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RESEARCH ARTICLE

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The effect of CEO-to-worker pay disparities on CEO compensation: The mediating role of shareholder say on pay votes

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[Correction added on 3 August 2023, after first online publication: The second affiliation and ORCID of Stephanie Giamporcaro have been added in this version.]

Abstract

In response to large pay disparities caused by rising CEO compensation and stagnant employee pay, US financial regulators have taken several initiatives to mobilise shareholders. However, the ability of these initiatives to enhance shareholder engagement and reduce excessive CEO compensation has been questioned. Using a large sample of 1594 non-financial firms from the Russell 3000 index over 2013–2019, we disentangle the complex role that shareholder engagement towards CEO-to-worker pay disparities plays on CEO compensation. We find that higher CEO-to-worker pay disparities increase shareholder dissent say on pay votes and that, paradoxically, shareholder dissent say on pay votes increase CEO compensation. Furthermore, we provide evidence that shareholder engagement mediates the relationship between CEO-to-worker pay disparities and CEO compensation through their say on pay votes. Our findings are consistent with the relative deprivation theory as shareholders react to large pay disparities to avoid the negative consequences of a feeling of deprivation on employees. They are also in line with the agency theory, as shareholder reactions to large CEO-to-worker pay disparities trigger reactions from the remuneration committee to better align CEO pay with their interests. Overall, our findings support the existence of a shareholder engagement channel driven by social comparison mechanisms and agency responses. This study has important implications for regulators by unpacking the usefulness of these regulatory initiatives to shareholders and also documenting their unintended consequences on CEO compensation.

KEYWORDS
CEO compensation, CEO-to-worker pay ratio, say on pay votes

1 | INTRODUCTION

The U.S. Security and Exchange Commission (SEC) was formed after the financial crisis of 1929 to serve two purposes, namely protecting investors and influencing corporate behaviours (Avakian, 2020). Consequently, after the global financial crisis of 2007–2009, the lack of transparency over CEO compensation practices and the

rise of CEO-to-worker pay disparities have triggered a number of responses from US financial regulators (Schoen, 2017). For example, the SEC enforced section 951 of the Dodd-Franck Act to give shareholders a 'say on pay' vote on CEO compensation in 2011. More recently, section 953 (b) was implemented to make the disclosure of the CEO-to-worker pay ratio mandatory in 2017. These two regulations have profoundly modified the US corporate governance regulatory landscape by giving more control to shareholders over CEO compensation practices and intensifying controversies over large CEO-to-worker pay disparities (Murphy & Jensen, 2018).

The adoption of these two regulations has generated a vivid debate concerning the usefulness of the CEO-to-worker pay ratio for shareholders, its impact on say on pay vote practices, and its ability to tackle excessive CEO compensation (Bank & Georgiev, 2019). On the one side, supporters argue that the CEO-to-worker pay ratio increases transparency by providing a better understanding of who contributed to corporate value creation and by detecting unfair compensation practices (Benedetti & Chen, 2018). This approach sees the CEO-to-worker pay ratio as beneficial in informing shareholders about a potential risk affecting their interests and decreasing excessive CEO compensation. On the other side, critics are sceptical about the rule's usefulness due to methodological flaws, high implementation costs, and potential unintended consequences on corporations and their stakeholders (Edmans, 2017; Loh, 2017; Murphy & Jensen, 2018). This more conservative approach questions the merits of the CEO-to-worker pay ratio for shareholders and its ability to curb excessive CEO compensation.

The existing literature on the effect of the CEO-to-worker pay ratio on CEO compensation is scarce and conflicting. For example, Chang et al. (2022) and Johnson (2022) find that remuneration committees are modifying the CEO compensation structure and reducing the pay components at risk when firms are under public scrutiny due to large CEO-to-worker pay disparities. However, Irlbeck (2019) documents an increase in CEO compensation (total pay and equity pay) and Knust and Oesch (2020) report no significant results. In addition, empirical evidence on the effect of the CEO-to-worker pay ratio on say on pay votes (Chang et al., 2022; Crawford et al., 2021; Knust & Oesch, 2020) and the effects of say on pay votes on CEO compensation (Balsam et al., 2016; Burns & Minnick, 2013; Faghani et al., 2015; Gregory-Smith et al., 2014; Grosse et al., 2017; Hadley, 2017; Kimbro & Xu, 2016) is mixed. Thus, there is a need to disentangle the complex role that shareholder engagement towards CEO-to-worker pay disparities plays on CEO compensation. As a result, McCahery et al. (2016) and Pan et al.

(2022) introduced the concept of shareholder engagement channel to explain the complex effect of shareholders' reaction to sustainability issue on corporation's activities and outcomes. However, no studies have applied this concept to explain the mediating role of shareholder say on pay votes on the relationship between CEO-to-worker pay disparities and CEO compensation.

Hence, this study examines the effect of CEO-to-worker pay disparities on shareholder dissent say on pay votes and their joined effects on CEO compensation. Relying on the relative deprivation and agency theories, we argue that CEO-to-worker pay disparities affect CEO compensation through shareholder dissent say on pay votes. This is because the adverse consequences of CEO-to-worker pay disparities caused by social comparisons are likely to create a negative feeling of deprivation on employees, which will trigger reactions from shareholders and the remuneration committee. Therefore, we posit that CEO-to-worker pay disparities have an indirect effect on CEO compensation via shareholder say on pay votes. We refer to this indirect path as the shareholder engagement channel and we expect shareholder say on pay votes to partially mediate the relationship between CEO-to-worker pay disparities and CEO compensation. Using a sample of 1594 non-financial companies in the Russell 3000 index from 2013 to 2019, for a total of 9075 observations, our results show that the CEO-to-worker pay ratio positively impacts shareholder dissent say on pay votes and shareholder dissent say on pay votes positively impact CEO compensation after controlling for the CEO-to-worker pay ratio. Finally, shareholder dissent say on pay votes are found to partially mediate the relationship between the CEO-to-worker pay ratio and CEO compensation.

The contribution of this study is twofold. First, prior studies have documented the effect of the CEO-to-worker pay ratio on say on pay votes (Chang et al., 2022; Crawford et al., 2021; Knust & Oesch, 2020) and the effect of say on pay votes on CEO compensation (Balsam et al., 2016; Burns & Minnick, 2013; Faghani et al., 2015; Gregory-Smith et al., 2014; Grosse et al., 2017; Hadley, 2017; Kimbro & Xu, 2016) with mixed results. Additionally, studies on the direct effect between the CEO-to-worker pay ratio and CEO compensation are also conflicting (Chang et al., 2022; Irlbeck, 2019; Knust & Oesch, 2020). Thus, this study contributes to and extends prior studies by proposing and documenting the mediating role of shareholder say on pay votes on the relationship between CEO-to-worker pay disparities and CEO compensation.

Second, this study demonstrates that shareholder engagement partially mediates the relationship between CEO-to-worker pay disparities and CEO compensation

through their say on pay votes. Drawing on the relative deprivation theory (Bolton & Ockenfels, 2000; Crosby, 1984; Fehr & Schmidt, 1999; Martin, 1981), we argue that a possible reason for this finding is the reaction of shareholders to large CEO-to-worker pay disparities due to their adverse effects on employees. These adverse effects increase shareholders' engagement during say on pay votes and, in turn, the remuneration committee reacts to these shareholder dissent say on pay votes by modifying CEO compensation. The response of the remuneration committee is consistent with the agency theory. Overall, these results support the existence of a shareholder engagement channel (McCahery et al., 2016; Pan et al., 2022) driven by the presence of social comparison mechanisms and agency responses. This study unpacks the usefulness of shareholder say on pay votes and CEO-to-worker pay ratio rules to increase shareholder engagement but also documents their unintended consequences on CEO compensation.

