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Testing the Participation Constraint in the Executive Labour Market[*]

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Abstract

This paper tests the participation constraint by examining the workings of the executive labour market in a panel of UK listed companies over a period of 14 years. Directors are found to move jobs regularly - both within companies and between companies. Consistent with agency theory, directors who are underpaid relative to their comparable peers are particularly likely to leave for higher paying jobs in other companies. Those who move between companies secure more favourable terms than those who move within their firm - even when the move does not involve promotion, calling into question the managerial power perspective of this area of employment.

Word Count: 8630

1 INTRODUCTION

With its high level of transparency and the relative ease with which payment can be gauged against company productivity measures, the topic of executive pay offers attractive opportunities to test rival theories of pay determination (Perkins and White, 2011). Early work focused on the Chief Executive Officer (CEO) (Roberts, 1956; Lewellen, 1968; Cosh, 1975), but as data availability improved and with the realisation that the entire team of executive directors was being remunerated in much the same way as the CEO, it became more usual to speak in terms of executive pay (Bender and Moir, 2006; BIS, 2011). As will be discussed below, the incentive aspect of these arrangements, the pay-performance-relationship, has come to dominate policy discussions:

> "Ridiculous levels of remuneration are going unchallenged as the norm, when there
> is no clear evidence of a correlation with performance." Vince Cable to ABI 2011

But, the mantra of labour economists (Ehrenberg, 1990) is that remuneration packages must be designed to 'attract, motivate and retain'. One implication being that if the labour market is competitive then agents are able to move to better rewarded positions should the current job not turn out as expected. In the field of executive pay, this view is pervasive and finds its way into governance codes (Combined Code, 2003, 2009) and institutional guidelines (ABI, 2006). But there is an opposing view which portrays executive pay as being essentially the result of the opportunistic exploitation of managerial power (Bebchuk and Fried, 2004). Here, remuneration is seen as being determined predominantly within an administrative framework, and one that is subject to manipulation by the key players. In this view, the managerial labour market is but a rhetorical device which comes in handy when pay awards need to be justified at the AGM or in reports to shareholders (Wade et al., 1997). Discussion in the trade and popular press leans towards the latter portrayal of the situation. Notwithstanding some 20 years of almost continuous corporate governance reform (Cadbury, 1992; Combined Code, 2009; DTI, 2002; Greenbury, 1995; Hampel, 1998; Higgs, 2003), there is a deep scepticism as to the existence of a functioning competitive executive labour market.

This paper offers an empirical assessment of a key aspect of the market-based perspective of executive pay, namely the participation constraint.

In the UK, the Directors Remuneration Report Regulations (DTI, 2002) oblige the remuneration committee to produce an annual report on directors' remuneration and to defend this report at the company's AGM, where it is subject to a shareholder vote. Although the Directors' Remuneration Report covers both executive and non-executive directors, most attention focuses on executive directors. Henceforth, we will talk in terms of 'executives' meaning executive directors. When members of remuneration committees are questioned as to their decisions regarding pay awards, they invariably revert to discussion of the executive labour market (Lincoln et al., 2006; Main et al., 2008; Perkins and Hendry, 2005). At best, what is offered is anecdotal in nature. Quantitative research in the area (Girma et al., 2007; Conyon, 1998; Conyon and Murphy, 2000; Conyon and Sadler, 2010; Fattorusso et al., 2007; Gregg et al., 1993) has tended to focus on the design of executive remuneration and its incentive properties (the 'motivate' component). But a substantial part of the remuneration committee's work focuses on the level or 'quantum' of pay. There are only a limited number of papers that deal directly with the participation constraint or the 'attract and retain' properties of executive pay, notably Gabarro (2012), Murphy and Zabojnik (2007), Oyer (2004), and Smith and Szymanski (1995).

This paper examines a longitudinal sample of UK companies that allows an empirical insight into the workings of the executive labour market and permits direct observation of: the extent to which executives do move jobs - not only within companies but also between companies; the increase in the likelihood of an executive switching companies if 'underpaid'; and the extent to which an external job move is more or less rewarding than an internal move. The analysis of this documented labour market activity presents a challenge to those favouring a wholly managerial power interpretation of executive pay. The main contribution of the paper is to use data that has the ability to track executives as they move between jobs in the same company or move between companies to focus attention on the role of the participation constraint (i.e., opportunity cost considerations) in determining executive pay. The results provide a counter to the view commonly found in policy circles that there is no

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active labour market for executive talent in the UK and that all executives are all paid more than need be.

The remainder of the paper is organised as follows. A review of the related literature is presented in Section 2. The data are introduced in Section 3 and the empirical analysis is discussed in Section 4. The paper concludes with a summary of our findings and a discussion of the policy implications.

2 THEORY AND LITERATURE REVIEW

2.1 Principal Agent Theory

The importance of paying employees in the correct way in order to elicit the desired behaviour is not a new concept. Over two hundred years ago, Adam Smith (Smith, 1776, Vol.2, p.283) drew on the poor quality of instruction he received at Oxford University as compared to his earlier experience at the University of Glasgow to highlight the importance of linking pay to performance (Campbell and Skinner, 1982; Ross, 1995). In the modern form, the identification of the control problem created by the separation of ownership and control, and the accompanying development of a professional managerial class, is generally attributed to Berle and Means (1932). The design of appropriate payment mechanisms, under what came to be known as principal-agent theory (Jensen and Meckling, 1976), was seen as a promising means of addressing the issues of bounded rationality (Simon, 1947), asymmetric information (Akerlof, 1970), and information impactedness (Williamson et al., 1975) that arise in such situations.

It is not sufficient, of course, to simply design payment-by-results schemes by focusing on managerial incentives in isolation. For the individual manager or executive to willingly enter into such arrangements, the overall package has to be as attractive as is available elsewhere. Nor is this simply something that is left to the rationality of the individual employee. In designing the optimal incentive arrangements, the employer must take into account the over-riding need for the resulting package to satisfy this individual rationality condition - or

what came to be known as the participation constraint. It was this major insight (Jensen and Meckling, 1976; Grossman and Hart, 1983) that gave principal-agent theory traction in the labour market, after near on two centuries of neglect. However, although the incentive constraint and the participation constraint remain inseparable, most attention in the literature focuses on the incentive constraint, to the extent that the participation constraint is characterised by Oyer (2004) as agency theory's 'often overlooked participation constraint'. But without it, the standard human resource management triplet of 'attract, motivate and retain' falls down on the 'attract' and 'retain' aspects.

One variant of the principal agent approach that has found fertile ground in the context of executive pay is tournament theory (Lazear and Rosen, 1981). This argues that even when it is difficult to provide a cardinal valuation of an individual's performance (to calibrate pay with performance, say), it remains possible to design a perfectly adequate incentive arrangement that relies simply on ordinal rankings of performance. This is, of course, particulary useful where individual performance is subject to common random shocks (arising from the business cycle, say). Under this logic, executives aspiring to be CEO (those in the tournament) each accept somewhat less than their expected value of marginal product with the surplus going into a prize fund for which they compete in the form of the higher pay available on promotion to CEO. In this sense, the observed pay of the CEO need not reflect that CEO's current productivity and yet the arrangement provides efficient incentives to those in the race to be CEO. Empirical tests of this theory in the specific context of executive pay have produced mixed results (O'Reilly et al., 1988; Main et al., 1993, 1995; Conyon et al., 2001), but even here the need to satisfy the participation constraint remains. Those that extend this logic to the search for 'superstars' (Rosen, 1981) or for 'corporate saviours' can end up asserting that the market is so thin that effectively there is no market (Khurana, 2002, p27). However, even with bilateral bargaining the notion of the opportunity cost to the target executive of taking a job (the participation constraint) remains a powerful consideration underpinning any acceptable pay offer from the hiring company.

