

Personality Traits: The link between women on upper echelon and financial performance: Automatic recognition of personality traits

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Abstract:

This paper explores how the personality traits of women in upper echelon impact the financial performance of FTSE 350 companies in the UK. The work is leveraging new insight from computational social scientist who adopted machine learning to extract personality traits scores from transcript of earnings call of women CEOs and CFOs with the analysts. The impact of these top executives on company's financial performance will be established using ordinary least square regression analysis to examine the relationship between the personality scores and financial performance using SPSS. The findings have core practical implications.

Introduction

Streams of evolved research exist on issues surrounding having women on corporate boards and in senior leadership positions, taking different approaches in investigating how diversity at the upper level of the organisation could impact financial performance. One of the limitations of these studies is that gender is treated as a single construct, failing to realise that there is diversity in gender itself. Some studies (e.g. Tonoyan and Olson-Buchanan, 2023) identified gender as surface diversity encompassing deep-level diversities, including skills, networks, personality, and cognitive attributes. Various theories (e.g. agency, human capital, social identity, critical mass, upper echelon theories) have also been explored to investigate the relationship between board gender diversity and financial performance. While all these theories add a unique perspective to the extant literature on board gender diversity, they are unsuitable for understanding the psychological attributes of directors, which play a significant role in the decision-making process and have a consequential effect on financial performance.

Extant literature (e.g. Neely et al., 2020) highlighted the need for more studies to address this shortcoming.

Responding to the need to understand the psychological attributes of directors, some literature in corporate governance has examined the relationship between an organisation's outcomes and the specific personality traits of Chief Executive Officers Chief, including narcissism (Chatterjee & Hambrick, 2007), hubris (Li & Tang, 2010), overconfidence (Chen et al., 2014), core self-evaluation (Simsek et al., 2010) and conservatism (Palvia et al., 2014). Since most of the CEOs are men, these studies reflect the personality traits of men. These studies are limited in scope, relying too heavily on data about male CEOs or focusing on one aspect of personality. Therefore, it is evident that there is a gap in the literature in the area of the personality traits of women at the upper echelon. Consequently, this study takes a more diversified approach employing all five dimensions (Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism) of the FFM model to investigate how women's personality traits at the upper echelon impact financial performance.

The most common methods of assessing personality traits are self-assessment and observer assessment questionnaires (Weisberg et al., 2011). This study will detect women's personality traits from the transcript of earnings calls with analysts. Previous studies (Brunzel, 2022; Harrison et al., 2020) that have adopted this approach focused on publicly listed companies in the United States (US). For this reason, this study makes inferences about personality traits from the transcript of women CEOs' and CFOs' earnings calls with the analyst to establish how their personality traits impact the financial performance of FTSE 350 companies in the United Kingdom (UK).

The aim of this research will be achieved using a quantitative research method. A period of 12 years (2011-2022) will be examined using secondary data from three sources, including Bloomberg Terminal, BoardEx and Annual Reports and Accounts. Open language Chief Executive Tool (OLCPT) developed by Harrison et al. (2019) will detect women's personalities from earnings call transcripts, and the ordinary least square (OLS) regression technique will be used to establish the relationship between women's personality traits and the company's financial performance.

This research will contribute to knowledge in the following ways: First, a congruous theoretical framework lacking in upper-echelon diversity studies is developed and proposed. Second, it will address the gap in the literature on the use of transcript calls as an unobstructed measure for detecting personality traits, which have not been explored in the context of the United Kingdom, especially for studies on women on corporate boards or in senior leadership positions. Third, a more diversified approach is taken by employing all five dimensions of the FFM model to investigate how women's personality traits at the upper echelon impact financial performance.

Theoretical Background

The study of top management characteristics is significantly crucial to the success of a company. They are powerful people that influence strategic decisions which is fundamental to the company's performance (Hambrick & Mason, 1984). So, knowing who they are is important for a company that wants to succeed. Since the emergence of upper echelon theory (UET) posited by Hambrick and Mason (1984), there have been proliferation of studies on the impact of leadership on company's performance. This paper adds to the body of

knowledge to examine how the personality traits of women in upper echelon impact the financial performance of FTSE 350 companies in the United Kingdom.

