CEO pay in UK FTSE 100: pay inequality, board size and performance

Forbes, W.P.; Pogue, M.; Hodgkinson, L.

European Journal of Finance

DOI:
10.1080/1351847X.2014.885457

Published: 01/06/2016

Peer reviewed version

CEO pay in UK FTSE 100: pay inequality, board size and performance. [1]

William Forbes
Loughborough School of Business & Economics,
Loughborough University,
Loughborough,
LE11 3TU.
&
Lynn Hodgkinson,
Bangor Business School,
Bangor University,
Bangor.
Gwynedd
LL57 2DG.
&
Michael Pogue
School of Management
University of Ulster,
Jordanstown campus.
Newtownabbey,
Co. Antrim,
BT37 0QB.

[1] Corresponding author, William Forbes Email w.forbes@lboro.ac.uk

Abstract

In this paper we examine the costs of seemingly excessive pay awards to CEO's within the UK FTSE 100 in the last decade and the consequent growth in executive pay inequality. Are CEOs taking a large proportion of the total pot (a big "pay slice") less able to return value to shareholders by better management? In presenting this evidence we describe variations in the whole distribution of executive pay, rather than invoking some arbitrary cut-off point, to determine how changes in shareholder value match to concurrent changes in the distribution of executive pay. We ask whether the impact of executive pay-inequality is a function of board size, rendering the CEO pay slice measure problematic in this context? If so, how does the interaction of board size and corporate performance, as measured by shareholder returns, explain variations in the sensitivity of the pay-performance relationship for UK FTSE 100 executives? We advance the Gini coefficient as a preferable measure of executive pay inequality in order to capture the impact of perceived inequality upon corporate performance.

Introduction

The very high pay of some executives has provoked public anger and official censure (see Hargreaves (2011)). Hargreaves (p 69) concludes

> "wage inequality is part of a toxic form of free market capitalism a winner takes all system that allows monopolies to accrue and discourages the entrepreneurialism it is meant to facilitate."

In this paper we examine the costs of seemingly excessive pay awards to CEO's within the UK FTSE 100 in the last decade. We focus on the proportion of total board pay taken by the CEO as a proportion of the remuneration pool available to all the executives on the board and not just the top 5 or some other arbitrary cut-off point.

Evidence that firm performance deteriorates as the share of total remuneration, given to the 5 best paid executives, rises already exists for the US. This metric is referred to as the "CEO pay slice" or CPS in much of the literature and we denote it as CPS ourselves henceforth. Bebchuk, Martijn, and Peyers (2011) present evidence on the relationship between CPS and corporate performance for a sample of large US companies. Bebchuk *et al* report that corporate value, as proxied by a number of performance measures including Tobin's Q, post-earnings announcement share price responses, shareholder responses to acquisitions and executive turnover, all deteriorate as CPS rises. This suggests that a high CPS may reflect something other than a reasonable reward for services rendered to company shareholders. Too high a CPS may induce feelings of unfairness, or exploitation, amongst the junior ranks of the senior management team. Jordan (2011) has replicated many of these results using Australian data for the years 2008-2010 obtaining a similar pattern of results.

This paper focuses on a potential weakness in the CPS as an inequality metric when applied to companies with boards containing both less than and more than five members, which accounts for about half the companies in our UK FTSE 100 sample. For such companies, with more than 5 board members, those executives from the sixth best paid and below do not have their pay included in the CPS measure of pay inequality. If the pay-performance relationship is constant across board size partitions of the sample then this is merely a technical quibble of little interest. But if pay-performance relationships vary systematically with board size then a more careful analysis becomes essential. In this paper we show that pay-performance relationships do vary systematically with board size and are especially sharp in larger board company cohorts where we might expect the CPS measure to be a poor proxy of pay inequality.

This paper provides additional evidence on the Bebchuk *et al* (2011) hypothesis that a higher CPS damages company performance for a sample of companies drawn from outside the US. We further ask whether the CPS measure, increasingly now invoked as the standard metric of executive pay inequality, is a helpful way to understand the relationship between executive pay inequality and corporate performance.

While much of the debate concerning managerial "power" to set their own pay has been US based. Conyon, Core, and Guay (2011) have shown that, controlling for risk, UK and US CEO pay levels are not as different as had previously been assumed. Hence comparable evidence from the UK concerning the impact of the distribution of executive pay within the board of directors on corporate performance is of interest in furthering the debate.

The structure of the rest of the paper is as follows. In the next section, Section 1, we review relevant literature and express the focus of our interest more fully. In Section 2 we give details of our research method in examining these issues and a description of the data we employ to investigate them and our data is presented in Section 3. Section 3 and 4 present our results and interprets them. Finally, Section 5 concludes the paper and draws some policy conclusions.

1 Previous research.

Bebchuck *et al* (2011) raised concerns about how excessive rewards to CEO's in relation to their senior executive peers may adversely affect corporate performance and especially shareholder returns. Explanations of executive pay broadly conform to one of two alternative theoretical frames

1. *optimal contracting*, or the provision of incentives for shareholders to deliver for shareholders,

2. *executive power*, reflecting the ability of executives to insulate themselves from market pressures and pay themselves too much.

The optimal contracting perspective simply sees high rewards to CEOs as a reward to risks taken by very talented individuals. While CEO pay may be high it simply reflects the outcome of contracts freely entered into by shareholders seeking to attract the best managerial talent ((Jensen and Meckling 1976), Hart (1995)). The purpose of large pay awards, especially stock option grants, in this model is to unify the interest of owners and managers in a corporation characterised by a division of ownership and control.

Bebchuk and Fried (2004) strongly supported the second view in their landmark book. The specific argument that a high CPS damages shareholders can be seen as an exercise of unaccountable power by CEO's and hence must be seen as part of the presence of a broader assertion of CEO "power" at shareholders' expense. Bebchuk *et al* (2011) present evidence of the relationship between company performance, as proxied by Tobin's Q, and a number of dimensions of corporate performance. They present evidence on over 3,000 CEO's heading up over 2,000 companies in the years 1993-2004 and report on the relationship between corporate performance and CPS. They find high CPS companies.

- report lower profits,
- are more likely to "backdate" options,
- are more likely to undertake shareholder value destroying acquisitions,
- are more likely to retain a poorly performing CEO.

