Average pay in banks

Average Pay in Banks: Do Agency Problems and Bank Performance Matter?

Abstract

We study the determinants of average pay across all levels of staff seniority for UK banks between 2003 and 2012. We show that pay is affected by agency problems but not by bank operating performance. Average pay does not depend on accounting outcomes at the bank level. By contrast, average pay is positively affected by the presence of a Remuneration Committee and the proportion of Non-Executives on the Board. These findings contribute to the existing literature in two ways. First, this is the first empirical study to directly compare the relative explanatory power of two theories of the determinants of bank pay (governance structures and bank performance). By finding empirical support for one theory but not the other, we identify dysfunctions in the determination of pay in banks. Second, our study considers a broader set of bank employees than any earlier research in this field, allowing us to identify more general patterns. Our results have practical implications for bank shareholders and regulators, suggesting the need for greater transparency in governance of bank pay.

Keywords: Corporate Governance, Remuneration, Bank Performance, Agency Problems.

JEL classification: G21, G34, G35, M52

1 Introduction

Bank pay is important in determining risk-taking behaviour (Guo *et al*, 2015) and its determinants are an important area of research (Yu and Van Luu, 2016). The aim of this study is to directly compare different theories of what determines pay in banks. Two main theories apply to how pay is determined in firms, including in banks. The first is that pay is determined by individual and firm performance, as a consequence of the marginal revenue product of labour being one of the determinants of the demand curve for labour (Addison *et al*, 2014) and a result of incentive-setting mechanisms (Fama, 1980). The second is that pay is determined as a consequence of agency problems: specifically that, because there are information asymmetries that advantage managers over shareholders, managers may be able to set pay unrelated to bank accounting performance (Carter *et al*, 2016). It is possible that neither, one or both of these theories is correct. Bank pay could, for instance, be linked to bank accounting performance, but with deviations introduced by different levels of agency problems in different banks, such that both theories would have some explanatory power.

In this paper, we seek to determine if either, or both, of these theories are confirmed in a specific empirical setting. In particular, we analyse determinants of average pay in UK banks over a ten-year period. We focus on accounting measures of bank performance because these correspond to the operating level at which most staff act and are assessed. Information at the operating and accounting levels is an important measure of risk and performance in banks and other businesses (Li, 2018, Chen *et al*, 2006) and is linked to other measures of risk (. In addition, we aim to include as many as possible of those entities which meet the economic definition of a bank.

Our results show that agency issues have an effect on bank pay. By contrast, we do not find evidence that bank accounting performance affects pay. We find that specific governance structures have effects differing from what regulators intend, with a Remuneration Committee leading to higher remuneration (likely because its presence can be used to justify high pay) and bank-level operating outcomes failing to affect pay.

Our paper contributes to the literature in the following ways. First, this is the first empirical study to directly compare the relative explanatory power of these two theories of the determinants of bank pay. Previous studies have considered the importance of specific drivers of pay, in the context of establishing specifications for empirical models, but they have not drawn these factors together into a comparative test of the power of the two theories, or shown that one theory is supported by evidence while the other is not.

Second, our study considers a broader set of bank employees than any earlier research in this field. Earlier studies of bank pay have addressed only the pay of the Chief Executive Officer (CEO) or, at most, of a few senior executives immediately under the CEO, and have ignored the pay of employees

at lower levels. Prominent examples include Srivastav and Hagendorff (2015), Bai and Elyasiani (2013), Hagendorff and Vallascas (2011), Uhde (2016) and Efing *et al* (2015). Ignoring lower levels is an important gap because focusing on a narrow sample in this way could obscure more general patterns. Specifically, industry surveys such as the annual salary survey conducted by the recruitment firm Robert Walters show that 17 out of 23 different sub-specialisms of finance professionals working in the UK banking sector earn salaries in the range of £50,000 to £120,000, with only director categories (which are likely to contain far fewer people per category) earning above this (Robert Walters Salary Survey 2018). Since it is well-established that pay levels at any level of seniority are linked to personal performance (Shapiro and Stiglitz, 1984), it appears that the literature examines bank pay in just one narrow segment (bank senior executives) whilst ignoring the equally important issue of bank pay across many segments (bank employees generally). Our paper fills this significant gap in the literature by studying the determinants of average pay across all levels of seniority in banks.

In this paper we do not differentiate between different types of pay (such as fixed base pay versus variable bonuses). It has been shown that base pay is a more important component of remuneration than bonuses across most levels of seniority in banks (Flabbi and Ichino, 2001) and, in any case, there is substantial evidence that banks routinely re-classify pay between the fixed and variable categories, such as when faced with opposition to bonuses from shareholders, regulators or society at large (European Banking Authority, 2014). This shows that the total level of pay that bankers have extracted from banks is a meaningful dependent variable. We therefore focus on average pay computed as an aggregate across all types of pay.

2 Literature review and hypotheses

Previous studies have argued that pay is determined by productivity and firm performance, sometimes alongside other causes. In basic microeconomics (e.g. Varian, 2014) pay is positively related to firm performance because of fundamental market mechanisms. Of greater relevance to our work, Fama (1980) discusses the possibility that higher pay is awarded following higher performance because this constitutes an *ex ante* signal from shareholders that high performance will be rewarded in future. As a matter of basic accounting (Atrill and McLaney, 2006) it is the case that higher bank accounting performance gives shareholders financial resources to pay more.

Contrary to the theoretical predictions of the literature suggesting a pay-performance link, the literature in agency theory argues that managers have informational advantages over shareholders and therefore set their own pay without reference to performance. Jensen and Meckling (1976) theorised that the separation of ownership and control inherent in typical corporate structures may result in managerial

decisions that deviate from shareholder value maximisation. Carter et al. (2016) argue that the consequences of unresolved agency problems may include excessive pay awards, in which managers are able to exploit the separation of control from ownership to award themselves high pay, while taking advantage of information asymmetries to obscure the fact that this pay is not justified by performance.

Vahey (2004) argues that the phenomenon of rent-sharing may be important in wage determination. This occurs in situations where multiple groups of insiders form coalitions to more effectively extract rents from other parties. One way in which this could manifest is that senior employees (who have power to determine wages) may form a coalition with less-senior employees (who lack such power) to more-effectively extract value from shareholders. Most basically, less-senior employees may be paid enough to ensure that they do not 'whistle-blow' on excessive executive pay. This suggests that average pay at all levels of seniority will be subject to similar agency problems to the most senior levels, given that executives may over-pay less-senior staff as a means of securing alliances and their own high pay.

A range of studies identify diverse aspects that are expected to have effects on remuneration. We summarise below this literature to justify the choice of regressors in the empirical estimations.