The core of UET is to examine how executives' cognition impacts strategic decisions and consequently company's outcomes. The authors view execution of strategic functions as a mental process which requires activation of cognitive base for interpretation of stimuli from the business's internal and external environment. However, owing to the difficulty of measuring the abstract concept, the authors resorted to the use of executive's demographics as the nearest proxy for the target variable. Beyond the measurement problem, unwillingness of top executives to present themselves for personality profiling is likely to dissuade researchers to explore the assessment of unobservable traits. Following the footprint of Hambrick and Mason, extant literature adopts executives' observable characteristics as a proxy for unobservable characteristics. Demographic information give insight about the profile of an organisation's top executives and can also be useful to understand the market a company serves but Hambrick's (2007) update on UET suggest that these proxies are imperfect and insufficient measure of psychological characteristics. Although the essence of UET lies in its application as a theoretical framework to understand how the characteristics of managers on the upper echelon dictates the company's performance, the pivotal need for valid constructs in research makes the use of the proxies a deficient measure and does not provide a justified basis for the methodical assessment of UET.

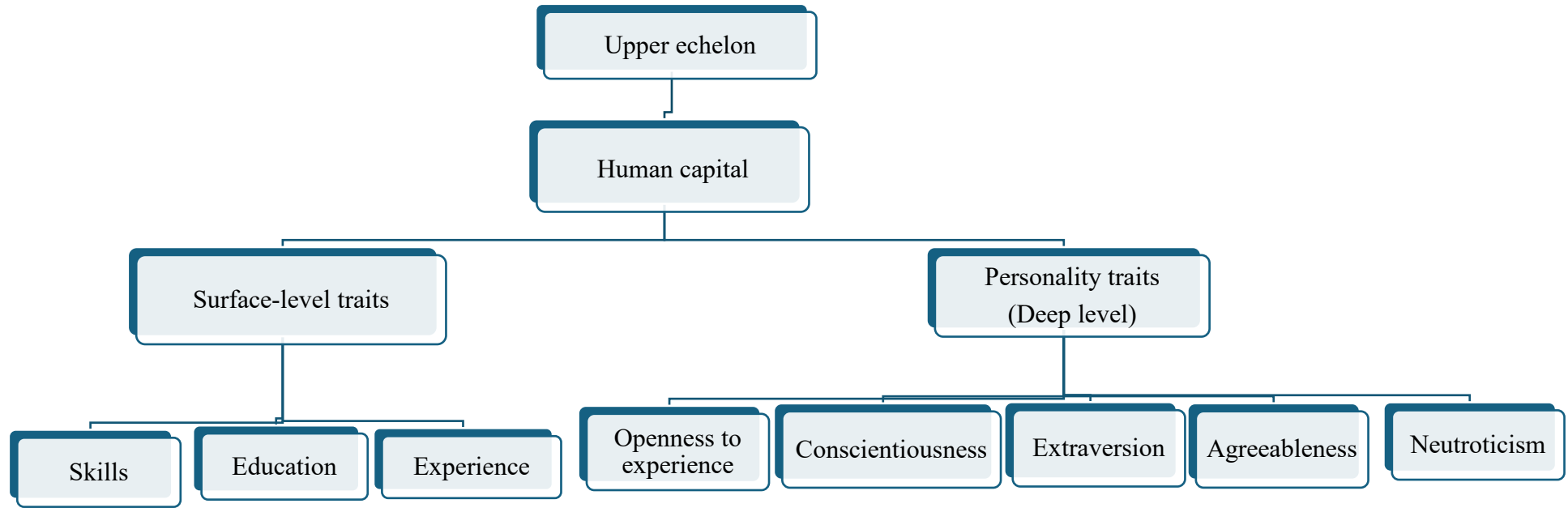
A major limitation of the UET is the methodological lapse of measuring managerial cognition. Hambrick and Mason, (1984) hoped that future research will leverage the expertise of psychology researcher to resolve this issue to improve the methodological strength of the theory. A few scholars (Carpenter et al., 2004; Jackson, 1992; Neely et al., 2020) have reviewed studies that built on UET. A point of convergence of this literature is the need for a better theoretical understanding of the process through which senior executives influence company's outcomes. Until psychological constructs that impacts the managerial cognitive base is understood, there may be endless debate that does not advance knowledge in upper echelon studies both theoretically and methodologically. This paper aims to contribute to this area by proposing a theoretical framework that gives a wholistic view of the process through which the cognitive base of executives' impact company's outcomes. Therefore, this study adopts the Big Five Personality Traits model from the psychology discipline and Human Capital Theory (HCT) which is primarily applicable in the economics discipline but has been extensively applied in the management and organisational behaviour. These theories including UET has been used to propose a rigorous theoretical framework (see Figure 1) to examine how unobservable characteristics of executives on the upper echelon enacts their cognitive base with a resultant effect on company's outcome.

