CEO-Employees Pay Ratio, Employees' Productivity and Firm Performance: Evidence from UK

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Abstract

This paper investigates the impact of the difference in pay between a CEO and regular employees on the productivity of employees and the overall performance of a company. A selection of companies listed on the FTSE All-Share Index from 2009 to 2019 was examined. The findings indicate a significant positive correlation between the pay ratio of CEO to employees and both employee productivity and firm performance. However, when the sample was divided into high and low CEO pay gap companies, the positive effect was less noticeable in the high pay ratio group than in the low pay ratio group. The study supports the tournament theory, which argues that employees compete for promotions to increase their pay. The research contributes to the ongoing debate and discussion about disclosing CEO-employee pay ratios, as it demonstrates how pay disparities can impact employee productivity and firm performance. The results are relevant to policymakers, practitioners, and other stakeholders who need to make informed decisions about levels of CEO and employee pay.

Keywords

Pay Inequality, CEO-Employees pay ratio, Tournament, Social comparison, Productivity.

1. Introduction

In recent years there has been escalation of inequality of income leading to an increase in the income gap between the rich and rest of population. One of the factors which may have contributed to this problem can be the growing pay differences between the Chief executive officer (CEO henceforth) and average employees. Many critics blame the rise in inequality over the past 20 years in the UK on the rise in companies' CEO compensation (Mueller *et al*., 2017; Zalewska, 2014). These critics use the multiple of "250 to 1" large company CEO pay compared to average UK employee pay. It is well-documented that UK income inequality, historically among the highest relative to other developed countries, has continued to increase significantly. The Office of National Statistics (ONS) finds that the gap between the richest in society and the rest of the population has widened over the last 10-year period; the income shares of the richest 1% increased from 7% to 8.3% between 2011 and 2020 (ONS, 2021). This growth in this disparity was not an "overnight event", instead, it was the result of different long-term labour market factors that led to huge increases for top managers' pay and lower growth for workers' wages in the market (Kay & Martin, 2016). In response of these concerns on income inequality, from the year 2020 the UK government requires the listed companies with over 250 employees to disclose the CEO pay ratio with the aim that these 'disclosures will make companies justify their pay for top bosses and account for how those salaries relate to wider employee pay' (Gov, 2019). Changes in the CEO pay ratio can have consequences; thus, this study aims to investigate if the CEO and average employee income gap (CEO-Employees pay ratio, henceforth) has an impact on the productivity of employees and the financial performance of the firm.

Most previous studies have examined executive pay and firm performance (Bebchuk & Freid, 2004; Ozkan, 2011; Tarkovska, 2017); executive pay and innovation and risk taking (Laux, 2015;

Pathan, Haq, & Morgan, 2022); excessive CEO pay and firm performance (Dah & Frye, 2017). Other recent studies on wage inequality in firms from several countries find a mixed relation between wage inequality and firm growth (Balsam, Choi, John, & Ju, 2019; Kiatpongsan & Norton, 2014; Mueller, Ouimet, & Simintzi, 2017). Mueller *et al*. (2017) in their study on wage inequality in UK firms use a survey to collect data and construct pay ratios comparing average employees pay across different hierarchy in an organisation; they find a positive relationship between wage inequality and firm growth. However, they do not examine employee productivity due to the pay gap. This study builds on the knowledge to examine the influence of CEO-Employees pay ratio in the UK context. In particular, the study investigates whether pay inequality between CEO and employees impacts on employees' productivity, which in turn affects firm outcomes.

The reason why we need to examine the consequences of disparity in pay within UK context lies partly in the failure of changing the income distribution in the UK's listed companies to act in the UK's economic interests. The priority for the government is to address the problems that result from a low wage and the potential consequences of a low productivity economy (Marsland, 2015). In addition, data from the World Inequality Database reveals that the top 1% of earners in the UK account for 14% of total earnings. If the increased proportion of pay that goes to these top earners across the economy reflects a pattern occurring at individual companies, this represents a substantial cost to business and thus, there is a need for examining the consequence of the increase in pay disparity and companies' performance (Kennedy, Murphy, Anderson, & Hildyard, 2019; Max & Esteban, 2016).