Brentiani (2004) points out that financial ratios which normalise performance to firm scale are important to shareholders. Return on Assets (ROA), which normalises net income to total assets, is particularly important because it provides a robust measure of the effectiveness of assets in generating profit. For this reason, we use ROA as a regressor in testing effects of bank accounting performance on average pay.

One important consideration to take into account in how ROA is treated as an explanatory variable is downward nominal wage rigidity. This is reported to be important at both the macroeconomic and microeconomic levels. In New Keynesian models, downward nominal wage rigidity explains why wages do not drop rapidly to restore aggregate equilibrium after a negative output gap has arisen (Romer, 2006). On a microeconomic level, Fehr and Goette (2005) show that downward nominal wage rigidity can exist regardless of the level of inflation and suggest that it arises because of the long-term nature of employment contracts, along with the behavioural heuristic of 'money illusion' (Wilkinson, 2008). Radowski and Bonin (2010) provide further evidence that the phenomenon exists on a micro-economic level, though it is more frequent in manufacturing than in services.

These studies imply we cannot expect a simple correlation between bank profitability and average pay. There is evidence that bonuses are a larger component of pay at the most senior levels but are less important at other levels (Flabbi and Ichino, 2001) so increases in fixed base salary may be more important than bonuses in understanding the effects of bank accounting performance on average pay across the bank. Given downward nominal wage rigidity, base salary may not move down after a year in which the bank has performed badly, but may move up after a year in which it has performed well

(because banks have the financial ability to pay more and a desire to set incentives by rewarding desired outcomes). So, as well as including simple measures of bank accounting performance, models of the determinants of average pay in banks should also contain measures of the *positive* component of bank accounting returns (calculated by setting returns to zero for observations where they were negative). Including the positive component of bank performance as an explanatory variable entirely addresses the issue of downward nominal rigidity in the relationship between bank performance and pay since it allows us to estimate the effects of positive bank performance separately from the effects of bank performance more generally. In addition, since pay contracts may consider accounting performance over more than one year, and since accounting performance in the preceding year will determine wage increases that persist indefinitely (at least until employee turnover occurs) lagged effects should be taken into account.

There are no studies which consider the effects of bank loan impairments on remuneration. However, on the basis of the literature discussed thus far, it is reasonable to hypothesise that large impairments might lead to negative impacts on pay (or at least an absence of pay increases) as banks have less resources when impairments are large, and reason to dis-incentivise behaviour that leads to impairments. Indeed, regulation in the United Kingdom that has existed in some form since before the crisis of 2007-2009, requires that risk be taken into account in pay settlements (Financial Conduct Authority Handbook, Systems and Controls Sourcebook, Chapter 19). Therefore, a measure of loan impairments, which is the most important metric of realised risk at the operating level for most banks, should be included in models of pay.

An indicator which may serve as a proxy for the importance of agency problems in determining pay is the presence or absence of a Remuneration Committee. This is because the way in which Remuneration Committees are composed may serve to exacerbate the effects of agency problems upon pay. The UK Corporate Governance Code (2014) ("the Code") tasks Remuneration Committees with directly determining the pay of senior executives and setting policies and criteria for determining the pay of other staff. The Code requires that Remuneration Committees ensure pay is 'reasonable', aligned with risk and not excessive. There is some evidence that Remuneration Committee composition can affect pay structures (Vafeas *et al*, 2003). However, Renneboog and Zhao (2011) argue that inter-personal networks between Directors and CEOs at different firms may strongly affect corporate wage-setting. This suggests that, although regulators view Remuneration Committees and oversight by Non-Executive Directors (NEDs) as means to restrict pay (UK Corporate Governance Code, 2014) it may actually be the case that these features of governance are used as justification for higher remuneration. Thus, the presence of a Remuneration Committee should be included as an explanatory variable in models of pay.

It can also be expected that a higher proportion of NEDs on the Board leads to higher pay. This is because, as Renneboog and Zhao (2011) posit, Remuneration Committee members permit higher pay, because they are part of the same social network as management. If NEDs on the Remuneration Committee belong to such networks, then NEDs in general will also, and so will suffer from the same incentive distortions.

There is also evidence that Executive Remuneration Disclosures may serve to mitigate agency problems and cause lower pay. Specifically, Directors' and senior managers' desire to protect their future reputation may affect decisions they make in respect of remuneration. For instance, there is evidence from Linet al. (2016) that Director reputation can be important in securing future business and, thus, that there is an incentive to act in ways that preserve reputation. This suggests that pay awards will be lower in cases where they must be publicly disclosed, because Directors do not wish to become known for permitting managers and employees to take an excessive share of corporate income. Because UK regulation encourages banks to disclose executive remuneration, as a means to discourage excessive pay through public scrutiny and reputational risk, we have been able to use such disclosures as an empirical indicator.

Finally, although there is no peer-reviewed evidence available, salary surveys conducted by recruitment firms (in particular the Robert Walters Salary Survey 2016) suggest that salaries are higher in certain parts of the banking sector, such as investment banks, and lower in other banks, such as mutuals. This is unsurprising and suggests that indicators of bank business model should be included as controls in models of remuneration.

Based on the above literature, we test the following hypotheses relating to the determinants of bank pay:

H1: *Average pay in banks is positively affected by bank accounting performance.*

H2: *Average pay in banks is affected by agency problems.*

In summary, theoretical literature suggests that bank performance and / or agency problems may be important as determinants of bank pay. Our work suggests that agency problems are important in determining pay in UK banks, but bank accounting performance is not. This is the first time the two theories have been compared in this way.

3 Method

3.1 The Model

We test whether measures of bank accounting performance and proxies for agency problems (i.e, the presence of a a remuneration committee, the presence of executive remuneration disclosures, the director ratio, and the presence of a Joint CEO-Chairman) explain average pay in banks using cross-sectional and panel regression models.