Hence for Bebchuk *et al* a high CPS is bad. It is bad because higher levels of CPS depress company's performance on a variety of credible performance measures[2]

Part of the reason why it is difficult to detect the economic impact of a CEO's ability on corporate value is that the best companies tend to attract the most able CEO's to start with, while the worst companies must scavenge for whatever is left. Hence it is not clear which way the causality runs. Do great CEO's create great companies or do great companies simply have the good fortune to be able to recruit the most able CEOs? Chang, Dasgupta, and Hilary (2010) try to resolve this causality issue by relating relative CEO pay (the CPS) to the performance of US CEOs leaving their companies over the years 1992-2002. They report higher CPS/CEO pay inequality is associated with

1. negative abnormal returns at the announcement of the CEO's departure, suggesting they were worth the pay they received,

2. better re-employment prospects upon departure, suggesting relatively high paid CEOs have both higher job-specific and general human capital endowments,

[2]This finding accords with a huge amount of evidence reported by behavioural economists that most of us value "fairness" and react badly to any perceived unfairness, or slight, others perpetrate against us (see Fehr and Gachter (2004))

3. CEOs joining companies where performance also improves subsequent to their arrival, suggesting they can add value both with their current company and elsewhere.

These findings suggest that the high pay of CEOs may indeed reflect their ability to create value for shareholders. Below we seek to shed light on the degree to which this result holds true for UK FTSE 100 CEOs in the last decade.

1.1 Corporate performance and board size.

Much of the debate concerning the distribution of executive pay has invoked the CPS/top slice measure. This asks how much the CEO earns as a proportion of the best five paid executives on the board. Once board membership exceeds five members this metric remains constant, as the sixth member of the board and beyond do not see their pay enter into the calculation. This is fine so long as board size and corporate performance are unrelated. But if not, and we aim to show this is the more credible scenario, then the CPS measure is placed in doubt. If both corporate performance and pay inequality vary with board size a potential for omitted variable bias arises.

The direction of any omitted variable bias thus induced is, a priori, unclear. But omitted variable bias also enlarges standard errors in regression based tests and this second form of bias can either compound that arising in the mean effect, or offset it depending on the direction of bias in the estimated mean. The much reported finding (for example see (Eisenberg, Sundgren, and Wells 1998)) that smaller boards make better decisions seems to accord with a belief that larger groups find it hard to reach consensus, or at least to do so quickly, suggests such an omitted variable bias may be present.

That corporate performance is affected by board size is already well chronicled in the literature. Yermack (1996) found a clear decline in returns to shareholders[3] as board size increased for a sample of large US companies in the period 1984-1991. This finding appeared robust to the inclusion of standard controls for a sample company's industry and size. Later Eisenberg, Sundgren, and Wells (1998) were able to confirm that more profitable companies had smaller boards on average using a sample of 900 Finnish companies, including some far smaller companies than those included in Yermack's earlier study.

For the UK Guest (2009) reports results that largely confirm the dele-

[3]As captured by Tobin's Q

terious effects of larger boards on company performance using three performance metrics, including shareholder returns. Guest find this result is robust to standard econometric controls for endogeneity, such as using general method of moments estimation which conditions upon the company's prior performance. This confirmed earlier evidence on a variety of European states reported a decade before by Conyon and Foreman-Peck (1998).

2 Research Method

Initially we focus on whether changes in the proportion of salary going to the CEO has affected corporate performance, as measured by shareholder returns, and how this varies with board size. We then ask whether the relationship between board size and corporate performance/pay-inequality relationship conditions pay/performance elasticities. For it is these very pay/performance elasticities that have been central to debate concerning the fairness of executive compensation.

2.1 Measures of salary inequality amongst senior executives

We measure the shifting distribution of CEO pay and its greater inequality over time by movements in the Gini coefficient for each of these variables. The Gini coefficient is a simple measure of inequality already much used in studies of income inequality (see Sen and Foster (1997) and Cowell (1995)).

The Gini coefficient measures the incremental percentage of income accounted for by the richest person in the group as a proportion of all income, as compared to that associated with an equal distribution of income. A Gini coefficient of one denotes the richest person getting all the income, that is, complete inequality. A Gini coefficient of zero denotes completely equal shares in income for everyone in the economy, that is, complete equality. Each Gini coefficient value reported below should therefore be interpreted as a premium in executive pay over and above what we would expect if all executives on the board were paid an equal share of the total board of directors pay pot[4].

[4] The Gini coefficient (G) is then the ratio of the difference between the 45° line of absolute equality and the curve denoting the actual, unequal, distribution to the total area lying beneath the line of equality.

While the Gini coefficient has various mathematical representations it can be expressed as simply one half of the relative mean difference, defined as the arithmetic average of the absolute value differences, between all pairs of incomes. So G can be expressed

$$
\begin{aligned}
G &= (1/2n^2\mu)\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j| \\
&= 1 - (1/n^2\mu)\sum_{i=1}^{n}\sum_{j=1}^{n} Min(y_i, y_j) \\
&= 1 + (1/n) - (2/n^2\mu)[y_1 + 2y_2 + ... + ny_n] \\
& for \quad y_1 \geq y_2 \geq .... \geq y_n. \qquad (1)
\end{aligned}
$$

where, y is the variable whose inequality is to be judged (here executive pay), μ is the average level of income across members of the group (say a company board) and n is the size of the population (or board size).

The Gini measure of pay-inequality thus has two primary advantages

- for smaller boards, of less than five members, the Gini metric can still be calculated,
- for larger boards, of more than five members, *all* board members, and not just the five highest paid, have their pay enter into the Gini index measure of pay inequality (unlike the CPS measure).

2.2 Measures of corporate performance

So far we have focused on the costs of employing highly paid executives, and especially CEOs. In this section we consider the potential benefits to shareholders in terms of improvements in shareholder returns on equity.

In this paper we focus upon just one of Bebchuk *et al* (2011) value metrics, returns to shareholder. We also use "abnormal" share price performance of the corporation employing the CEO as captured by the 3-factor asset pricing model of Fama and French (1993)

$$R_{it} - R_{ft} = \alpha_t + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + \epsilon_{it} \tag{2}$$

as a corporate performance benchmark. Where $\mathrm{R}_{it} - R_{ft}$ is the stock market premium commanded by the stock, $\mathrm{R}_M - R_{ft}$ is the standard market premium offered over the risk free-rate, as in the standard CAPM, SMB is the premium/discount paid on the smallest 30% of stocks traded by market capitalisation, as against the biggest 30% by market capitalisation. HML is the premium/discount paid by stocks ranked in the highest 30% of the book to market distribution, as compared to those ranked in the lowest 30% of the book to market distribution.