The motivation for this study originates from three main sources. First, there has been considerable policy concern in UK regarding the disparity in pay between employees and CEOs

that reinforce corporate governance improvement (Gov, 2019), however, empirical evidence for the consequences of this disparity is under-researched. Despite a conceptual link between difference in pay and its impact on productivity and performance, empirical research on these issues in UK remains scant. Second, prior studies on CEO pay ratio focused on the determinants and other related reasons for the variance in pay between CEO and top executives such as CEO power and other related corporate governance factors. However, studies on the consequences of the differences in pay between employees and CEO is short, and thus, this study seeks to contribute to covering this shortage especially in the UK context. Third, prior studies are focused on the empirical setting of the U.S. (Balsam *et al*., 2019; Faleye, Reis, & Venkateswaran, 2013; Rouen, 2020; Uygur, 2019), where the CEO pay ratio has been mandatory since 2013 and the few studies applied in UK are concerned with the impact of the differences in pay between CEO and top executive or depend mainly on survey data. In this study, we claim that examining the consequences of the disparity in pay between employees and CEO would enable a better understanding of the empirical link between the conceptual targets from disclosing the CEO pay gap information and its impact on productivity and performance.

Using a sample of FTSE All-Share Index, we find that there is a significant positive relationship between CEO-Employees pay ratio and employees' productivity as well as firm performance. These results support tournament theory which argues that the employees' pay increases as their rank order goes up, which provides incentives and competition to gain promotion; once promoted, there will be a large rise in pay (Lazear & Rosen, 1981). So, the pay differential provides incentives for the individual to exert effort to win the tournament in an organization. Thus, large pay ratio will lead to more productivity and better firm performance. On the other hand, these results are not consistent with the arguments of social comparison theory which suggests that the pay

differences increase the perception of inequality which can demotivate employees and lead to less collaboration among competitors in the tournament (Adams, 1965).

This study makes three significant contributions; first, to the best of our knowledge, it is the first study to examine the CEO-Employees pay ratio to firm performance in the UK; second, it extends the literature by examining CEO-Employees pay ratio and employee productivity; and lastly, it informs regulators and practitioners useful information regarding the disclosure of CEO pay gap and its implications on firm performance and employees' productivity.

The remainder of the paper is organised as follows: theoretical background and hypothesis development are presented in the second section. Then data, methods and models are discussed in the third section. This is followed by presentation for the results in the fourth section and finally section five provides a discussion of the results followed by the conclusion.

2. Literature Review/hypothesis development

2.1 Theoretical Background

The theoretical framework for this study is based on predictions made by tournament theory versus that made by social comparison theory. Tournament theory was developed in the field of labour economics to design optimal labour contracts (Lazear & Rosen, 1981), many studies use it in management and governance research to explain the performance effects of unequal pay and inequality (Connelly, Tihanyi, Crook, & Gangloff, 2014). Tournament theory built on the idea that that participants work harder and perform better when faced with tournament incentives (Becker & Huselid, 1992; Lazear 1989). These incentives result from the pay differences between the winner's compensation and that of the runner-up (DeVaro,2006a, b; Henderson & Fredrickson, 2001; Lee, Lev, & Yeo, 2008).

On the other hand, the pay differences may also cause harm if they generate feelings of inequity or induce a focus on individual pecuniary rewards, which may incite self-interested behaviour (Fredrickson, Davis-Blake, & Sanders, 2010; Henderson & Frederickson, 2001; Zalewska, 2014). Social comparison theory provides support to this side of the argument. According to social comparison theory, the major complication of pay inequality arises from social comparison, whereby employees compare pay, benefits, and other important measures with other company employees (Festinger, 1954). The comparison will have negative impacts if it is followed by perceptions of inequality as these perceptions will motivate employees to engage in costly behaviors (Adams, 1965; Cowherd & Levine, 1992; Feldman, Gartenberg, & Wulf, 2018). Perception of inequality among individuals within the US firms have been shown to result in reduced teamwork, less collaboration, reduced productivity, deception, lower satisfaction, and employee turnover (Edelman & Larkin, 2014; Fredrickson *et al*., 2010; Gino & Pierce, 2010; Kacperczyk & Balachandran, 2018). The pay disparity between CEOs and employees could be followed by behaviour costs that affect negatively on productivity and firm performance.

In short, both the positive impact of unequal pay on performance as supported by tournament theory and the negative impact of unequal pay supported by social comparison theory are well developed. The results from this study can be explained and supported by either of these theories.