$$\begin{aligned}\mathrm{AP}_{it} = {} & \beta_0 + \beta_1 \mathrm{ROA}_{it} + \beta_2 \mathrm{L.\,ROA}_{it} + \beta_3 \mathrm{POS\_ROA}_{it} + \beta_4 \mathrm{L.\,POS\_ROA}_{it} + \beta_5 \mathrm{LI}_{it} + \beta_6 \mathrm{REMC}_{it} + \\ & \beta_7 \mathrm{ERD}_{it} + \beta_8 \mathrm{DR}_{it} + \beta_9 \mathrm{JOINT}_{it} + \beta_{10} \mathrm{MUT}_{it} + \beta_{11} \mathrm{SEC}_{it} + \beta_{12} \mathrm{SIZE}_{it} + \beta_{13} \mathrm{RBA}_{it} + \\ & \beta_{14} (\mathrm{SIZE} * \mathrm{DR})_{it} + \beta_{15} (\mathrm{SIZE} * \mathrm{ERD})_{it} + \boldsymbol{\beta_{16}} \mathbf{YRD_{it}} + \alpha_i + \varepsilon_{it} \qquad (1)\end{aligned}$$

$$\begin{aligned}\mathrm{AP}_{it} = {} & \beta_0 + \beta_1 \mathrm{ROA}_{it} + \beta_2 \mathrm{L.\,ROA}_{it} + \beta_3 \mathrm{POS\_ROA}_{it} + \beta_4 \mathrm{L.\,POS\_ROA}_{it} + \beta_5 \mathrm{LI}_{it} + \beta_6 \mathrm{REMC}_{it} + \\ & \beta_7 \mathrm{ERD}_{it} + \beta_8 \mathrm{DR}_{it} + \beta_9 \mathrm{JOINT}_{it} + \beta_{10} \mathrm{MUT}_{it} + \beta_{11} \mathrm{SEC}_{it} + \beta_{12} \mathrm{SIZE}_{it} + \beta_{13} \mathrm{RBA}_{it} + \\ & \beta_{14} (\mathrm{SIZE} * \mathrm{DR})_{it} + \beta_{15} (\mathrm{SIZE} * \mathrm{ERD})_{it} + \boldsymbol{\beta_{16}} \mathbf{YRD_{it}} + \varepsilon_{it} \qquad (2)\end{aligned}$$

where subscript *i* represents a bank while *t* represents a year. The β terms are parameters to be estimated. AP represents average pay, across all employees in the bank. ROA represents return on assets. POS_ROA represents the positive component of ROA and is included to allow for the possibility of downward nominal rigidity in the effect of accounting performance on wages, as explained above. Both ROA and POS_ROA are included with a lag (denoted by "L") to allow for the possibility that performance-related elements of wage contracts may reference accounting performance at time lags of greater than 12 months, as recommended by the UK financial services regulator (UK Financial Conduct Authority Handbook, Systems and Controls Sourcebook, Chapter 19).

The variable LI represents loan impairments and is included because impairments are expected to have a negative effect on wages. REMC represents the presence of a remuneration committee and is included because this is expected to have a positive effect on wages. ERD represents the presence of executive remuneration disclosures and is expected to have negative effect on pay. DR represents the director ratio (NEDs as a proportion of total Directors) and is expected to have a positive effect on pay, for the same reasons as a Remuneration Committee.

JOINT represents the presence of a Joint CEO-Chairman and is included as a control to allow for the possibility that increasing the powers of the CEO will affect how pay is set. There is evidence from a range of settings that different aspects of the composition of a Board affects corporate behaviour (Faleye *et al*, 2018, Chen *et al*, 2018, Lu and Boateng, 2017, Lee and Lee, 2009 and Luo and Hachiya, 2005). MUT is a dummy variable representing mutual ownership, while SEC represents the proportion of assets that are listed securities (a proxy for investment banking activity). The latter two are controls included to reflect the likelihood that ownership and business model affect pay. **YRD** is a vector of year dummies for years 2004-2012 (with 2003 as a base year) and serves as a control for changing external conditions (legal, regulatory and economic) that are likely to affect pay.

We also include interactions of bank size with director ratio and with executive remuneration disclosures, to accommodate the possibility that these have different effects in larger firms.

Alongside these regressors, our models contain an idiosyncratic error term ε_{it} reflecting variation from sources external to the model that can be treated as random and uncorrelated with anything included in the model.[1] Model (1) also contains a bank-specific error term α_i to control for unobserved heterogeneity that is constant for banks over time.

Models are estimated in linear form because linear functions are sufficient to test hypotheses while treating confounding factors as constant. Model (2) is estimated using Ordinary Least Squares while (1) uses the random effects estimator, which is suitable for the panel-model specification used in that equation. This approach serves to show that results are robust to the choice of estimator.

3.2 Data

To test our hypotheses, data was extracted from Bankscope Bureau Van Dijik and combined with manually-sourced data on governance and ownership. The data we employ relates to the United Kingdom and is at annual frequency, since quarterly data is severely incomplete. It spans years 2003 through 2012. This period covers both a benign economic period (2003-2007) and a crisis period (2008-2012).

Our initial sample include data on 711 legal entities for the United Kingdom. We remove firms that are not retail, commercial, corporate, investment or universal banks and ensure that only one entity per corporate group (the consolidated parent entity in all but two cases) is present in the data set. This reduces the sample to 115 banks and total observations for these 115 banks over the 10-year period

[1] Testing shown in Table 4 verifies that this assumption is justified.

numbered 762. In the context of the UK, this represents the population at the time.[2] The sample is an unbalanced panel due to *de novo* creation of new banks, mergers and bankruptcies, but the estimators used are robust to this.

For each bank we manually collected data from annual reports and the Pillar 3 disclosures required under Basel 2 and 3 regulations. The data collected in this way relate to ownership type, numbers of executive and non-executive directors, presence of a joint CEO-Chairman, presence of a Remuneration Committee and presence of a Joint CEO-Chairman. The use of manually-collected data gives our research unique information not used in other studies.

The data we use from Bankscope are on an annual, calendar-year basis, with variables presented with universal definitions across banks, based on the Fitch Universal format. For banks that do not have a December year end, Bankscope includes data for the nearest bank year-end to the December year-end in showing annual data. For our analysis, this detail is of limited importance as the great majority of the banks in our sample have a December year end for financial accounting purposes.[3]

We record governance data collected from annual reports and Pillar 3 disclosures as the values that prevailed for most of the calendar year. For instance, if a bank had 8 non-executive directors for most of the year but lost one of them three months before the calendar year-end, then we record the number of NEDs present for the year as 8. This is possible because banks disclose arrival and departure dates for Directors during the year. In this way, outcomes over the year are compared with the governance structure that prevailed for most of the year.

In cases where a foreign parent has control over a UK branch or subsidiary, the composition of the foreign parent's Board was used as the basis of the governance data we collected. A separate UK Board was used only where the annual reports of the company state explicitly that it has decision-making independence from the parent. This convention provides further support for the argument that governance variables are exogenous: if a characteristic originates with an overseas parent entity, it is

[2] Where banks are established de novo and come into existence during a year, a record is included for them in our data for the year in which they come into existence. Where banks cease to exist during a year due to failure, a record is also included for them for that year, but not for subsequent years. Where banks cease to exist during a year due to merger or acquisition, no record is included for them for that year in order to avoid double-counting with the new group entity that is thereby created and which is also present in the data set.

