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Control Structures and Payout Policy

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ABSTRACT

This paper examines the payout policies of UK firms listed on the London Stock Exchange during the 1990s. It complements the existing literature by analyzing the trends in *both* dividends and total payouts (including share repurchases). In a dynamic panel data regression setting, we relate target payout ratios to control structure variables. Profitability drives payout decisions of the UK companies, but the presence of strong block holders or block holder coalitions considerably weakens the relationship between corporate earnings and payout dynamics. While the impact of the voting power of shareholders' coalitions on payout ratios is found to be always negative, the magnitude of this effect differs across different categories of block holders (i.e. industrial firms, outside individuals, directors, financial institutions). The controlling shareholders appear to trade off the agency problems of free cash flow against the risk of underinvestment, and try to enforce payout policies that optimally balance these two costs. Finally, the paper improves upon some methodological flaws of the recent empirical studies of payout policy.

JEL classification: G35, G32, G30.

Keywords: Payout policy, dividend payout, share repurchases, partial adjustment, ownership and control, voting power, Banzhaf power indices, corporate governance, free cash flow, pecking order.

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1. Introduction

The opinions about the relative importance of different determinants of corporate payout vary across both scholars and financial mangers (Allen and Michaely, 2003; Brav et al., 2003; Baker and Wurgler, 2004). For instance, Correia da Silva et al. (2004) cite part of a letter written to the major UK companies by Michael McLintock, the CEO of M&G, part of Prudential and one of the largest institutional investors in the UK. In this letter McLintock argues that *'the investment case for dividends in the majority of circumstances is a strong and well-supported one, has stood the test of time, and is likely to be increasingly appreciated in the economic and stock market conditions which we seem likely to face for the foreseeable future.*'[1] This view does not appear to be uniformly shared by the investment community. Apparently, some investment bankers admit '*telling their clients that paying dividends is like an admission that you have nothing better to do.*'[2]

Although the seminal research in this area dates back to Lintner (1956), Miller and Modigliani (1961), and Black (1976), the controversy about why firms should pay dividends has not been satisfactorily resolved.[3] This paper contributes to this debate as it assesses empirically the contrasting predictions of agency theories of payout (Rozeff, 1982; Easterbrook, 1984; Jensen, 1986) and the implications of the pecking order models (Myers, 1984; Myers and Majluf, 1984). In particular, the paper derives and tests a set of hypotheses pertaining to the impact of shareholder control concentration on the firms' payout ratios.[4] We argue that the controlling

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[1] *The Financial Times.* October 8, 2002.

[2] *The Economist.* November 18, 1999.

[3] The well-known textbook of Brealey and Myers (2003) deems the dividend controversy to be among the '10 unsolved problems in finance'.

[4] Recent theoretical and empirical studies relating ownership and payout include among others Eckbo and Verma (1994), Lucas and McDonald (1998), Allen et al. (2000), Fenn and Liang (2001), Grinstein and Michaely (2002), Short et al. (2002), Gugler and Yurtoglu (2003), Perez-Gonzalez (2003), Farinha (2003), Gugler (2003), Brav et al. (2003), and Baker and Wurgler (2004).

shareholders trade off the agency problems of free cash flow against the risk of underinvestment, and try to enforce payout policies that optimally balance these two costs.

In addition, the role of share repurchase plans (as a way of disbursing funds to shareholders) has recently increased both in the US (Grullon and Michaely, 2002) and the UK (Oswald and Young, 2004). Therefore, contrary to the existing studies that have analyzed payout policies in the UK, we do not restrict our attention to one payout channel only (either dividends, or repurchases), and we investigate the factors that determine total payout.[5]

This paper complements the existing literature in several ways. First, we investigate the relationship between the dynamics of earnings payout and the voting power enjoyed by different types of shareholders. This allows us to test a set of hypotheses derived from agency and pecking order theories. Second, we address the problem of control measurement and advocate the use of Banzhaf indices as a relevant measure of voting power in the analysis of corporate policy choices. According to our best knowledge, this is the first study employing those game theory-based concepts in the context of corporate payout policies. Third, we extend the traditional framework proposed by Lintner (1956) and suggest an econometrically sound approach to modeling the dynamics of the total payout. Whereas most – even recent – studies on payout policy show some methodological flaws, we apply state-of-the-art dynamic panel data estimation procedures.