2.2 CEO-Employees pay ratio, Employees' productivity and Firm performance.

Excessive executive compensation and income inequality are controversial issues that have been in the forefront of discourse amongst shareholders, media and society as a whole who seek fairness in wealth distribution. The new mandatory disclosure of the CEO-Employees pay ratio links these two issues directly. There are two contradictory arguments regarding pay disparity

between CEOs and employees (Lacmanović, 2013). On one side, supporters of high pay ratios argue that managers of today are working in a complex and competitive environment and as CEOs successfully manage the companies in such complex circumstances, therefore, it is justified that they get high pay. On the other side of the argument, there is a belief that the success of a company is the result of teamwork between CEOs and employees, therefore, there needs to be more equity in pay. If all employees contribute to improving performance, CEO pay levels should be more in line with the rest of their company's employee pay structure (Garofalo, 2012; Lacmanović, 2013).

Previous literature suggests that pay ratio or difference between top management and ordinary employees pay has important consequences for employees' productivity and, consequently, on firm performance (Bebchuk, Cremers, & Peyer, 2011; Faleye *et al*., 2013; Forbes, Pogue, & Hodgkinson, 2016; Fredrickson *et al*., 2010; Frydman & Saks, 2010; Kale, Reis, & Venkateswaran, 2009; Ibrahim, Li, Yan, & Zhao, 2021; Lee *et al*., 2008; Zalewska, 2014). One strand of research focuses on the influence of pay ratio on employee's motivation, morale, behaviour, and loyalty (Artz, 2008; Connelly *et al*., 2014; Conyon, Peck, & Sadler, 2001; Kini & Williams, 2012; Neeley & Boyd, 2010). While another strand focuses on the effects of the pay ratio on the companies' financial results, total effectiveness, image in public and change in performance (Faleye *et al*., 2013; Lin, Kuo & Wang, 2013; Ozkan, 2011; Tarkovska, 2017). This study falls amongst the second strand of studies relating relative pay to productivity and firm performance.

In previous literature, Faleye *et al*. (2013) find wider pay gap has a positive correlation with corporate value and operating performance; Lee *et al*. (2008), Kale *et al*. (2009), and Rankin and Sayre (2011) also find that a wider pay gap has a significant positive effect on corporate performance, which mainly materializes by improving corporate governance. In recent studies,

using US data, Uygur (2019) finds positive association between pay ratio and firm performance, but this association weakens with a chair who is also a CEO. He finds a positive relation between pay ratio and pay performance sensitivity when there is a high-ability CEO receiving higher pay whereas the pay-performance sensitivity weakens when a low-ability CEO is paid more. Also, Cheng, Ranasinghe, & Zhao (2017) argue that higher CEO-Employees pay ratios reduce employee morale and productivity which reflects CEO rent extraction in firms with weak corporate governance. They find that firms with higher CEO-Employees pay ratios have higher market value. Other literature examines the implication of the pay gap between CEOs and top executives rather than average employees pay. For example, Kini and Williams (2012) argue that high CEO pay ratio between CEOs and the top executive provides tournament incentives. They find significantly positive relation between tournament incentives and firm risk.

Based on the review above we find that there is support in the literature for the tournament theory argument. Therefore, we hypothesise that high CEO-Employees pay ratio will motivate CEO to make every effort to ensure successful company performance, and other employees will be motivated to perform better to win the tournament incentives (Becker & Huselid, 1992; Lazear 1989). This leads us to the following hypotheses:

H1a. CEO-Employees pay ratio is positively associated with employees' productivity.

H1b. CEO-Employees pay ratio is positively associated with firm performance.

On the other hand, based on social comparison theory, the high CEO-Employees pay ratio can lead to a feeling of inequity amongst employees and this can negatively affect their performance. For example, Fong, Misangyi, and Tosi (2010) suggest that compensation should reflect a manager's ability and not create strong feelings of inequality/injustice among peers. Also, Levine

(1991) finds that inequities between the pay of CEOs and average workers contributed not only to lower perceptions of fairness by employees but also to lower quality of products. Levine argues that high pay gap between the CEO and other employees may affect employee commitment to managerial goals, and cooperation, and consequently, firm performance. Many other studies examine the impact of pay gap between CEOs and top executives. They find that tournament mechanisms can produce negative incentives for top executives who are competing for the CEO position and may refuse to cooperate (Bebchuk *et al*., 2011; Milgrom & Roberts, 1992; Tarkovaska, 2017). In addition, Fredrickson *et al*. (2010) find that high CEO pay can be the result of a lot of effort by the CEO to increase the size of the firm, and Zalewska (2014) find that higher ratio of CEO's pay to the top five executives' pay leads to lower firm value, though this association changes when there is a American CEO on board. Similarly, based on social comparison theory perspective, Tarkovska (2017) examines the same idea on UK firms and finds that a large gap between CEO pay and the pay of the next layer of senior managers is negatively associated with firm value.

