thereafter analyzed for which statistical analyses was best-suited. This would be based on the research study's objectives, whilst taking into account other meaningful results which may potentially have been discovered, yet not foreseen or sought explicitly by the researcher. Furthermore, prudent statistical practice was required in order not to present false outcomes as real – by conducting irrelevant or unjustified statistical tests on the data.

The process by which the data were processed drew from the "machine learning process" which is applicable to most data science scenarios. The relevant steps of the process are:

1. Data collection
2. Pre-processing and transformation
3. Analysis
4. Hypothesis testing (if statistically viable)

The collated data were transferred from the collection sheets in Microsoft Excel to IBM SPSS Statistics Package 26. After descriptive statistics were drawn, the data were analyzed for normality. The researcher executed these tests to ascertain whether the data were arranged in a normal distribution, and therefore could be analyzed by means of parametric measures. The raw data collected appeared at first inspection largely not to be normally distributed – as depicted in Figure 1 below and confirmed mathematically in section 4.

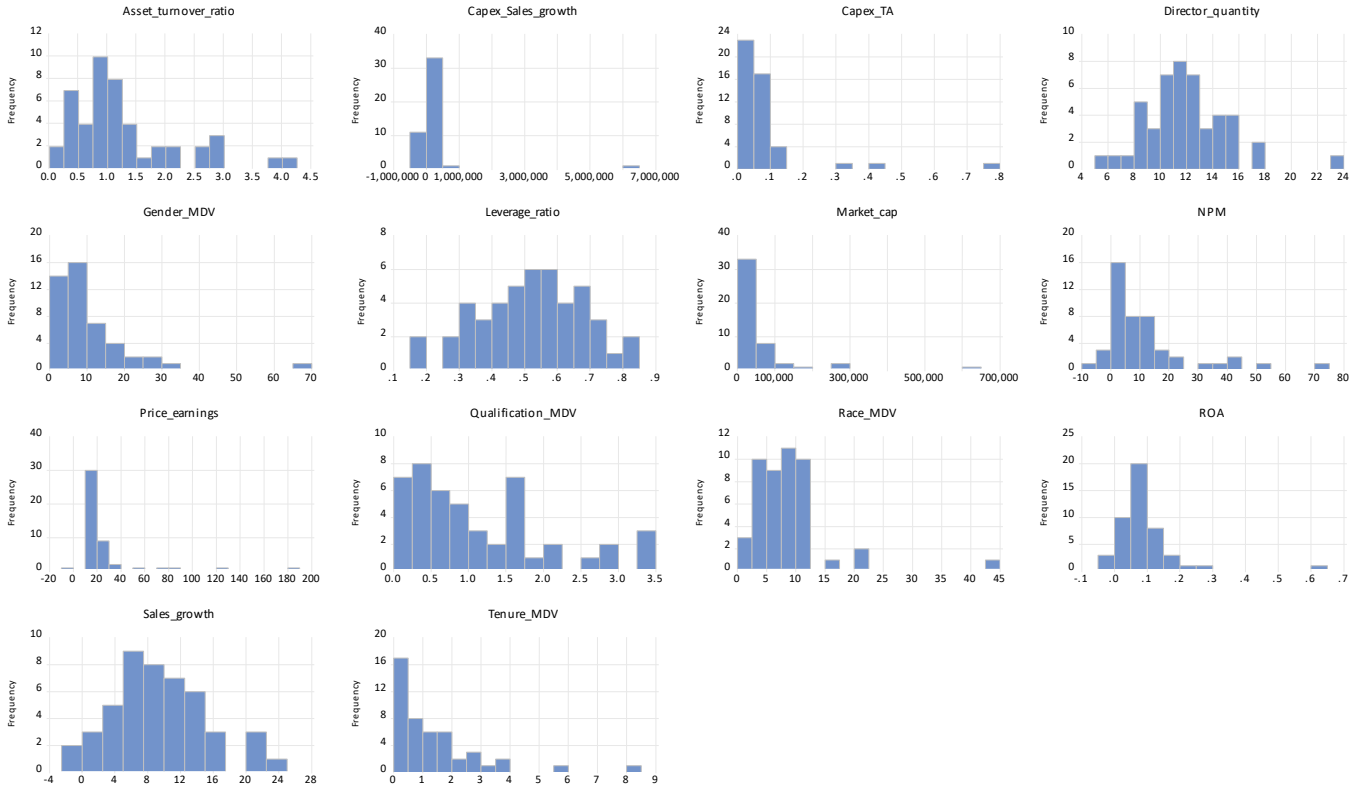


Figure 1: Distribution of raw data

This discovery prompted the need to attempt to normalize the data by utilizing a natural log conversion of all the variables – the outcome of which is presented graphically in Figure 2 and elaborated upon in section 4. However, the result was a dataset that may have been able to conform to the central limit theorem at a very fundamental level, however, still was not conducive to parametric analysis. This decision was taken considering the tests of normality results tabulated in section 4, showing still an insufficient overall composition in terms of standard distribution.