3 Data

Our CEO executive pay database is comprised of payments made to executives employed by UK FTSE 100 constituent members in the period March 1998 to March 2010 provided by Hemscott[5] part of the Morningstar group. The data consists of 6046 individual executive years taken from 127 companies who featured in the UK FTSE 100 during our sample period.

Data on shareholder returns is taken from the London Share Price database, which is described in Staunton (2012). A distinct advantage of this database is its coverage of both live and "dead" companies in the database, thus mitigating at least one source of survivorship bias. The database also captures a true measure of liquidating returns to shareholders, as opposed to the -100% return implicitly assumed in price based return measures.

The data on factor mimicking portfolios for estimating the Fama and French (1993) model are taken from the Exeter XFi website[6] described in Gregory, Tharyan, and Huang (2009). While the Fama-French model is now something of an industry standard in the US, employing factors drawn from Ken French's website, the use of comparable adjustments in the UK are only

[5]http://www2.hemscott.com/

[6]http://xfi.exeter.ac.uk/researchandpublications/portfoliosandfactors/files.php

now emerging.

Table 1 gives some basic data descriptives for trends in the data. Executive pay is rising in our sample years when we consider all executive positions, but executive remuneration is also increasingly widely dispersed as the decade goes on. As we shall show this is partially because of the growing premia paid to UK FTSE 100 CEOs in the last decade. The variability in executives pay within this UK FTSE 100 sample is immediately obvious. These amounts may seem paltry compared to US counterparts, Conyon *et al* (2011), for example, report that for a sample of UK and US executives median pay of the UK sample was $1.9 million, or 30% less than their US peer group.

4 Results.

4.1 Alternative measures of board pay inequality.

Table 2 gives a comparison of our Gini and CPS inequality metrics when they are constructed for just the highest paid executive, when that person is also the CEO of the company. Figure 1 shows how the two measures cross-section distribution relate to each other. Recall the CPS is a measure of the proportional share taken by the CEO, as a proportion of the total paid to five best paid directors, whereas the Gini coefficient captures a premium paid to the CEO over and above that expected if all executives on the board were to be paid an equal share. When making this comparison we only consider companies where the highest paid director is the CEO. We lose 4 companies from the sample, for at least some sample years, because of this restriction. Henceforth we refer to the highest paid director as the CEO in our analysis.

The CPS metric tells us that the CEO takes about 30% of the pay-pot available on average to the five best paid directors. But the Gini coefficient reveals that when all members are considered, and not just the five best paid, the CEO takes around 10% more of the *total board* pay pot than he would if the distribution of pay amongst all executives were equal. However the difference in means between the CPS and Gini measures of inequality is most obvious in Table 2 and Figure 1. Yet the dispersion of these two measures of pay inequality is of far greater analytical interest here because we use it to explain resulting differences in corporate performance.

This comparative stability of company based CPS calculations in Table 2 derives mechanically from the fact that whilst CPS relates only to the five best paid executives, while the Gini coefficient measures the share of the

CEO relative to the total board pay bill. Since our comparison in Table 2 is only for board's containing 5 or more members the Gini coefficient we report is bounded below the CPS metric of earlier research. But the difference in levels between CPS and Gini metrics is small compared to the huge difference in variation between the two inequality metrics. The Gini coefficient is six times more volatile than the CPS metric if variation is measured by the coefficient of variation, c_v.

The use of the Gini coefficient enables us to measure inequality at a level beyond that captured by focussing upon on the CEO's remuneration alone. Thus we extend our measure of executive pay inequality to capture that associated with the 3, 5, and ten best paid executives. Table 3 shows the distributional properties of these broader metrics. Confining discussion to the first ten ranked positions, where the vast majority of our data clusters, the CEO stands all too clearly as *primus inter pares* with the emphasis very much on his/her primacy. The Gini coefficient falls substantially once we measure it for the 3 best paid directors. So discussion of executive pay inequality as a major policy issue most probably only makes sense in the UK if consideration is entirely focused on the CEO highest paid executive rather than the senior management team as a whole.

4.2 Inequality and board size.

To get a sense of how inequality varies with board size we plot our two inequality measures by board size group in Figure 3. We break measured inequality into four board size bins, group 1 consists of companies with 5 or less directors, group 2 consists of boards with 6 to 10 directors, group 3 consists of companies with 11 to 20 directors and, finally, group 4 consists of companies with 21 or more directors on the board. Such divisions must be regarded as to a large extent arbitrary, although a target board membership of eight to ten board members commonly appears in the research literature. While the CPS is unaffected by the pay of executives below the fifth best paid, the Gini metric is somewhat peaked at group 4, which represents companies with over 21 directors on the board. The CPS measure can only be constructed for boards with 5 members[7] so the mean value of CPS in group 2 reflects the overweighting of the markedly lower inequality in such 5 director member companies in the overall aggregate figure. For companies with boards larger than 5 members the salary of remaining members does not enter the calculation of CPS. The great strength of the gini coefficient is it is unaffected by board size as it it measures pay inequality over all board

[7]So the CPS metric calculation for group 1 is solely compared of 5 member boards.

members regardless of board size.

So only the Gini coefficient can capture variation in inequality for companies with board sizes greater than 5. Since such companies make up 43% of our sample company-years this seems a large sacrifice to make to adopt the CPS measure and a striking reason to prefer our Gini inequality index measure because it offers a far more comprehensive measure of executive pay inequality.

Only if the pay-performance relationship is constant across companies with board sizes smaller than and larger than five members is such an omission of any control board size advisable. Otherwise the CPS measure of pay inequality becomes of dubious value. If the pay-performance relationship varies with board size then the Gini metric can offer added value in the analysis of the effect of executive pay inequality upon corporate performance. For example, could it be the that changes in board sizes over time explains changes in executive pay inequality in ways that the CPS metric is ill-suited to capture?