In recent studies using US data, Rouen (2020) finds negative association between pay disparity between CEOs and employees and firm performance. They suggest that the negative association is due to weak corporate governance. Also, Balsam *et al*. (2019) use Compustat and the ExecuComp databases to examine an association between CEO-Employees pay ratio and firm value and find it to be nonlinear and dependent on firm characteristics. In another study, Cullen and Truglia (2018) use a survey of 2,060 employees in one company to examine the impact of employees' perception regarding the variation in salaries. They report that higher management salary increases the efforts and output, however that higher perceived peer salary decreases effort

and output. The study has limited generalizability because it covers employees in a single company.

Considering these previous studies and in accordance with social comparison theory, we argue that high CEO-Employees pay ratio can impact negatively on team spirit and motivation, weakening board effectiveness. Also, employees compare their pay with those of others and if they perceive inequality regarding pay, this can reduce productivity and firm performance. Based on that, we argue a high CEO-Employees pay ratio may result in less cooperation which negatively affects productivity and firm performance. This argument leads to the following hypotheses:

H2a. CEO-Employees pay ratio is negatively associated with employee productivity.

H2b. CEO-Employees pay ratio is negatively associated with firm performance.

3. Research Design and Data

3.1 Sample selection and data

Our study sample comprises of 258 non-financial firms that were part of FTSE All-Share Index in 2020. These firms are from 9 industries (basic materials, consumer goods, consumer services, health care, industrials, oil and gas, technology, telecommunications and utilities). The sample collected is for the period 2009 – 2019. We initially had 2,832 observations and deleted 681 observations by excluding of financial firms[1], missing data[2] and firms with less than 250 employees[3], to reach the final of 2,151 observations. Winsorization of the variables was performed at 1% to remove extreme outliers in the dataset before conducting the regression analysis, this

[1] Financial firms are highly regulated and monitored

[2] Missing data from the databases were removed.

[3] The exclusion of companies with less than 250 employees is because the new legislation for disclosure of CEO pay ratio only applies to UK listed companies with over 250 employees (https://www.gov.uk/government/news/new-executive-pay-transparency-measures-come-into-force)

resulted in 2149 observations. The distribution of the sample across the industries is summarised in Table 1 below.

[Insert Table 1 here]

3.2 Measures

3.2.1 Primary variable

Our primary variable of interest was the remuneration of the CEO relative to the average employee pay. In constructing this variable, data was needed for both the remuneration of CEOs and ordinary employees. We obtained this data from Minerva Analytics[4] which provided the CEOs' remuneration received, average employees' wage and CEO-Employees pay ratio. We define a CEO as the person identified as the Chief Executive Officer, Chairman and Chief Executive, Chief Executive and President of a firm in the Minerva database. CEO pay is considered as the total remuneration actually received in a particular year which includes fixed remuneration, bonuses and value of vested shares in that year. Average employees' wage is defined as the total employees' remuneration (which does not include the CEO pay) divided by the total number of employees in that year. The CEO-employees pay ratio is then obtained by dividing CEO pay by average employees' wage. This is consistent with other studies (Faleye *et al*., 2013; Crawford, Nelson, & Rountree, 2018). Our primary measure is the natural log of CEO-Employees pay ratio, consistent with Faleye *et al*. (2013).

Information of CEO-Employees pay ratio is not widely available in the UK, unlike for example, the United States where there is a legal requirement for disclosure of such information (see, SEC,

[4] Minerva Analytics offers corporate governance, executive remuneration, voting results and sustainability data (manifest.co.uk). Minerva supplied tailored data exports to capture executive remunerations, average employee pay and CEO-pay ratio.

2015[5]). Thus, our sample is limited to those FTSE All-Share index companies covered in the Minerva database. This data source on directors' remuneration has been used in other UK studies (Morris, Gregory-Smith, Main, Montagnoli, & Wright, 2020; Shiwakoti, Iqbal, & Jarvis, 2019). In addition, Thomson Reuters DataStream was used to obtain firm characteristics while Minerva was used for corporate governance variables.