UET is applied in this study to justify Hambrick and Mason's believe that the top executive's idiosyncrasies reflect in organisation's outcome. Although one of the limitations of the theory is the inability to explain the process through which organisations reflect the givens of people on the upper echelon. This limitation is due to the omission of unobservable psychological constructs. FFM is adopted in this theoretical framework to integrate unobservable psychological characteristics (deep level characteristics) omitted in UET resolving the use of inappropriate and insufficient proxies. The observable characteristics adopted as proxies in UET are not disregarded in this study, rather they are perceived as the human capital of upper echelon top executives. Hence, the adoption of HCT as one of the underpinning theories for this study. Human capital theory (HCT) posits that when individuals invest in education, learning and training, they acquire knowledge and possess valuable skills which enhance

their productivity with a resultant increase in income (Becker, 1964, as cited by Kell et al., 2018). Following this theory, human capital is defined as the stock of resources, including knowledge, skills, and experience, that an individual possesses because of investment in education, which has implications for life and organisational outcomes. However, one of the critics of HCT is the neglect of the role of non-cognitive abilities, including personality traits, mindsets, attitudes, behaviour, and socio-economic skills (McCracken et al., 2017). Adoption of FFM in this study resolves the neglect of non-cognitive attributes by HCT. Kell et al. (2018) described personality traits as intangible human capital, and they have implications for education (Ashton, 2022) and business outcomes (Liu et al., 2018). Hence, the congruous theoretical framework proposed in this study posit that top executives at the upper echelon have human capital (observable and unobservable psychological characteristics) and the unobservable psychological characteristics are means through which the observable characteristics of upper echelon executives enhance organisation's performance. Invariably, the organisation's outcomes reflect all these characteristics.

The unobservable characteristics in this study are personality traits including openness, conscientiousness, extraversion, agreeableness, and neuroticism. Traditionally, these traits are measured using questionnaires. However, researchers find it difficult to access senior executives due their unwillingness to be assessed for research purpose, following recent headway in research (Akstinaite et al., 2022 ; Al-Samarraie et al., 2017; Brunzel, 2022; Harrison et al., 2019; Harrison & Malhotra, 2024; Mairesse et al., 2007; Wang & Chen, 2019) this paper adopts unobtrusive measure to make a distant assessment of the personality traits of women on the upper echelon in the FTSE 350 companies in the UK.

Figure 1: Author's Proposed Theoretical Framework



Personality-Performance Relationship

Personality traits "are relatively enduring characteristics that influence our behaviour across many situations" (Stangor & Walinga, 2014, p. 540) and can be used to distinguish individuals. Traditionally, personality traits are assessed by researchers using 60-item NEO Five-Factor Inventory (NEO-FFI) developed by Costa and McCrae, 16 Personality Factor Questionnaire (16PF) developed by Cattell. These questionnaires have been widely used in research including religion (Musson, 1998), education, psychology and strategic management (e.g, Nadkarni & Herrmann, 2010). They are known for their predictive validity yet their construct validity remain questionable (Matthews et al., 2003). However, the Big Five Factor Personality Traits also known as Five Factor Model (FFM) has become the most prominent and adopted construct for assessing personality traits. It provides a central domain within which many specific psychological attributes can be understood (John & Srivastava, 1999; Weisberg et al., 2011). There is a consensus that the classification of personality traits into the big five encompasses important psychological characteristics of humans (Nadkarni & Herrmann, 2010) and most of what psychologists call personality traits are summed up in FFM (McCrae and Costa, 1999). Although, 16PF questionnaire provides wide range of traits for assessing individual's personality while NEO-FFI offers fast and effective assessment of the Big Five Personality Traits, they are both individually developed as a data collection tool by psychologist and lack theoretical basis. A group of psychologist researcher contributed to the development and validation of FFM. The model provides theoretical context within which research can be situated allowing identification of constructs that are relevant to the research problem.