The remainder of this study is organised as follows. Section 2 reviews the literature and develops the hypotheses. Section 3 describes the data and methodology. Section 4 presents the results of our empirical analysis. Finally, section 5 concludes this study.

2 | LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 | The background of the 'Say on Pay' and 'Pay Ratio Disclosure' regulations

In response to the global financial crisis of 2007–2009 and the rise of political movements asking for more social and economic justice (i.e., Occupy Wall Street), US financial regulators implemented the Dodd Franck Act in 2010 to restore confidence in capital markets by giving more information and rights to shareholders. In this section, we focus on two recent regulations (i.e., the say on pay rule and the CEO-to-worker pay ratio disclosure rule) that have fuelled the debate on shareholder engagement towards CEOs' increasing level of compensation and, more recently, on CEO-to-worker pay disparities (Bank & Georgiev, 2019).

In 2011, the SEC implemented section 951 of the Dodd-Franck Act, also known as the say on pay regulation. This regulation requires publicly listed companies to vote on CEO compensation packages at least every 3 years or more frequently (i.e., every 1 or 2 years). Consequently, shareholders can express their opinions on CEO compensation programmes during the annual meeting of a given year. The SEC designed this rule to give timely and relevant information to shareholders to

enhance their engagement on CEO remuneration practices (SEC, 2015). However, the say on pay regulation is not binding, meaning that companies are not legally obliged to follow voting outcomes.

In 2013, the SEC adopted section 953 (b) of the Dodd-Franck Act to reinforce the accountability of publicly listed companies by requiring the disclosure of the pay ratio between the CEO and the median of all other employees. Enforced in 2017, the rule requires targeted companies to disclose (under item 402 (c)(2)(x) of Regulation S-K) the following information:

1. The median of the annual total compensation of all employees.
2. The annual total compensation of the CEO.
3. The ratio of the two.

Although directed by the U.S. Congress in July 2010, the pay ratio disclosure rulemaking process has been delayed due to an unprecedented engagement from academics, practitioners, and the general public (Crawford et al., 2021; Johnson, 2022). For example, the SEC received more than 287,400 comment letters and 1540 individual letters after proposing the rule and inviting public comments (SEC, 2015). The SEC argues that the information provided by the CEO-to-worker pay ratio disclosure is useful for investors as it gives important information on the labour practices and incentive structures of a given corporation (SEC, 2015).

In conclusion, these two rules of the Dodd-Franck Act of 2010 have modified the US regulatory landscape by giving more control to shareholders, increasing transparency over CEO compensation practices, and promoting accountability in the financial system. However, their implementation has been subject to a heated debate. Supporters argue that the CEO-to-worker pay ratio is useful for shareholders and can reduce excessive CEO compensation while critics assert the opposite (Bank & Georgiev, 2019).

2.2 | Pay disparities

Pay is a highly controversial topic because it symbolises one's efforts and accomplishments, reflecting status (Cowherd & Levine, 1992; O'Reilly et al., 1988). As most individuals' income comes from their employment, pay disparities greatly influence income distribution and fuel broader economic inequality (Song & Whang, 2020; Wang et al., 2015). Thus, pay is seen as a symbol conveying broader societal questions related to social inequity and economic inequality (Bank & Georgiev, 2019). This socially constructed symbolic representation of pay

appears as a significant root of the controversy surrounding the usefulness of the CEO-to-worker pay ratio disclosure for shareholders and its ability to curb excessive CEO compensation (Bank & Georgiev, 2019).

The relative deprivation theory (Bolton & Ockenfels, 2000; Crosby, 1984; Fehr & Schmidt, 1999; Martin, 1981) explains the socially determined symbolic value that pay could represent through social comparisons.[1] It posits that a feeling of deprivation perceived by individuals originates from the effects of comparing their rewards to the rewards of a reference individual or group of individuals (Folger & Martin, 1986). This feeling of deprivation alters their impressions of fairness and lowers their morale and productivity, having detrimental consequences on corporations and their stakeholders (Trevor et al., 2012). Empirical evidence has demonstrated that a feeling of deprivation derived from the social comparisons of pay disparities could cause inequity perceptions corrosive to cooperation and, ultimately, firm performance (Breza et al., 2018; Cowherd & Levine, 1992; Trevor et al., 2012). Furthermore, perceived inequity could also affect productivity (Beaumont & Harris, 2003; Pfeffer & Langton, 1993), product quality (Cowherd & Levine, 1992; Shaw et al., 2002), job satisfaction (Card et al., 2012; Green & Zhou, 2019), attendance (Cornelissen et al., 2011) and employees' turnover (Shin et al., 2015; Wade et al., 2006). Thus, the relative deprivation theory is relevant for this study due to its long-standing of empirical research focusing on the disadvantages of vertical pay disparities comparisons (Cowherd & Levine, 1992; Henderson & Fredrickson, 2001).

2.3 | Hypotheses development

2.3.1 | The CEO-to-worker pay ratio and shareholder say on pay votes

The relative deprivation theory suggests that individuals may feel dissatisfied or resentful when they compare their situation to those of a reference individual or group of individuals. The CEO-to-worker pay ratio might create a feeling of relative deprivation among employees as the pay ratio reveals the size of the gap between their compensation and those of their CEOs (Przychodzen & Gómez-Bezares, 2021). Employees wonder whether their CEOs deserve the pay received and if the CEO compensation package rewards the performance achieved. Their morale and productivity might be affected due to a perception of unfairness, as their efforts are not rewarded appropriately compared to their CEOs (Breza et al., 2018; Cowherd & Levine, 1992; Trevor et al., 2012). This 'pay for performance' motive of relative deprivation might affect employees and have detrimental consequences on the corporation. In sum, the relative deprivation theory suggests that employees might experience a negative feeling of relative deprivation due to vertical pay comparisons with their CEOs.

Prior studies examining the relationship between the CEO-to-worker pay ratio and shareholder say on pay votes are mixed. For example, Crawford et al. (2021) demonstrate that shareholders react to large CEO-to-worker pay ratios by voting against CEO compensation packages during their say-on-pay proposals. Their study focuses on a sample of U.S. commercial banks from 2010 to 2017 and a sample of ExecuComp firms for 2017. Similar results have been reported by Chang et al. (2022) for a sample of 2704 U.S. firm-year observations from 2014 to 2018. However, Knust and Oesch (2020) find no relationship between the CEO-to-worker pay ratio and say on pay votes for a sample of 354 U.S. firms from 2015 to 2017. Thus, the argument can be made that shareholders react to large CEO-to-worker pay ratios because it may affect corporate performance. However, studies on the CEO-to-worker pay ratio and corporate performance are also inconclusive, with some reporting a positive association (Banker et al., 2016; Cheng et al., 2017; Faleye et al., 2013), a negative association (Pan et al., 2022) and a mixed association after disaggregating the CEO-to-worker pay ratio (Rouen, 2020). Kaplan and Zamora (2018) suggest that shareholders not only look at corporate profits during their say on pay votes, but also consider income attributes, such as the performance against analysts' expectations and income source, compared to past performance and other peer companies' performance. Their results show that the perception of fairness about CEO compensation is a significant determinant of shareholder say on pay votes.

To conclude, the relative deprivation theory and previous studies suggest that shareholders are likely to react to large CEO-to-worker pay disparities to prevent the adverse effects of a negative feeling of deprivation on employees. Thus, we propose the following hypothesis:

> **H1.** The CEO-to-worker pay ratio increases the proportion of shareholder dissent say on pay votes.