We analyze a large panel of UK firms for the 1990s and find that the payout policy is significantly related to control concentration. Expectedly, profitability is a crucial determinant of payout decisions, but the presence of strong block holders or block holder coalitions weakens the relationship between the corporate earnings and the payout dynamics. Block holders appear to realize that an overly generous payout may render the company to be liquidity constrained, and, consequently, result in suboptimal investment policy. While the impact of the voting power of shareholders' coalitions on payout ratios is found to be always negative, the magnitude of this effect differs across different categories of block holders (i.e. industrial firms, outside individuals,

[5] For the UK, Bond et al. (1996), Lasfer (1996), Bell and Jenkinson (2002), Short et al. (2002), Farinha (2003), Lasfer and Zenonos (2003), Correia da Silva et al. (2004) analyze dividend policy only, while Rau and Vermaelen (2002) and Oswald and Young (2004) focus exclusively on factors determining repurchase decisions.

directors, financial institutions). The results challenge some of the implications of the agency theories of payout, and favor a pecking-order explanation for the observed patterns. Our analysis of payout dynamics reveals also that companies adjust payout policies to changes in earnings only gradually, which is consistent with 'dividend smoothing' as documented in the literature. In fact, our results suggest a presence of a more general phenomenon of the 'total payout smoothing'.

The remainder of the paper is organized as follows. Section 2 surveys the background literature, develops research hypotheses, and motivates the control variables used in the study. Subsequent part describes data and methodology used in the paper. Results of the analyses are presented in Section 4. Section 5 discusses the extensions and robustness checks, while Section 6 concludes.

2. Payout policy and ownership structure: Background literature and hypotheses

Miller and Modigliani (1961) were the first to challenge the popular belief that higher payout translates into higher firm value. Under the restrictive conditions of perfect capital markets, any mix of retained earnings and payout will not affect firm value. Subsequent literature advances several theoretical justifications for firms' payout choices. Our paper takes an agency perspective as a starting point for explaining payout policy.[6] The agency models of payout relax the original Miller and Modigliani (1961) assumption about the independence of dividend and investment policies of the firm. Whenever a firm suffers from agency conflicts between managers and shareholders, payout policy may provide a partial remedy (Rozeff, 1982). Distributing funds to shareholders by means of dividends or share repurchases forces firms to raise capital externally in order to finance new projects and, consequently, to be submitted to the discipline of the market (Easterbrook, 1984). A commitment to pay out funds to shareholders (either as dividends or as

[6] Other explanations include, for instance, taxation, signaling arguments, institutional constraints, and behavioral considerations (Allen and Michaely, 2003). While we acknowledge that some of these factors may affect firms' payout choices, a full analysis of all those possible explanations is beyond the scope of this paper. Bond et al. (1996), Lasfer (1996), Bell and Jenkinson (2002), Rau and Vermaelen (2002), and Oswald and Young (2004) extensively discuss the empirical relevance of those arguments (in particular, taxation) in the UK context.

repurchases) reduces the amount of free cash flows that managers could otherwise spend on value reducing projects (Jensen, 1986). Fluck (1999) develops a model, in which the amount of dividends depends on the outsiders' effectiveness in disciplining the management. In the model proposed by Allen et al. (2000), firms pay high dividends in order to attract lower-taxed investors (i.e. financial institutions) who may have an advantage in detecting firm quality and ensuring that firms are well managed.

The relationship between control structures and payout is a focus of several empirical studies. Using US data, Zeckhauser and Pound (1990) do not find significant differences in payout ratios between firms with and without large block holders. Consequently, they conclude that ownership concentration and payout policy cannot be considered substitute monitoring devices. For German firms, the vast majority of which is characterized by strong investor (groups) holding majority control, Gugler and Yurtoglu (2003) document that the power of the largest equity holder reduces the dividend payout ratio whereas the power of the second largest shareholder increases the payout. Also for Germany, Goergen et al. (2004) find that, given that strong shareholders exert their control power, there is no need for the dividend policy to constitute an additional monitoring device. Moh'd et al. (1995) find that, in the US, more dispersed ownership (as measured by the number of owners) results in higher payout ratios. The identity of the block holders is found to affect the payout ratios as well. A high payout in companies with considerable institutional ownership is consistent with the idea that dividends are used as a way of compensating block holders for their monitoring activities (Shleifer and Vishny, 1986). Moh'd et al. (1995) document that larger managerial ownership translates into lower dividend payout ratios, while larger institutional stakes are associated with higher payout.[7] Using

[7] Eckbo and Verma (1994) test a very similar prediction employing a sample of Canadian firms. Still, in their theoretical model and the discussion of empirical results, they consider managerial preferences for high payout and institutional preferences for a low one to be largely exogenous (and not necessarily driven by the agency considerations).