Diverse studies have proven that personality influence many areas of life, establishing a relationship between personality and performance. For instance, personality traits influence academic performance (Poropat, 2014; Verbree et al., 2023), job productivity (Gavoille & Hazans, 2022; Wilmot et al., 2019; Wilmot & Ones, 2019), leadership efficacy and performance (Nadkarni & Herrmann, 2010; Peterson et al., 2003). A study by Vedel (2014) systematically reviewed and meta-analysed results of 20 studies with an aggregated sample of 17, 717 to establish the relationship between the big five personality traits and academic performance in tertiary education. Consistent with other studies (Verbree et al., 2023; Zell & Lesick, 2022), conscientiousness is the strongest predictor of academic success measured by gross point average (GPA) and yielded an effect size of 0.26. Agreeableness and Openness produces positive significant weighted summary effect of 0.08 and 0.07 respectively as weak predictors of GPA while neuroticism and extraversion have an insignificant predictive power on academic performance.

Van Aarde et al. (2017) meta-analysed the result of 33 South- African studies and 6,782 individuals to assess the predictive validity of personality traits for job performance categories (overall, academic & training, technical, and counterproductive work behaviour). Conscientiousness was found as a non-predictive factor of overall performance but its influence on other performance dimensions of this study is stronger. Extraversion appears as the strongest predictor of training and technical performance but on the contrary the study reported extraversion as a negative predictor of academic performance. The effect size of personality-performance prediction ranges between 0.12 to 0.25.

Zell & Lesick, (2022) synthesised the findings of 54 meta-analysis to establish the effect size of the association between the big five personality traits and general performance. The

authors took precautions to ensure that the tendency of meta-analyses that examined same subset of studies in another meta-analysis is reduced to the barest minimal. The findings of this study reveal that each of the big five personality traits is correlated with performance. Conscientiousness shows the larger correlation with performance compared to its counterpart traits. However, the big five personality traits were insignificantly associated with overall performance. This striking result may be due to cumulative effect of the varied association between the big five personality traits and different performance categories (job and academic performance). The effect size returned 0.19(conscientiousness), 0.13(openness), 0.10(extraversion), 0.10(agreeableness), -0.12(neuroticism). Notwithstanding, a replicability test among three sets of partially overlapping but independent meta-analyses show a similar pattern of relationship of personality with specific performance despite the differences in the inclusion/exclusion criteria and dissimilarity in the calculation of effect size. Although the yield of effect sizes of this meta-analysis is small, it does not invalidate the implications of personality traits for life performances but rather indicate the influence of other factors. This paper recognises the implications of other factors and therefore considers the observable characteristics skills, education, experience and ethnicity.

A closer look at the predictive validity of personality traits across the studies reviewed shows a relatively small but closely related effect size. This is not surprising as the famous author (Mischel, 2009) as long established that cross-situational consistency of personality functioning is low when the universal nomothetic traits constructs such as the big five personality traits is utilised. Although, his point was largely misconstrued by researchers (e.g. Roberts et al., 2007) that personality traits have limited use in the prediction of life outcomes. This could demean the use of the big five personality traits as a theoretical framework and methodological constructs. However, the misconceived notion of Walter Mischel was later corrected by Orom & Cervone (2009) but they advocated for idiographic approach which assess a unique trait of individuals.