2.3.2 | Say on pay votes and CEO compensation

The agency theory posits that there is a potential conflict of interest between shareholders and managers (Jensen & Meckling, 1976). This is because managers

may take advantage of their positions to prioritise their own interests at the expense of shareholders, leading to decisions that are not in the best interests of shareholders. The design of CEO compensation is supposed to address this agency problem by incentivising and rewarding CEOs for their performance (Bebchuk & Fried, 2004). However, shareholders are concerned about the overpayment of CEOs and the lack of alignment with corporations' performance (Grewal et al., 2016). This has led to the introduction of the shareholder say on pay votes, which allows shareholders to express their opinions on CEO compensation packages (SEC, 2015).

The agency theory assumes that the proportion of shareholder dissent votes can have a negative effect on CEO compensation because it signals to the remuneration committee[2] that shareholders lack confidence in the CEO's performance or compensation package (Conyon, 2016). In turn, the remuneration committee might review and reduce the CEO compensation package to better align it with the interests of shareholders. In other words, the threat of shareholder dissent say on pay votes serves as a monitoring mechanism that triggers a reaction from the remuneration committee to act in the best interests of shareholders. Thus, the remuneration committee might reduce CEO compensation to respond to shareholder dissent say on pay votes because it demonstrates its willingness to address shareholder concerns and ensures that CEO compensation is aligned with corporate performance.

Empirical evidence on the relationship between shareholder say on pay votes and CEO compensation is largely mixed. While some studies report a negative association between say on pay votes and CEO compensation (Balsam et al., 2016; Kimbro & Xu, 2016), others find no association (Burns & Minnick, 2013; Grosse et al., 2017) and a positive association (Gregory-Smith et al., 2014). Beyond these conflicting results, some studies find that shareholder dissent say on pay votes affects the CEO compensation mix. For example, Burns and Minnick (2013) and Faghani et al. (2015) argue that corporations having experienced a high level of shareholder dissent say on pay votes increase the use of performance-based compensation. Moreover, Hadley (2017) finds the voluntary use of additional or complementary performance-based compensation.

Overall, the agency theory suggests that the remuneration committee is likely to consider shareholder dissent say on pay votes because they signal the lack of confidence of shareholders in the CEO compensation package. As a result, the remuneration committee will adjust CEO compensation to respond to shareholder concerns and better align the CEO compensation package with corporate performance. Therefore, we propose the following hypothesis:

> **H2.** The proportion of shareholder dissent say on pay votes has a negative effect on CEO compensation.

2.3.3 | The mediating effect of say on pay votes

According to the relative deprivation theory, large CEO-to-worker pay disparities have detrimental consequences on corporate performance because they create a negative feeling of deprivation affecting employees. Perceiving this problem, the remuneration committee can have a direct effect on CEO compensation by modifying its level and structure. Moreover, the agency theory posits that shareholders can have an indirect effect on CEO compensation by issuing dissent say on pay votes that will be considered by the remuneration committee. In the latter case, shareholders' reactions are expected to trigger action from the remuneration committee to change CEO compensation. We refer to this indirect path as the shareholder engagement channel and the combined effect of these two paths (direct and indirect) explains the total effect of the CEO-to-worker pay ratio on CEO compensation.

The concept of shareholder engagement channel, introduced by McCahery et al. (2016) and Pan et al. (2022), might help explain the indirect effect of shareholder say on pay votes on the relationship between CEO-to-worker pay disparities and CEO compensation. Under this concept, shareholder engagement towards a specific sustainability issue, such as income inequality, generates a reaction affecting corporate activities and outcomes through a complex channel of impacts on different corporate systems. This channel starts from the sustainability issue of interest, then provokes a reaction from shareholders, and subsequently affects a corporation's activities and outcomes (Pan et al., 2022). Applied in our case, the shareholder engagement channel begins with the disclosure of the CEO-to-worker pay ratio, which triggers a reaction from shareholders that is expressed through their say on pay votes, and subsequently affects CEO compensation.

Prior research on shareholder engagement in the United States has mostly focused on its effects on corporate outcomes (Gillan & Starks, 2007). For example, in a review of 73 empirical studies, Denes et al. (2017) find that shareholder engagement is associated with improved shareholder value and corporate operations. More narrowly, some research has focused on the effect of shareholder engagement on CEO compensation. Ertimur et al.
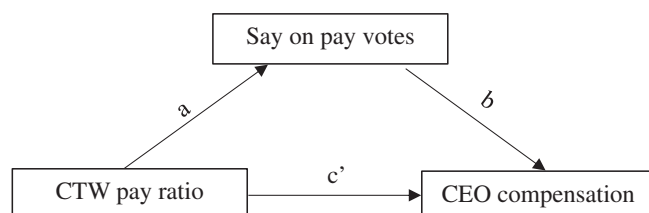
FIGURE 1 Mediation model. Post-estimation calculations: direct effect = c'; indirect effect = $a \times b$; Sobel test = $a \times b$/SQRT $(b^2 \times s_a^2 + a^{2*}s_b^2 + s_a^2 \times s_b^2)$. RIT, indirect effect/total effect (direct + indirect effects). RID, indirect effect/direct effect.

(2011) find that shareholder engagement, expressed through vote-no campaigns, reduces CEO compensation by 38% in corporations with excess CEO compensation. Conyon (2016) documents a reduction in the growth of CEO pay in the United States context, while Ferri and Maber (2013) report an increase in the sensitivity of CEO pay to poor performance in the United Kingdom context. Additionally, shareholder engagement on sustainability issues is becoming prevalent in recent years. Grewal et al. (2016) report that shareholder engagement went from 8% in 1999 to 21% in 2013. The authors also find that shareholder engagement on sustainability issues is associated with improved performance on environmental, social, and governance issues and firm value if the proposals are on material (i.e., financially significant) sustainability issues (Grewal et al., 2016).

Consequently, we propose applying the concept of shareholder engagement channel to examine the role of shareholder dissent say on pay votes on mediating the relationship between the CEO-to-worker pay ratio and CEO compensation. Based on the relative deprivation and agency theories, we expect that shareholder dissent say on pay votes will mediate the relationship between the CEO-to-worker pay ratio and CEO compensation. Thus, we propose the following hypothesis:

> **H3.** The proportion of shareholder dissent say on pay votes mediates the relationship between the CEO-to-worker pay ratio and CEO compensation.

Figure 1 presents the conceptual model.

3 | DATA AND METHODOLOGY

3.1 | Data and sample

This study focuses on a large sample of non-financial U.S. firms in the Russell 3000 index from 2013 to 2019, which covers 98% of publicly traded equities in this

TABLE 1 Final sample and sector classification.

Panel A: Sample selection		Russell 3000 index
Initial sample		2992
Less: Financial companies		745
Less: Missing CEO-to-worker pay ratios		332
Less: Missing say on pay votes		321
Final sample		1594
Panel B: Sector classification	Frequency	Percentage
Energy	120	7.53
Materials	119	7.47
Industrials	332	20.83
Consumer discretionary	291	18.26
Consumer staples	91	5.71
Healthcare	223	13.99
IT	301	18.88
Communications	99	6.21
Utilities	18	1.12
Total	1594	100

Note: The final sample is unbalanced panel data and composed of 1594 firms with 9075 observations from 2013 to 2019.

country. Due to the mixed results from the literature on CEO-to-worker pay ratio, say on pay votes, and CEO compensation (Chang et al., 2022; Crawford et al., 2021; Knust & Oesch, 2020), extending the knowledge to small and mid-cap companies might provide new insights on the level of pay disparities, shareholder voting, and CEO compensation practices for this group of companies. The sample period starts in 2013 with the adoption of the CEO-to-worker pay ratio rule by the SEC and ends in 2019, the latest year available when data has been collected. Our data comes from the Bloomberg terminal, a well-known and popular financial data provider widely used in academic research (Park & Ravenel, 2013). Finally, our final sample consists of an unbalanced panel with 1594 firms and 9075 firm-year observations. Table 1 reports the sample selection process and the sector classification.