4.3 Inequality, board size and corporate performance.

While it may be true that the CPS measure induces an omitted variable bias into the relationship between corporate performance and measured inequality in executive pay, this difference may not be material and hence little more than a tedious methodological quibble. To show that this is not the case we now proceed to present evidence concerning how the effect of executive pay inequalities[8] on corporate performance varies with board size.

Figure 3 shows the greater annual variation in the Gini coefficient in comparison to the CPS measure of inequality. While for the majority of company/years in our sample the Gini and CPS measures of inequality overlap, in a minority of company years with a fairly ordinary CPS value of 0.2 to 0.4 (suggesting the CEO takes between 20% and 40% of the total wage bill) the Gini coefficient inequality metric spikes much more (rising from a premium of 6% to 10% for example). The explanation for this cannot be greater inequality in pay amongst smaller boards, since these companies (with less than 5 directors) are not included in the Figure 3 comparison anyway. So the explanation must be greater inequality in larger boards containing executives paid a a small amount compared to the CEO.

[8]As measured by both CPS and the Gini coefficient.

Could it be that these larger boards, with comparatively poorly paid "place men" account for the poor performance of board's with very unequal executive pay? If so, the examination of the effect of CEO pay on corporate performance may be conflating two issues; the well documented impact of board size on corporate performance/shareholder returns, and the impact of pay inequality itself upon the same variable. We try to disentangle the effect of these two interacting variables in our reported results below.

Table 4 and Figure 3 show the impact of board size on the sensitivity of corporate value to executive pay inequality, as measured by CPS and the Gini coefficient. Table 4 shows both the overall Spearman rank correlation coefficient between changes in raw shareholder returns and pay inequality prevailing in our four board size groups (1=less than 5, 2=6 to 10, 3=11 to 20, 4=20 or more).

Figure 4 gives a graphical representation of the shareholder return sensitivity to pay inequality implied by Table 4. Overall a fairly weak correlation is found between shareholders' returns and executive pay inequality, this is small and negative for both CPS (-0.042) and the Gini coefficient (-0.032) inequality metrics[9].

[9] Sample sizes for our 4 board of director size grouping are given in Tables 5 and 6

But it is at the extremes of the board size distribution distribution that very different inferences arise using the Gini and CPS metrics of pay inequality. Amongst the cohort of companies with the smallest boards, five members or less, pay inequality appears damaging whichever executive pay inequality metric is used. This makes intuitive sense because it is in such small boards that personal ties are likely to ensure than pay differences are most keenly felt. Nevertheless the large negative correlation between pay inequality and returns to shareholders for the cohort of companies with five directors (CPS cannot be calculated for smaller boards) reminds us of the reduction in the CPS sensitivity to underlying inequality amongst all board members (and not just the five highest paid) for larger boards.

In the group of companies with a board size of between six and ten greater executive pay inequality appears to serve to raise corporate performance, or at least raise returns to shareholders if the Gini metric of executive pay inequality is used. This finding is in direct contradiction to the findings of prior research (for example Bebchuk, *et al*) which argues for a uniformly negative impact of executive pay inequality. The CPS measure here shows a uniformly negative effect of executive pay inequality on shareholder returns in

below.

accordance with the reported findings of previous studies using that measure.

For boards of ten members this measure of executive pay inequality ignores the salary of half the board in measuring the degree of inequality. As Figure 4 shows both large (more than twenty members) and small boards (five or less board members) are associated with inequality reducing performance when the Gini inequality metric is used. The effect of executive pay inequality on shareholders' returns follows a inverted U-shape, reducing returns amongst corporations with small or large boards and raising returns (if a Gini inequality measure is used) elsewhere. Together with the previously reported U shaped relation between executive pay and corporate performance this suggests medium sized boards, with a clearly dominant leader, are best placed to yield shareholders superior returns

The diminution of corporate value by executive pay inequality is less marked when a CPS measure is used but is also most marked for large boards of more than twenty members (Group 4 in our board size banding). It is of course for such boards that three-quarters or more of the executives on the board do not see their salary enter into the calculation of the CPS metric of pay inequality. Hence it might appear that the CPS is making the strongest inferences about how pay inequality impacts upon corporate performance where its usage seems most inappropriate.

4.4 The impact of board size on pay versus performance sensitivities.

The focus of our paper is decisively the impact of pay inequality on corporate performance rather than the standard pay-performance sensitivity as such. Yet if our critique of the usage of CPS is to prove fruitful we would expect the sensitivity of the pay/performance relationship itself to be conditioned on board size. To investigate this implication of the previous results we return to the classic pay-performance sensitivity estimated by Jensen and Murphy (1990) for the US and more recently by Conyon *et al* (2011) for the UK and the US.

In Table 5 we consider changes in pay for only the ten best paid executives each company-year in our sample, unless there are less than ten members of the board recorded. We impose this restriction to prevent insignificant comparisons, with minor players on the board, blurring our results. We include only executives who stay with the same company in the consecutive years for which we calculate those executives' pay change. We calculate returns on an April to April basis to allow for publication of company results and hence market assessment of the executive team's performance. Initially we examine pay-performance relationships using raw annualised cumulative returns.

The results of standard pay-performance regressions of the form of equation (1) in Jensen and Murphy (1990), are reported in Table 5, Figure 4 gives Spearman rank correlation tests for the same dependency. Previous findings that increases in the pay awarded to executives and the returns shareholders receive for the executives' efforts bear almost no relationship is confirmed for the overall sample. But the interest in Table 5, once again, lies in what happens once the estimation of pay-performance sensitivities are decomposed into the board size bandings previously considered.

The lower panels in Table 5 shows the sensitivity of changes in returns to changes in executive pay for the ten best paid executives. For the largest boards, with 21 or more members, pay-performance relationships are, positive, quite tight and clearly statistically significant. Elsewhere the estimated coefficient is either significant but smaller (board group 1, companies with 5 or less executives on the board) or insignificant and perversely signed (board groups 2 and 3, companies with six to twenty members of the board). This U-shaped relationship between pay and performance, positive and significant for small and large boards, negative and insignificant for medium sized boards confirms our hypothesis that board size is important as a conditioning variable, as argued earlier. This is confirmed by a joint F-test of the restriction to exclude the board size dummies from the estimated pay-performance regression.