3.2.2 Dependant Variables

Our main objective is to examine the influence of our primary variable, CEO-Employees pay ratio, on companies' financial performance and employees' productivity. We measure firm performance using Return on Equity (ROE) and Return on Assets (ROA) which are widely used financial performance indicators (Coles, Daniel, & Naveen, 2008; Faleye *et al*., 2013; Smirnova & Zavertiaeva, 2017; Wu, Ying, & Chen, 2018). ROA is defined as the ratio of operating income after depreciation to total assets whilst ROE is the ratio of net income to average total equity. Employees' productivity was measured as the natural log of revenue per employee (RPE) calculated as the ratio of revenue to the number of employees following Cronqvist, Heyman, Nilsson, Svaleryd, and Vlachos (2009) and Faleye *et al*. (2013).

3.2.3 Control Variables

In order to examine the effect of our primary variable (CEO-Employees pay ratio) on our dependent variables (ROE, ROA, RPE), we controlled for corporate governance, CEO, firm, and industry characteristics that are detailed below. Each of the control variables has a potential link to firm performance and/or employee productivity, based on previous studies (Coles *et al*., 2008; Faleye *et al*., 2013; Gan, Park, & Suh, 2020; Graham, Kim, & Leary, 2020; Pandey, Vithessonthi, & Mansi, 2015; Tarkovska, 2017).

[5] The USE Securities and Exchange Commission adopted the Rule for Pay Ratio Disclosure in 2015 (https://www.sec.gov/news/pressrelease/2015-160.html)

The first corporate governance control variable we included was board size as literature suggests that larger boards are less effective at monitoring management (Jensen, 1993; Yermack, 1996). The board size variable is measured as the natural logarithm of the total number of all directors on the board. The second control included was board independence which is the percentage of directors who are independent**.** Independent directors are deemed more effective monitors due to greater reputational costs (Fama & Jensen, 1983; Coles *et al*., 2008). However, evidence exists consistent with board capture theory, suggesting that independent directors do not necessarily seek to maximize shareholder value (e.g. Core, Holthausen, & Larcker, 1999). Board busyness is captured as the proportion of busy directors at board level with literature suggesting that busy directors are less effective in their performance due to overcommitment (Core *et al*., 1999; Jackling & Johl, 2009; Pandey *et al*., 2015). Board Busyness is defined as the number of directorships, including the "home" company and in other public companies at the same time.

In addition, we controlled for CEO characteristics which reflect managerial power and experience. The first is CEO tenure, measured as the number of years of service of the current CEO. The longer the CEO tenure, the greater the expected influence over the board (Graham *et al*., 2020). The second is CEO duality which is reflected as a dummy variable equal to one (1) if the CEO is also the chair of the board, zero (0) otherwise. CEOs that are chair of their board are expected to receive higher compensation due to greater power over the board (Bebchuk, Fried, & Walker, 2002; Grinstein & Hribar, 2004). Further, CEOs that are also chair may receive higher compensation due to their holding two roles (Krause, Semadeni, & Cannella Jr, 2014). The third variable controlled is the CEO first year service, also reflected as a dummy variable equal to one (1) if it is the CEO's first year of service at that firm in that year, zero (0) otherwise. CEOs new to a firm may receive higher compensation during that year due to sign-on bonuses, or lower

compensation due to performance incentives that are not realized until future years (Cadman, Carter, & Hillegeist, 2010).

We controlled for firm specific characteristics which could have an impact on our dependent variables. The variables controlled were firm size captured as the natural logarithm of total assets and firm leverage measured as long-term debt divided by total assets. Capital expenditures was also controlled for, as reported in the respective year. In addition, the book value per share, calculated by dividing total equity by current outstanding shares was included as a proxy for investment opportunities (Kallapur & Trombley, 1999). Companies with greater investment opportunities are associated with a higher demand for CEO talent and thus, higher compensation (Kallapur & Trombley, 1999; Murphy 1985).

The definitions of all variables are provided in Table 2 below:

[Insert Table 2 here]

3.3 Empirical Model

We draw upon prior literature (Faleye *et al*., 2013; Tarkovska, 2017) to construct two empirical models for regression of CEO-Employees pay ratio to employee productivity and firm performance respectively. The empirical model for employees' productivity as the dependent variable is shown as model 1 below:

$$\begin{aligned}\text{Productivity}_{it} = {} & \beta_0 + \beta_1 (\text{CEO - Employees pay ratio}_{it}) \\ & + \sum \beta_a \text{ Corporate Governance}_{it} \\ & + \sum \beta_b \text{CEO Characteristics}_{it} \\ & + \sum \beta_c \text{Firm Characteristics}_{it} \\ & + \sum \beta_d \text{Industry Indicators}_{it} \\ & + \sum \beta_e \text{Year Indicators}_{it} \\ & + \varepsilon_{it}\end{aligned}$$