UK data, Short et al. (2002) obtain a similar result and interpret it as a support for the free cash flow explanation of payout (Jensen, 1986).[8]

Most of the existing agency models involving payout policy hinge on the implicit assumption that firms can be refinanced frictionlessly (without additional costs) by the external capital markets when they need funds to undertake new investment projects. Consequently, for a firm with value-enhancing investment opportunities, an optimal strategy minimizing agency costs can consist of maintaining a high payout to reduce the amount of free cash flow and of raising new outside capital. In particular, such a policy can be imposed by strong outside block holders (like corporations, or individuals or families) who intend to curb managerial propensity to overinvest. As a result, the corporate resources that can be spent by management on value reducing projects are limited. The underlying idea is that, once the free cash flow is returned to the shareholders, the external capital markets screen managerial investment proposals and can impede inefficient investments by setting a prohibitive cost of capital (Easterbrook, 1984). *Therefore, we hypothesize that strong voting power held by outside shareholders like industrial firms, and families or individuals (not related to a director), increases the payout ratio (**Hypothesis 1**).*

Contrarily, firms in which directors hold substantial voting power may opt for low payout ratios. High earnings retention may allow managers to enjoy substantial private benefits (e.g. perquisites) associated with excess cash flow and corporate growth resulting from negative net present value projects (Jensen, 1986). According to this agency view, managers, whose control power is difficult to challenge, are able to enforce such a strategy.[9] *Thus, we hypothesize that the*

[8] Also Farinha (2003) invokes agency arguments to explain the relationship between insider ownership and dividend payout in the UK.

[9] Managerial equity stake also helps to align the interests of management and shareholders (Jensen et al., 1992). If, due to this alignment, the severity of the manager-shareholder agency conflict is low, payout ratios in a firm with substantial managerial holdings may be low not only because managers are able to secure the funds for lavish investments, but also because the optimal financing policy requires the increase of the firm's financial slack (see below).

*earnings-sensitivity of payout decreases with the voting power of executive directors (**Hypothesis 2**).*

The third major class of block holders is that of institutional investors (banks, insurance companies, investment funds, unit trusts, pension funds). In contrast to other outside shareholders, there is evidence that UK institutional investors are not actively monitoring the companies they invest in (Lai and Sudarsanam, 1997; Franks et al., 2001; Faccio and Lasfer, 2002). There are essentially two reasons for this lack of institutional shareholder activism. First, they do not usually have the resources to monitor the (many) firms in their portfolios. Second, monitoring would provide institutions with inside information and their investments would therefore be locked in. Hence, in case of substantial agency conflicts between managers and shareholders in a specific firm, institutions are more likely to sell (part of) their investment rather than to attempt to reduce agency conflicts by, for instance, imposing specific payout policies. Correia da Silva et al. (2004) report that UK institutions prefer high payout (in the form of dividends) for two reasons: (i) for some institutions, dividend payments are tax efficient[10] and (ii) high dividends facilitate the flow of funds from and to their investment portfolios. *Considering the institutions' preference for dividends (for tax reasons as well as for asset and liability considerations), we expect that the earnings-sensitivity of payout strengthens with the voting power of financial institutions (**Hypothesis 3**).*

The discussion of the hypotheses above assumes perfect capital markets and, consequently, the independence of investment and financing decisions. Under asymmetric information, however, the market requires – even for high quality firms/projects – a premium equal to the one required for investing in the average firm (Myers and Majluf, 1984). Consequently, underinvestment problems may emerge: due to adverse selection, relatively lower quality projects may seek external financing whereas some of the positive NPV projects are not undertaken at all (Myers, 1984). A lack of internally generated funds or an excessively generous payout policy may constrain the investment expenditures of some firms (Goergen and

[10] See Bell and Jenkinson (2002) and Rau and Vermaelen (2002) for a detailed discussion of tax treatment of various forms of payout in the UK.