2.2 Alternative perspectives

One of the reasons that the participation constraint slips from sight and becomes Oyer's 'often overlooked participation constraint' (Oyer, 2004) is that the area is ripe for rival theories that thrive on the institutional complexity of the executive pay environment (Berrone et al., 2008). Specifically, the notion of managerial power (Pfeffer, 1981; Salancik and Pfeffer, 1977) has been developed by Bebchuk and Fried (2004) into a telling critique of the executive pay setting process. In this view, opportunistic executives exert power over the board's non-executives in such as way as to secure reward packages that enrich the executives at the expense of the shareholders and other stakeholders. The only constraint seen as operative here being the 'outrage costs' (Bebchuk and Fried, 2004, p.64) that arise should particularly egregious pay awards come to light and stir up shareholder, regulatory and public disquiet. The resulting generous payments are often described as being delivered 'under the radar' (Bebchuk et al., 2002, p.759) as 'stealth compensation' (Bebchuk and Fried, 2005, p.16) through leniently designed incentive plans. Bebchuk and Fried (2004, p21) are quite clear that here is no functioning labour market, asserting 'Those invoking the market analogy implicitly rely on the premise of arm's-length bargaining, which is valid for athletes but not for executives.' Bebchuk and Fried (2004, p21).

A related explanation of executive pay is grounded in neo-institutional theory (Scott, 1991, 2001) and suggests that the way CEO pay is determined may owe more to norms and routines that tend to perpetuate through repeated use than to any reference to the labour market. Attention here focuses on the remuneration committee, that sub-group of non-executive directors charged with the responsibility of overseeing the pay arrangements of the executive directors. Rather than using pay incentive arrangements to optimize the connection between the executives' interests and the interests of the owners, as suggested by principal-agent theory, neo-institutional theory views the process as being heavily circumscribed by the need of remuneration committees to achieve legitimacy for their decisions (Meyer and Rowan, 1977; DiMaggio and Powell, 1983). Faced with their own bounded rationality, the remuneration committee reaches for what is perceived to be customary practice - that which

is 'taken for granted' (DiMaggio and Powell, 1991, p.9). In particular, by closely following what other firms are doing, an 'isomorphism' of practice (DiMaggio and Powell, 1983, p.149) emerges. There is no explicit notion of a participation constraint here.

The managerial power perspective has gained considerable support in the popular press as it accords with what many see as the inexorable rise in executive pay. Main (2011) highlights the difficulty that managerial power has in explaining the continuing rise of executive pay when corporate governance reforms of the last two decades have considerably reduced the scope for abuses of managerial power (Girma et al., 2007). Guest (2010) shows that for UK companies improved corporate governance controls lead to both an increased pay for performance sensitivity and a slowing in the growth in the level of pay. On the other hand, Conyon and Sadler (2010) and Gregory-Smith et al. (2014) find little restraining effect on pay growth from the 'say on pay' vote on executive remuneration now allowed under the Directors' Remuneration Report Regulations (2002). Conyon (2006) and Murphy (2002) have attempted to challenge the managerial power view by highlighting the evidence from the USA that points to executives being able to negotiate every bit as favourable levels of reward when they move to a CEO position - no matter whether the move represents an internal promotion or an outside appointment. This clearly undermines the notion of entrenched management exploiting power over their captive board. It is this approach that will be expanded upon below utilising UK data.

2.3 Empirical literature

Most empirical testing of the agency theory approach to executive pay has focused on incentive alignment considerations. Initial results were disappointing (Conyon, 1995; Gregg et al., 1993; Jensen and Murphy, 1990), producing estimates of the pay for performance incentive effects empirically too small to be persuasive. Subsequently, however, the strength of the estimated incentive effect has risen (Conyon and Murphy, 2000; Hall and Liebman, 1998; Gregory-Smith and Main, 2014) and explanations have been proffered as to why the observed estimates might, indeed, be in accordance with the theory (Conyon et al., 2011; Hall and Murphy, 2002). A

critical appraisal of research to date is available in Dorff (2014).

Efforts to support the market based view of executive remuneration levels have rested on comparative work between countries, for example the UK and the USA, as in Conyon et al. (2011); Conyon and Murphy (2000), and Main et al. (1994), or the USA and Japan, as in Kaplan (2008), or between private and public directorships as in Tarbert et al. (2008). There have been relatively few studies, to date, that examine the impact of executive pay levels on the propensity of serving executives to move to other companies (Gabarro, 2012; Huson et al., 2001; Murphy, 2002; Murphy and Zabojnik, 2007; Oyer, 2004). Furthermore, apart from the study by Murphy (2002) who questions the Bebchuk et al. (2002) claim of managerial rent extraction by illustrating that externally appointed CEOs are generally better paid than internal appointments, there has been little discussion of the extent to which such inter-company moves result in superior pay to within-company job moves. Murphy and Zabojnik (2007) provide evidence for the USA regarding an increased pay premium on external hires. They explain this as being due to the increase in the demand for general management talent to lead companies in place of the historical emphasis on specific-human capital - expertise built up over a long tenure with the company. Reasons for such a shift include the increasingly global nature of commerce where communication skills are of greater importance. Taken in conjunction with the impact of computers and the internet on management practice, external hires are seen as being better able to exploit their general human capital in this new environment.

The research framework adopted here attempts to expose the workings of the executive labour market by examining both company to company and within company moves as experienced by board-level executives. It is possible to view this testing of the participation constraint as the outcome of a matching process whereby executives routinely scan their job prospects for a situation where they can find a job match that leaves them better off than their current position. Such a model is developed in Gabaix and Landier (2008) and extended in Gabarro (2012).

Notwithstanding the empirical evidence reviewed above, a recent survey of the area summarized the market based approach to executive pay under a chapter headed 'Market

Mythology' in which it is claimed that such 'justificatory theories fall short' Dorff (2014, p89). And, as reviewed above, the scepticism of Bebchuk and others as to the existence of a functioning executive labour market is clear. This view also permeates policy circles, where the influential Investment Management Association[1] opposes use of payments directed at retention (i.e., responding to participation constraint concerns): 'Shareholders believe that retention awards for main board directors rarely work. Retention concerns on their own are not sufficient grounds for remuneration to increase' (IMA, 2014). Sceptical comments regarding the existence of a market for executive talent abound in the business press. This contrasts with the principal-agent notion of a participation constraint: 'The constraints reflect the existence of a market for workers services: if expected profits from a particular worker as of time T were positive, then that worker would be bid away by another firm offering a slightly better contract' Harris and Holmstrom (1982, p391).