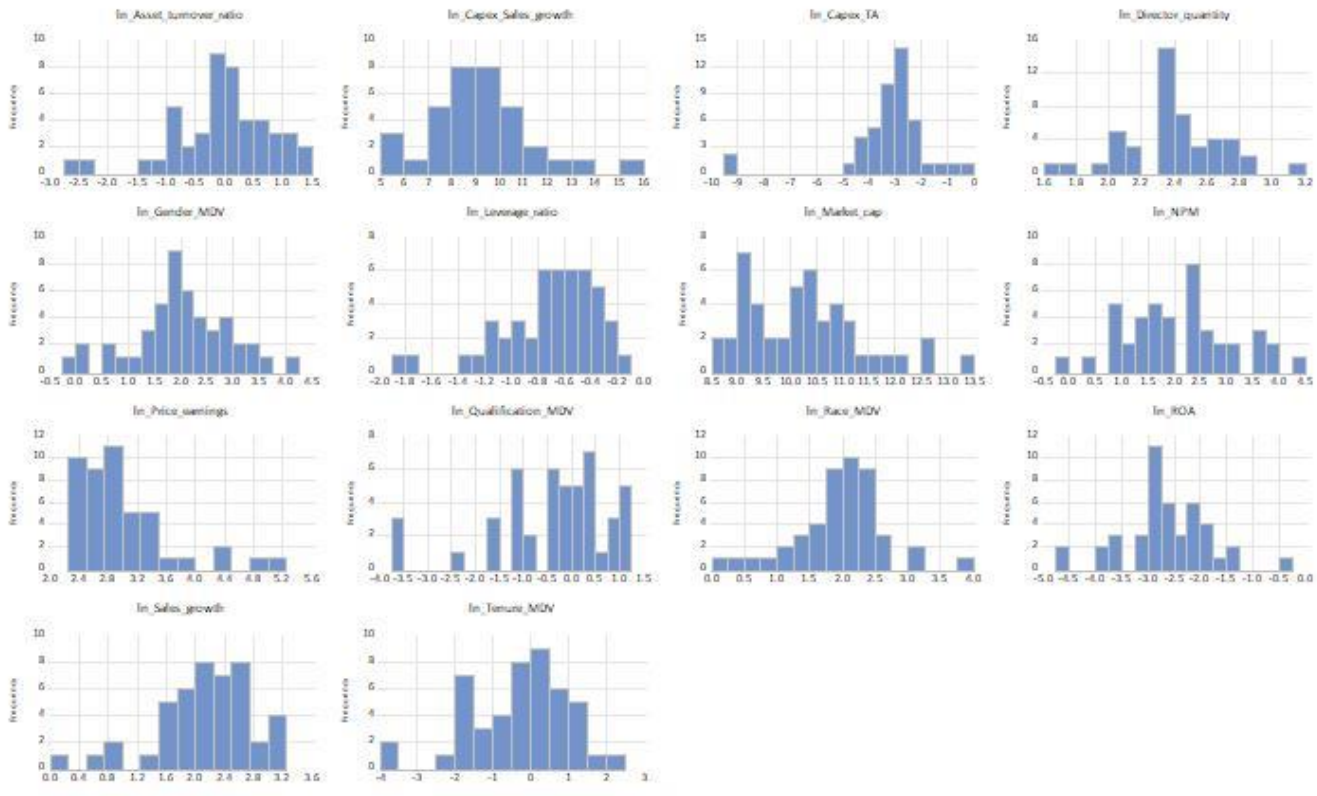


Figure 2: Distribution of ln transformed data

The consequences arising from the aforementioned data analysis resulted in the exclusion of analysis beyond correlation testing in order to present responsible and accurate statistical results, without risking spurious regression outputs and incorrect conclusions. Correlational analysis was done in the context of correlation co-efficients by means of non-parametric correlational analysis. This approach was taken in an effort to attribute statistically significant relationships between groupthink proxies and value accretion or destruction – absolutely or relatively.

3.3. Assumptions, limitations, and delimitations

- For the purposes of this study, macroeconomic fluctuations were ignored, and economic activity was assumed to be stable for the duration of the study. This may present itself for future research by way of advanced mathematical modelling to account for macroeconomic volatility which may have existed.
- All board members were assumed to be acting in good faith in the interests of value creation for their respective firms, excluding conscious conformity bias (compliance variant) as a contributory factor.
- The researcher did not have access to the board members in person at decision-making time, therefore necessitating the use of carefully selected proxies.
- The researcher was restricted to the demographic data disseminated by companies and available electronically, and therefore may have been unable to garner interpersonal relationship dynamics between board members with a high degree of accuracy.
- Firms were selected based on being among the JSE top 100 in 2019 and are required to have been listed on the JSE at least since 2014.

3.4. Ethical considerations

No human contact and/or primary data collection was undertaken as part of the research conducted. All data collected was secured on a modern laptop computer with encrypted storage and password protection. No harm or cost is deemed to have been incurred by any subject of the secondary data collected and anonymity of the data was ensured.

4. Results and discussion

In accordance with the research objectives and hypotheses, the following descriptive statistics describe the fundamental state of groupthink in the sample companies, as measured by the mean deviation variance, utilizing homogeneity as an indicator of groupthink proclivity. As no standardized scale exists, these descriptive statistics serve simply to indicate a degree of groupthink potential.

In the raw data – according to Table 1 – the proxy depicting the highest potential for groupthink according to its mean is gender, followed closely by race, while tenure is seen to hold the lowest potential for groupthink behaviour. In the ln transformed data presented in Table 2, the proxy depicting the highest potential for groupthink according to its mean is gender, followed closely by race, while tenure again is seen to hold the lowest potential for groupthink behaviour. Thereafter, the descriptive statistics for the performance metrics are presented in both raw data and ln transformed data forms (Table 3 and Table 4 respectively).

Table 1: Groupthink proxies' descriptive statistics (raw data)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Director Quantity	47	5	23	11.47	3.182	.934	.347	2.660	.681
Gender MDV	47	.892	65.790	10.99570	11.118241	2.992	.347	12.258	.681
Qualification MDV	47	.025	3.432	1.14115	.945121	.981	.347	.130	.681
Race MDV	47	1.151	43.043	8.79223	6.691258	3.231	.347	14.704	.681
Tenure MDV	47	.025	8.025	1.39911	1.547339	2.322	.347	6.943	.681

Table 2: Groupthink proxies' descriptive statistics (ln transformed data)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ln_Director_quantity	47	1.61	3.14	2.4025	.27823	-.301	.347	1.117	.681
ln_Gender_MDV	47	-.11	4.19	2.0199	.90490	-.256	.347	.308	.681
ln_Qualification_MDV	47	-3.69	1.23	-.3540	1.21809	-1.240	.347	1.631	.681
ln_Race_MDV	47	.14	3.76	1.9668	.66089	-.364	.347	1.501	.681
ln_Tenure_MDV	47	-3.69	2.08	-.2571	1.24425	-.726	.347	.831	.681