[3] Those that did not mostly had year ends close to December. Out of 111 entities for which we could obtain annual reports, 85 (77%) had year ends at the end of December and 106 (95%) had year ends between the end of September and the end of March. In any case, since the external economic and regulatory conditions that are included in our models (captured through year dummies) tend to be very stable from one year to the next and the fundamental characteristics of banks themselves change slowly, a slight mismatch in the time points at which banks are compared would have minimal effect on the analysis.

less likely to be subject to reverse causality in which it is affected by financial characteristics of the branch or subsidiary.

For a few continental European parent entities where there is both a supervisory Board and a managerial Board, we include the supervisory Board only in defining variables relating to Board composition. This is because the supervisory Board has oversight over the managerial Board and can over-rule its decisions, while the managerial Board is more similar to an Executive Committee in a UK corporate governance context.

Non-Executive Directors are defined in our data as Directors who do not have any executive responsibilities identified by the annual report. In applying corporate governance codes and guidelines, banks may operate slightly different definitions of non-executive status, such as having no executive responsibilities and having had no such responsibilities with the same or a related organisation at any time in the past. Since banks vary in their application of definitions established in governance codes – such as in what counts as a 'related organisation' – adopting their definitions could lead to inconsistency in our data. We therefore adopt the simpler, more objective standard of simply counting NEDs as directors who do not have specifically identified executive responsibilities. By this definition, Chairmen and Vice / Deputy Chairmen of banks are classified as non-executive if they do not have specific identified executive responsibilities and instead serve mainly to oversee the CEO and other executives.

Generating descriptive statistics confirmed that variables were suitable for inclusion in econometric models. This revealed that means, standard deviations and outliers all had economically plausible values.

Missing data was imputed by backward replacement in which a missing value was replaced with the value at the subsequent time point for the relevant variable and bank or, if this was not possible, replacement with the average value for the relevant variable across all observations. This approach takes advantage of the autocorrelation present in the data. Importantly, no imputation was carried out for the dependent variable, thus avoiding a situation where imputation occurred on both sides of the comparison.

3.3 Descriptive Statistics

Variables used in our models are as follows, shown with definitions and descriptive statistics that verify their suitability for inclusion in models (Table 1).

[TABLE 1 ABOUT HERE]

In addition, we examined the distribution of the dependent variable, average pay, across banks. We find that 85% of the mass of the empirical distribution of this variable lies below a pay level of £120,000, which corresponds to the upper bound for the great majority of workers in salary surveys of the banking sector (Robert Walters Salary Survey 2018). This suggests that a large majority of banks in our sample are peopled mainly by staff earning salaries far below the executive level. This, in turn, indicates that our data are suitable for the objective of analysing determinants of pay across all levels of seniority in banks.

Table 2 shows a correlation matrix for explanatory variables, indicating no high multicollinearity.

[TABLE 2 ABOUT HERE]

4 Results

4.1 Main Results

We find that no aspect of bank accounting performance has a robust effect on bank pay. By contrast, aspects of governance have robust significant effects in a manner that suggests the importance of agency problems. For instance, the presence of a Remuneration Committee leads to higher average pay, which may well be due to social network effects involving executives and NEDs in the manner discussed by Renneboog and Zhao (2011). Table 3 below shows our estimation results, with equations (1) and (2) being as stated in the Methods section above and equations (3) and (4) being similar to (2) albeit with regressors dropped for reasons of robustness testing.

[TABLE 3 ABOUT HERE]

In the above estimation results (Table 3), individual bank accounting performance does not have a significant effect on average pay, while several of the explanatory variables serving as proxies for the effects of agency problems are statistically significant, in a manner that is robust to model specification and estimation method, and have the expected sign.

A simple measure of accounting returns has no effect on average pay, but neither does a measure that takes account only of positive components of returns while setting negative returns to zero – referred to

as Positive ROA (POS_ROA). This is contrary to the reasoning of Fehr and Goette (2005) that downward nominal wage rigidity arises because of the long-term nature of employment contracts, along with behavioural heuristics in which employees individually and collectively resist downward wage movements, while readily accepting upward movements. This is important because it is contrary to predictions of basic theory and assumptions that underpin regulation of bank governance.

The finding that bank pay is insensitive to any measure of bank accounting performance also indicates that bonuses are not the main component of remuneration for most bank staff. If they were, the effect of bonuses dropping when ROA performance is weak or negative, and rising when the opposite is true, would be expected to manifest as significant positive parameter values for both of the first two regressors in Table 3 above.

It is also clear that higher loan impairments do not lead to lower average pay in the banks in our sample. This suggests that, even when impairments are high, as they were for certain bank-year observations in our sample, the effects on average pay are negligible. This suggests that the linkage of pay to realised risk expected by regulators (Financial Conduct Authority Handbook, Systems and Controls Sourcebook, Chapter 19) is not widespread for employees in general in the banks in our sample. So, although these are findings of no significant association, they nevertheless have interesting implications for regulation.

Taking the above findings together, it is clear that hypothesis H1 cannot be accepted. There is no statistically-significant evidence that bank accounting performance has an effect on average pay within banks.

By contrast, indicators that serve as a proxy for the extent of agency problems do have a significant association with bank pay in our models. Specifically, a Remuneration Committee and a higher NED ratio both have a positive effect on bank pay, as expected. This is in accordance with the argument of Renneboog and Zhao (2011) that oversight structures can have effects on remuneration very different from what is envisaged in guidance such as the UK Corporate Governance Code (2014). It is clear that overseers may collude in, or be used as justification for, higher pay. This casts doubt on the view that internal controls within banks can be used to ensure reasonable and efficient remuneration.

As summarised by Morris *et al* (2009) the dominant view of corporate remuneration in the UK and countries with similar economies has been that centralised regulation would introduce inefficiencies and that regulators, acting via the audit profession, should simply encourage independent oversight structures at the firm level, designed to ensure that pay awards are justified. However, there have been critics such as Renneboog and Zhao (2011) who point out that the Directors and CEOs of different firms belong to connected interpersonal networks and this may introduce inefficiency. The results we report here support the critics, rather than the established view.

These results show that agency problems are important in determining pay within banks. Having a Remuneration Committee and a higher Director Ratio exacerbates agency problems relating to pay because it places control over remuneration in the hands of individuals who are part of the same social network as management (Renneboog and Zhao, 2011) and creates a means of appearing to justify high pay.

Amongst control variables, we find that remuneration is higher in investment banks and lower in mutual banks, compared to other banks. This is not surprising, but it is the first time it has been reported in a rigorous econometric study and it suggests that our model is working well.