Another factor that could be responsible for the small effect sizes is publication bias. Usually studies with small effect size do not find their way through to publication (Vedel, 2014). The implication of this publication bias is underestimated effect size due to the elimination of various studies and possibility of incorrect conclusions in meta-analysis (Sutton et al., 2000). Vedel (2014) mitigate the effects of publication bias in by retrieving the studies that didn't scale through to publication due to small effect size using the file drawer method. They used funnel plot to assess the possibility of publication bias and trim and fill method for re-computation of summary effect size considering the retrieved missing studies. This approach suggests the conclusions reached is a result of rigorous methodological process and are reliable.

Despite the low effect size of the big five personality traits predictive strength recorded in meta-analysis, overtime, this paper considers it appropriate, first because the use of nomothetic traits constructs makes research findings generalisable and provides standard for comparison across diverse studies (Mastor, 2018). Second, the modal effect sizes for general psychology ranges from 0.10 to 0.40 and this is similar to those obtainable other human functioning fields (Meyer et al., 2001)

Mischel (2009) recorded a higher correlational limit of .30 and a similar effect size that ranges from .20 to .30 was recorded by other personality psychologist. Roberts et al. (2007) noted what matters is the nature of what is to be predicted and not the magnitude of the

association of the predictor with the outcome. Third, FFM is a recognised and validated constructs for individual's personality assessment (Brunzel, 2022).

The use of personality traits is classified as an unobtrusive measure. Unobtrusive measures have paved the way for research area that seems to be like a dead end and the advancement in technology has proffer solution to the difficulty in its measurement. For example, the use of machine learning and text analysis software has been adopted in recent times by computational social scientist (e.g. Akstinaite et al., 2022; Brunzel, 2022; Harrison et al., 2019) to assess personality traits. This paper appreciates this advancement and therefore adopts machine learning algorithm for automatic recognition of personality traits from text.

Automatic Recognition of Personality Traits

Moving forward from observable characteristics of leaders, recently extant literature now examines whether the unobservable psychological characteristics of leaders determine successful outcomes. This provides a promising avenue for the long standing intent of Hambrick & Mason (1984) who hoped that someday the measurement of managerial cognition will be possible through an interdisciplinary research and advancement of knowledge in upper echelon studies. Hambrick & Mason (1984) recognised expertise of the psychologist as the only complementary knowledge required by the social scientist. However, the trend in automatic recognition of personality traits has proven the relevance of the computer scientist in this research area.

It is not impossible to collect data on personality traits of women on the upper echelon in FTSE 350 companies in the UK using the traditional methods such as survey and personality questionnaires. However, this calibre of women is unlikely to present themselves for public profiling. Extant literature (Brunzel, 2022; Chatterjee & Hambrick, 2007) attest that access to these elites is tough.

Several attempts have been made for the extraction of personality traits from unobtrusive measures like photographs, videos, blogs, social media, speech and text. Peterson et al. (2003) collected personality data of Chief Executive Officers (CEO) from biographies and interview to examine the relationship between CEO personality and top management team (TMT) dynamics. They employ readers who read the information from the archives and completed California Adult Q-set, a 100-item assessment tool for evaluating personality traits. Q-sorters was used to sort the 100-item statements into categories based on pre-defined instructions. A similar approach was followed by Chatterjee & Hambrick (2007) who aim to assess the effect of CEO narcissism on company's strategy and performance. The authors adopted 5 unobtrusive measures (photograph, press releases, interviews, cash and non-cash compensations). Of particular interest to this paper is the use of press releases and interviews of CEOs. The text was analysed using content analysis. These studies adopted unobtrusive measures however they are still subject to some limitations. For example, the use of readers in the study of Peterson et al. (2003) is subject to bias which is a common shortcoming of self-rating and observer-assessment usually adopted for personality inventory questionnaires (Chatterjee & Hambrick, 2007; Funder, 2012; Hickman et al., 2021; Van Scotter & Roglio, 2018; Weisberg et al., 2011). Automatic recognition of personality traits from unobtrusive measures can eliminate these limitations. The unobtrusive measure adopted in this paper is texts.