In terms of the participation constraint, our first research question is whether those executives who are in jobs paying less than their market value are more likely to move by exiting from the under-paying company. In the analysis below, the influence on job mobility of such job matching in the form of alternative pay opportunities is examined by using a Probit model to estimate the probability of leaving an employer as a function of the gap between current pay and alternative pay opportunities (Table 4). As sketched above, under the managerial power interpretation, internal job moves are expected to be better rewarded than between firm moves. A second research question that will be addressed in this paper is, therefore, whether those executives moving jobs within the company extract more favourable terms than would be available in the external labour market. By utilising information on the level of position within the board, the paper also assesses the reward secured by moving jobs in the context of whether the job move was a promotion or demotion, and whether it was within or between companies. This is done in a fixed effects framework and examines both the level of pay in the new job and the gap between current pay and market potential, to test whether external job moves are differently rewarded from internal job moves (available

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[1]The Investment Affairs division of the Association of British Insurers (ABI) merged with the IMA on 30 June 2014. The periodically revised Guidelines of the ABI have been a major influence on the design of executive pay in the UK since the 1980s (Main, 2006).

in Table 5 below).

These two tests: (i) whether the propensity to move companies is significantly related to the extent of under or over-payment in the current job; and (ii) whether those who enjoy external job moves do better than those who move internally, form the backbone of the paper. The next section introduces the data used in these tests.

3   DATA AND DESCRIPTIVE STATISTICS

The data used in this study come from Manifest Information Services Ltd., a commercial provider. They have collected annual boardroom data on FTSE350 companies since 1995. Once included, companies continue to be followed, even if they leave the FTSE350, until they are wound up or taken private. The cut of the data that was purchased extends from 1995 through to early 2008, and provides a picture extending across 14 years covering some 953 companies. The data include all companies ever appearing in the FTSE350 over the time period. Three basic pay aggregates are examined. 'TCC' represents total cash compensation and comprises the executive's salary and any other cash payments such as annual bonus received during the year. Two broader measures of pay, or total direct compensation, are also available. The first, 'TDC Awarded' adds to the 'TCC' measure by including the grant-date value of options and equity incentives awarded during the year[2]. The alternative broad measure of pay, 'TDC Realised', uses the observed realised value of options and other equity based incentives as vested during the year, instead of the expected values at award. 'TDC Awarded' is our preferred measure as it is the best proxy for the expected value of the executive's annual remuneration. Additional company descriptive data is obtained from DataStream [3]. All

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[2]Following Conyon and Murphy (2000) the expected value of share options is computed as the Black-Scholes value of the shares under option using the term of the option grant, the strike price at award, and the share price volatility over the prior 36 months as available from the London Stock Price Data Base. The expected value of performance contingent share awards are computed as 0.7 time their face value. This approach to valuing options is not without its critics (Hemmer et al., 1996, 1994; Noreen and Wolfson, 1981; Yermack, 1995) as it treats executive share options as any other option, ignoring their inalienable nature, vesting conditionality and the consequent absence of a secondary market.

[3]There is some attrition that occurs in matching to DataStream with the overall sample size falling by 9.3%. Tests on the level of pay, age, tenure, board size, number of non-executives, percentage of non-executives, and duality failed to find any significant difference between the pre- and post-match sample.

financial data are expressed in £2008. Summary statistics are presented in Table 1.

Insert Table 1: Summary Statistics

Table 2 summarises the executives' movement and salary progression at board level both within the firm and between companies. The sample captures substantial movement at board level, not just internally but also between FTSE350 companies. Job moves both within and between companies can be tracked through changes in job titles and reference to the recorded tenure on the board. Of course, the nature of the data means that only movements within the sample of companies are observed. Actual movement is greater. Of all moves, some 68% are tracked in the sample - by people staying within the firm or moving to another firm. Some 32% leave the sample and we do not know whether they retire or end up in a non-sample company, e.g., in private equity or elsewhere outside of the FTSE350. Nevertheless, we feel that in observing the wage determination process for those who remain within the observed set of companies we are able to say something of interest regarding the workings of the executive labour market - as we do observe full detail on the pay arrangements in all of these positions[4].

Within our restricted window of observation, 581 executives (= 511 + 60 + 10 as shown in the upper part of Table 2) exit to join another company within the observed sample of companies. A further 1,212 executives (= 971 + 206 + 30 + 5 as shown in the lower part of Table 2) are seen to change their role on the board. Each row in the table denotes the number of moves observed for that group of executives. The ability to track a large cohort of executives between companies differentiates our sample from prior studies. Unfortunately, as our sample only tracks individuals already working at board level in our sample companies, we cannot distinguish between CEO appointments where the individual was working at another company out of our sample and the case of an internal appointment where the new CEO

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[4]Measuring the mean age of executive, size of company, pay level and company performance (TSR) of each executive at the point of movement, we compare those we do observe again with those who disappear from our sample. Their average age is identical but those who disappear from the sample tend to come from smaller companies, paying less well and performing less well. All these observed differences are statistically significant. Table 5 contains a Heckman sample selection effect in an attempt to control for these differences. In addition to the sample selection term, Table 5 also controls for these factors (age, size of company, company performance) and includes a Fixed Effect at the executive level. So unless there is some change in any unobserved characteristics brought about by the move itself then hopefully much of any potential bias is eliminated.

had not previously held a board position. But we do have a clear view of those who were promoted internally to an executive board position (e.g., as CEO) having previously served on the board. In our sample, this conventional 'passing the baton' (Vancil, 1987) accounted for an average of 56% of CEO appointments between 1997 and 2001 and some 59% between 2002 and 2008. This is consistent with Cremers and Grinstein (2013), but at odds with Murphy and Zabojnik (2007) who find internal appointments to have been declining markedly over the 1970-2005 period.

Insert Table 2: Median pay and job moves: internal vs external moves

Consistent with established evidence on labour mobility and job matching within this high skill group (Greenhalgh and Mavrotas, 1996; Chan, 1996; Pellizzari, 2011), it is those who move companies who seem able to benefit the most. This is also, of course, consistent with the participation constraint - the expectation of higher earnings leads to mobility. Comparing the fourth row and fourth column in the respective parts of Table 2, it can be seen that after moving between companies three times, median annual pay is over £1m more (at £1.496m) than the executives who stayed within the same company and moved an equivalent number of times (£418k). There could be a number of forces at play here. First, observing an executive's ability to move is perhaps a signal of greater human capital. This appears to be part of the story as Table 2 shows that those executives who move companies are generally earning more at the median, even prior to their move (comparing first columns in the respective parts of Table 2). Yet Table 2 also documents substantial pay growth after the move. The median pay growth of the first move is 34% if internal (£380k to £508k) and 45% if to another company (£409k to £593k). Moreover, subsequent external moves are far more lucrative than internal moves. These descriptive findings are consistent with the participation constraint perspective, which maintains that those currently underpaid will be more likely to move. Furthermore, the results of Table 2 are at odds with the view that owing to managerial power internal moves will be more lucrative than external moves.

Of course, executives are unlikely to move to another company without compensation for the inconvenience of relocating, the loss of firm-specific capital, and possibly the sacrifice

of equity incentives built up in the prior firm. Equally, firms would not meet these higher wage demands unless they believe that the incoming executive will deliver sufficient value. Further, if superior job matches (Gabarro, 2012; Janovic, 1979; Pellizzari, 2011) result from movement between companies, executives on average will perform better in their new company than in their prior company. This superior performance will be reflected in greater realised payments in the new job, hence we need to control for individual fixed effects in the multivariate analysis below to eliminate unmeasured aspects of individual ability. Nevertheless, as has been pointed out by others (Conyon, 2006; Murphy, 2002), the observation that external movers handsomely trump internal movers does not sit well with the managerial power narrative of inflated pay for entrenched executives (Bebchuk and Fried, 2004). It is difficult to reconcile the much larger rewards to executives from moving between companies with the centrality given to managerial power in the Bebchuk perspective. The subsequent section of the paper provides a detailed analysis of these descriptive findings and attempts to clarify the role played by the market in determining executive remuneration.