This U-shaped relation mimics the results of our earlier tests of the impact of executive pay inequality (however we measure it) on shareholders' returns, where an inverted U-shape characterised the inequality/performance relationship. Pay changes may serve to raise performance, especially amongst a cohort of companies governed by larger boards. But it is exactly the appeal of this incentive effect that serves to induce a destructive level of pay inequality amongst serving executives which may erode the likelihood of better performance.This suggests discussion of the incentive effects of executive pay inequality should bear in mind the mediating impact of board size. It appears large pay inequalities can erode the incentive effect of further pay rises in companies that do not have medium sized boards. These offsetting effects must be traded-off by remuneration committees given their potentially contradictory impact upon shareholders' returns.

Taken together Figures 3 and 4 suggest pay rises have their greatest motivating effect, in inducing better performance, amongst companies with larger boards. The results presented in Table 4 suggest for such large companies executive pay inequality can be damaging to shareholder returns.

Hence one interpretation of our combined results is that pay rises for companies with larger boards improve corporate performance. However this is only if these pay increases are not given in a way that exacerbates existing pay inequality amongst board members.

Regression based tests of hypotheses are notoriously plagued by specification problems of heteroskedasticity, autocorrelation and peculiarities of functional form. So as a robustness check in Table 6 and Figure 4 we revisit pay-performance sensitivities, for the ten best paid executives, through the lens of Spearman rank correlations. A Spearman rank correlation is a non-parametric measure of correspondence less likely to have its results distorted by outlier observations and non-linearities in the observed pay/performance relationships.

Once again, as for the regression based tests, our U-shaped pay performance relationship indicates executive pay increases are associated with higher shareholders' returns for the smallest and largest board size bands, while the relationships in the other board size groups are not. Indeed for smaller boards, those with five members or less, the Spearman rank correlation, while marginally positive, is tiny and (just) insignificant at the 95% confidence interval. It is positive and significant for large boards, where increases in CEO pay appear to have substantial motivating effects. Hence it is for these very companies that the CPS measure, so central to prior published research, is likely to represent executive pay inequality very poorly indeed.

4.5 Robustness checks

In this section we control for two of the most obvious sensitivities of our results to the particular research methods followed in constructing them. The first concerns the sample chosen and the second the particular way in which we measure corporate performance. Firstly we control for risk in measuring variations in shareholder returns. Secondly we show how the division of the sample between executive and non-executive directors (NEDs) influences our results.

4.5.1 Controlling for risk.

Our reported results, using the Gini pay inequality metric, suggest companies with a medium sized board have their performance significantly improved by greater pay inequality amongst members of the board. This is in clear contradiction of previously published research on the topic which claims a uniformly negative effect of pay inequality upon corporate performance. To check whether these differences are offset by companies with medium-sized boards simply taking on risker projects in a search to raise their board membership's pay (especially the call option component) we repeat two central prior tests using risk-adjusted returns measures. To capture the impact of risk on the shareholder returns used in our previous tests we repeat the Spearman rank correlation tests previous reported as Figures 3 and 4 above but now using the Fama-French 3-factor model risk adjusted returns of equation (2).

$$R_{it} - R_{ft} = \alpha_t + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + \epsilon_{it}$$

Such abnormal returns are simply the difference between raw shareholder returns and those that would be predicted by Fama-French 3-factor model of equation (2) above when normal sensitivities to the three factors considered are assumed.

These tests are reported as Figure 5 (a risk-adjusted version of Figure 3) and Figure 6 (a risk-adjusted version of Figure 4) below. Estimates of the three factor loading are obtained by running Fama-French 3-factor model regressions for the five years/60 months prior to the company-year return considered. These factor sensitivities are then imposed on the data for the relevant company-year to generate a "abnormal" return value.

Overall we conclude the effect of risk-adjustments on our results is to simplify and sharpen them. Specifically the underlying sensitivity of pay-inequality/performance is positive throughout all board size groups, but is strongest amongst the smallest (with 5 members or less) and largest (with more than 21 members) boards .

4.6 The status of the director, executive directors versus NEDs

Executive and non-executive directors have very different roles on the board and are paid very differently. Hence treating them both as having the same influence on pay-inequality and hence corporate performance is somewhat hazardous. For this reason we repeat our analysis excluding NEDs from our sample. This removes 165 observations of our sample of 6046 executive/year observations, about 2.7%. The Combined code guidance suggests at least two NEDs should be appointed to each board (FRC (2012)), but the board should not be allowed to become so large as to be unwieldy. This suggests our sample may considerably understate the presence of NEDs on UK boards.

We present our revised results for Tables 6 and 7. Removal of the small number of NEDs in our sample does not change our substantial finding of a U shaped at least over the range of board size groupings 1 to 3, containing twenty members or less. For very large boards, with more than twenty members (in group 4) increases in pay inequality reduce shareholder returns rather than increase them less, as in board group 2 (consisting of companies of 5 to 10 members). So for this sample of purely executive directors increases in pay never damage shareholder wealth, except in a small number of companies with very large boards, but do not increase shareholder returns either.

5 Conclusions and implications.

This paper revisits the issue of the impact of inequality in executive pay awards on corporate performance using the UK FTSE 100 sample over the period 1998-2010. Prior US evidence finds a significantly damaging impact of executive pay inequality on corporate performance using a wide variety of performance indicators. Examining shareholder returns for our UK FTSE 100 sample we are unable to replicate this result insofar as it relates to executive pay inequality damaging shareholders' returns. Rather it appears the effect of executive pay inequality on shareholders' returns depends on the size of the corporate board, with reductions in returns for companies with large and small boards and incremental shareholders' returns, especially when they are risk-adjusted, for companies with medium sized boards (of between six and twenty members given our definition). A number of researchers have pointed to an optimal board size of around eight to ten (see Guest (2009) and Jensen (1993)) our research says little about this matter directly. Rather we point out the danger of asserting a damaging affect of executive pay inequality using a metric, like the CPS, which is so clearly sensitive to variations in board size.

This dependency of the relationship between pay inequality and corporate performance on corporate board size has some disturbing implications for how pay inequality is currently measured. Published research on the effects of executive pay inequality has relied heavily on the CPS metric. This metric cannot be constructed at all for companies with less than 5 members on the board of directors. Such companies constitute about 43% of the UK FTSE

100 sample have board sizes of 5 members or less in our sample data.