Machine learning is now employed for automatic recognition of personality traits from text. This requires pre-training algorithms with collected written or spoken communications of CEO. In the field of business and social science, researchers (Harrison et al., 2019; Hickman et al., 2021; Malhotra et al., 2018) have developed machine learning algorithms for the detection of personality traits from text.

Harrison et al. (2019) developed personality traits measurement tool using the text of spoken communications of 3,573 CEOs of S&P 1500 firms obtained from the over 100,000 transcripts of earnings call of senior executives with the analysts. The authors matched 9,000 words obtained from six separate transcripts to each CEO. This corpus was divided into two parts, the smaller corpus includes the transcripts of spoken word of 207 CEOs. The corpus of the smaller group was used to pre-test the tool. The personality scores of this group had been obtained from a study conducted by Hill et al. (2019) using videometric unobtrusive measure. These scores were used to pre-train the tool. The authors used WordVec algorithm in R for extracting linguistics markers from the large corpus. The vector representation of words obtained was used by the authors to develop the regression model trained using a machine learning algorithm called Gradient Boosting Machine. This model was used for the estimation of personality scores of the small group of 207 CEOs. A correlation that ranges from 0.62 to 0.67 was established between the predicted personality scores obtained from open-language measurement tool and the scores obtained from the videometric study. This step is crucial for establishing the predictive accuracy of the developed tool. Harrison et al. (2019) reported higher convergent validity compared to Golbeck et al. (2011) and Mairesse et al. (2007). A convergent validity that ranges from 0.48 to 0.65 (M5' algorithm) and 0.05 to 0.17 (Gaussian) was reported by Golbeck et al. (2011) who automatically extracted personality traits from social media data gathered from 279 Facebook users. The extraction was done in WEKA (Waikato Environment for Knowledge Analysis) with 10-fold cross-validation and 10-iteration using M5' rule and Gaussian Processes algorithm on. The predictive validity in these studies is encouraging. The use of machine learning in social sciences is still in its early stages of adoption, and it is expected that some weaknesses are observed. This is not strange as all other methods are not without a shortcoming, but it is believed that further advancement in the field of computational social science will resolve the limitations.

Brunzel (2022) investigated the effect of CEO linguistic cues on financial performance using sample of all publicly listed companies in the Fortune 500 list in 2012. The author collected CEO letters for the purpose of extracting CEO's personality traits from their use of language. The use of CEO letters has been widely used to capture CEO hubris (Craig & Amernic, 2016), tone at the top (Amernic et al., 2010) and it is believed that it reflects the organisational performance (Yarkoni, 2010). Brunzel (2022) used the trained algorithm developed by Harrison et al. (2019) and implemented it R-studio on the written communications of the CEO obtained from the annual report and accounts to automatically recognise their big five personality traits. The author used six financial performance metrics (earnings before income and tax, return on assets, return on equity, market to book ratio, cashflow per share and earnings before income, tax, depreciation and amortization). They controlled for other factors that can impact financial performance including individual demographic, firm, industry and individual cognitive. Their findings suggests that personality traits can be detected in language, and this is in line with the results of other studies (e.g. Koutsoumpis et al., 2022; Moreno et al., 2021). In addition, they find openness and conscientiousness to be positively and negatively respectively related to financial

performance while neuroticism shows a negative relationship with firm performance measures. It is not surprising to see their result portray the negative implication of neurotic CEO on financial performance. A neurotic individual is characterised with guilt, pessimistic attitudes, hopelessness, and sadness (McCrae & Costa, 1999). They lack self-confidence and low self-esteem (Judge & Bono, 2000).

Apart from Brunzel (2022), Harrison et al. (2020) and Harrison & Malhotra (2024) also adopted the Open Language Chief Executive Personality Tool (OLCPT) developed by Harrison et al. (2019) in their studies. The discriminant validity and content validity of the tool with each of the big five personality traits has been proven overtime. This paper follows the same approach adopting OLCPT for automatic recognition of personality traits of senior women executive in the FTSE 350 companies in the UK.