3.2 | Variable measurement

3.2.1 | CEO compensation, shareholder dissent say on pay votes, CEO-to-worker pay ratios

Consistent with previous studies on CEO compensation (Ertimur et al., 2013; Shaw & Zhang, 2010), *CEOTot* is the natural logarithm of the total CEO compensation. It

measures the benefits received by CEOs in return for their services. Obermann and Velte (2018) suggests that shareholder dissent say on pay votes are mainly triggered by total CEO compensation. Thus, *SNO Votes* is measured by the proportion of shareholders voting against the CEO compensation package. Following previous literature on say on pay votes (Conyon, 2016; Ertimur et al., 2013), this variable is computed by the number of shareholder dissent votes divided by the total votes (addition of 'for', 'against', and 'abstention' votes). Finally, following prior study (Crawford et al., 2021), the CEO-to-worker pay ratio (*CTW*) is calculated by the total compensation of the CEO divided by the average employee pay where the average employee pay is measured by the total selling, general, and administrative (SG&A) expenses divided by the total number of employees.

3.2.2 | Control variables

Based on previous studies on corporate governance (Boateng et al., 2021; Cadman & Carter, 2014; Liu et al., 2017; Sarhan et al., 2019; Wang et al., 2022), we include a set of control variables that may potentially impact shareholder dissent votes and CEO compensation. We include *Peers* as social comparison effects between CEO remunerations might affect our dependent variables. *Peers* assesses the distance of CEO compensation relative to other CEOs in their sector (Cadman & Carter, 2014; Denis et al., 2020). The quality of corporate governance is also likely to affect shareholder dissent say on pay votes and CEO compensation. Consistent with previous studies by Core et al. (1999), Bertrand and Mullainathan (2001), Ertimur et al. (2013), Conyon (2016) and Elmagrhi et al. (2020), we control for the presence of compensation consultants (*CompAdv*), the total number of directors sitting on the board (*BoardSize*), the separation of the roles of chairman and CEO (*CEODual*), the presence of a founding member as having a role of CEO (*CEOFounder*), the age of the CEO (*CEOAge*), the proportion of institutional shareholders (*InstOwn*), and the proportion of non-executive directors on the board (*NonExec*).

Prior literature (Ertimur et al., 2011; Ferri & Maber, 2013) shows that firm performance is a key driver of shareholder dissent votes and CEO compensation. Thus, we include the return on asset (*ROA*), an accounting-based measure, and the total shareholder return (*TSR*), a market-based measure. Finally, we control for firm characteristics by including *FirmSize*, measured by the natural logarithm of total assets, and *Leverage*, calculated by dividing total liabilities by its total equity (Conyon, 2016). Consistent with Ryan and

TABLE 2 Definitions of variables.

Variables	Definition
Main dependent and independent variables	
CEOTot	The total amount of compensation the company paid to the Chief Executive Officer (CEO).
SNOVotes	The proportion of shareholders voting against the CEO compensation package (in percentage).
CTW	The CEO-to-worker pay ratio is calculated by the total CEO compensation divided by the average employee pay. The average employee pay is measured by the total selling, general, and administrative (SG&A) expenses divided by the total number of employees.
Control variables	
Peers	The *CEOTot* relative to the average CEO pay in their sector. *Peers* is calculated by subtracting the total CEO compensation and the average CEO pay of the associated sector in absolute value.
CompAdv	1, if the company appoints outside executive compensation advisors, 0 otherwise.
BoardSize	The number of directors on the company's board, as reported by the company.
CEODual	1, if the company's chief executive officer is also chairman of the board, 0 otherwise.
CEOFounder	1, if the company's chief executive officer is also the founder of the company, 0 otherwise.
CEOAge	The age of the chief executive officer.
InstOwn	The proportion of institutional ownership to total company ordinary shareholdings.
NonExec	The percentage of non-executive directors on the board.
ROA	The return on assets is the ratio of net income to total assets.
TSR	The total shareholder return is the annual appreciation or depreciation of the share price plus any dividends paid for 1 year.
Firmsize	The natural log of total assets.
Leverage	The ratio of debt in current liabilities plus debt in long-term debt divided by the total shareholders' equity.
RDIntensity	The research and development expenses divided by total assets.
NofEmpl	The total number of employees engaged in the business for 1 year.

Wiggins (2001) and Wade et al. (2006), we also include *RDIntensity*, determined by dividing R&D expenses and total assets, and *NofEmpl*, measuring the total number of

employees. Sector and year dummies have also been included in the model. Table 2 presents the definitions of all the variables employed in this study.

3.3 | Econometric model and analysis technique

We conduct a regression-based mediation analysis following Baron and Kenny (1986) to test our hypotheses. This approach has been employed in previous research on corporate governance (Murphy & Sandino, 2020). Mediation can be established through three regressions. A first regression examines the relationship between the independent variable and the mediator, a second regression investigates the relationship between the mediator and the dependent variable, and finally, a third regression tests the relationship between the mediator and the dependent variable after controlling for the independent variable (Baron & Kenny, 1986). Therefore, we estimate the following models.

$$SNO\ Voting_{it+1} = \beta 0 + \beta 1\ CTW_{it} + \beta 2\ Controls_{it} + \varepsilon_{it} \quad (1)$$

$$CEOC_{it+1} = \beta 0 + \beta 1\ SNO\ Voting_{it+1} + \beta 2\ Controls_{it} + \varepsilon_{it} \quad (2)$$

$$CEOC_{it+1} = \beta 0 + \beta 1\ SNO\ Voting_{it+1} + \beta 2\ CTW_{it} + \beta 3\ Controls_{it} + \varepsilon_{it} \quad (3)$$

In model (1), the dependent variable is *SNO Voting*, measured by the proportion of shareholders voting against the CEO compensation package for a firm 'i' in the function of time 't'. In model (2) and model (3), the dependent variable is *CEOC*, the total CEO compensation for a firm 'i' in the function of time 't'. In terms of independent variables, in model (1), the main variable is the CEO-to-worker pay ratio, while in model (2), the main variable is *SNO Voting*, and finally, in model (3), the main variables are *SNO Voting* and the CEO-to-worker pay ratio (*CTW*). *Controls* represents control variables. Finally, a set of sector and year dummies have been included to control for their effects.

Model (1) tests the relationship between the CEO-to-worker pay ratio and the mediator, shareholder dissent say on pay votes, as predicted by hypothesis H1. The coefficient β1 of this model (coefficient a in Figure 1) estimates the first part of the indirect effect of the CEO-to-worker pay ratio on CEO compensation. Model (2) tests the relationship between shareholder dissent say on pay votes and CEO compensation, as predicted by hypothesis H2. Finally, model (3) tests

hypothesis H3 regarding the mediating effect of shareholder dissent say on pay votes on the relationship between CEO-to-worker pay disparities and CEO compensation. The coefficient β1 (coefficient b in Figure 1) captures this second part of the indirect effect of the CEO-to-worker pay ratio on CEO compensation. The coefficient β2 of this model (coefficient c′ in Figure 1) captures the direct effect of the CEO-to-worker pay ratio on CEO compensation. The total effect of the CEO-to-worker pay ratio on CEO compensation is the sum of the direct and indirect effects.

We conduct two tests to evaluate the significance of the mediation effect. First, we compute the Sobel test to determine whether the indirect effect of the predictor on the outcome variable through the mediator is statistically different from zero (MacKinnon et al., 1995; Sobel, 1982). The Sobel test is computed by the ratio of the product of the coefficients *a* and *b* divided by the standard errors (Preacher & Leonardelli, 2001). Second, we calculate the ratio of the indirect effect to the total effect (RIT) and the ratio of the indirect effect to the direct effect (RID) to estimate the size of the mediating effect (Mehmetoglu, 2018).