For companies with boards containing more than five members the CPS metric ignores the pay of executives beyond the fifth best paid on the board. So for larger boards the CPS measure can be a very inadequate measure of executive pay inequality. Such large board companies are exactly those that bear the strongest correlation both between shareholders' returns and executive pay inequality and individual executives pay rises and shareholder returns. This serves to remind us of a central tenet of the UK Corporate Governance Code's (FRC (2010)) "comply or explain" principle that prudent investors

> " should pay due regard to companies individual circumstances and bear in mind, in particular, the size and complexity of the company and the nature of the risks and challenges it faces."

This includes the size of the board itself and how individual executives' pay packages are structured in order to make the board in place, whatever its size, most effective in serving shareholders' interests. The prominent use of the CPS metric of pay executive inequality in debate surrounding executive pay seems strange when there are alternative measures, like the Gini coefficient, which is not subject to such a dependency on board size. To better understand the relation between executive pay inequality and corporate performance we suggest the alternative path outlined in this paper is further explored.

6 Tables & Figures.

Table 1: **Summary statistics for compensation data using full sample.**

Variable	N	Mean	σ.	Min	Max
salary	6046	398434.9	301351.3	0	9100000
bonus	6046	314234.9	515870.6	0	1.00E+07
benefits	6046	44125.36	105692.1	0	2021218
other	6046	27030.09	242991.4	-46332	1.07E+07
pension	6046	26483.61	100197.4	0	2971055
options	6046	55898.5	341106.2	-1068441	1.12E+07
comp	6046	19838.04	177077.7	0	6076200
exception	6046	678.7959	43100.72	0	3300000
total	6046	886724.2	907539.7	8000	1.39E+07

Note. All figures are in £.

Table 2: **Comparison of CPS and Gini coefficient for highest paid executive.**

Variable	N	Mean	σ.	Min	Max	c_v
Gini	650	0.10	0.15	0.00	0.83	1.53
Cps	331	0.32	0.08	0.04	0.77	0.25

Note Here σ denotes the standard deviation of the variable and c_v its coefficient of variation (the ratio of the standard deviation to its mean value).

Table 3: *Gini coefficient for larger executive pay groups 1998-2010*

Year	N (all ranks)	Gini for best paid if CEO	Gini 3 best	Gini 5 best	Gini 10 best
1998	225	0.07	0.093	0.04	0.03
1999	482	0.1	0.089	.045	0.027
2000	505	0.08	0.088	0.046	0.03
2001	500	0.095	0.083	0.049	0.029
2002	520	0.05	0.094	0.051	0.042
2003	520	0.095	0.091	0.061	0.046
2004	1005	0.11	0.164	0.094	0.05
2005	552	0.093	0.089	0.056	0.04
2006	542	0.085	0.09	0.059	0.043
2007	447	0.051	0.077	0.056	0.048
2008	442	0.082	0.081	0.058	0.057
2009	470	0.06	0.087	0.048	0.034
2010	155	0.075	0.083	0.053	0.03

Table 4: **Spearman rank correlations between inequality measures and shareholder returns.**

			Full sample	Group 1: *Five or less Directors*			
	CPS	Gini	Returns		CPS	Gini	Returns
CPS	1			CPS	1		
Gini	-0.019	1		Gini	0.12	1	
Returns	-0.042	-0.032	1	Returns	-0.508	-0.1146	1
Group 2: *Five to ten directors*				Group 3: *Eleven to twenty directors*			
	CPS	Gini	Returns		CPS	Gini	Returns
CPS	1			CPS	1		
Gini	-0.443	1					
Returns	-0.231	0.181	1				
Group 4: *Twenty-one or more*							
	CPS	Gini	Returns				
CPS	1						
Gini	-0.258	1					
Returns	-0.13	-0.066	1				

Table 5: **Pay-performance regressions.**

All years						
$Return_{i,t}$	Coef.	SE	White t-value	P(t)	R^2	N
returns	0.012	0.016	0.76	0.444	0.0003	2246
cons	0.185	0.011	16.54	0		
board group = 1, Five or less directors on board.						
$Return_{i,t}$	Coef.	SE	White t-value	P(t)	R^2	N
returns	0.068	0.031	2.18	0.029	0.006	907
cons	0.216	0.018	11.73	0.180		
board group = 2, Six to ten directors.						
$Return_{i,t}$	Coef.	SE	White t-value	P(t)	R^2	N
returns	-0.004	0.021	-0.17	0.868	0	1047
cons	0 .167	0.015	11.02	0		
board group = 3, Eleven to 20 directors.						
$Return_{i,t}$	Coef.	SE	White t-value	P(t)	R^2	N
returns	-0.040	0.0433	-0.96	0.34	0.005	227
cons	0 .171	0.04	4.23	0		
board group = 4, Twenty-one directors or more.						
$Return_{i,t}$	Coef.	SE	White t-value	P(t)	R^2	N
returns	0.343	0.110	3.12	0.004	0.17	38
cons	-0.136	0.083	-1.64	0.11		

$$Return_{i,t} = a + b\Delta Pay_{i,t} \tag{3}$$

Note. Calculated using data for the ten best paid corporate executives in each company-year, or fewer when the board has less than ten members. Reported t-values are constructed according to White (1980) robust methods. The various dummies included are defined according to our board size groupings. So board group=2 equals 1 for company-years where board size is greater than five but less than ten board group=3 equals 1 for company-years where board size is greater than ten but less than twenty and, finally, board group=4 equals 1 for company-years where board sizes is greater than twenty.

Table 6: **Spearman rank correlation (ρ) of executive pay changes relation to shareholder returns delivered for ten best paid executives.**

	Spearman ρ	Significance level	N
All companies	0.013	0.52	2246
boardgroup=1	0.062	0.06	907
boardgroup=2	-0.027	0.37	1074
boardgroup=3	-0.055	0.407	227
boardgroup=4	0.378	0.018	38

Note. The various dummies included are defined according to our board size groupings. So boardgroup=2 equals 1 for company-years where board size is greater than five but less than ten board group=3 equals 1 for company-years where board size is greater than ten but less than twenty and, finally, board group=4 equals 1 for company-years where board sizes is greater than twenty.