4 EMPIRICAL ANALYSIS

In order to test the propensity to move company when the participation constraint is violated (i.e., when expected earnings elsewhere are higher than in the current job), it is necessary to estimate a wage equation that reflects the going market rate for each executive in the sample. This is done in Table 3 which uses a panel of annual observations for each executive. The estimates also control for individual characteristics such as role (the executive's job title - CEO, Chairman or executive director), age, and tenure on the board, as well as company characteristics such as the size of the company (market capitalisation and turnover), its performance (total shareholder return, TSR), and aspects of corporate governance (board size and percentage of non-executives). There are also controls included for the number of days served in the financial year and the number of days in the financial year. Year dummies and fixed effects are included but not reported. In an attempt to control for unobserved heterogeneity, individual fixed effects are used. The CEO and Chairman roles bring a wage premium, being

more senior board positions. Pay rises with age (general human capital) and with tenure on the board (specific human capital). The performance or incentive element of pay is shown in the linkage to the TSR of the company. Large companies (by market capitalisation and by turnover) pay more and, while large boards hold pay in check, the percentage of non-executives on the board actually enhances pay. Some prior empirical studies have also found a positive significant relationship between the percentage of non-executives on the board and the level of executive pay (Harford and Li, 2007; Gregory et al., 2012; Ozkan, 2007), while others have variously found no significance (Capezio et al., 2011), or do indeed find a restraining effect (Guest, 2010; van Essen et al., 2012). In our case, we find a positive effect which we ascribe to a legitimacy effect (Deephouse, 1996; Deephouse and Suchman, 2008; DiMaggio and Powell, 1983; DiPrete and Eirich, 2010; Eisenhardt, 1988). The equations estimated in Table 3 allow the expected pay in a comparable job to be computed. By comparing this with the actual pay being received, the difference (as captured by the residual from the estimated wage equation) provides a measure by how much the individual is being over or under paid in their current job (Wade et al., 2006).

Insert Table 3: Wage equation for pay residuals

Insert Figure 1: Pay Progression: External vs Internal

The left hand side of Figure 1 contrasts the progression in pay level available to those who move within a company to those who move between companies. External movers progress more markedly. The pay residual (see Table 3) used in the right hand side of Figure 1 captures the unexplained wage variation - the extent to which the director may be said to be overpaid or underpaid in the current job as compared with others observed in similar job situations at that time. Those moving between companies appear to command a wage premium that is not generally secured by internal job movers.

To eliminate the possible influence of sample selection bias, in each plot presented in Figure 1 a point is drawn for the first job observed that excludes those who are destined never to subsequently move jobs. This does not alter the above interpretation of the findings. The

overall picture reinforces the story from Table 2, namely that executives gain from moving jobs but external movers gain more. The standard error bars on the median pay levels (Figures 1a and 1c) indicate that the greater amounts to external executives are statistically significant at conventional levels. The pay residual (Figures 1b and 1d) is also informative. Not only do external movers earn more in absolute terms, they earn significantly more beyond what would be normally expected given the size of the new job and general wage escalation in the executive labour market. The more significant wage gaps emerge after three or more moves. The size of the error bars in Figure 1 serve to caution against over-interpretation of the observed differences here.

One justification commonly articulated by remuneration committees in defence of their awards of executive remuneration is that smaller payments would increase the likelihood of executive exit to better paying jobs (Bender, 2003; Main et al., 2008). Our sample allows a thorough examination of whether this concern is warranted. To examine the proclivity of executives to exit companies as a function of current remuneration, Table 4 estimates a probit regression on the likelihood of executive exit using three different constructs of pay.

Insert Table 4: Probit estimates of executive turnover

The estimated coefficients, consistent across all three measures of executive pay, document an inverse relationship between exit and pay that is statistically significant at conventional levels. For each of the respective three measures of pay, the coefficient on 'Raw Pay' describes the extent to which higher paid executives have lower exit rates. Of course, the raw level of pay is in theory set by the remuneration committee to maintain the likelihood of exit within acceptable bounds. Consequently, a more informative perspective is the extent to which the executive can be said to be underpaid or overpaid in their position. This is captured by the residual estimates from the pay equations in Table 3 and included alongside the raw estimates in Table 4. Furthermore, there are other obvious personal and company specific factors that influence the mobility of executives, hence these are also included in the fuller version of the estimated equations. We are unable to distinguish between forced and

unforced exits[5] and rely on the age, age-squared and tenure descriptors to control for this (retirement being a major cause for exit, as argued by Murphy and Zabojnik (2007) and Shen and Cannella (2002)).

For reasons stated above, our preferred measure of the pay residuals is 'TDC Awarded', the broadly based measure of awarded pay, and from here on we will focus on this measure. To provide an economic interpretation of the impact of underpayment on exit, we calculate the marginal effect at the mean values of the covariates (MEM) (Cameron and Trivedi, 2009, p.478) of the 'TDC Awarded' pay residual on the exit probability. A one standard deviation increase in the pay residual is associated with a fall in the likelihood of exit by 18.7 percentage points[6]. At face value, this appears an expensive mechanism for retaining executives. Note, however, that *ceteris paribus* the probability of exit is only approximately 10%. Consequently, a one standard deviation decrease in the TDC1 residual more than doubles the likelihood of exit. This suggests that exits are sensitive to being paid less than the market wage and we are unable to reject the agency view of market-determined executive pay.

To date, we have demonstrated that paying less than the going rate as suggested by the market leads to a statistically significant higher exit probability. We now turn to examining the wage progression of those who move (both within and between companies) as compared to those who do not. The left hand side of Figure 2 shows that those who exit for an external job enjoy an upturn in their remuneration - beyond that observed for those simply moving up in the company. The right hand side of Figure 2 utilises wage residuals as opposed to pay levels. Note that the positive aspect of the residuals is enhanced for those who move companies but disappears for those who move up in the company - possibly as the person being groomed for success (and already being well paid in anticipation) is duly elevated. This reinforces the story from Table 2 and Figure 1, but Figure 2 adds further detail by focusing on the timing of the pay progression.

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[5](Peters and Wagner, 2014, p.1537) have suggested treating everyone under age 56 as a forced move, but while experimentation with this in our data did not alter our results, we were not sufficiently convinced by the approach to include it in the paper.

[6]Evaluated at the sample mean, $\frac{\delta p}{\delta x} = -0.39$; 1 s.d.=0.48 and evaluated in £ terms, a standard deviation of 0.48 is equivalent to an additional £197k. We use the MEM as opposed to the average marginal effect (AME) because in the calculation of the marginal effect, the random effect is assumed to be zero, which is true by construction at the mean. The AME when assuming the random effect to be zero was -0.40.