4 | EMPIRICAL FINDINGS

4.1 | Descriptive statistics

Table 3 presents the descriptive statistics of all the variables used in this study. The average *SNOVotes* is 7.44%, which is in line with the study of Crawford et al. (2021), who found an average of 8% for a sample of commercial banks from 2010 to 2017. The average total CEO compensation (*CEOTot*) is 15.39 (or $7218,880), which is consistent with Conyon (2016). Regarding the independent variables, the average CEO-to-worker pay ratio is about 168-to-1 with a median of about 83-to-1. Moreover, these findings differ from Crawford et al. (2021), who found an average CEO-to-worker pay ratio of about 28-to-1 for U.S. commercial banks. Finally, the descriptive statistics of other explanatory variables are consistent with prior studies (Conyon, 2016; Crawford et al., 2021; Ertimur et al., 2013).

Table 4 presents the Pearson correlation matrix. The results show that the CEO-to-worker pay ratio is positively and significantly correlated with the proportion of shareholder dissent say on pay votes, consistent with H1. Besides, total CEO compensation is positively and significantly correlated with the CEO-to-worker pay ratio and the proportion of shareholder dissent say on pay votes. In addition, the variance inflation factors (VIFs; see Table A1) are relatively

TABLE 3   Descriptive statistics.

Variable	Obs.	Mean	Q1	Median	Q3	SD
CEOTot ($000 s)	9075	7218.88	2803.02	5525.36	9881.82	5770.08
CEOTot (log)	9075	15.39	14.85	15.52	16.11	1.31
SNOVotes (%)	9075	7.44	1.69	3.72	8.30	9.20
CTW	9075	168.17	33.00	82.90	194.54	215.90
Peers	9075	14.98	14.47	15.16	15.60	1.10
CompAdv (1/0)	9075	0.84	1.00	1.00	1.00	0.36
BoardSize	9075	9.05	8.00	9.00	10.00	2.12
CEODual (1/0)	9075	0.39	0.00	0.00	1.00	0.49
CEOFounder (1/0)	9075	0.10	0.00	0.00	0.00	0.29
CEOAge	9075	56.84	52.00	56.63	61.00	7.21
InstOwn (%)	9075	87.31	81.23	95.05	100.00	18.13
NonExec (%)	9075	84.65	81.82	87.50	90.00	8.18
ROA	9075	5.29	1.76	5.21	9.14	6.50
TSR	9075	0.16	−0.08	0.15	0.36	0.33
FirmSize (log)	9075	7.74	6.59	7.67	8.79	1.64
Leverage	9075	4.03	3.59	4.02	4.76	1.54
RDintensity	9075	0.03	0.00	0.00	0.03	0.06
NofEmpl	9075	8.43	7.31	8.50	9.55	1.76

Note: CEOTot denotes CEO total compensation; SNOVotes denotes shareholders say on pay votes; CTW denotes the CEO-to-worker pay ratio; Peers denotes CEO total compensation relative to the average CEO pay in their industry; CompAdv denotes compensation advisors; BoardSize denotes board size; CEODual denotes CEO duality; CEOFounder denotes the founder of the company; CEOAge denotes the age of CEO; InstOwn denotes institutional ownership; NonExec denotes non-executive directors; ROA denotes return on assets; TSR denotes total shareholders return; Firmsize denotes the size of the firm; Leverage denotes leverage; RDintensity denotes R&D intensity; NofEmpl denotes total number of employees.

low for each model, indicating no major multicollinearity problems.

4.2 | Multivariate regression results

First, Column (1) of Table 5 reports the results regarding the first part of the shareholder engagement channel related to the effect of the CEO-to-worker pay ratio on shareholder dissent say on pay votes. We find a positive and significant association between the CEO-to-worker pay ratio and shareholder dissent votes ($\beta = 0.008$, $p < 0.01$). For every 10 points of the CEO-to-worker pay ratio, the proportion of dissent votes increases by 0.8%. Second, Column (2) of Table 5 shows the results regarding the second part of the shareholder engagement channel dealing with the effect of shareholder dissent say on pay votes on total CEO compensation. We find a positive and significant relationship between shareholder dissent say on pay votes and total CEO compensation ($\beta = 0.022$, $p < 0.01$). For every 10% of shareholder dissent say on pay votes, CEO compensation increases by 2.2%, which is about $137,494. Overall, the results of column (1) of

Table 5 support hypothesis H1, whereby shareholders' response to large CEO-to-worker pay ratio is likely to increase dissent say on pay votes. Nevertheless, the results of column (2) of Table 5 does not lend support for our hypothesis H2 but reveal a positive and significant association between shareholder dissent say on pay votes and CEO compensation.

Third, we examine the mediating effect of say on pay votes by estimating the direct effect between CEO-to-worker pay disparities and CEO compensation after controlling for the mediator's effect on the dependent variable. Column (3) of Table 5 reports a positive and significant association between the CEO-to-worker pay ratio and CEO compensation ($\beta = 0.001$, $p < 0.01$). Additionally, the mediator's effect (say on pay votes) on total CEO compensation is positive and significant ($\beta = 0.021$, $p < 0.01$). These results demonstrate that the relationship between the CEO-to-worker pay ratio and total CEO compensation is partially mediated by the proportion of shareholder dissent say on pay votes, as the direct and indirect paths are both significant. Overall, we find that shareholders' responses to large CEO-to-worker pay gaps affect CEO compensation, which lends support for our hypothesis H3.

TABLE 4 Pearson correlation matrix.

	CEOTot	SNOVotes	CTW	Peers	CompAdv	BoardSize	CEODual	CEOFounder	CEOAge	InstOwn	NonExec	ROA	TSR	FirmSize	Leverage	RDintensity	NofEmpl
CEOTot	1																
SNOVotes	0.199**	1															
CTW	0.385**	0.154**	1														
Peers	−0.008	0.119**	0.101**	1													
CompAdv	0.349**	0.032*	0.157**	−0.120**	1												
BoardSize	0.364**	0.009	0.266**	0.050**	0.266**	1											
CEODual	0.033*	0.032*	0.019	0.037**	−0.017	−0.008	1										
CEOFounder	−0.167**	0.029**	−0.059**	0.037**	−0.080**	−0.151**	0.206**	1									
CEOAge	0.039**	0.016	0.003	0.012	−0.074**	0.010	0.262**	0.060**	1								
InstOwn	0.221**	0.026*	0.115**	−0.174**	0.297**	0.120**	−0.048**	−0.036**	−0.090**	1							
NonExec	0.254**	0.016	0.148**	−0.081**	0.331**	0.321**	−0.036**	−0.152**	−0.109**	0.243**	1						
ROA	0.040**	−0.123**	0.055**	0.012	−0.068**	0.052**	−0.007	−0.007	0.071**	0.001	−0.028**	1					
TSR	−0.013	−0.074**	0.001	−0.001	−0.030**	−0.039**	0.011	0.020	−0.035**	−0.029**	−0.038**	0.120**	1				
FirmSize	0.499**	0.100**	0.382**	0.099**	0.287**	0.608**	0.085**	−0.080**	0.009	0.207**	0.262**	0.008	−0.062**	1			
Leverage	0.172**	0.038**	0.123**	−0.034**	0.123**	0.193**	0.003	−0.070**	−0.030*	−0.030*	0.072**	−0.145**	−0.028**	0.273**	1		
RDintensity	−0.086**	0.016	−0.158**	0.034**	0.008	−0.139**	−0.025*	0.190**	−0.124**	−0.025*	−0.036**	−0.100**	0.081**	−0.184**	−0.114**	1	
NofEmpl	0.409**	0.014	0.574**	0.028**	0.232**	0.543**	0.096**	−0.101**	0.031*	0.218**	0.229**	0.122**	−0.016	0.735**	0.162**	−0.191**	1

Note: This table reports the Pearson correlation coefficients. **, * indicate that correlation is significant at the 0.01 and 0.05 levels, respectively. CEOTot denotes CEO total compensation; SNOVotes denotes shareholders say on pay votes; CTW denotes the CEO-to-worker pay ratio; Peers denotes CEO total compensation relative to the average CEO pay in their industry; CompAdv denotes compensation advisors; BoardSize denotes board size; CEODual denotes CEO duality; CEOFounder denotes the founder of the company; CEOAge denotes the age of CEO; InstOwn denotes institutional ownership; NonExec denotes non-executive directors; ROA denotes return on assets; TSR denotes total shareholders return; Firmsize denotes the size of the firm; Leverage denotes leverage; RDintensity denotes R&D intensity; NofEmpl denotes total number of employees.