Table 3: Performance metrics' descriptive statistics (raw data)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Asset Turnover Ratio	47	.08	4.11	1.2887	.93100	1.294	.347	1.359	.681
Capex / Sales Growth	46	-99947.7662	6387977.226	163145.1620	942841.6179	6.683	.350	45.039	.688
Capex / TA	47	.0000	.7606	.079166	.1253228	4.225	.347	20.196	.681
Leverage Ratio	47	.16	.82	.5183	.16051	-.158	.347	-.467	.681
Market Cap. (million ZAR)	47	5828.95	646448.63	59906.1255	105944.9892	4.225	.347	20.965	.681
Net Profit Margin (%)	47	-6.00	72.06	11.9421	15.14211	2.160	.347	5.195	.681
P/E	47	-7.73	181.47	26.3428	32.13120	3.473	.347	13.286	.681
ROA	47	-.03	.61	.0896	.09847	3.474	.347	16.775	.681
Sales Growth (%)	47	-.73	23.10	9.5957	5.78101	.539	.347	.074	.681

Table 4: Performance metrics' descriptive statistics (ln transformed data)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ln_Asset_turnover_ratio	47	-2.53	1.41	-.0248	.83199	-.910	.347	1.634	.681
ln_Capex_Sales_growth	35	5.25	15.67	9.2296	2.11667	.680	.398	1.522	.778
ln_Capex_TA	46	-9.21	-.27	-3.2177	1.55447	-2.376	.350	8.636	.688
ln_Leverage_ratio	47	-1.83	-.20	-.7137	.36113	-1.108	.347	1.502	.681
ln_Market_cap	47	8.67	13.38	10.2937	1.09480	.683	.347	.237	.681
ln_NPM	43	-.05	4.28	2.0909	1.00544	.187	.361	-.412	.709
ln_Price_earnings	46	2.34	5.20	2.9983	.65255	1.798	.350	3.245	.688
ln_ROA	44	-4.61	-.49	-2.6503	.80318	-.166	.357	1.038	.702
ln_Sales_growth	45	.20	3.14	2.1338	.65043	-.918	.354	1.048	.695

As mentioned in the preceding section, this study seeks not only to measure the proclivity for groupthink behavior, but also to gain an insight into the mechanisms by which groupthink may manifest. Ergo, if groupthink is present, then it would affect an

interim performance mechanism which would reflect in one of the performance metrics measured. The summary of assigned relationships between performance metrics and underlying performance altering mechanisms is presented in Table 5.

Table 5: Performance metrics' underlying mechanisms

Performance metric	**Underlying mechanism**
Market cap. (Millions)	Market valuation, external perception
P/E	
Net profit margin (%)	Mechanisms described above in relation to Delen et al. (2013)
Leverage ratio - debt management	
Asset turnover ratio - efficiency	
ROA (times)	
Capex/total assets	Creativity, innovation, and ambition
Sales growth	Efficiency and strategic effectiveness
Capex/sales growth	

As mentioned in the section 3.2, normality tests were conducted both on the raw data as well as the ln transformed data as presented in Table 6 and Table 7 respectively. The tests used are the Kolmogorov-Smirnov and the Shapiro-Wilk tests of normality. These tests essentially test whether a dataset variable will conform to a normal distribution in a given population. This is done by testing the null hypothesis that the variable is normally distributed in some population. As per common practice, the null hypothesis is rejected if $p \geq 0.05$. Therefore, it can be reduced to say that if the p value is greater than 0.05 then the null hypothesis (that the data are normally distributed) can be rejected, resulting in the conclusion that the data are non-normally distributed. It follows that despite the attempt to normalize the data by natural-log transformation, some metrics remained non-normally distributed even after the natural-log conversion.

This outcome is in contravention of the assumptions required to be fulfilled in order to utilized parametric regression techniques without the risk of a spurious regression outcome. The researcher concluded that parametric analysis was incompatible with the datasets of this study, and hence the statistical tests performed were restricted to non-parametric tests. With this being said, an example of the hypothetical output of a multiple regression analysis are presented in appendices C; utilizing ln_market_cap as the dependent variables regressed against independent variables of the natural log conversions of Diversity Measure, Director Quantity, Tenure MDV, Gender MDV, as well as Race MDV. This process would have been repeated for each performance measure respectively as the dependent variable, against the identical independent variables.

Table 6: Raw data normality test results

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Director Quantity	.136	47	.030	.944	47	.025
Race MDV	.210	47	.000	.708	47	.000
Gender MDV	.242	47	.000	.710	47	.000
Qualification MDV	.148	47	.011	.890	47	.000
Tenure MDV	.189	47	.000	.762	47	.000
Market Cap. (million ZAR)	.318	47	.000	.491	47	.000
P/E	.334	47	.000	.536	47	.000
Net Profit Margin (%)	.235	47	.000	.760	47	.000
Leverage Ratio	.049	47	.200*	.987	47	.868
Asset Turnover Ratio	.189	47	.000	.880	47	.000
ROA	.208	47	.000	.687	47	.000
Capex / TA	.321	47	.000	.490	47	.000
Capex / Sales Growth	.458	46	.000	.176	46	.000
Sales Growth (%)	.086	47	.200*	.966	47	.183

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 7: ln transformed data normality test results