(1)

where $Productivity_{it}$ is employee productivity captured by natural log of revenue per employee. $\sum\beta_a$ $Corporate\ Governance_{it}$ is sum of corporate governance variables, $\sum\beta_b CEO\ Characteristics_{it}$ is the sum of CEO characteristics variables, $\sum\beta_c$ $Firm\ Characteristics_{it}$ is the sum of firm characteristics variables; $\sum\beta_d Industry\ Indicators_{it}$ is industry effect adjustment, $\sum\beta_n Year\ Indicators_{it}$ is year effect adjustment and ε_{it} is error term.

Model 1 is then adjusted for firm performance to form Model 2

$$\begin{aligned} Performance_{it} = {} & \beta_0 + \beta_1\,(CEO - Employees\ pay\ ratio_{it}) \\ & + \sum \beta_a\ Corporate\ Governance_{it} \\ & + \sum \beta_b CEO\ Characteristics_{it} \\ & + \sum \beta_c Firm\ Characteristics_{it} \\ & + \sum \beta_d Industry\ Indicators_{it} \\ & + \sum \beta_e Year\ Indicators_{it} \\ & + \varepsilon_{it} \end{aligned} \qquad (2)$$

Where $Performance_{it}$ is firm performance captured by ROA and ROE, β represents coefficients for the variables and β_0 as the constant.

As CEO-Employees pay ratio could vary across industries (Bebchuk *et al*., 2011), we control for industry effects by specifying dummy variables on the basis of Fama-French 12 industry classification. Year specific effects were also controlled by including a year-dummy variable.

4. Results

Table 3 displays the descriptive statistics of the variables used in the analysis. The mean CEO-Employees pay ratio shows that on average the CEO pay is 63 times higher than that of the average worker in FTSE All-Shares firms. The variation in the pay gap between CEO and average worker

is 75.75 which indicates high level of variation in pay gap in the sample. Productivity shows that on average the employee generates £310,000 of the revenue per annum, there is high variation in productivity due to the difference in revenue generated by firms. This variation can be attributed to the wide differences in number of employees across industries and firms.

[Insert Table 3 here]

The correlations between variables used in the study are reported in Table 4 along with the significance at 5% level. There is significant and positive correlation noted between the CEO-Employees pay ratio and firm performance (ROE and ROA) as well as between productivity of employees and firm performance, in line with our expectations. The results of the variance analysis shows that there is no issue of multicollinearity.

[Insert Table 4 here]

Based on Hausman test, fixed effects estimation was chosen to estimate the model, this controls for unobservable time-invariant firm characteristics. Table 5 presents the results from the regression model to test hypothesis 1a which states that CEO-Employees pay ratio is positively associated with employees' productivity and the alternate hypothesis 2a. The analysis confirms hypothesis 1a and shows that there is a significant and positive influence of CEO-Employees pay ratio on employees' productivity.

[Insert Table 5 here]

We find that when the CEO-Employees pay ratio increases by one unit, the employees' productivity increases by 0.04%. The CEO tenure is found to be negatively related to employees' productivity, possibly indicating that if the CEO is in the job for a long period their enthusiasm to motivate wanes, lowering employees' productivity. Faleye *et al*. (2013) found similar result relating CEO tenure to employee productivity. It is found that firm size is positively and

significantly related to productivity, indicating that large firms have higher revenue and hence higher productivity (Patrizio & Fabiano, 2003).

The CEO-Employees pay ratio is split into two sub samples using the median, namely high CEO-Employees pay ratio and low CEO-Employees pay ratio. Column 2 and 3 in Table 5 present the results of the relationship between high and low CEO-Employees pay ratio with employees' productivity. Column 2 shows that higher CEO-Employees pay ratio is less significantly and positively related to productivity compared to the subsample of low CEO-Employees pay ratio. It is found that the variables denoting first year as CEO is positively and significantly related to employees' productivity in the sub-sample of higher pay gap, we suggest that it indicates enthusiasm and motivational level of the newly appointed CEO which drives productivity. Board busyness is negatively and significantly related to productivity in the sample that has higher CEO-Employees pay ratio, possibly indicating that directors who have many directorships and are busy, may not be able to contribute in motivating productivity. Column 3 shows the results of the sub-sample of lower CEO-Employees pay ratio. It shows that among these firms with lower pay gap, the relation between pay disparity and productivity is significant and positive at 1% level. In this sub-sample, CEO tenure is significantly negatively related to employee productivity; again similar to the full sample results indicating that if the CEO is in the job for a long period their enthusiasm to motivate wanes, lowering employees' productivity. Firm size and capital expenditure are significantly and positively related to productivity in the sample that has lower pay ratio (Patrizio & Fabiano, 2003). This, we suggest, shows that smaller firms that have lower pay gap also have lower productivity, as their revenues are comparatively lower; also we suggest that if the capital expenditure is low the productivity is low.