Insert Figure 2: Exit to a higher paying job, External vs Internal

Table 5 exploits a further advantage of our sample, namely its identification of executive reward both before and after the move. Here we are also able to distinguish between promotions, lateral moves and demotions, both between companies and within the same company. We are considering only board level executive jobs, and a promotion is defined as a move from a position as an ordinary executive director to that of a CEO or Chairman (where Chairman is always an executive position in our sample). Demotion is the reverse. And a lateral move is where the executive retains the same title after a move. As a robustness check, we classified the firms by the position in the FTSE100, FTSE250, and non-FTSE350 in each year. Where executives moved to a lower index category we redefined what would otherwise be a lateral move as a demotion and, similarly, where the move was to a higher index category then we re-defined a lateral move as a promotion. We find the subsequent results to be consistent in sign and significance with our reported results in Table 5, with only some modest variation in the magnitude of the estimated coefficients[7]. Continuing to focus on the 'TDC Awarded' level of pay, Table 5 presents three sets of estimated equations: pay levels (columns 1 and 2), pay growth (columns 3 and 4), and pay residuals (columns 5 and 6). The inclusion of the fixed effects estimator controls for unobserved executive quality. We are unable to distinguish between forced and unforced moves, but do include an attempt to allow for sample selection in the form of the observed movers being different from those who remain in their posts by including an inverse Mills ratio based on a probit describing the probability of an executive moving position in any year. The inverse mills ratio from a first stage probit is included in the second stage regression above [8] and the standard errors are bootstrapped (400 replications). Inclusion of the selection term is significant in columns (1) to (4). The estimated coefficients

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[7]Output is omitted here but available at:
http://www.homepages.ed.ac.uk/mainbg/working_papers.htm

[8]Output is omitted here but available at:
http://www.homepages.ed.ac.uk/mainbg/working_papers.htm. The first stage probit uses % Non-executive churn to identify selection by executives to be movers. This 'Non-executive churn' measures the average proportion of non-executives who exit the board each year. We propose that this variable is correlated with the likelihood that the executive changes job, but not directly correlated with the level of payment the executive receives in their job (the exclusion restriction). Non-executive churn is significant in the likelihood of movement (0.377 p < 0.003). As this model is just-identified (one instrument), there is no statistical test of the exclusion restriction available to us, but we have no a priori reason for suspecting direct causation from non-executive churn to executive pay. The full first stage results are available as indicated above.

of Table 5 are consistent with the preceding results. Even a lateral move to another company is associated with significantly higher pay. Controlling for executive quality, the fixed effect estimates of column 2 indicates that an lateral external move increases total pay by approximately 17% or £111k. The remuneration committee's concern that their executives would earn greater amounts if they leave appears not without foundation. In contrast, there is evidence of a more modest financial payoff for executives who have a lateral internal change in roles (around 6%). This contradicts the prediction of managerial power which suggests that those operating internally will be able to exploit their influence and control over the non-executive directors (e.g., those service on the compensation or remuneration committee) to extract more favourable terms for themselves.

Insert Table 5: Regression estimates of executive wages following move to new job

The additional reward for external movement continues for promotions. Internal promotions are associated with a 6% pay increase, compared to a 49% pay increase [9] for external promotions. Furthermore, the residual for internal promotion (column 6 of Table 5) indicates that externally promoted CEOs are earning approximately 5% more than the going rate, given the size of the company and other controls. The relative generosity of pay increment observed in the between company moves is not only a challenge to the managerial power perspective of Bebchuk and Fried (2004), but it also contradicts the expectation from tournament theory that internal promotions would capture an element of a 'prize' over and above any productivity related component.

It is widely suspected that executive pay does not adjust downwards following a demotion. However, we find that both internal and external demotions are associated with declines in remuneration, although only statistically significant in the fixed effects estimators for external demotions. Column 2 of Table 5 reveals a 20% reduction for externally demoted executives but an insignificant decline for internal demotions. It is possible this reflects an

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[9]Recalling that as the dependent variable is logged the 0.40 estimated coefficient must be interpreted as a 49% increase

element of managerial power, but the effect is modest in magnitude and the difference lacks statistical significance at conventional levels[10]. In general, the results of Table 5 do not sit well with the managerial power hypothesis in its existing form.

5 CONCLUSION

This paper documents the labour market activity in the executive labour market for a wide sample of UK companies between 1995 and 2008. It demonstrates that executives move not only within companies but also between companies. The observed market outcomes suggest that the much articulated preoccupation of remuneration committees with the 'attract, motivate and retain' triplet seems not to be without empirical foundation - certainly as far as the attract and retain part goes. Executives are observed as more likely to move companies when their pay is low and, in particular, when they are being paid less than prevailing market conditions suggest is possible. This is consistent with Gregory-Smith and Wright (2015) who finds that higher pay makes those who have been passed over for the top job more likely to stay on in the company. Although we have made efforts to control for endogeneity by including a wide range of control variables, utilising fixed effects estimators and allowing for sample selection, it is, as always, necessary to recognise that our data do not derive from a natural experiment and therefore some caution is advisable in interpreting the results[11].

Equally, moving jobs generally leads to higher levels of pay, with the greatest improvement falling to those who switch companies. This was true for promotions and even for sideways moves. It could be that pay awards to external movers reflect in part a compensation for foregone non-vested options at the prior company (Fee and Hadlock, 2003). This is not something on which we had data but even if the effect were present, it would simply represent another market based feature of executive pay. On the other hand, none of this

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[10]Using a Wald test for the statistical significance of the difference produces a $chi2(1) = 2.09, Prob > chi2 = 0.1486$

[11]On a related point, we were not able to control for M&A activity, although we surmise that those displaced following M&A activity would otherwise not have moved externally and tend to be of the nature of forced exits. Their unmeasured presence would probably, therefore, reduce the observed wage gain by external movers. This would leave our results as a conservative estimate of the superiority of external moves to internal moves.

rules out the operation of managerial power in the boardroom as portrayed by Bebchuk and Fried (2004), but it certainly calls into question whether managerial power is the whole story in terms of executive pay. On the evidence presented above, boards and their remuneration committees appear to have a sound empirical foundation for their desire to pay heed to market intelligence regarding prevailing pay trends among comparator companies. The prospect of executives decamping to better paid jobs elsewhere is more than a convenient rhetorical device.

From a policy perspective, the evidence presented above regarding the active market in executive talent opens up the possibility that the remuneration committee, when confronted with the task of determining the pay arrangements for the executive team in the coming period, find themselves in a prisoners dilemma (Main, 2011; Pepper, 2006) where the dominant strategy is to err on the side of generosity. To risk underpaying is to risk either an expensive and disruptive loss of key boardroom executives or, at the very least, a degree of disgruntlement and resentment among the top management team as they see other companies act in a more generous manner. Being generous, on the other hand, is rational if other companies end up doing the same, and being generous boosts the morale of the incumbent team of executives who feel particularly valued should other companies be more restrained in their pay awards. In such a world, the dominant strategy for a large company where executive pay is a relatively modest proportion of total expenses is to err on the side of generosity in determining executive pay.

This interpretation of the situation becomes sustainable if the perceived threat of labour mobility is more than anecdotal. The business press is inclined to ascribe a mythical status to the notion that executives can or will leave their companies if not paid the appropriate rate. The evidence presented above, while restricted to the 1995-2008 period of the data, demonstrates clearly that remuneration committees can draw on significant empirical evidence of the threat of mobility and, hence, will be aware of the need to both attract and retain the key members of the executive team.