TABLE 5 CEO-to-worker pay disparities and the shareholder engagement channel.

	1st part of the channel	2nd part of the channel	Mediation
	Dep: *SNOVotes*	Dep: *CEOTot*	Dep: *CEOTot*
	(1)	(2)	(3)
CTW	0.008*** (0.001)		0.001*** (0.001)
SNOVotes		0.022*** (0.002)	0.021*** (0.002)
Peers	0.385*** (0.106)	−0.065*** (0.009)	−0.077*** (0.010)
CompAdv	0.084 (0.324)	0.652*** (0.064)	0.634*** (0.062)
BoardSize	−0.236*** (0.067)	0.022*** (0.007)	0.024*** (0.007)
CEODual	0.806*** (0.235)	0.092*** (0.029)	0.104*** (0.029)
CEOFounder	0.534 (0.430)	−0.469*** (0.094)	−0.481*** (0.094)
CEOAge	0.031* (0.016)	0.013*** (0.003)	0.014*** (0.003)
InstOwn	0.011* (0.006)	0.004*** (0.001)	0.004*** (0.001)
NonExec	0.022 (0.015)	0.009*** (0.002)	0.009*** (0.002)
ROA	−0.089*** (0.018)	0.008*** (0.002)	0.008*** (0.002)
TSR	−2.700*** (0.405)	0.250*** (0.047)	0.233*** (0.047)
FirmSize	1.278*** (0.127)	0.272*** (0.021)	0.289*** (0.020)
Leverage	−0.079 (0.078)	0.025* (0.014)	0.021 (0.013)
RDIntensity	3.633	0.225	0.416
	(2.540)	(0.396)	(0.381)
NofEmpl	−1.285*** (0.135)	0.026** (0.010)	−0.027** (0.014)
Year effects	Yes	Yes	Yes
Sector effects	Yes	Yes	Yes
Intercept	−1.008 (2.387)	11.046*** (0.291)	11.411*** (0.274)
Adj. R^2	0.072	0.370	0.376
No. of obs.	7280	7280	7280

Note: This table presents the OLS estimations for the CEO-to-worker pay ratio as a determinant of shareholder dissent votes (first part of the shareholder engagement channel), for the shareholder opposition to pay gaps and its effect on future CEO compensation (second part of the shareholder engagement channel), and for the joint effect of the CEO-to-worker pay ratio and the shareholder opposition to pay gaps on future CEO compensation (mediation relationship). Robust standard errors are presented in the parenthesis and *, **, *** indicate statistical significance at 10%, 5%, and 1%. CEOTot denotes CEO total compensation; SNOVotes denotes shareholders say on pay votes; CTW denotes the CEO-to-worker pay ratio; Peers denotes CEO total compensation relative to the average CEO pay in their industry; CompAdv denotes compensation advisors; BoardSize denotes board size; CEODual denotes CEO duality; CEOFounder denotes the founder of the company; CEOAge denotes the age of CEO; InstOwn denotes institutional ownership; NonExec denotes non-executive directors; ROA denotes return on assets; TSR denotes total shareholders return; Firmsize denotes the size of the firm; Leverage denotes leverage; RDintensity denotes R&D intensity; NofEmpl denotes total number of employees.

Finally, we conduct the Sobel test to estimate the significance of the indirect effect of the CEO-to-worker pay ratio on CEO compensation via the proportion of shareholder dissent say on pay votes. The Sobel test reveals a positive and significant indirect effect of the proportion of shareholder dissent say on pay votes on CEO compensation ($Z = 6.345$, $p < 0.01$), which lends support to hypothesis H3. Following Mehmetoglu (2018), we calculate the ratio of the indirect effect to the total effect (RIT) and the ratio of the indirect effect to the direct effect (RID) to evaluate the size of the mediating effect. We find that the RIT is equal to 0.144, meaning that about 14% of the effect of the CEO-to-worker pay ratio on total CEO

compensation is mediated by shareholder dissent say on pay votes. We also find that the RID is equal to 0.168, meaning that the mediated effect is about 0.168 times as large as the direct effect of the CEO-to-worker pay ratio on total CEO compensation. Figure 2 summarises the results of the mediation test on total CEO compensation.

In sum, we find that CEO-to-worker pay disparities increase shareholder dissent say on pay votes. Consistent with the relative deprivation theory, we argue that shareholders may react to higher CEO-to-worker pay disparities by preventing the adverse effects of a negative feeling of deprivation caused by social comparisons between employees and CEOs. Second, we find that
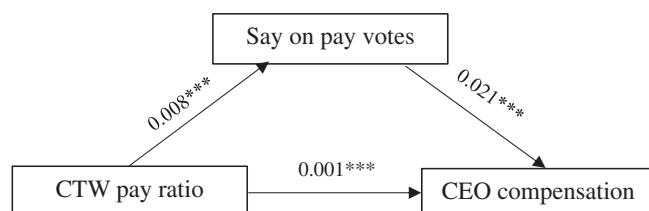
FIGURE 2 CEO-to-worker pay ratio mediated influence on total CEO compensation. Post-estimation calculations: direct effect = 0.001; indirect effect = 0.00017; Sobel test = 6.345***. RIT = 0.144. RID = 0.168.

shareholder dissent say on pay votes increase CEO compensation. Although unexpected, this result can be explained by the agency theory. We argue that the remuneration committee does consider shareholder dissent say on pay votes because they provide information about the potential negative consequences of large CEO-to-worker pay disparities on employees' and CEOs' performance. However, instead of decreasing the level of CEO compensation, the remuneration committee may modify the CEO compensation mix to tighten the link between pay and performance (Burns & Minnick, 2013; Faghani et al., 2015; Hadley, 2017). Thus, if CEOs perform well, their remuneration is likely to increase. Finally, we find that shareholder dissent say on pay votes partially mediate the link between CEO-to-worker pay disparities and CEO compensation. This result is consistent with our relative deprivation and agency arguments supporting the existence of a shareholder engagement channel. Through this indirect channel, the negative effects of relative deprivation experienced by employees trigger actions from shareholders and the remuneration committee to modify CEO compensation.

Prior studies examining these relationships are mixed. Consequently, we compare and contrast our findings with the existing literature examining the effect of the CEO-to-worker pay ratio on shareholder say on pay votes and the effect of shareholder say on pay votes on CEO compensation. In terms of hypothesis H1 (the effect of CEO-to-worker pay disparities on CEO compensation), our result is consistent with the study of Chang et al. (2022) and Crawford et al. (2021). However, it is not in line with the findings of Knust and Oesch (2020), who report no significant relationship between the CEO-to-worker pay ratio and shareholder say on pay votes. Concerning hypothesis H2 related to the effect of say on pay votes on CEO compensation, our result is consistent with the study of Gregory-Smith et al. (2014). However, it goes against the findings of Balsam et al. (2016) and Kimbro and Xu (2016), who report a negative association between shareholder dissent say on pay votes and CEO

compensation, and Burns and Minnick (2013) and Grosse et al. (2017), who find that say on pay votes reduce CEO compensation. Finally, hypothesis H3 related to the mediation effect of shareholder dissent say on pay votes in the relationship between CEO-to-worker pay disparities and CEO compensation is consistent with the arguments of McCahery et al. (2016) and Pan et al. (2022) on the existence of a shareholder engagement channel triggered by sustainability issues. To conclude, we provide evidence of a positive and significant direct effect of the CEO-to-worker pay ratio on CEO compensation and a positive and significant indirect effect through shareholder dissent say on pay votes. These findings add to prior studies by documenting the mediating role of shareholder engagement in the relationship between CEO-to-worker pay disparities and CEO compensation.