Table 7: **Spearman rank correlation (ρ) of executive pay changes relation to shareholder returns delivered for ten best paid executives. Excluding all NED's**

	Spearman ρ	Significance level	N
All companies	0.09	0.05	2081
boardgroup=1	0.20	0.001	854
boardgroup=2	0.05	0.05	1010
boardgroup=3	0.24	0.028	201
boardgroup=4	-0.16	0.33	16

Note. The various dummies included are defined according to our board size groupings. So boardgroup=2 equals 1 for company-years where board size is greater than five but less than ten board group=3 equals 1 for company-years where board size is greater than ten but less than twenty and, finally, board group=4 equals 1 for company-years where board sizes is greater than twenty.

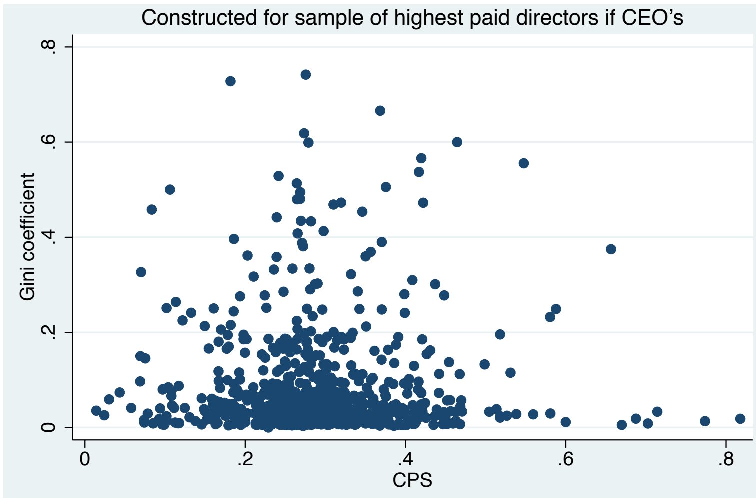

Figure 1: Gini versus CPS measure of pay inequality.

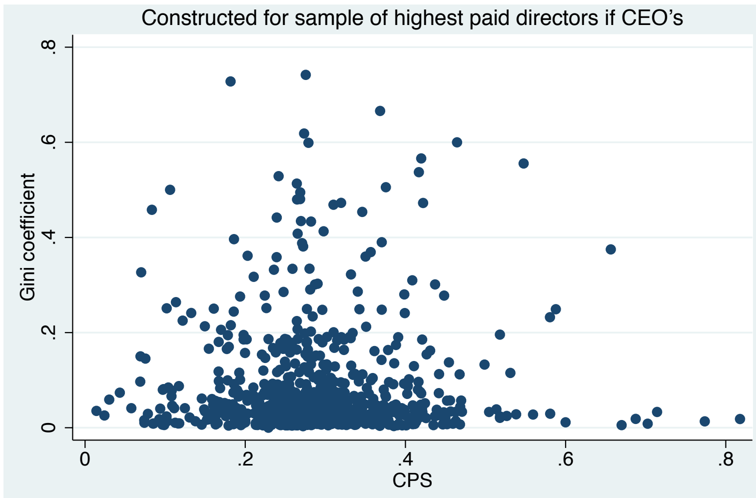

Figure 2: Gini versus CPS measure of pay inequality.

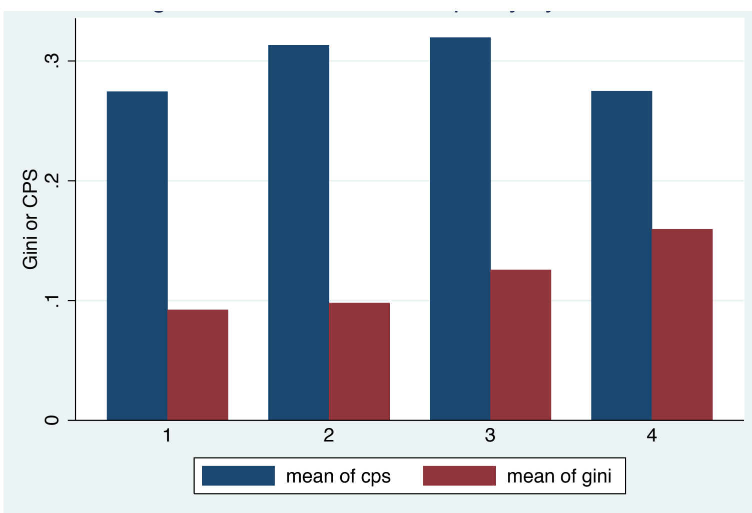

Figure 3: Distribution of inequality by board size.

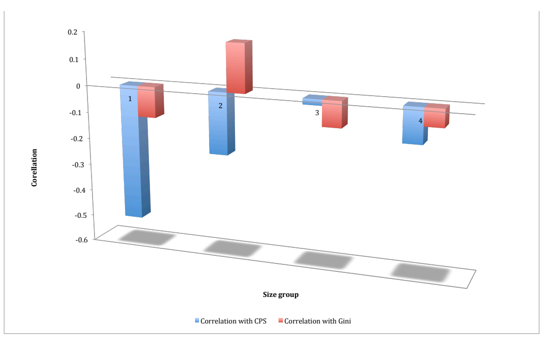

Figure 4: Spearman rank correlation between raw shareholders' returns and inequality metrics.
Note Where Group 1 consists of companies with five or fewer directors on the board, Group 2 consists of companies with five to ten directors, Group 3 consists of companies with eleven to twenty directors and, finally Group 4 consists of companies with more than twenty directors on the board.

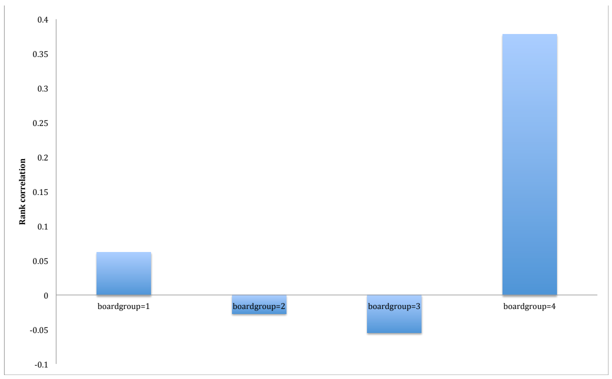

Figure 5: Spearman rank correlation between raw shareholders' returns and changes in highest paid executive (if the CEO) pay.
Note
Calculated using data for the ten best paid corporate executives in each company-year, or fewer when the board has less than ten members. Where Group 1 consists of companies with five or fewer directors on the board, Group 2 consists of companies with five to ten directors, Group 3 consists of companies with eleven to twenty directors and, finally Group 4 consists of companies with more than twenty directors on the board.