Data Collection

This paper collect data for analysis from three sources: Bloomberg Terminal, BoardEx and Annual Reports and Accounts. The researcher of utilise these sources to avoid difficult accessing the company's directors reported in previous studies (Brunzel, 2022; Van Scotter & Roglio, 2018). Following the recent use of machine learning for automatic recognition of personality traits from text in social sciences, this paper leverage on this method to advance innovative ideas in methodological approaches as the field of computational social sciences advance. Transcript of earnings calls of senior executives of FTSE 350 companies with analysts was collected from Bloomberg Terminal. Earnings call is held periodically after the release of financial result for a reporting period (Medya et al., 2022). Investors, analysts, journalist, the Chief Executive Officer (CEO) including some management members of the company are present during the calls (Medya et al., 2022). These calls convey important information about the company's performance (Chin & Fan, 2022). Personality traits will be extracted from the text of the spoken communications of the CEO and CFO during this meeting. A similar approach can be seen in (Brunzel, 2022; Harrison et al., 2019; Harrison & Malhotra, 2024). This paper differs from these previous studies considering its focus on public listed companies in the UK rather than United States. The financial metrics that measure financial performance in this study are return on assets (ROA) and Tobin Q, which will be collected from Bloomberg Terminals. Their relationship with the extracted personality scores will be examined using SPSS. Personality traits is therefore the predictor variable of this study. Data of women CEOs and CFOs' demographics and control variables is obtained from BoardEx. BoardEx is a database suitable for academic research, providing access to rich data, including designation, education, experience and networks of directors and senior managers of companies across the globe (BoardEx, n.d.). Reference will be made to the annual reports and accounts for data that may be missing from the other sources.

Sample and Time Specification

This study aims to establish a relationship between the personality traits of women in the upper echelon and the financial performance of companies listed on the LSE from 2011-2022. The aim of my research is to measure the personality traits of female leaders and evaluate how they impact the financial performance of firms led by them. The study targets female-led companies in the UK's FTSE 350 companies and will use all firms instead of a sample for two reasons. Firstly, measuring female leaders' personality traits requires sophisticated machine learning algorithms, which is a new attempt in the field with limited previous studies as guidance. Secondly, empirical analysis requires a decent sample size, and

hence all female-led FTSE 350 companies will be included, along with a long-term dimension of 11 years. All companies used in the study have a female CEO or CFO or both. After preliminary data cleaning, the sample size for empirical analysis should be at least 50 female-led firms, making the sample size 550 (50x11) for empirical analysis. This is a reasonable size for empirical analysis according to standard statistics theory.

This paper acknowledges the possible impact of shocks such as Covid-19 on financial performance during the studied period. The researcher understands economic events during the period under review could impact the study's result. For example, the global outbreak of Covid-19 between 2020 and 2021 negatively impacted business performance during this period. I propose to use a long-time dimension in my research, which means I need to be careful in selecting the right empirical model and consider various model specifications to ensure that my results are robust. I also open the possibility of extending the time dimension if there were some female leaders before 2011 in FTSE350 firms. Unfortunately, I cannot fill those gaps at this stage as I have not constructed my panel dataset yet, and I have not conducted a comprehensive literature review on econometric modelling. Given my current knowledge, I may use a methodology of dynamic panel analysis and control for both entity and time fixed effects (See, e.g., Hayakawa et al., 2023; Pedroni, 2001 and 2004; Pesaran et al., 1999). To make an informed decision, I need to consider the past performance of firms and analyse both short-term and long-term effects. However, I am uncertain about the dynamic panel method that I should use as I need to first test for stationarity. Alternatively, I could explore multidimensional panel models (such as Balazsi et al., 2018) as my dataset involves three dimensions: firm, industry, and time.