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ln_Director_quantity	.126	47	.060	.973	47	.337
ln_Race_MDV	.118	47	.106	.960	47	.112
ln_Gender_MDV	.088	47	.200*	.981	47	.639
ln_Qualification_MDV	.139	47	.024	.887	47	.000
ln_Tenure_MDV	.119	47	.093	.954	47	.063
ln_Market_cap	.095	47	.200*	.953	47	.055
ln_Price_earnings	.211	46	.000	.807	46	.000
ln_NPM	.080	43	.200*	.983	43	.757
ln_Leverage_ratio	.112	47	.183	.926	47	.005
ln_Asset_turnover_ratio	.119	47	.091	.941	47	.019
ln_ROA	.124	44	.087	.973	44	.389
ln_Capex_TA	.188	46	.000	.744	46	.000
ln_Capex_Sales_growth	.092	35	.200*	.966	35	.334
ln_Sales_growth	.101	45	.200*	.944	45	.029

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Before the data were converted by means of natural log (ln) conversion, non-parametric 2-tail correlation analysis was applied to the original raw data. Spearman's rank correlation co-efficient (Spearman's rho), and Kendall's rank correlation co-efficient (Kendall's tau) were utilized to understand whether correlations existed between the performance metrics and the groupthink proxies. Despite parametric tests intrinsically possessing a higher degree of statistical power, they rely on linearity and homoscedasticity to ensure that this power is valid and reliable. The more data points are added to the scatter plot the more one – even visually – may discern a degree of linearity or lack thereof. In order for the statistical mathematics to predict accurately utilizing this data, a minimum number of cases are required even in the case of perfectly normalized datasets in order not to risk spurious regressions. The afore-

mentioned non-parametric tests measure monotonic relationships between sets of continuous data. Non-parametric tests utilize mean ranks instead of the means utilized by parametric tests, negating data composition requirements.

With respect to which non parametric correlation test is superior, Colwell and Gillett (1982) conclude that there is little to choose between Spearman's rho and Kendall's tau. Furthermore, the tests both embody qualities of high efficiency as well as smooth and bounded influence functions (Croux & Dehon, 2010). As such, both tests were conducted on both the raw data as well as the ln transformed data.

Testing revealed that statistically significant correlations were found to be present in the raw data as well as in the ln transformed data. As mentioned above, despite the attempt to normalize the data by natural log transformation, some metrics retained a non-normal distribution even after the natural log conversion, and as such pre-and-post conversion datasets were only available to be analyzed by means of non-parametric measures. The unabridged outcomes of the non-parametric measures of correlation analysis are presented in Appendices D, E, F, and G for the raw data and ln converted data, respectively.

It is apparent from appendices F, G, H, and I – as well as the summaries thereof in Tables 8, 9, and 10 – that multiple correlations are present – both intergroup correlations (demographic metrics and performance metrics), as well as intragroup correlations. All of the demographic measures were correlated intragroup with at least one other demographic measure. The researcher anticipated the aforementioned positive correlations to be found due to the regulated way in which formal business is required to be conducted in South Africa, where gender and race formally are mandated to be pivotal consideration criteria when compiling a staff compliment. This is executed by means of B-BBEE legislation.

B-BBEE was first introduced in the B-BBEE Act 53 of 2003, amended in the B-BBEE Codes of Good Practice gazetted in 2007, and further amended in the B-BBEE Amendment Act 46 of 2013. According to the dedicated page on the website of the department of economic development, B-BBEE "aims to ensure that the economy is structured and transformed to enable the meaningful participation of the majority of its citizens and to further create capacity within the broader economic landscape at all levels through skills development, employment equity, socio economic development, preferential procurement, enterprise development, especially small and medium enterprises, promoting the entry of black entrepreneurs into the mainstream of economic activity, and the advancement of co-operatives."

B-BBEE – in its current form – is widely criticized as being an ineffective and incomplete system. Forbes and Rust (2019) conducted a qualitative study on the sentiments towards B-BBEE as it stood in 2019, with negative responses coming strongly to the fore. The respondents cited irrelevant underpinning principles, a negative macro-economic effect on the entire economy, as well as a reduced level of compliance to the process. Furthermore, Sibiya and Barnard (2019) acknowledge that while the legislation has benefitted small, medium, and micro enterprises (SMME's), the benefits were limited and more value could be extracted from partnerships.

While detailed analyses of the performance of B-BBEE is being researched, it is beyond the scope of this study to draw any conclusions of the system's efficacy at achieving its goals. However, the claim of Mbandlwa and Anwana (2020) that B-BBEE does not benefit black entrepreneurs or the black population as a whole, but rather it benefits a select group who are selected and expedited into lucrative executive managerial and board positions is relevant. The ln transformed data seem to indicate the widespread adoption of B-BBEE to be binary – as indicated by the positive correlations present between director quantity and race/gender MDVs. This assumption fits well with the disdain shown by many business at the implementation of B-BBEE in its current form (Forbes & Rust, 2019). Ergo, businesses that adopt B-

BBEE practices execute them ad-infinitum, and those who do not adopt them resent them and reject them to a similar degree. Notwithstanding the result of any debate on the efficacy of B-BBEE in its current form, the presence of said system seems to result in an environment of homogeneity and ergo increased propensity for groupthink.

Additional analysis reveals a positive correlation between director quantity and qualification MDV. This implies that the more directors a board recruits, the higher the corresponding qualification MDV, and therefore the more homogeneity, resulting in a higher propensity for groupthink. Unsurprisingly there is a dominance of finance and accounting qualified personnel populating South African listed companies' boards in general. This diversity absence may inhibit the ability of boards to think "outside of the box", as a very narrow collective viewpoint is able to be debated (Erhardt et al., 2003).

The consequent question is whether this homogeneity and consequent groupthink propensity contributes to value accretion or destruction. The data show that all demographic metrics apart from race have positive correlations with performance metrics. Interestingly, this exclusion of race as a contributory criterion to value accretion affirms the assertion made in chapter 2 of this report in which tokenism is postulated to be a material influencer in the relationship between racial integration and consequent firm performance – simply put, racial diversity needs to be based on more than the colour of an individual's skin (Chapple & Humphrey, 2013; Ekadah et al., 2012; O'Reilly & Main, 2012).