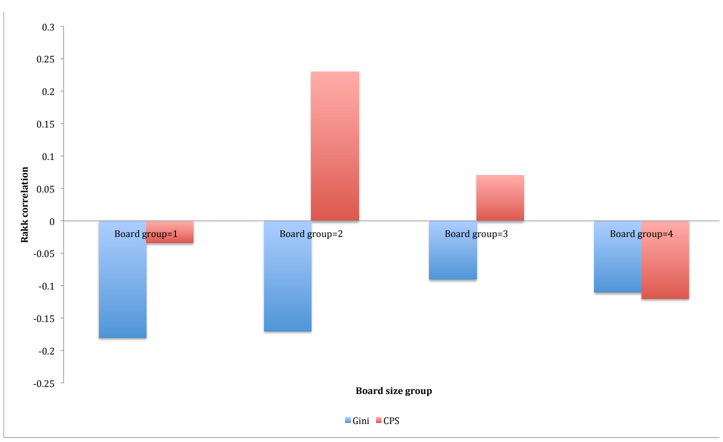

Figure 6: Spearman rank correlations between Fama-?French factor risk-?adjusted returns and pay inequality measures

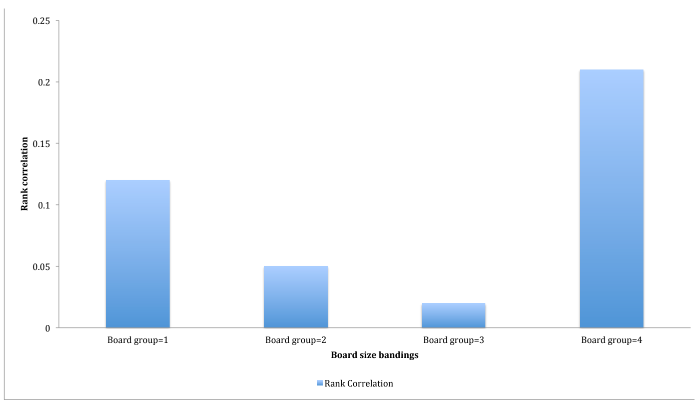

Figure 7: Spearman rank correlation between Fama-French 3-factor risk-adjusted returns and changes in highest paid executive (if CEO pay).

Note on Figures 5 & 6

Here returns are adjusted according to the Fama-French 3 factor model benchmark adjusted returns where regressions to estimate the factor loadings on of the form

$$R_{it} - R_{ft} = \alpha_t + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + \epsilon_{it}$$

which are estimated on five years of monthly data, or 60 months, in the period just before the year for which the rank correlation is measured.

References

Bebchuk, Lucian, and Jessie. Fried, 2004, *Pay without performance: The unfulfiled promise of executive compensation* (Harvard University Press: Cambridge, Massachusetts, USA).

Bebchuk, Lucian., Cremers. Martijn, and Urs. Peyers, 2011, The ceo pay slice., *Journal of Financial Economics.*

Chang, Yuk Sing., Sudipto. Dasgupta, and Gilles. Hilary, 2010, Ceo ability, pay and firm performance, *Management Science* 56, 211–229.

Conyon, Martin., John. Core, and Wayne. Guay, 2011, Are us ceos paid more than uk ceos? inferences from risk-adjusted pay, *Review of Financial Studies* 24, 402–438.

Conyon, Martin, and Martin. Foreman-Peck, 1998, Board size and corporate performance: Evidence from european countries, *European Journal of Finance* 4, 291–304.

Cowell, Frank, 1995, *Measuring Inequality* (Philip Allan) 2nd edition edn.

Eisenberg, Theodre., Stefen. Sundgren, and Martin Wells, 1998, Larger board size and decreasing firm value in small firms, *Journal of Financial Economics* 48, 35–54.

Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3–56.

Fehr, Ernst, and Gachter, 2004, *Advances in Behavioral Economics*chap. Fairness and retailiation: The economics of reciprocity . no. 18 (Russell Sage Foundation-Princeton University Press).

FRC, 2010, Uk corporate governance code, Discussion paper Financial Reporting Council 71-91 Akdwych, London.

——— , 2012, The uk corporate governance code, Aldwyth House, London.

Gregory, Alan., Rajesh. Tharyan, and Angela Huang, 2009, The fama-french and momentum portfolios and factors in the uk, SSRN Working Paper 1506960 Exeter XFi Centre for Finance and Investment.

Guest, Paul, 2009, The impact of board size on firm performance: evidence from the uk, *European Journal of Finance* 15, 385–404.

Hargreaves, Deborah, 2011, Cheques with balances: why tackling high pay is is the national interest, Discussion paper High Pay Commission.

Hart, Oliver, 1995, Corporate governance: some theory and implications, *Economic Journal* 105, 678–689.

Jensen, Michael, 1993, The modern industrial revolution, exit, and the failure of internal control systems, *Journal of Finance* 48, 831–880.

Jensen, Michael., and William. Meckling, 1976, The theory of the firm:managerial behaviour, agency costs and ownership structure., *Journal of Financial Economics* 3, 305–360.

Jensen, Michael., and Kevin. Murphy, 1990, Performance pay and top management incentives, *Journal of Political Economy* 98, 225–264.

Jordan, Tim, 2011, The ceo's slice of pay, Discussion paper Deutsche Bank.

Sen, Amartya., and James. Foster, 1997, *On economic inequality* . Clarendon Paperpacks (Oxford University Press).

Staunton, Michael, 2012, London share price data lspd monthly reference manual, Discussion paper London Business School Regents Park, London, England.

White, Halbert, 1980, A heteroskedasticity-consistent covariance estimator and direct test for heteroskedasticity, *Econometrica* 48, 817–838.

Yermack, David, 1996, Higher market valuations of companies with small boards of directors, *Journal of Financial Economics* 40, 185–211.