4.3 | Robustness tests

First, we conduct a test with alternative measures for the dependent variable using the same estimation technique as for the baseline regressions. We replace total CEO compensation (*CEOTot*) with three alternative proxies: CEO cash compensation (*CEOCash*), CEO equity compensation (*CEOEquity*), and CEO all other compensation (*CEOAllOther*). *CEOCash* is the natural logarithm of the total salary and bonus paid to the CEO. *CEOEquity* is the natural logarithm of the total stocks and options awards paid to the CEO. *CEOAllOther* is the natural logarithm of the total non-cash and non-equity paid to the CEO. Consistent with prior studies on CEO compensation (Ertimur et al., 2011; Shaw & Zhang, 2010), this disaggregation of CEO compensation controls for the potential effects of accounting volatility and external shocks. Table 6 reports that the indirect effect of the CEO-to-worker pay ratio on CEO compensation through the proportion of shareholder dissent say on pay votes is significant ($p < 0.05$) for all models. These results are in line with our baseline findings.

We perform the Sobel test to further test the significance of the indirect effect. We find a positive and significant indirect effect for CEO cash compensation ($Z = 3.556$, $p < 0.01$), CEO equity compensation ($Z = 5.173$, $p < 0.01$), and CEO all other compensation ($Z = 3.186$, $p < 0.01$). However, the size of the indirect effect varies depending on the component of CEO compensation. As for *CEOCash*, the RIT is 0.060 and the RID is 0.064, for *CEOEquity*, the RIT is 0.247 and the RID is 0.328, while for *CEOAllOther*, the RIT is 0.101 and the RID is 0.112. The mediation effect is therefore greater for the equity component of CEO compensation. This result is consistent with our arguments derived from the

TABLE 6 Alternative measures for the dependent variable.

	1st part of the channel	2nd part of the channel			Mediation		
	SNO votes	CEO cash	CEO equity	CEO AllOther	CEO cash	CEO equity	CEO AllOther
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CTW	0.008*** (0.001)				0.001*** (0.001)	0.001*** (0.001)	0.001** (0.001)
SNOVotes		0.010*** (0.002)	0.044*** (0.006)	0.015*** (0.004)	0.008*** (0.002)	0.041*** (0.006)	0.014*** (0.004)
Peers	0.385*** (0.106)	−0.039*** (0.016)	−0.310*** (0.041)	−0.010 (0.030)	−0.059*** (0.016)	−0.332*** (0.042)	−0.019 (0.030)
CompAdv	0.084 (0.324)	0.612*** (0.089)	2.290*** (0.205)	0.424*** (0.112)	0.585*** (0.088)	2.258*** (0.204)	0.411*** (0.111)
BoardSize	−0.236*** (0.067)	0.047*** (0.016)	0.113*** (0.035)	0.077*** (0.020)	0.049*** (0.016)	0.116*** (0.035)	0.078*** (0.020)
CEODual	0.806*** (0.235)	0.072 (0.045)	0.053 (0.106)	0.276*** (0.073)	0.089** (0.046)	0.074 (0.106)	0.284*** (0.074)
CEOFounder	0.534 (0.430)	−1.188*** (0.139)	−0.842*** (0.225)	−1.203*** (0.155)	−1.207*** (0.139)	−0.864*** (0.225)	−1.212*** (0.155)
CEOAge	0.031* (0.016)	0.023*** (0.005)	−0.006 (0.009)	0.032*** (0.005)	0.023*** (0.005)	−0.006 (0.009)	0.032*** (0.005)
InstOwn	0.011* (0.006)	0.001 (0.001)	0.025*** (0.004)	0.004 (0.002)	0.001 (0.001)	0.025*** (0.004)	0.004 (0.002)
NonExec	0.022 (0.015)	0.010*** (0.003)	0.048*** (0.009)	0.020*** (0.005)	0.009*** (0.003)	0.047*** (0.009)	0.020*** (0.005)
ROA	−0.089*** (0.018)	0.001 (0.004)	0.009 (0.009)	0.024*** (0.006)	0.001 (0.004)	0.009 (0.009)	0.023*** (0.006)
TSR	−2.700*** (0.405)	0.248*** (0.070)	0.207 (0.187)	−0.075 (0.127)	0.222*** (0.069)	0.177 (0.187)	−0.087 (0.127)
FirmSize	1.278*** (0.127)	0.121*** (0.027)	0.366*** (0.059)	0.409*** (0.038)	0.148*** (0.026)	0.397*** (0.059)	0.421*** (0.038)
Leverage	−0.079 (0.078)	0.031** (0.016)	0.030 (0.037)	0.012 (0.027)	0.024 (0.015)	0.022 (0.037)	0.008 (0.028)
RDIntensity	3.633 (2.540)	−3.252*** (0.508)	2.463*** (1.239)	−2.916*** (0.874)	−2.958*** (0.488)	2.803** (1.229)	−2.781*** (0.876)
NofEmpl	−1.285*** (0.135)	0.007 (0.019)	0.048 (0.049)	0.141*** (0.031)	−0.075*** (0.024)	−0.047 (0.059)	0.104*** (0.036)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	−1.008 (2.387)	10.449*** (0.474)	5.596*** (1.129)	2.117*** (0.704)	11.013*** (0.466)	6.249*** (1.148)	2.377*** (0.712)
Adj. R^2	0.072	0.168	0.189	0.235	0.175	0.191	0.235
No. of obs.	7280	7280	7280	7280	7280	7280	7280

Note: This table presents the OLS estimations for the two parts of the shareholder engagement channel and the mediation relationship using CEO cash compensation, CEO equity compensation, and CEO all other as alternative measures of the dependent variable. In all columns, independent variables are lagged by 1 year, except *SNOVotes*. Robust standard errors are presented in the parenthesis and *, **, *** indicate statistical significance at 10%, 5%, and 1%. CEOTot denotes CEO total compensation; SNOVotes denotes shareholders say on pay votes; CTW denotes the CEO-to-worker pay ratio; Peers denotes CEO total compensation relative to the average CEO pay in their industry; CompAdv denotes compensation advisors; BoardSize denotes board size; CEODual denotes CEO duality; CEOFounder denotes the founder of the company; CEOAge denotes the age of CEO; InstOwn denotes institutional ownership; NonExec denotes non-executive directors; ROA denotes return on assets; TSR denotes total shareholders return; Firmsize denotes the size of the firm; Leverage denotes leverage; RDintensity denotes R&D intensity; NofEmpl denotes total number of employees.

relative deprivation and agency theories. The negative effects of large CEO-to-worker pay disparities on employees through shareholder dissent say on pay votes are perceived by remuneration committee members, which may trigger action to modify the mix of CEO compensation to tighten pay to performance. Consequently, if CEOs perform well, their remuneration is likely to increase. Overall, our results give a more granular understanding of the complex relationship between CEO-to-worker pay disparities, shareholder say on pay votes, and CEO compensation, consistent with our previous findings.