Furthermore, director quantity is correlated positively with performance metrics linked to increased market valuation and external perception; creativity, innovation, and ambition; as well as efficiency and strategic effectiveness. According to the data, it can be said that the higher the director count, the higher the market capitalization. While the data depict that a larger board is indicative of a higher market valuation, social identity theory suggests that a higher probability for disagreement exists as more heterogenous agents are introduced. For the purposes of our studies, one arguably

may surmise that an increase in board size reflects attenuations of groupthink in boards. The key to whether this conflict is constructive or destructive may lie in the individuals comprising the boards in question. With the correct governance structures and procedures more directors – through the metric's correlations with gender, race, and qualifications – are predicted to provide higher performance levels by means of a higher degree of innovation (Sharma, 2016). This prediction agrees with the data which identifies positive correlations between director quantity and the capex/total assets performance metric – which serves as a proxy for creativity, innovation, and ambition. However, a logical diminishing returns phenomenon would be expected to be observed as exponential returns increases and thus corresponding exponential director onboarding cannot be expected to depict a corporate environment accurately in practicality.

The demographic proxy least embedded in director quantity – tenure – is correlated positively with sales growth. It appears that efficiency and strategic effectiveness as represented by sales growth are a function of stability in the form of average board tenure. A cohesive group – regardless of whether they have served for a short or long period of time – appear to leverage tenure homogeneity to develop a successful common strategy by means of common ideology and exposure. This environment may foster a mindset similar to that proposed by the affiliative leadership style. Whether everyone is relatively new to the board and all trying to prove that they can achieve success, or whether an experienced board is seeking to establish a legacy of the company they have served for many years – a cohesive team pulling in the same direction can result in positive results stemming from a degree of ideological and sociological consistency.

This is an example of the other side – the positive side – of groupthink, one that is postulated to exist under the correct circumstances. Coulson-Thomas (2005) proposes that ultimately the effect of groupthink on a corporate board is determined by the attitudes, conduct, and approaches of the board's members which will lead the

company either in a positive or negative direction stemming from an unambiguous concept – groupthink.

Tables 8, 9, and 10 display the correlations found by means of non-parametric correlational analysis between demographic/performance metric pairs – before and after natural log transformation of the data. In these tables “Kt” is used to indicate the presence of a statistically significant correlation in the Kendall’s tau test, whereas “Sr” is used to indicate the presence of a statistically significant correlation in the Spearman’s rho test.

Table 8: Correlations summary for raw data

	Director Quantity	*Race MDV*	*Gender MDV*	*Qualification MDV*	*Tenure MDV*
Market cap.	**Kt; Sr**		**Kt; Sr**	**Kt; Sr**	
Sales growth					**Kt; Sr**
Director quantity MDV		**Sr**	**Sr**	**Sr**	
Race MDV	**Sr**		**Sr**	**Sr**	
Gender MDV	**Sr**	**Sr**			
Qualification MDV	**Sr**	**Sr**			**Sr**
Tenure MDV				**Sr**	

Table 9: Correlations summary for ln transformed data

	ln Director Quantity	*ln Race MDV*	*ln Gender MDV*	*ln Qualification MDV*	*ln Tenure MDV*
ln Market cap.	**Kt; Sr**		**Kt; Sr**	**Kt; Sr**	
ln Capex / sales growth	**Kt; Sr**		**Kt; Sr**		
ln Sales growth					**Kt; Sr**
ln Capex / total assets	**Sr**				
ln Director quantity MDV		**Kt; Sr**	**Kt; Sr**	**Kt; Sr**	
ln Race MDV	**Kt**		**Kt; Sr**	**Kt; Sr**	
ln Gender MDV	**Kt**	**Kt; Sr**			
ln Qualification MDV	**Kt**	**Kt; Sr**			**Kt; Sr**
ln Tenure MDV				**Kt; Sr**	

Table 10: Summary of correlational agreement between raw data and ln data correlations in Table 8 and Table 9

	ln Director Quantity	*ln Race MDV*	*ln Gender MDV*	*ln Qualification MDV*	*ln Tenure MDV*
ln Market cap.	**Kt; Sr**		**Kt; Sr**	**Kt; Sr**	
ln Capex / sales growth	**Kt; Sr**		**Kt; Sr**		
ln Sales growth					**Kt; Sr**
ln Capex / total assets	**Sr**				
ln Director quantity MDV		**Kt; Sr**	**Kt; Sr**	**Kt; Sr**	
ln Race MDV	**Kt**		**Kt; Sr**	**Kt; Sr**	
ln Gender MDV	**Kt**	**Kt; Sr**			
ln Qualification MDV	**Kt**	**Kt; Sr**			**Kt; Sr**
ln Tenure MDV				**Kt; Sr**	

Black indicates only ln data correlation

Red indicates raw data and ln data correlations

Due to the fact that positive correlations were found for many demographic/performance metric pairs – before and after natural log transformation of the data – the researcher was prompted to compute a new dependent variable derived from the MDV's of the constituent demographic metrics in anticipation that a combination of the demographic metrics may yield statistically significant relationships with performance metrics, thereby guiding the implementation of the outcomes of this study. This new variable was computed as the arithmetic mean of the MDV values of race, gender, qualification, and tenure – termed the arithmetic average of demographic mean deviation variances (AADMDV). While it is worth noting that the raw data version of the AADMDV did yield a positive correlation with market capitalization indicating that generalized homogeneity may hold some intrinsic market value in agreement with the antecedent paragraph's theme, one should be mindful of the relatively low power of the analysis due to data distribution limitations. This disclaimer is justified somewhat by the absence of such correlation in the ln transformed data. All-the-while it is critical to be mindful of the fact that statistically significant correlation is indicative of an underlying relationship, not automatically one of causation, and further analysis is required to ascertain cause and effect. This may be executed with a larger dataset subject to parametric analysis by means of a multiple regression analysis – an avenue unavailable to the researcher in this study.