Coefficients on binary regressors can be interpreted as marginal effects; that is the number of thousands of pounds sterling (GBP) added to average pay by increasing the relevant regressor by one unit. Having a remuneration committee raises average pay by between £37,000 and £68,000. Having a Board composed 75% of NEDs raises it by between £23,000 and £38,000 compared to a bank with a Board composed 50% of NEDs. These effects are large, but they occur in a sample where the average bank has average pay of £150,000 per annum and some banks pay much more. They may be somewhat larger than intuition would suggest, but they are reliable in that they have been isolated by means of a well-controlled estimation strategy.

It is important to consider the possibility that results might differ across bank type, or over time as structural conditions change. In particular, mutual banks have different corporate objectives and incentive structures from shareholder-owned banks. The mutual objective involves a broader set of goals including the provision of high quality products and services, along with adequate profitability. It follows that profit maximisation is one of – and probably not the most important – business objective of these credit institutions. Thus managers at mutual banks have lower incentives to maximise profits and seek risk, either in the form of bonus schemes or substantial equity holdings in the bank. In consequence, mutual banks tend to have lower risk and lower return than shareholder-owned banks (Schliefer and Vishny, 1997).

It is therefore possible that the effects of performance and governance upon remuneration are different in mutual banks compared to other banks. To test this possibility, we add to our models multiplicative interactions of mutuality with ROA, positive ROA, loan impairments, the presence of a Remuneration Committee and the Director ratio.

[TABLE 4 ABOUT HERE]

Our results remain robust in this analysis. The presence of a remuneration committee continues to have positive effects on pay. Bank performance continues to have no robust effects. The interaction terms

themselves are not significant in most specifications. Therefore, our results hold across different bank ownership types.

In the same vein, it is possible that the effects (and non-effects) we measure may change through time. In particular, the global financial crisis of 2008-2009 could have led to transient or permanent changes in the effects of our explanatory variables. In the case of a transient effect, the phenomenon of 'flight to safety' in the financial sector is well-documented (Kontonikas *et al*, 2013) with returns of safe-haven assets turning negative in some cases (International Monetary Fund, 2016). If a similar phenomenon of temporarily foregoing personal gain in order to remain safe occurs in rent-seeking behaviour, then effects of governance and bank performance on pay might change during a crisis period.

To test this possibility, we generate a during-financial-crisis indicator (FinCr) that takes a value 1 in the years 2008 and 2009 (the most intense years of the global financial crisis) and a value zero in all other years.

[TABLE 5 ABOUT HERE]

This analysis shows clearly that our results hold during the crisis years and non-crisis years equally. The presence of a remuneration committee continues to have positive effects on pay. Bank performance continues to have no robust effects. The interaction terms themselves are not significant.

In the case of a possible permanent structural break, it is known that regulators began to immediately improve bank governance once the global financial crisis erupted, removing bank leaders seen as ineffective or corrupt from the moment banks were bailed out in 2008, and improving standards in the enforcement of governance codes and remuneration codes from that time and over the next several years (Masciandaro and Romelli, 2017). It is possible that these supervisory and regulatory changes altered the way in which pay is determined in banks.

To test this possibility, we generate a post-financial-crisis indicator (PFC) that takes a value 1 for all years from 2008 onwards (reflecting the beginning of structural change at that point in time) and a value zero in earlier years. We generate multiplicative interactions of this with ROA, positive ROA, loan impairments, the presence of a Remuneration Committee and the Director ratio.

[TABLE 6 ABOUT HERE]

This analysis reveals that bank performance continues to lack any robust effects when we allow for the possibility of a structural break and that, in fully-controlled models with all controls included in the specification, the presence of a remuneration committee continues to lead to higher pay. Results are robust to interactions with changing conditions over time, and to interactions with mutual ownership type.

In summary, we can reject hypothesis H1. There is, surprisingly, no evidence that financial outcomes at the bank level affect average pay within banks. By contrast, hypothesis H2 cannot be rejected. We find that the presence of a Remuneration Committee and large numbers of NEDs lead to higher pay, which indicates that agency problems are important in determining bank pay. This suggests bank shareholders and regulators need to adopt radically greater measurability and transparency in pay-setting mechanisms and possibly some centralised regulation for important firms where there is limited sensitivity to reputational pressure.

4.2 Robustness Testing

This study deals effectively with a range of empirical issues that can arise in models. Most fundamentally, parameter stability can be assumed because the basic institutions and corporate law of the United Kingdom did not change fundamentally over the period of study. Models are varied across specifications (1) to (4) in Table 3 as a means to show robustness to the set of explanatory variables included and to the choice of estimation method.

Our estimations are robust to endogeneity. Endogeneity due to error in measurement of regressors is unlikely since explanatory variables are precise categorical, count or financial terms that are measured accurately. Endogeneity due to reverse causality or simultaneity is similarly unlikely because lagged regressors are used where relevant and explanatory variables relating to governance, ownership and business model are remarkably stable over time for individual banks. Such features represent relatively fixed, constitutional choices made by banks, which do not generally change in response to variations in commercial outcomes, at least not over the time scales considered in this study. This is evident in that explanatory variables relating to institutional features of banks were all found to have autocorrelation exceeding 0.86.

Endogeneity due to omitted variables is possible in principle if there are factors that affect average pay which are not measured (perhaps because they are features of corporate culture that cannot be measured in any practical way) and which are correlated with our explanatory variables. However, empirical testing using auxiliary regressions to test for correlation of residuals from estimations in column 3 and 4 (Table 3) with the regressors shows no evidence of endogeneity (Table 4 in Appendix A).

This shows no evidence that regressors are correlated with residuals and, hence, no evidence of endogeneity. We did not include powers of explanatory variables in the auxiliary regression as this serves to test for omitted nonlinearities, rather than endogeneity alone. The same results as above (no significant association of residuals with any regressor) are found when we include all regressors in a one-equation auxiliary regression with idiosyncratic error terms from equation (3) as dependent variable (results not shown for reasons of space, can be provided upon request).

Pay is intrinsically highly serially correlated. For each individual, pay for each year is generally determined by means of a proportionately small adjustment relative to pay in the preceding year (Martin and Whiting, 2016), an arrangement that inevitably makes average pay for a bank serially correlated. We verify this empirically, finding that average pay has correlation coefficients with itself over lags of one to three years of 0.98 to 0.95. A number of the explanatory variables are also intrinsically serially correlated.

Our estimators are fully robust to this serial correlation, irrespective of whether it arises in dependent or explanatory variables. Our analysis makes cross-sectional, rather than time-series, comparisons and the serial correlation is therefore not relevant in specification of models or choosing estimators for the beta coefficients. OLS and panel-data estimators of the kind we use are robust to serial correlation provided that standard errors are adjusted by clustering (Cameron and Trivedi, 2005). Since all of our standard errors are clustered, our results are robust.