Table 1: Summary statistics

	N	Mean	St. Dev	p10	p25	p50	p75	p90
Director Pay								
Ln TCC	34727	12.440	0.8889	11.451	11.951	12.453	12.983	13.482
Ln TDC Realised	34727	12.549	0.9871	11.482	11.983	12.514	13.126	13.756
Ln TDC Awarded	34727	12.677	1.0189	11.538	12.061	12.654	13.311	13.933
Director Controls								
Age	34727	50.307	7.4859	40.501	44.997	50.327	55.493	59.677
Age Squared	34727	2586.8	766.32	1640.3	2024.7	2532.8	3079.5	3561.3
Tenure	34727	5.8202	6.1562	.70363	1.7002	3.9151	7.8166	13.246
CEO	34727	0.2177	0.4126	0	0	0	0	1
Chairman	34727	.05379	0.2256	0	0	0	0	0
CEO & Chairman	34727	.02502	0.1562	0	0	0	0	0
Fraction of Year Served	34727	.95372	.27358	.66667	1	1	1	1
Company Controls								
Ln Market Cap	34727	12.968	1.7933	10.932	11.713	12.736	14.102	15.429
Ln Sales	34727	12.767	1.9835	10.437	11.509	12.7	14.074	15.339
TSR	34727	.05331	0.5251	-.48568	-0.1533	0.1046	0.3135	0.5315
Board Size	34727	10.767	3.6285	7	8	10	13	16
% Non-Execs	34727	0.4851	0.1389	0.300	0.3846	0.500	0.5833	0.6667
No. Days in Year	34727	364.46	15.370	363	364	364	365	365

1. TCC represents total cash compensation and comprises the executive's salary and any other cash payments such as annual bonus received during the year . TDC Realised adds to this measure by including the realised value of options and other equity based incentives exercised during the year. TDC Awarded is identical to TDC Realised except it uses a grant-date value of options (Black-Scholes) and equity incentives granted during the year instead of their realised values. TDC Awarded is our preferred measure as it is the best proxy for the expected value of the executive's annual remuneration. All pay variables are transformed by their natural log.

2. Age is the executive's age measured in years. There are priors suggesting that age should be entered into regressions as a squared term to capture non-linear relationship with pay.

3. Tenure the length of executive's position to date at time t, measured in years.

4. CEO is a dummy variable identifying executives who are a CEO at time t.

5. Chairman is a dummy variable identifying executives who are a Chairperson at time t.

6. Chairman & CEO is a dummy variable identifying executives who are both CEO and Chairperson at time t.

7. Year Fraction is the proportion of the year served by the executive at time t.

8. Ln Market Cap is the natural log of the firm's market capitalisation £2008 at time t.

9. Ln Sales is the natural log of the firm's market capitalisation £2008 at time t.

10. TSR is firm's Total Shareholder Return between t-1 and t. It is calculated as the difference in the log of the total return index from Thomson Datastream. This captures both capital growth in the share price and income from dividends.

11. Board Size is the total number of executive and non-executive executives serving on the board at time t.

12. % Non-Execs is the percentage of non-executive executives serving on the board at time t.

13. No. Days in Year is the number of days in the financial period. In a small number of cases the reporting period does not equal 365 days.

14. The panel is unbalanced, comprising 6824 executives from 953 companies between 1995 and 2008 for a total of 34,727 executive-years.

Table 2: Median pay (£000) and job moves: internal vs external moves

	External: Consecutive Companies			
	1	2	3	4
Companies				
$1^{N=6,200}$	£356			
	(9)			
$2^{N=511}$	£409	£593		
	(34)	(85)		
$3^{N=60}$	£294	£485	£676	
	(43)	(82)	(89)	
$4^{N=10}$	£434	£730	£830	£1,496
	(882)	(296)	(716)	(617)
Total N=6782				

	Internal: Consecutive Jobs				
	1	2	3	4	5
Internal Jobs					
$1^{N=6,207}$	£352				
	(12)				
$2^{N=971}$	£380	£508			
	(19)	(33)			
$3^{N=206}$	£298	£429	£547		
	(34)	(54)	(58)		
$4^{N=30}$	£327	£413	£583	£418	
	(93)	(168)	(379)	(286)	
$5^{N=5}$	£357	£463	£576	£912	£749
	(121)	(127)	(174)	(370)	(554)
Total N=7419					

1. Pay is the median TDC Awarded (£000), by individual within each company, using the Black-Scholes value for share options.
2. Standard errors in the parentheses
3. N represents the number of executives by the number of positions they held. Total internal N is greater than total external N as executives change jobs more frequently within company than between companies. This means there are more internal averages than external averages with the same number of individual executives.

Table 3: Regression estimates for pay residuals with individual FE

	TCC	TDC Realised	TDC Awarded
Director Controls			
CEO	0.32***	0.32***	0.38***
	(15.2)	(13.7)	(15.8)
Chair	0.089*	0.10*	0.13**
	(1.69)	(1.77)	(2.34)
Chair&CEO	-0.085	-0.11*	-0.12**
	(-1.63)	(-1.92)	(-2.11)
Age	0.25***	0.30***	0.32***
	(7.15)	(7.70)	(7.87)
Age Squared	-0.0019***	-0.0018***	-0.0021***
	(-13.7)	(-12.8)	(-13.9)
Tenure	0.0047***	0.011***	0.0022
	(3.18)	(6.09)	(1.22)
% Year Served	0.84***	0.79***	0.80***
	(33.0)	(30.7)	(30.2)
Firm Controls			
Ln Market Cap	0.12***	0.20***	0.20***
	(13.3)	(19.6)	(19.5)
Ln Sales	0.072***	0.058***	0.043***
	(6.79)	(5.02)	(3.79)
TSR	0.016**	0.033***	0.032***
	(2.18)	(3.93)	(3.46)
Board Size	-0.012***	-0.016***	-0.014***
	(-5.87)	(-7.02)	(-6.52)
% Non-Execs	0.33***	0.30***	0.25***
	(7.36)	(5.98)	(4.89)
No. Days in Year	0.0022***	0.0021***	0.0019***
	(8.15)	(7.65)	(6.72)
Individual FE	Yes	Yes	Yes
Observations	33,688	33,688	33,688
R-squared	0.397	0.389	0.356
Number of Directors	6,824	6,824	6,824

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

1. The pay residuals $\hat{\mu}_{ijt}$ used in this paper were calculated after the fixed effect regressions using the explanatory variables in the table above. Specifically we estimated:

$$y_{ijt} = \alpha_j + \boldsymbol{X}'_{ijt}\hat{\boldsymbol{\beta}} + \mu_{ijt}$$
$$\hat{\mu}_{ijt} = y_{ijt} - \alpha_j - \boldsymbol{X}'_{ijt}\hat{\boldsymbol{\beta}}$$

where y_{ijt} represents pay (either TCC, TDC1 or TDC2) transformed by its natural log at firm i, for individual j, at time t; α_j is the individual fixed effect; $\boldsymbol{X}'_{ijt}\hat{\boldsymbol{\beta}}$ is the vector of controls with their associated estimated coefficients. In addition to the controls reported in the Table above, year and sector dummies were included (sectors are identified in these fixed effects regressions as individuals do move between sectors over time).