Ely and Thomas (2020) as well as Adams and Ferreira (2009) echo the sentiment proposed by this study, that while diversity is most certainly correlated with improved performance, no causal link has yet been proven to the exclusion of additional external influencers. They continue to assert the belief that a comprehensive and inclusive approach to diversity is required in order to boost firm performance. They propose that critical factors such as company culture, power structure, and a learning orientation must be calibrated in order to reap the benefits of diversity. The authors postulate that the building blocks upon which to base a diversified staff need to be considered around four pillars:

1. Creating an open and honest trust-based environment in which people feel free to express themselves and their ideas.
2. Actively generating an environment in which bias and discrimination are unacceptable under any and all circumstances.
3. Creating an environment not only where diversity is not discriminated against, but rather is embraced – one where diversity in demographic profile, ideology, style, and approach are encouraged.
4. Utilizing the diverse skill and experience profiles of the staff to contribute complimentary elements to projects in order to achieve a culminative outcome superior to the outcome had this approach have not been taken.

5. Conclusion

The data seem to indicate that groupthink indeed exists in the boards of companies listed on the JSE as determined by groupthink-proxy measurements by means of MDV measurement and elevated output feedback. However, considering the findings that higher MDV's are associated with higher performance metrics, it appears that groupthink's consequential influence – in specific environments as those studied in this paper – is not intrinsically bad, but rather is dependent on other individual traits and group-dynamics when manifesting either as positive or negative company performance outcomes (Adams & Ferreira, 2009; Coulson-Thomas, 2005; Ely & Thomas, 2020; Sharma, 2016). Coles, Daniel, and Naveen (2020) entrench this position of duality by hypothesizing that while groupthink may lead to an environment in which desire for consensus overrides critical thinking, the possibility also exists for groupthink to enable better teamwork through lower coordination and communication costs resulting in positive performance effects on the firm concerned. Future research may seek to isolate the correct composition of factors which result in the performance effects of groupthink either to reflect value accretion or value destruction in publicly listed firms on the JSE.

It is worth reiterating the fact that this study was restricted in terms of the statistical analysis to non-parametric analysis due to the non-normality of data. The set of non-parametric analysis in turn, did not permit deeper econometric relationships to be investigated. This includes ascertaining the association between groupthink tendency and firm performance whilst controlling for other performance-relevant variables.

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6. Appendices

Appendix A

Table 11: Race demographic metric MS Excel sheet example

Directors													
	Race for year ending:										Mean	Mean Deviation	Mean Deviation Variance
Category	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019			
Caucasion		4	6	7	7	6	5	6	6	7	6,0	7,33	
African		5	6	6	7	7	8	8	8	9	7,1	6,22	
Coloured		1	1	0	0	0	0	0	0		0,3	13,08	
Asian		0	0	0	0	0	0	0	0	0	0,0	13,33	
Total / Average		10	13	13	14	13	13	14	14	16	13,3	9,99	10,500

Table 12: Gender demographic metric MS Excel sheet example

Directors													
	Gender for year ending:										Mean	Mean Deviation	Mean Deviation Variance
Category	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019			
Male		6	9	10	11	10	10	10	10	11	9,7	3,67	
Female		4	4	3	3	3	3	4	4	5	3,7	9,67	
Total / Average		10	13	13	14	13	13	14	14	16	13,3	6,67	9,000

Appendix B

Table 13: Tenure demographic metric MS Excel sheet example

	Directors					
	Tenure as of 2019					
	<2 Years	2-5 Years	>5 Years	Total Staff	Std. deviation	Variance
Number of Staff	4	4	8	16	2	5,333333333
Mean	5,3					
Mean Deviation	1,33	1,33	2,67			
Mean Deviation Variance	**0,395**					

Table 14: Professional qualification demographic metric MS Excel sheet example

	Directors				
	Professional Qualification / Experience as of 2019				
	Accounting / Finance / Economics	STEM	General MBA / Marketing / Business Development / Social Sciences	Other	Total
Number of Staff	9	5	2	0	16
Mean	5,3				
Mean Deviation	3,67	0,33	3,33		
Mean Deviation Variance	**2,247**				

Appendix C

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	5.584	1.506		3.708	.001	2.542	8.625
	ln_Director_quantity	2.144	.807	.545	2.659	.011	.516	3.773
	ln_Race_MDV	-.557	.380	-.336	-1.467	.150	-1.324	.210
	ln_Gender_MDV	-.084	.244	-.069	-.342	.734	-.577	.410
	ln_Tenure_MDV	-.341	.188	-.388	-1.817	.077	-.720	.038
	ln_Diversity_measure	.871	.495	.516	1.760	.086	-.129	1.871

a. Dependent Variable: ln_Market_cap

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	8.5332	11.5663	10.2937	.61572	47
Residual	-1.64041	2.59825	.00000	.90525	47
Std. Predicted Value	-2.859	2.067	.000	1.000	47
Std. Residual	-1.711	2.710	.000	.944	47

a. Dependent Variable: ln_Market_cap

Appendix D

Table 15: Summary of MS Excel collated (pre-SPSS) data preparation input variables

Demographic Variables	Market-related Variables	Financial-statement Variables
Yearly number of directors	Yearly market capitalization	Yearly net income
Yearly race breakdown of directors	Yearly price/earnings ratio	Yearly total sales
Yearly gender breakdown of directors		Yearly total assets
Tenure breakdown of directors		Yearly total liabilities
Academic and professional breakdown of directors		Yearly capital expenditure (CapEx)

Appendix E

Table 16: Summary of pre-calculation SPSS input variables

Demographic Variables	Market-related Variables	Financial-statement Variables
Average yearly number of directors	Average market capitalization	Average net profit margin
Race mean deviation variance	Average price/earnings ratio	Average leverage ratio
Gender mean deviation variance		Average asset turnover ratio
Tenure mean deviation variance		Average return on assets
Academic qualification/experience mean deviation variance		Average capex / average total assets
		Average sales growth percentage