In addition, the inclusion of year dummies as explanatory variables makes our results robust against empirical problems caused by time trends.

Our models have Variance Inflation Factors (VIFs) of 1-8 for the regressors of interest. This indicates that multicollinearity has magnified coefficient standard errors by factors of 1 to 2.8. However, we do not remove regressors as the VIFs are not excessively high, there is no one obvious regressor to remove and we do not wish to unbalance our model specification strategy. In any case, it has clearly been possible to obtain significant results and we verify (using models with smaller numbers of regressors – not shown) that multicollinearity does not cause sign reversal.

The testing to confirm this involved the four explanatory variables ROA, lagged ROA, the positive ROA and the lagged positive ROA being included individually in models (without the other three but with all other regressors). This is important because these variables are intrinsically correlated with one another, such that they account for all VIFs greater than 2.3 (standard error magnification of 1.5) in our analysis. This testing still does not yield the expected association of any of the four regressors with average pay. (It does produce some evidence of an association of L.ROA with pay, but this is not robust and has the opposite sign from what all theory and literature suggests.) Our testing thus confirms that multicollinearity is not the reason the expected associations have not been detected for measures of bank accounting performance.

5 Conclusions and Policy Implications

We find no evidence that average bank pay depends on accounting outcomes at the bank level. By contrast, indicators that serve as proxies for agency problems do matter as determinants of average pay. The presence of a Remuneration Committee or of higher proportions of NEDs on the Board leads to higher average pay, likely because these structures are used to apparently justify high pay.

This study has practical implications for bank shareholders and regulators. In particular, it departs from the standard view as summarised in Morris *et al* (2009) that controls at the firm level can restrain pay and implies instead that Remuneration Committees, even if they are useful as tools of risk management, are counter-productive as tools of pay restraint. If real justification of pay is to be an objective of policy, it must be achieved by other means.

What might these other means be? The essence of the problem is that, in the presence of information asymmetries, members of Remuneration Committees (and NEDs more generally) can be used to apparently justify pay decisions by managers because they have limited incentives to act otherwise. One possible solution is to introduce centralised regulation of pay, such that incentive distortions at the firm level become irrelevant. Another is to reduce the information asymmetry by linking pay more explicitly to measurable outcomes at the personal or firm level, with radically greater transparency for internal and external parties on how the process works.

Theoretical work (Thanassoulis, 2012) has argued for centralised regulation of bank pay on different grounds, namely that competition amongst banks for staff pushes up pay and thus increases the risk that banks will default, because capital is depleted. Based on the evidence presented in our paper, it is clear that central regulation would lessen the incentive distortions involved in setting pay. However, the phenomenon of pay-setters belonging to the same interpersonal networks as bank managers might not disappear entirely (in the case of regulatory capture) and the problem of information asymmetries could well be worse than for shareholders.

Radically greater transparency in pay setting appears more promising, in that it would reduce problems of information asymmetry and would also be effective against distorted incentives, in that individuals are less likely to act on such incentives when there are substantial reputational costs.

Transparency could be less effective in cases where managers have personal objectives that are intangible and hard to measure. For instance, if a specific manager has a remit to ensure effective interpersonal communication across teams, how exactly could this be measured? Nevertheless, many tasks that are not currently measured could be made measurable by identifying Key Performance Indicators (KPIs) that serve as a reasonable proxy for desired outcomes and by ensuring that someone other than the person affected verifies the measurement. For instance, a human resources manager (a

responsibility often considered intangible) could be remunerated based on KPIs relating to staff recruitment, turnover and retention and staff incidents, normalised to industry benchmarks.

Improved transparency could also improve the effectiveness of centralised regulation, if one of the main vulnerabilities of such regulation is information asymmetry. Regulation could likewise seek to ensure that disclosures do not seek to mislead, distort or omit.

Thus, our recommendation to bank shareholders and regulators is to make the determination of bank pay much more measurable and transparent. We also suggest that some form of centralised regulation should be considered (for instance for systematically important firms) in case pay-setters simply perceive no reputational cost of excessive pay awards or seek to distort disclosures. Regulation could include a rule that systemically important banks must justify to the regulator pay awards that breach thresholds pre-defined with respect to industry norms.

In summary, we conclude that bank pay is determined by agency problems, not accounting performance, implying a need for greater measurability and transparency in setting pay, and some centralised regulation.

Appendix A: Endogeneity testing

The following table shows the results of bivariate auxiliary regressions conducted for reasons of endogeneity testing.

[TABLE 6 ABOUT HERE]

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Tables

Table 1: Variables used and descriptive statistics.

Variable	Symbol	Definition	Obs.	Unit	Mean	Std. Dev.	Min	Max
Dependent variable								
Average Pay	AP	Total remuneration expenditure divided by the number of employees	598	£GBP thousands	150	680	10	1011
Performance								
Return on Assets	ROA	Net income over total assets, all multiplied by 100	756	%	0.37	2.25	-33.48	23.93
Positive Component of ROA	POS_ROA	Equals ROA if ROA>0, 0 otherwise	756	%	0.61	1.58	0	23.93
Loan Impairments	LI	Loan impairment charge over total assets, all multiplied by 100	645	%	0.63	1.9	-17.33	29.91
Agency variables								
Remuneration Committee Present	REMC	Takes value 1 if a Remuneration Committee is present, 0 otherwise	556	Binary	0.89	0.32	0	1
Executive Remuneration Disclosed	ERD	Takes value 1 if executive remuneration is disclosed, 0 otherwise	554	Binary	0.63	0.48	0	1
Director Ratio	DR	Proportion of the Board who are Non-Executive Directors	528	Ratio	0.72	0.14	0.27	1
Joint CEO-Chairman	JOINT	Takes a value of 1 if the Board Chairman and CEO of the bank are the same individual, 0 otherwise	532	Binary	0.09	0.28	0	1
Mutual Ownership	MUT	Takes a value of 1 if the bank is owned by depositors and / or employees, 0 otherwise	760	Binary	0.4	0.49	0	1
Other controls								
Securities Holdings	SEC	Total securities holdings over total assets	730	Ratio	0.21	0.21	0	1
Size Over GDP	SIZE	Total assets divided by UK nominal GDP for the same year	760	Ratio	0.07	0.26	7.90E-05	2.05
Rank by Assets	RBA	A ranking computed on the basis of total assets	520	Rank	3282	2463	18	10152
Year Dummies	YRD	Year dummies that take the value of 1 for each individual year between 2003 and 2012, zero otherwise	-	-	-	-	-	-

In this table we report the variables employed in the analysis, their definition and descriptive statistics. Outliers have been removed in regression analysis to avoid excessive impact on estimates, including three observations were average pay was less than £20,000 because the bank had existed for less than the full year that the observation relates to. Year dummy parameters include effects of inflation; results do not change when an inflation-adjusted version of AP is used.