Table 4: Random effects probit estimates of executive turnover

	TCC		TDC Realised		TDC Awarded	
Director Pay						
Raw Pay	-0.065***		-0.037***		-0.085***	
	(-6.81)		(-4.26)		(-9.99)	
Pay Residual		-0.23***		-0.14***		-0.40***
		(-11.7)		(-7.64)		(-22.0)
Director Controls						
CEO		-0.21***		-0.21***		-0.21***
		(-7.85)		(-7.94)		(-7.75)
Chair		-0.26***		-0.25***		-0.27***
		(-5.09)		(-5.07)		(-5.17)
Chair&CEO		-0.15*		-0.15*		-0.15*
		(-1.95)		(-1.95)		(-1.96)
Age		-0.032**		-0.033***		-0.030**
		(-2.51)		(-2.59)		(-2.31)
Age Sq.		0.00047***		0.00048***		0.00046***
		(-3.81)		(-3.88)		(-3.62)
Tenure		-0.016***		-0.016***		-0.016***
		(-7.90)		(-7.90)		(-7.73)
Female		0.083		0.082		0.088
		(-1.56)		(-1.53)		(-1.62)
% Year Served		-0.057**		-0.047*		-0.055**
		(-2.25)		(-1.85)		(-2.15)
Firm Controls						
Ln Market Cap		-0.095***		-0.094***		-0.10***
		(-8.52)		(-8.50)		(-8.87)
Ln Sales		0.054***		0.054***		0.057***
		(-5.58)		(-5.62)		(-5.76)
TSR		-0.16***		-0.16***		-0.16***
		(-7.67)		(-7.68)		(-7.83)
Board		0.043***		0.042***		0.044***
		(-11.7)		(-11.6)		(-11.7)
% Non-Execs		0.15*		0.15*		0.15*
		(-1.82)		(-1.81)		(-1.81)
No. Days in Year		0.0008		0.00078		0.00079
		(-1.32)		(-1.30)		(-1.32)
ρ		.055***		.054***		.066***
Observations	34,727	34,727	34,727	34,727	34,727	34,727
Number of Directors	6,824	6,824	6,824	6,824	6,824	6,824

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

1. The estimated coefficients above (β_j) are obtained from a random effects probit using the 12-point Gauss-Hermite quadrature. The 'quadchk' command in STATA 12.1 confirmed that these estimates were very stable to alternative quadrature points (8 and 16). The marginal effect ($\frac{\delta p}{\delta x_j}$) of an increase in variable x_j on the probability of executive exit can be calculated by multiplying the reported β_j above by $\phi(\boldsymbol{X'\beta})$, where ϕ is the standard normal density.

2. The pay residuals are calculated after the regressions of Table 3 above (which include an individual fixed effect). A one standard deviation decrease in the TDC Awarded residual is associated with an increase in the likelihood of exit by 18.7% points (marginal effect at mean (MEM) $\frac{\delta p}{\delta x} = -0.39$; one s.d.=0.48). In relative terms, this more than doubles the likelihood of exit. The MEM is calculated at the mean values of the covariates. The average marginal effect (AME) was $\frac{\delta p}{\delta x} = -0.40$. Here they are very similar but in general we prefer the MEM over the AME because in the calculation of the marginal effect, the random effect is assumed to be zero, which is true by construction at the mean.

3. ρ estimates the proportion of the total variance attributable to the panel-level variance component. The statistical significance of ρ is tested by a likelihood ratio test, comparing the random effects probit against a standard probit model. In our estimates above, the random effects model is preferred.
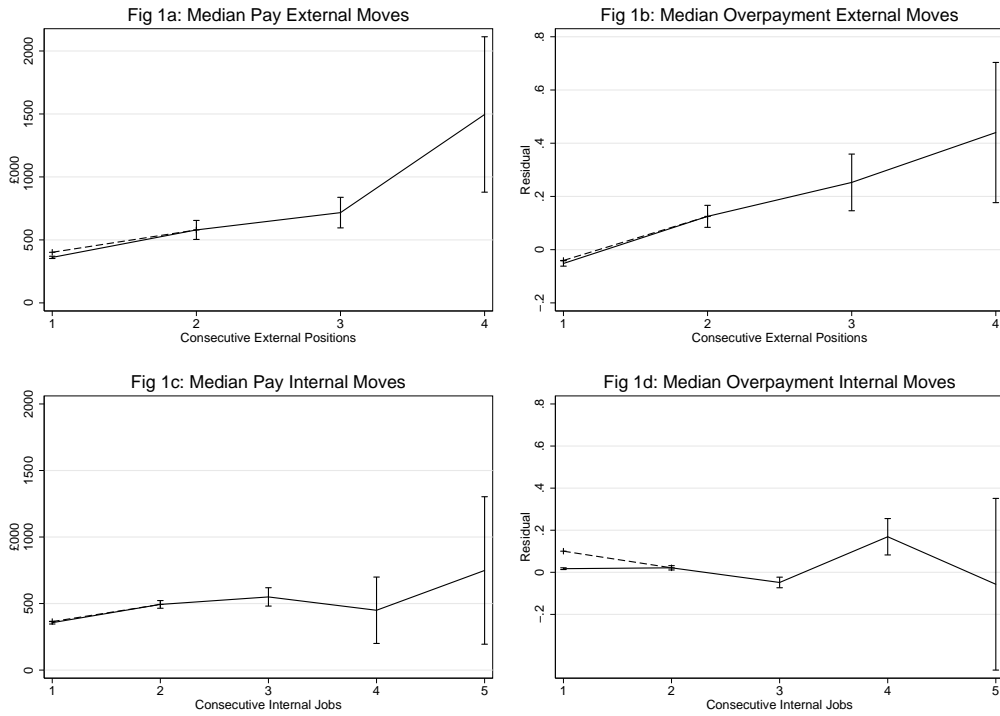
4. Year and sector dummies included.