Motivation, Justification and Contribution

While the gaps identified in the literature are some of the motivations for this study, the need for improvement in organisations' recruitment and promotion practices also drives the interest in this research. In an article about the c-suite skills that matter most, Harvard Business Review (2022) presents research undertaken by Raffaella Sadun, Joseph Fuller, Stephen Hansen, and PJ Neal. Their review notes that business operations are more complex than ever and facing challenges resulting from technological advancement and as a result, businesses need to evaluate skills other than the traditional requirements (qualifications, administrative skills, good track record of achievements, industry expertise) for hiring the CEO and other executives in the organisation's upper echelon. This suggests a shift in leadership roles and businesses demand a new approach to their processes including the recruitment and selection requirements. Harvard Business Review (2022) notes that the authors obtained data from Russell Reynolds Associates, a renowned company whose services are employed by businesses such as FTSE 100 companies when deciding successor for an executive role. Obtaining data from an executive search firm provides rich and quality data which ensures the reliability of the research findings. There is evidence that there is a need to focus more on "social skills" compared to the usual emphasis on qualifications and expertise alone (Harvard Business Review, 2022). The review defined social skills to include psychological attributes. In a report on Board Diversity and Effectiveness in FTSE 350 companies, personality differences emerged as the most valued form of diversity in the analysis of interviews of 71 directors sitting on the board of 25 companies in the United Kingdom (The Financial Reporting Council, [FRC], 2021). These two pieces of research show that the personality traits of executives' matter.

Therefore, this paper has core practical implications. First, while qualifications and expertise serve as the selling point for identifying and attracting women qualified for executive positions, this thesis will identify personality traits that are necessary for the effective functioning of women in the upper echelon justifying the selection of a preferred candidate in a situation where qualifications, expertise, and experiences of two or more women are at par. Second, in addition to the traditional requirements, this paper will suggest personality trait(s) that are a priority for selection or promotion to the positions in the upper echelon. Third, human resource personnel will need to implement practices that encourage mentoring of women subordinates to acquire significant traits. Fourth, this thesis will also provide valuable insight into the need to nurture the deep-level traits of students in higher education. Emphasis should be laid on the essentiality of personality traits both at undergraduate and postgraduate levels. The inclusion of a module that caters for this need in the school curriculum will enable students to be self-aware of who they are and get them work-ready.

Theoretically, this work build upon UET and HCT to build a theoretical framework and advance knowledge by introducing unobservable psychological characteristics (using the big five personality traits) omitted in these theories. Methodological, assessment of unobservable characteristics and access to top executives has been major limitations of research in this area. Therefore, through automatic recognition of personality traits, this paper provides an avenue to have a distant assessment of top executives and undertake socially beneficial research that may be impossible without utilising computational methods and tools.

Conclusion

This paper has explored how the personality traits of women in upper echelon impact the financial performance of FTSE 350 companies in the UK leveraging new insight from computational social scientist who adopted machine learning to extract personality traits scores from transcript of earnings call of women CEOs and CFOs with the analysts. The impact of these top executives on company's financial performance will be established using ordinary least square regression analysis to examine the relationship between the personality scores and financial performance using SPSS.

Despite the theoretical, methodological and practical contributions of this study, it is not without its limitations. First, the automatic recognition of personality traits form text requires a several skills sets and approach which is different from the methods in business and social science research. Learning the use of tools such as Python, Jupyter Lab and Google Collab is time consuming for the researcher. In addition, research of this nature, require large datasets, in fact data collection and cleaning has been really challenging. On the average data cleaning for a participant takes an average of three hours. However, the researcher, see the PhD journey as an opportunity to learn and create a research niche for career progression. Future researchers should explore collaborative effort between organisational, psychologist, linguistic and data science researchers to overcome this limitation.

Furthermore, it is often difficult to understand how machine learning tools obtain personality scores from text. However, for this present study, the Open language Chief Executive Tool (OLCPT) adopted for this study was developed through a rigorous process using the text of spoken communications of 3,573 CEOs of S&P 1500 firms obtained from the over 100,000 transcripts of earnings call of senior executives with the analysts. The predictive, content and discriminant validity of this tool has proven and some study (e.g. Brunzel, 2022) has replicated the use of this tool. While destructive criticism of new methods can limit

advancement of novel research areas and contribution to knowledge, this paper is open to constructive feedback and hope future research will continue to explore how the validity of this approach can be improving overtime.

This paper hopes to extend this work by analysing the data collected and discussing the alignment of the results with extant literature. Also, seeking feedback from experts in the field will help to gain guidance on the hurdles they encountered and how they resolved it.

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