Appendix F

Correlations

			Director Quantity	Race MDV	Gender MDV	Qualification MDV	Tenure MDV
Kendall's tau_b	Director Quantity	Correlation Coefficient	1.000	.540	.445	.219	.095
		Sig. (2-tailed)	.	.000	.000	.040	.373
		N	47	47	47	47	47
	Race MDV	Correlation Coefficient	.540	1.000	.443	.321	.122
		Sig. (2-tailed)	.000	.	.000	.002	.232
		N	47	47	47	47	47
	Gender MDV	Correlation Coefficient	.445	.443	1.000	.167	.040
		Sig. (2-tailed)	.000	.000	.	.107	.699
		N	47	47	47	47	47
	Qualification MDV	Correlation Coefficient	.219	.321	.167	1.000	.291
		Sig. (2-tailed)	.040	.002	.107	.	.005
		N	47	47	47	47	47
	Tenure MDV	Correlation Coefficient	.095	.122	.040	.291	1.000
		Sig. (2-tailed)	.373	.232	.699	.005	.
		N	47	47	47	47	47
	Market Cap. (million ZAR)	Correlation Coefficient	.396**	.166	.200*	.207*	.019
		Sig. (2-tailed)	.000	.101	.048	.044	.854
		N	47	47	47	47	47
	P/E	Correlation Coefficient	.006	-.049	-.033	.145	.058
		Sig. (2-tailed)	.956	.627	.748	.159	.569
		N	47	47	47	47	47
	Net Profit Margin (%)	Correlation Coefficient	-.025	-.021	.070	.141	.013
		Sig. (2-tailed)	.810	.833	.491	.171	.898
		N	47	47	47	47	47
	Leverage Ratio	Correlation Coefficient	-.146	-.185	-.127	-.092	-.077
		Sig. (2-tailed)	.165	.068	.215	.372	.456
		N	47	47	47	47	47
	Asset Turnover Ratio	Correlation Coefficient	-.137	.003	.001	.033	.038
		Sig. (2-tailed)	.192	.978	.993	.747	.713
		N	47	47	47	47	47
	ROA	Correlation Coefficient	.007	.071	.078	.176	.061
		Sig. (2-tailed)	.948	.490	.450	.095	.561
		N	47	47	47	47	47
	Capex / TA	Correlation Coefficient	.149	.017	.050	.004	-.082
		Sig. (2-tailed)	.157	.869	.620	.971	.424
		N	47	47	47	47	47
	Capex / Sales Growth	Correlation Coefficient	.112	-.028	.151	-.095	-.093
		Sig. (2-tailed)	.293	.784	.142	.362	.372
		N	46	46	46	46	46
	Sales Growth (%)	Correlation Coefficient	-.099	-.029	-.023	.179	.292**
		Sig. (2-tailed)	.346	.776	.819	.082	.004
		N	47	47	47	47	47

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix G

Correlations

			Director Quantity	Race MDV	Gender MDV	Qualification MDV	Tenure MDV
Spearman's rho	Director Quantity	Correlation Coefficient	1.000	.693**	.587**	.291*	.138
		Sig. (2-tailed)	.	.000	.000	.047	.356
		N	47	47	47	47	47
	Race MDV	Correlation Coefficient	.693**	1.000	.612**	.445**	.186
		Sig. (2-tailed)	.000	.	.000	.002	.210
		N	47	47	47	47	47
	Gender MDV	Correlation Coefficient	.587**	.612**	1.000	.232	.066
		Sig. (2-tailed)	.000	.000	.	.116	.658
		N	47	47	47	47	47
	Qualification MDV	Correlation Coefficient	.291*	.445**	.232	1.000	.388**
		Sig. (2-tailed)	.047	.002	.116	.	.007
		N	47	47	47	47	47
	Tenure MDV	Correlation Coefficient	.138	.186	.066	.388**	1.000
		Sig. (2-tailed)	.356	.210	.658	.007	.
		N	47	47	47	47	47
	Market Cap. (million ZAR)	Correlation Coefficient	.551**	.247	.311*	.320*	.056
		Sig. (2-tailed)	.000	.094	.033	.028	.707
		N	47	47	47	47	47
	P/E	Correlation Coefficient	.014	-.047	-.045	.213	.088
		Sig. (2-tailed)	.927	.752	.762	.150	.555
		N	47	47	47	47	47
	Net Profit Margin (%)	Correlation Coefficient	-.026	-.024	.104	.203	.013
		Sig. (2-tailed)	.863	.873	.487	.170	.929
		N	47	47	47	47	47
	Leverage Ratio	Correlation Coefficient	-.188	-.259	-.157	-.123	-.114
		Sig. (2-tailed)	.205	.078	.293	.411	.444
		N	47	47	47	47	47
	Asset Turnover Ratio	Correlation Coefficient	-.193	.015	-.013	.038	.065
		Sig. (2-tailed)	.194	.919	.933	.799	.664
		N	47	47	47	47	47
	ROA	Correlation Coefficient	.025	.119	.107	.242	.088
		Sig. (2-tailed)	.867	.428	.473	.101	.557
		N	47	47	47	47	47
	Capex / TA	Correlation Coefficient	.221	.007	.071	.003	-.110
		Sig. (2-tailed)	.135	.961	.635	.983	.462
		N	47	47	47	47	47
	Capex / Sales Growth	Correlation Coefficient	.153	-.039	.216	-.120	-.134
		Sig. (2-tailed)	.309	.795	.149	.428	.375
		N	46	46	46	46	46
	Sales Growth (%)	Correlation Coefficient	-.127	-.027	-.037	.259	.422**
		Sig. (2-tailed)	.395	.857	.808	.079	.003
		N	47	47	47	47	47