Table 5: Estimates of executive wages following the move to a new job

	TDC Awarded		Δ TDC Awarded		TDC Awarded Residuals	
	OLS (1)	FE (2)	OLS (3)	FE (4)	OLS (5)	FE (6)
Promotion						
External	0.52***	0.40***	138,165*	241,614***	0.028	0.028
	(15.4)	(5.08)	(1.79)	(4.71)	(0.94)	(0.94)
Internal	0.059***	0.060**	-26,585	-18,769	0.019*	0.019*
	(3.65)	(2.07)	(-1.44)	(-0.66)	(1.72)	(1.94)
Lateral						
External	0.039*	0.16***	24,921	114,118***	0.048***	0.048***
	(1.88)	(3.92)	(0.23)	(3.67)	(3.18)	(3.35)
Internal	0.059***	0.060**	-26,585	-18,770	0.019	0.019*
	(3.09)	(2.02)	(-1.55)	(-0.69)	(1.59)	(1.87)
Demotion						
External	0.019	-0.23**	-76,698*	-48,260	-0.058	-0.058
	(0.30)	(-2.11)	(-1.67)	(-0.86)	(-1.16)	(-1.14)
Internal	0.14***	-0.053	-96,582**	-84,288	0.010	0.010
	(4.02)	(-1.04)	(-2.46)	(-1.63)	(0.40)	(0.43)
Director Controls						
Age	0.15***	0.35***	-14,403	7,819		
	(20.2)	(8.05)	(-1.42)	(0.18)		
Age Squared	-0.0015***	-0.0025***	103	-12.0		
	(-20.7)	(-12.3)	(1.15)	(-0.053)		
Tenure	0.060***	0.068***	-36,614**	-69,139**		
	(8.51)	(3.12)	(-2.15)	(-2.41)		
Female	0.37***		-346,348*			
	(4.74)		(-1.85)			
% Year Served	0.54***	0.55***	258,411***	376,954***		
	(15.0)	(6.45)	(2.99)	(2.93)		
Firm Controls						
Ln Market Cap	0.21***	0.16***	42,883***	79,439***		
	(38.5)	(10.6)	(5.05)	(3.58)		
Ln Sales	0.036***	-0.022	37,112*	76,390**		
	(4.09)	(-0.81)	(1.83)	(2.10)		
TSR	0.021**	0.070***	-4,445	-34,575		
	(2.04)	(4.64)	(-0.25)	(-1.41)		
Board Size	-0.0042*	-0.0016	-13,026***	-21,403***		
	(-1.85)	(-0.28)	(-4.39)	(-2.96)		
% Non-Execs	0.53***	0.011	203,663	381,396**		
	(11.3)	(0.10)	(1.42)	(2.56)		
Days in Year	0.0010***	0.0013***	1,235***	1,937***		
	(3.40)	(3.27)	(3.28)	(4.72)		
invmills (λ)	-1.47***	-1.87***	1.033e+06*	2.035e+06**	0.0052	0.0052
	(-7.12)	(-2.88)	(1.94)	(2.41)	(0.56)	(1.06)
Observations	34,727	34,727	27,903	27,903	34,727	34,727
Number of individualid	6,824	6,824	6,025	6,025	6,824	6,824

t-statistics in parentheses after 400 bootstraps
*** p<0.01, ** p<0.05, * p<0.1

1. The dependent variable in columns (1) and (2) is the level of TDC Awarded transformed by its natural log. In columns (3) and (4) the dependent variable is the growth (first-difference) in TDC Awarded. In columns (5) and (6) the dependent variable is the residual of TDC Awarded as calculated from column (3) of Table 3.

2. The fixed effects (FE) estimates control for unobserved time-invariant firm level heterogeneity. Alternative specifications including GMM regressions are available at *homepages.ed.ac.uk/mainbg/working_papers.htm*.

3. Year dummies are included in all regressions. Sector dummies are included in the OLS estimates but are not identified in the firm FE regressions firms do not change sector in our sample. The control variables are omitted from the residual regressions as the residual already controls for these variables.

4. The inverse mills ratio from a first stage probit is included in the second stage regression above and the standard errors are bootstrapped (400 replications). Inclusion of the selection term is significant in columns (1) to (4). The first stage probit uses '% Non-executive churn' to identify selection by executives to be 'movers'. This measures the average proportion of non-executives who exit the board each year. We propose that this variable is correlated with the likelihood that the executive changes job, but not directly correlated with the level of payment the executive receives in their job (the exclusion restriction). 'Non-executive churn' is significant in the likelihood of movement (0.377 p<0.003), satisfying the first criteria. As this model is 'just-identified' (one instrument) there is no statistical test of the exclusion restriction available to us, but we have no *a priori* reason for suspecting direct causation from non-executive churn to executive pay. The full first stage results are available at *homepages.ed.ac.uk/mainbg/working_papers.htm*.

Figure 1: Pay Progression: External vs Internal

Fig 1a: Median Pay External Moves

Fig 1b: Median Overpayment External Moves

Fig 1c: Median Pay Internal Moves

Fig 1d: Median Overpayment Internal Moves

1. The x-axis categorises the executive's job order. In the top row, this represents positions at consecutive companies. In the bottom row, this represents consecutive jobs in the same company. The y-axis in the left hand column shows median pay levels by consecutive executive job as measured using median pay levels TDC Awarded, which comprises the sum of annual salary, annual bonus and a grant-date value of options and equity incentives granted during the year. TDC Awarded approximates the expected value of the executive's annual remuneration. The right hand column shows median residuals from the TDC Awarded pay regression. This captures the level of unexplained compensation and proxies for the level of under/overpayment to the executive.

2. The median levels are bounded in the vertical direction by 95% confidence interval bars. Thus the bars inform the extent to which the averages are statistically significant from each other.

3. The + (dashed line) omits executives who never move. This controls for possible unobserved heterogenous human capital between executives who are able to move and those who are not.

Figure 2: Exit to a higher paying job: External vs Internal
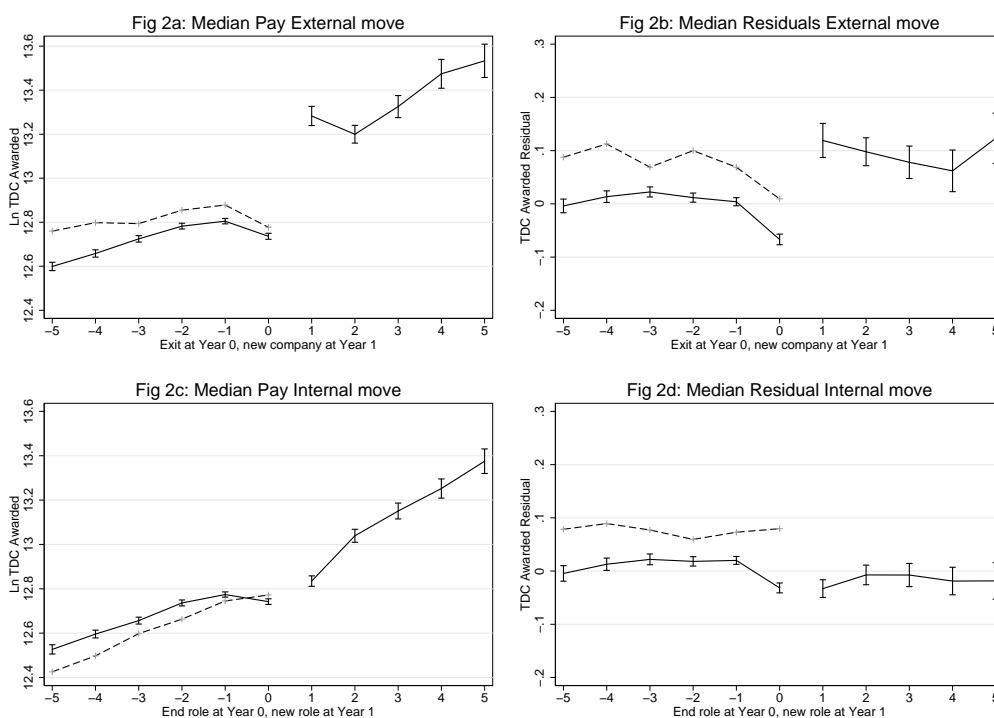
1. The x-axis categorises the year before/after the executive changes position, with t=0 representing the last (part) year in the prior position and t=1 the first (part) year in the new position. In the top row, the change represents a new position at a new company. In the bottom row, this represents a new position in the same company. The y-axis in the left hand column shows median pay levels, as measured by logged TDC Awarded. The right hand column shows median residuals from the TDC Awarded pay regression.
2. The median levels are bounded in the vertical direction by 95% confidence interval bars. Thus the bars inform the extent to which the averages are statistically significant from each other.
3. The + (dashed line) omits executives who never move. This controls for possible unobserved heterogenous human capital between executives who are able to move and those who are not.

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