For one unit of increase in CEO-Employees pay ratio, within the larger pay gap sample, productivity of an employee increases by 0.02%; when the pay gap is less the productivity is higher (0.4%). This implies that when the difference in pay is smaller, employer productivity is improved. Table 6 presents the results from the regression model to test Hypotheses 1b which predicted that CEO-Employees pay ratio is positively associated with firm performance and the alternate hypothesis 2b. The estimation model contains corporate governance, CEO and firm level control variables. The model tests the hypothesis for the effect of the CEO-Employees pay ratio to firm performance, using ROA and ROE. The results for all companies in the sample are shown in column 1 and 2 of Table 6.

[Insert Table 6 here]

Hypothesis 1b predicted that there would be a positive influence of a higher CEO-Employees pay ratio on firm performance and our analysis supports this hypothesis. We find a significant positive relation between the CEO-Employees pay ratio and both measures of firm performance, using the whole sample.

The sample was split into subsamples using the median into high and low market capitalization firms. Column 3 and 4 of Table 6 present the results of the relationship of the CEO-Employees pay ratio to firm performance (ROE) for these two subsamples (large size and small size firms). The results show that for larger size companies, if there is a larger CEO-Employees pay ratio then firm performance (ROE) is enhanced. When the CEO-Employees pay ratio increases by one unit, ROE increases by 1.4%. Though in smaller size companies this relationship is not significant, though positive. Column 5 and 6 of Table 6 present the results of the relationship of the CEO-Employees pay ratio to firm performance using ROA for larger and smaller firms. The relationship between CEO-Employees pay ratio and firm performance using ROA for large and small size firms

is positive and significant. When the CEO-Employees pay ratio increases by one unit, firm performance as measured by ROA increases by 1.1% for large size firms and by 3.5% for smaller firms.

Robustness checks

We use robustness tests to confirm our results. It is possible that a positive association does not imply causation, therefore, firstly we use pooled OLS estimation method (column 1 of Table 7) and show that there is a significant positive relation between CEO-Employees pay ratio and firm performance.

[Insert Table 7 here]

Secondly, the results are confirmed when we use a lag of the CEO-Employees pay ratio in the regression models. We use lagged variable to mitigate for reverse causality as well as simultaneity (Cornett, Marcus, Saunders, & Tehranian, 2007). We find that there is a significant positive relation of CEO-Employees pay ratio to firm performance (column 2 of Table 7). Lastly, we test for endogeneity concerns; it is possible that the CEO-Employees pay ratio can be endogenous with firm performance. Hence, as a robustness test, the one step linear dynamic panel-data estimator and system GMM estimation is used to estimate the model without the year dummies (Arellano & Bond, 1991; Arellano & Bover, 1995). Both these estimations confirm the results of a positive and significant relationship between CEO-Employees pay ratio and firm performance (column 3 of Table 7). These findings strongly suggest that the results are substantive.

In addition, as part of the robustness test, independent variables were lagged to check for possible effect on the dependent variables since previous literature shows that there can be a lagged

effect on impact on performance (Wintoki, Linck, & Netter, 2012). The results though not presented here confirm our results.

5. Discussion

In this study we investigate how the CEO-Employees pay ratio affects productivity and firm performance. We provide evidence to show that there is a positive and significant relation between the CEO-Employees pay ratio and productivity as well as firm performance. We argue that the difference in pay may be motivating employees to work harder and improve their productivity, thereby improving firm performance. This argument supports the tournament theory point of view as against the argument supported by social comparison theory.