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix H

Correlations

			ln_Director_quantity	ln_Race_MDV	ln_Gender_MDV	ln_Qualification_MDV	ln_Tenure_MDV
Kendall's tau_b	ln_Director_quantity	Correlation Coefficient	1.000	.540**	.445**	.219*	.095
		Sig. (2-tailed)	.	.000	.000	.040	.373
		N	47	47	47	47	47
	ln_Race_MDV	Correlation Coefficient	.540**	1.000	.443**	.321**	.122
		Sig. (2-tailed)	.000	.	.000	.002	.232
		N	47	47	47	47	47
	ln_Gender_MDV	Correlation Coefficient	.445**	.443**	1.000	.167	.040
		Sig. (2-tailed)	.000	.000	.	.107	.699
		N	47	47	47	47	47
	ln_Qualification_MDV	Correlation Coefficient	.219*	.321**	.167	1.000	.291**
		Sig. (2-tailed)	.040	.002	.107	.	.005
		N	47	47	47	47	47
	ln_Tenure_MDV	Correlation Coefficient	.095	.122	.040	.291**	1.000
		Sig. (2-tailed)	.373	.232	.699	.005	.
		N	47	47	47	47	47
	ln_Market_cap	Correlation Coefficient	.396**	.166	.200*	.207*	.019
		Sig. (2-tailed)	.000	.101	.048	.044	.854
		N	47	47	47	47	47
	ln_Price_earnings	Correlation Coefficient	.018	-.014	-.026	.170	.027
		Sig. (2-tailed)	.864	.887	.798	.102	.790
		N	46	46	46	46	46
	ln_NPM	Correlation Coefficient	.038	-.006	.097	.093	.080
		Sig. (2-tailed)	.728	.958	.362	.389	.456
		N	43	43	43	43	43
	ln_Leverage_ratio	Correlation Coefficient	-.146	-.185	-.127	-.092	-.077
		Sig. (2-tailed)	.165	.068	.215	.372	.456
		N	47	47	47	47	47
	ln_Asset_turnover_ratio	Correlation Coefficient	-.137	.003	.001	.033	.038
		Sig. (2-tailed)	.192	.978	.993	.747	.713
		N	47	47	47	47	47
	ln_ROA	Correlation Coefficient	.091	.097	.066	.128	.111
		Sig. (2-tailed)	.412	.366	.542	.241	.308
		N	44	44	44	44	44
	ln_Capex_TA	Correlation Coefficient	.202	.062	.098	.043	-.040
		Sig. (2-tailed)	.057	.544	.343	.683	.697
		N	46	46	46	46	46
	ln_Capex_Sales_growth	Correlation Coefficient	.357**	-.018	.246*	-.055	-.130
		Sig. (2-tailed)	.004	.876	.039	.648	.279
		N	35	35	35	35	35
	ln_Sales_growth	Correlation Coefficient	-.055	.008	.003	.179	.248*
		Sig. (2-tailed)	.608	.938	.977	.090	.018
		N	45	45	45	45	45

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix I

Correlations

			ln_Director_quantity	ln_Race_MDV	ln_Gender_MDV	ln_Qualification_MDV	ln_Tenure_MDV
Spearman's rho	ln_Director_quantity	Correlation Coefficient	1.000	.693**	.587**	.291*	.138
		Sig. (2-tailed)	.	.000	.000	.047	.356
		N	47	47	47	47	47
	ln_Race_MDV	Correlation Coefficient	.693**	1.000	.612**	.445**	.186
		Sig. (2-tailed)	.000	.	.000	.002	.210
		N	47	47	47	47	47
	ln_Gender_MDV	Correlation Coefficient	.587**	.612**	1.000	.232	.066
		Sig. (2-tailed)	.000	.000	.	.116	.658
		N	47	47	47	47	47
	ln_Qualification_MDV	Correlation Coefficient	.291*	.445**	.232	1.000	.388**
		Sig. (2-tailed)	.047	.002	.116	.	.007
		N	47	47	47	47	47
	ln_Tenure_MDV	Correlation Coefficient	.138	.186	.066	.388**	1.000
		Sig. (2-tailed)	.356	.210	.658	.007	.
		N	47	47	47	47	47
	ln_Market_cap	Correlation Coefficient	.551**	.247	.311*	.320*	.056
		Sig. (2-tailed)	.000	.094	.033	.028	.707
		N	47	47	47	47	47
	ln_Price_earnings	Correlation Coefficient	.032	.000	-.036	.248	.044
		Sig. (2-tailed)	.831	.998	.810	.096	.769
		N	46	46	46	46	46
	ln_NPM	Correlation Coefficient	.058	-.002	.152	.130	.100
		Sig. (2-tailed)	.712	.992	.329	.404	.524
		N	43	43	43	43	43
	ln_Leverage_ratio	Correlation Coefficient	-.188	-.259	-.157	-.123	-.114
		Sig. (2-tailed)	.205	.078	.293	.411	.444
		N	47	47	47	47	47
	ln_Asset_turnover_ratio	Correlation Coefficient	-.193	.015	-.013	.038	.065
		Sig. (2-tailed)	.194	.919	.933	.799	.664
		N	47	47	47	47	47
	ln_ROA	Correlation Coefficient	.142	.160	.098	.177	.163
		Sig. (2-tailed)	.359	.300	.527	.249	.289
		N	44	44	44	44	44
	ln_Capex_TA	Correlation Coefficient	.304*	.075	.143	.060	-.050
		Sig. (2-tailed)	.040	.623	.345	.692	.739
		N	46	46	46	46	46
	ln_Capex_Sales_growth	Correlation Coefficient	.494**	-.019	.341*	-.071	-.193
		Sig. (2-tailed)	.003	.915	.045	.686	.266
		N	35	35	35	35	35
	ln_Sales_growth	Correlation Coefficient	-.067	.025	-.002	.260	.364*
		Sig. (2-tailed)	.660	.873	.989	.085	.014
		N	45	45	45	45	45

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).