Table 2 Pearson correlation matrix of explanatory variables.

	loan impairments	return on assets	positive ROA	director ratio	securities holdings	size over gdp	mutual ownership	remun committee	exec rem disclosed	joint ceo-chairman
LI	1									
ROA	-0.5	1								
POS_ROA	-0.22	0.64	1							
DR	0.22	-0.35	-0.07	1						
SEC	0.16	0.04	0.02	0.3	1					
SIZE	0.08	-0.07	-0.04	0.25	0.55	1				
MUT	-0.47	0.02	-0.18	-0.4	-0.52	-0.45	1			
REMC	0.08	-0.09	0.01	-0.17	0.13	0.11	0.05	1		
ERD	-0.12	0.1	-0.05	-0.32	-0.14	0.13	0.26	0.45	1	
JOINT	0.06	-0.2	0.19	0.28	-0.1	-0.08	-0.23	-0.05	-0.2	1

In this table we report the Pearson correlation coefficients for the main variables included in the analysis. Note that the only correlations with an absolute value of 0.5 or greater are those shaded.

Table 3 Estimation results for models explaining average pay in banks.

	(1)	(2)	(3)	(4)
ROA	8.810	-2.287	-7.986	
	(5.874)	(14.65)	(17.56)	
ROA_{t-1}	-7.485	-18.67	-13.94	
	(5.451)	(11.96)	(11.81)	
POS_ROA	-6.122	19.09	31.98	5.462
	(7.656)	(16.36)	(34.41)	(18.39)
POS_ROA_{t-1}	-13.66	-15.47	-39.13	-70.57**
	(9.237)	(18.25)	(27.96)	(32.51)
LI	0.873	-9.775	-13.44	-7.052
	(1.846)	(6.517)	(9.590)	(5.386)
REMC	37.14**	68.38***	63.62**	55.47**
	(17.84)	(21.00)	(26.14)	(24.06)
ERD	-25.81	-41.16**	-19.96	-18.06
	(16.93)	(17.39)	(27.94)	(31.48)
DR	89.62**	90.11	229.6*	
	(44.00)	(60.50)	(117.4)	
JOINT	23.13	75.53**		
	(14.69)	(35.77)		
MUT	-98.48***	-70.30***	-98.55***	-110.5***
	(16.99)	(16.38)	(34.45)	(41.69)
SEC	235.3*	419.7***	324.2***	376.2***
	(126.1)	(90.50)	(66.18)	(82.23)
SIZE	-1,152***	-1,891	621.3***	397.7**
	(293.9)	(1,383)	(131.8)	(181.6)
WRA	1.60e-05	0.00702***		
	(0.00288)	(0.00190)		
SIZE*DR	1,002***	2,468	-323.0*	-90.73
	(388.3)	(1,628)	(168.4)	(135.3)
SIZE*ERD	161.2	147.3	-500.9***	-463.4***
	(146.9)	(454.7)	(92.84)	(117.3)
Constant	38.29	-52.12	-100.6	84.23***
	(31.82)	(59.64)	(88.54)	(27.29)
Year Fixed Effects	YES	YES	YES	YES
Number of Observations	292	292	410	410
R-squared	0.789	0.804	0.576	0.539
VIFs	1.3 – 8.4	1.3 – 8.4	1.5 – 7.3	1.2 – 3.9
F statistic		2241.4	102.6	117.8

Pr > F		<0.001	<0.001	<0.001
Wald Chi^2	1023.5			
Pr > Chi^2	<0.001			
F (endo reg)	0.00	0.00	0.00	0.00
Pr > F endo reg	>0.999	>0.999	>0.999	>0.999
Pr > Breusch-Pagan	<0.001	<0.001	<0.001	<0.001

In this table we present the results from the estimation of Equation (1) and (2). The dependent variable is average pay in all estimations. Column (1) estimates from the random effect model (Equation 1); columns (2-4) estimates from the OLS model (Equation 2). Diagnostic testing for heteroskedasticity using the Breusch-Pagan test shows it to be present, such that clustered standard errors are used. VIFs for this set of regressors vary from 1.21 to 7.47, but this has not prevented the detection of significant associations or caused sign reversals (determined using smaller sets of regressors). Pr>Chi2 is the probability of obtaining a Chi2 at least as large as was obtained under the null hypothesis that the regression coefficients are all zero. Pr>F is the probability of obtaining an F at least as large as was obtained under the null hypothesis that the regression coefficients are all zero. Pr>F is the probability of obtaining an F statistic at least as large as was obtained in an auxiliary regression of residuals on regressors (a test for endogeneity) under the null hypothesis that the auxiliary regression coefficients are all zero. (Bivariate tests also confirmed absence of endogeneity; results not shown.) Pr>Breusch-Pagan is the probability of obtaining a test statistic at least as extreme as that obtained under the null hypothesis of spherical error variance. Clustered standard errors appear in parentheses.

*, **, and *** represent statistical significance at 10%, 5%, and 1% two tailed level, respectively.

Table 4 Estimation results including mutual ownership

	(1)	(2)	(3)	(4)
ROA	10.21	-2.258	-7.124	
	(6.754)	(16.1)	(18.42)	
ROA_{t-1}	-7.695	-18.15	-14	
	(5.644)	(12.27)	(11.98)	
Mutual_ROA	-19.91	-18.18	-25.7	-27.36*
	(16.92)	(24.5)	(25.03)	(14.03)
POS_ROA	-7.241	11.64	24.57	-3.978
	(8.612)	(18.09)	(33.58)	(16.22)
POS_ROA_{t-1}	-12.7	-13.87	-36.35	-66.58**
	(9.576)	(19.62)	(27.42)	(30.6)
Mutual_POS_ROA	24.79	51.09	72.48*	107.9**
	(24.45)	(35.75)	(38.5)	(43.8)
LI	1.392	-10.32	-13.51	-7.737
	(1.878)	(7.164)	(9.796)	(5.751)
Mutual_LI	-11.97	5.832	-22.01	-10.79
	(10.49)	(14.39)	(16.57)	(12.8)
REMC	37.03*	83.31***	79.84**	71.25**
	(18.95)	(24.57)	(34.47)	(29.71)
Mutual_REMC	-6.447	-49.59*	-65.75	-67.75
	(19.91)	(29.15)	(45.16)	(42.87)
Constant	39.13	-59.11	-111.4	70.46***
	(31.66)	(61.31)	(99.33)	(25.56)
Agency variables	YES	YES	YES	YES
Other controls	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES

In this table we present the results from models that include interactions with mutual bank status. The dependent variable is average pay in all estimations. The table reports the results for the main effects and the interactions with mutual ownership. All specification include the same explanatory variables and controls included in Table 3. Clustered standard errors appear in parentheses.