Second, we conduct a mediation test using structural equation modelling (SEM). The sole use of a regression-based approach to establish a mediation effect has been criticised because it produces larger standard errors for the path coefficients than an SEM-based approach (Iacobucci et al., 2007). Mehmetoglu (2018) argues that the SEM-based approach is more precise due to the simultaneous estimations of parameters. Therefore, we apply the two-step method of Iacobucci et al. (2007), which adjusts Baron and Kenny's (1986) approach to SEM. The first step of the Iacobucci et al. (2007) approach is to estimate the direct and indirect paths of the mediation model simultaneously through SEM. This helps estimate whether the mediation effect is absent, partial, or complete. The second step can be conducted if the mediation effect is either partial or complete. It consists of computing the Sobel test to estimate the significance and the size of the direct and indirect paths. Finally, the results can be reported and categorised as absent, partial, or complete. Using the SEM-based approach, the results (not tabulated) show that the indirect effect of shareholder dissent say on pay votes on the relationship between CEO-to-worker pay disparities and CEO compensation is strongly significant ($p < 0.01$). Furthermore, the Sobel test is positive and significant ($Z = 4.536$, $p < 0.01$), the RIT is 0.052, and the RID is 0.055 which supports hypothesis H3, whereby the effect of the CEO-to-worker pay ratio on CEO compensation passes through the proportion of shareholder dissent say on pay votes. Overall, the SEM-based approach results are consistent with those reported in Table 5.

5 | CONCLUSIONS

The US financial regulator has implemented a number of initiatives to provide more information to shareholders on labour practices and pay disparities within corporations (Bank & Georgiev, 2019; Murphy & Jensen, 2018). Nevertheless, empirical evidence is inconclusive as to their effects on shareholders and CEO compensation (Balsam et al., 2016; Burns & Minnick, 2013; Chang et al., 2022;

Crawford et al., 2021; Faghani et al., 2015; Gregory-Smith et al., 2014; Grosse et al., 2017; Hadley, 2017; Kimbro & Xu, 2016; Knust & Oesch, 2020). Using a large sample of 1594 non-financial firms from 2013 to 2019, we investigate the influence of the CEO-to-worker pay ratio on shareholder dissent say on pay votes and the mediating effect of shareholder dissent say on pay votes on the relationship between CEO-to-worker pay ratio and CEO compensation. We find that CEO-to-worker pay disparities increase shareholder dissent say on pay votes and that shareholder dissent say on pay votes increase CEO compensation. Moreover, we document the mediating role of shareholder say on pay votes on the relationship between CEO-to-worker pay disparities and CEO compensation.

First, our findings are consistent with relative deprivation theory perspective concerning the shareholders' reactions to large CEO-to-worker pay disparities. Shareholders are likely to issue dissent say on pay vote because they perceive the negative consequence of a feeling of deprivation caused by a 'pay for performance' motive on employees. Second, we find that shareholder dissent say on pay votes increase CEO compensation. This result can be explained by the agency theory that the remuneration committee is likely to consider shareholder dissent say on pay votes by modifying CEO compensation to avoid the adverse consequences of a feeling of deprivation on employees. Nevertheless, shifting the CEO compensation mix to a more performance-based mix may increase CEO compensation if the CEO performs well. Finally, we find that shareholder say on pay votes mediate the relationship between CEO-to-worker pay disparities and CEO compensation, as predicted by the relative deprivation and agency theories.

This study has important implications for policy maker and regulators because it unpacks the usefulness of the CEO-to-worker pay ratio disclosure for shareholders. The regulation pressures board of directors to tighten CEO pay to performance because the CEO-to-worker pay ratio gives shareholders a benchmark to compare within-corporation pay fairness. However, its unintended consequences raise questions about its real benefits to society, fuelling the debate on the effects of disclosure regulation (Edmans, 2017; Loh, 2017; Murphy & Jensen, 2018). Overall, this study makes two primary contributions to the literature. First, it articulates two streams of the literature that have reported mixed findings concerning the effects of the CEO-to-worker pay ratio on say on pay votes and the effects of say on pay votes on CEO compensation. Consequently, this study extends the literature by documenting the mediating role of shareholder say on pay votes on the relationship between CEO-to-worker pay disparities and CEO compensation. Second, based on the relative deprivation and agency theories, we show that shareholders and the board of directors are reacting to CEO-

to-worker pay disparities due to the potential negative consequences of a feeling of deprivation experienced by employees and CEOs. We provide evidence that the indirect impact of shareholder reactions to CEO-to-worker pay disparities on CEO compensation. In a nutshell, our findings support the existence of a shareholder engagement channel driven by social comparison mechanisms and agency responses.

Like other studies, our study has limitations that may open avenues for future research. First, the current study focuses on the mediating role of say on pay votes and future research can investigate the mediating role of other factors such as compensation consultants on the relationship between CEO-to-worker pay disparities and CEO compensation. Second, although the disclosure regulation of the CEO-to-worker pay ratio has recently been adopted in various developed countries (e.g., France in 2018 and the United Kindom in 2020), the ratio is mainly used for informational purposes. Nevertheless, recent tax initiatives have been proposed to penalise companies with large CEO-to-worker pay disparities. For example, the city of Portland, Oregon, is applying a 10% surtax on firms surpassing a ratio of 100:1 and this surtax rose to 25% for companies having a ratio of more than 250:1 (City of Portland, 2017). Future research could explore the effectiveness of these tax initiatives to give timely evidence to companies, investors, and regulators.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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ENDNOTES

[1] An alternative to the relative deprivation theory is the tournament theory (Lazear & Rosen, 1981). Under this approach, large pay gaps are seen as beneficial for shareholders because they enhance employees' motivation and productivity as the value of rewards increases with job levels (Rouen, 2020). Therefore, the tournament theory predicts no reactions from shareholders and no mediation relationship between CEO-to-worker pay disparities and CEO compensation through shareholder say on pay votes.

[2] The remuneration committee represents the interests of shareholders. Accordingly, it plays a crucial role in the contracting process because it is responsible for designing the CEO compensation package and ensuring its alignment with corporate performance.

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APPENDIX

TABLE A1 Variance inflation factors (VIFs) and tolerance.

Variable	1st part of the channel (dep = *SNOVotes*)		2nd part of the channel (dep = *CEOTot*)		Mediation (dep = *CEOTot*)	
	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance
CTW	1.57	0.64			1.64	0.61
SNOVotes			1.05	0.95	1.08	0.93
Peers	1.14	0.88	1.12	0.89	1.14	0.88
CompAdv	1.27	0.79	1.27	0.79	1.27	0.79
BoardSize	1.82	0.55	1.83	0.55	1.83	0.55
CEODual	1.17	0.85	1.17	0.86	1.17	0.85
CEOFounder	1.15	0.87	1.15	0.87	1.15	0.87
CEOAge	1.13	0.88	1.13	0.88	1.13	0.88
InstOwn	1.24	0.81	1.24	0.81	1.24	0.81
NonExec	1.32	0.76	1.32	0.76	1.32	0.76
ROA	1.14	0.88	1.14	0.88	1.14	0.88
TSR	1.33	0.75	1.34	0.75	1.34	0.74
FirmSize	3.62	0.28	3.60	0.28	3.69	0.27
Leverage	1.15	0.87	1.14	0.88	1.15	0.87
RDIntensity	1.48	0.68	1.47	0.68	1.48	0.68
NofEmpl	4.14	0.24	3.35	0.30	4.30	0.23

Note: CTW denotes the CEO-to-worker pay ratio; SNOVotes denotes shareholders say on pay votes; Peers denotes CEO total compensation relative to the average CEO pay in their industry; CompAdv denotes compensation advisors; BoardSize denotes board size; CEODual denotes CEO duality; CEOFounder denotes the founder of the company; CEOAge denotes the age of CEO; InstOwn denotes institutional ownership; NonExec denotes non-executive directors; ROA denotes return on assets; TSR denotes total shareholders return; Firmsize denotes the size of the firm; Leverage denotes leverage; RDintensity denotes R&D intensity; NofEmpl denotes total number of employees.