We find that when the CEO-Employees pay ratio increases by one unit the employee productivity increases by 0.04% and firm performance as measured by ROE and ROA increases by 4.4 % and 1.4% respectively. Faleye *et al*. (2013) using a US based sample of firms find no significant relation between relative pay and employee productivity, whereas we find a significant positive relation. We argue that when there is an increase in pay difference, the productivity of employee increased. Unlike Faleye *et al*. (2013), Lee *et al*. (2008) and Kale *et al*. (2009) who used US data samples, we find a positive significant relation between relative pay and firm performance. Our results are different from Zalewska (2014) who used a sample of 781 UK firms over the period 2000-2008, to find a negative relationship between CEO pay dispersion and firm performance. This difference in result may be due to the fact that Zalewska (2014) use data based on a survey which can have response bias as compared to this study where the data has been collected from an established database. Also, the author examines pay gap amongst executives of boards which is a smaller non-hierarchical group, whereas our study uses pay dispersion between CEO and average

employee. Therefore, we suggest that our results are specific to the disclosure required by the UK regulators and are robust.

We argue that employees do not perceive a large pay gap as an issue of inequality that would lower their productivity by shirking, instead they work towards improving firm performance. The results show that in the subsample of firms with lower pay dispersion, the productivity coefficient is higher than those firms with higher pay dispersion, indicating that with smaller difference in relative pay the productivity is higher. This indicates that employees where the relative pay gap is smaller may find that they may be able to achieve the higher pay level and work harder.

For larger size firms, the relationship of the CEO-Employees pay ratio to ROE is positive and significant. These results indicate that for large firms a unit increase in CEO-Employees pay ratio increases ROE by 3.8%, whereas this relationship is not significant for smaller size firms. For larger firms the CEO salary is usually higher and hence can lead to a wider pay gap (Faleye *et al*., 2011), this gap can be a motivating factor for employees to perform better leading to enhanced firm performance. The relationship is positive and significant between CEO-Employees pay ratio to ROA for both large and small size firms.

6. Conclusion

The guideline requiring firms to disclose CEO-average employee pay ratio for public listed companies was the result of the intense debate among shareholders regarding excessive CEO pay resulting in lower returns as well as other stakeholders who argue about social responsibility of firms to improve equity in pay levels between CEO and average employees.

The study uses a sample of FTSE All-Shares to find evidence of a positive relation between the CEO-Employees pay ratio and employees' productivity. The results are significant and positive

when the pay gap is small or large. Our results are supported by tournament theory which argues that differences in pay drives competition and ambition and hence improves productivity and firm performance. As opposed to studies that find a negative association between CEO and average employee pay gap and firm performance (Bebchuk *et al*., 2011; Milgrom & Roberts, 1992; Tarkovaska, 2017), our study shows a positive and significant relation between CEO-Employees pay ratio and firm performance (ROA), similar to studies using US based sample and other developed countries (Faleye *et al*., 2013; Mueller *et al*., 2017).

The study provides significant contribution to the on-going debate among academics, policy makers, and social activists in UK about the impact of CEO-Employees pay ratio on employees' productivity and firm performance. We show that even though there are calls for narrowing the CEO-average employee pay gap from shareholders, stakeholders and politicians, with guidelines for firms to disclose this pay gap, our results show that the pay dispersion may be a motivating factor for employees to improve productivity and hence, firm performance. Also, the study extends the literature concerned with the impact of pay differential, employee productivity and firm performance via considering the CEO-Employees pay ratio, whereas much of the literature uses pay dispersion amongst top managers and CEO. In addition, the results inform regulators and practitioners useful information regarding the disclosure of CEO pay gap and its implications on firm performance and employees' productivity. Based on the results, if there is legislation to limit the pay gap, it may lead to lower productivity and hence, lower firm performance in certain class of firms. Furthermore, we claim a contextual contribution via providing empirical evidence using UK data on the impact of the variance in pay between employees and CEOs on productivity and performance. This is an important contribution because while most prior studies are concerned with the US context where the disclosure of CEO pay ratio is mandatory, the impact of such ratio

has not been empirically examined in UK where the regulator's main concern in recent years has been the pay gap between workers and top executives which translated in the issuance of the rule that mandate the disclosure of this ratio from 2020.

The limitation of this study is that the results may not hold for small companies or private companies. Actual behaviour and opinions of employees would be useful to know which this study does not capture and could be done in future studies using survey. Future research can examine the relevance of the CEO pay ratio disclosure rule that came into force in UK from January 2020 to provide comprehensive evidence.

Declaration of Generative AI and AI-assisted technologies in the writing process'.

During the preparation of this work the authors have not used any AI technologies. The authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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