*, **, and *** represent statistical significance at 10%, 5%, and 1% two tailed level, respectively.

Table 5 Estimation results, effects of the financial crisis

	(1)	(2)	(3)	(4)
ROA	4.963	3.828	11.61	
	(7.068)	(14.23)	(15.24)	
ROA_{t-1}	-7.744	-19.37*	-17.23	
	(4.855)	(11.19)	(12.61)	
FinCr_ROA	2.373	-17.19	-25.74	-8.647
	(11.68)	(23.71)	(18.8)	(21.35)
POS_ROA	-3.065	7.129	6.415	0.936
	(10.22)	(20.96)	(24.55)	(17.98)
POS_ROA_{t-1}	-13.85	-6.987	-34.1	-68.20**
	(9)	(14.88)	(24.17)	(29.97)
FinCr_POS_ROA	-10.48	-9.865	24.84	7.675
	(21.97)	(40.24)	(31.76)	(36.37)
LI	-3.204	-18.83*	-25.55	-27.72*
	(5.459)	(10.11)	(15.78)	(16.13)
FinCr_LI	2.874	5.061	12.52	20.57
	(5.704)	(10.14)	(11.1)	(13.86)
REMC	38.36**	69.56***	67.22**	61.62**
	(18.86)	(20.13)	(26.37)	(24.76)
FinCr_REMC	16.85	2.799	-6.857	-10.88
	(12.12)	(17.28)	(22.29)	(25.28)
DR	76.89*	69.57	246.0*	
	(40.09)	(57.92)	(131.6)	
FinCr_DR	72.98	58.64	-84.76	
	(73.14)	(57.92)	(108.3)	
Constant	31.94	-32.29	-32	92.77**
	(32.29)	(56.4)	(61.66)	(42.54)
Agency variables	YES	YES	YES	YES
Other controls	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES

In this table we present the results from models that include interactions with an indicator of financial crisis conditions. The dependent variable is average pay in all estimations. The table reports the results for the main effects and the interactions with a during-financial-crisis dummy (FinCr). All specifications include the same explanatory variables and controls included in Table 3. Clustered standard errors appear in parentheses.

*, **, and *** represent statistical significance at 10%, 5%, and 1% two tailed level, respectively.

Table 6 Estimation results, effects of structural change

	(1)	(2)	(3)	(4)
ROA	8.038	-14.23	-3.098	
	(26.69)	(33.77)	(27.55)	
ROA_{t-1}	-9.207	-20.42	-16.34	
	(6.298)	(12.30)	(12.04)	
PFC_ROA	1.269	14.78	-10.67	-16.43
	(26.43)	(37.80)	(35.87)	(17.18)
POS_ROA	-13.10	7.735	-8.071	-14.75
	(32.87)	(44.55)	(31.40)	(15.25)
POS_ROA_{t-1}	-17.61	-14.76	-30.96	-65.88**
	(11.76)	(20.07)	(25.71)	(30.75)
PFC_POS_ROA	10.31	28.52	69.10	53.63
	(32.32)	(52.55)	(61.65)	(37.40)
LI	17.67	12.00	10.11	12.51
	(19.45)	(33.12)	(21.07)	(20.51)
PFC_LI	-17.36	-20.28	-26.72	-26.02
	(19.63)	(32.25)	(18.38)	(18.75)
REMC	40.64**	57.91**	41.26	32.14
	(19.45)	(27.68)	(25.52)	(25.55)
PFC_REMC	16.57	15.99	35.83	39.24
	(13.64)	(25.72)	(27.84)	(24.99)
DR	125.8**	101.1	135.5**	
	(62.99)	(88.88)	(65.88)	
PFC_DR	-35.22	-17.72	145.5	
	(43.39)	(100.1)	(143.6)	
Constant	-6.994	-44.54	-162.7	53.34*
	(49.99)	(74.41)	(111.3)	(28.89)
Agency variables	YES	YES	YES	YES
Other controls	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES

In this table we present the results from models that include interactions with an indicator of structural change occurring after the global financial crisis. The dependent variable is average pay in all estimations. The table reports the results for the main effects and the interactions with a post-financial-crisis dummy (PFC). All specifications include the same explanatory variables and controls included in Table 3. Clustered standard errors appear in parentheses. Note that the results for REMC are significant in the full specification.

*, **, and *** represent statistical significance at 10%, 5%, and 1% two tailed level, respectively.

Table 7 Empirical testing for endogeneity.

	ε_{it}	ε_{it}	ε_{it}	ε_{it}	ε_{it}	ε_{it}	ε_{it}	ε_{it}	ε_{it}	ε_{it}	ε_{it}	ε_{it}	ε_{it}
ROA	-7.23e-08												
	(2.959)												
L.ROA		-1.59e-07											
		(3.96)											
POS_ROA			-4.23e-08										
			(6.794)										
L. POS_ROA				-1.65e-07									
				(6.526)									
LI					-6.78e-09								
					(1.417)								
REMC						1.89e-08							
						(3.436)							
ERD							1.54e-08						
							(4.234)						
DR								1.09e-08					
								(4.321)					
JOINT									-9.54e-07				
									(17.25)				
MUT										3.58e-09			
										(4.03)			
SEC											4.80e-07		
											(13.62)		
SIZE												-7.40e-07	
												(38.79)	
WRA													0
													(0.001)
Number of Observations	292	292	292	292	292	292	292	292	292	292	292	292	292
R-squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table presents the results of the test for endogeneity. Note that this is a set of regressions with one explanatory variable and no intercept, such that it is equivalent to a Pearson correlation. The dependent variable is the idiosyncratic error term from equation (3) in Table 3 and is stated at the top of columns. Explanatory variables are in rows. Equations are estimated using OLS. Estimated parameter values are shown with star symbols for statistical significance. Classical standard errors are in parentheses. These are not adjusted for heteroskedasticity or serial correlation, so as to maximise the chances of detecting endogeneity. Equivalent results (no evidence of endogeneity) are obtained when all of the regressors are put in one equation with the idiosyncratic error term as the dependent variable. Standard errors appear in parentheses.

*, **, and *** represent statistical significance at 10%, 5%, and 1% two tailed level, respectively.