Renneboog, 2001; Pawlina and Renneboog, 2005), while the resulting suboptimal investment policy may harm the incumbent shareholders (Gugler and Yurtoglu, 2003).

Apart from the indirect costs discussed above, raising external capital involves direct costs such as issuance costs. For instance, in case of seasoned equity offerings, the fees paid by issuing firms typically range between 1 and 10% of the value of the issue (Butler et al., 2003). Therefore, a policy of frequent refinancing requires a company to incur nontrivial costs of raising new capital (Myers, 1984). Moreover, even if there were no asymmetric information problems, additional funds cannot be raised immediately. Some investments are hardly deferrable and even a temporary lack of available resources may force a firm to forego an attractive project (Fama and French, 2002).

Hence, if capital markets are imperfect, shareholders face an important tradeoff. They have to weigh the costs of overinvestment (type-I error, i.e. the projects that should not have been accepted are undertaken) against the possibility that a cash-constrained firm will not be able to undertake a profitable investment (type-II error). Enforcing a high payout policy mitigates the probability of type-I errors at a price of the higher likelihood of type-II errors in the investment policy. If the latter cost is substantial compared to the former one, outside shareholders may be better off when firms opt for relatively low payout ratios and finance their investment internally (Jensen et al., 1992). Thus, if a firm has strong shareholders (such as outside block holders or financial institutions) who realize that a firm is liquidity constrained, they may reduce their demand for a high payout. This would attenuate Hypotheses 1 and 3.

As the choice of payout policy cannot be abstracted from the firm's investment opportunities, we include Tobin's Q as a proxy for the firm's growth opportunities in our models. We control for firm size which is often considered as a proxy for firm maturity and has been shown to affect dividend policy (Grullon et al., 2002). Moreover, firms with more assets-in-place tend to have higher dividend payout ratios (Smith and Watts, 1992).

Leverage may influence firms' choices of payout policy because debt can also be used to alleviate potential free cash flow problems (Jensen, 1986). Moreover, some debt contracts include protective covenants limiting the payout a firm is allowed to make (in order to prevent the expropriation of bondholders by shareholders). Therefore, we expect a negative relationship between payout ratios and leverage.

Industries differ with respect to maturity and information opacity (Zeckhauser and Pound, 1990). Thus, the degree of free cash flow problems and, consequently, payout ratios are likely to vary considerably across sectors (Moh'd et al., 1995). Since our sample includes firms operating in a variety of sectors (see Section 3.1), controlling for industry-specific effects assures the reliability of the results. Finally, we also include year dummies to control for macroeconomic shocks (such as economy-wide cycles, etc.).

3. Data and methodology

3.1. Sample selection, data sources and summary statistics

Our sample covers UK firms listed on the London Stock Exchange. We exclude banks, insurance companies, and other financial firms (SIC codes 6000-6900) because their financial reporting standards are different from those of the rest of the sample. We also exclude utilities (SIC codes 4900-4949), because their payout policies and the access to external financing are regulated. Finally, we only retain those firms that are present in the Worldscope Disclosure dataset for at least three years in the period 1992-1998. As a result, we are left with the sample of 985 firms that covers more than two thirds of the UK listed non-financial firms and represents a broad range of industries.[11] We used the Worldscope database to gather ownership and control data as well as accounting data.

We classify shareholders controlling the equity blocks into 6 mutually exclusive categories: (i) executive directors and their families, (ii) non-executive directors and their

[11] The sample includes 206 agricultural, mining, forestry, fishing and construction firms (SIC codes 1-1999), 407 manufacturing firms (SIC codes 2000-3999), 204 retail and wholesale firms (SIC codes 5000-5999) and 168 service firms (SIC codes 7000-8999).

families, (iii) individuals and families not related to directors, (iv) the government,[12] (v) financial institutions (i.e. banks, insurance companies, investment and pension funds), and (vi) other industrial and commercial companies. To classify the more than 5000 individual shareholders into the categories of executive/non-executive directors or of individuals/families not related to a director, we consult the London Stock Exchange Monitor and the Who's Who-guides. To identify institutional shareholders, we consult Datastream and the Institutional Investors Annual Guides.

Table 1 summarizes the sample characteristics.[13] All the data are expressed in constant 1992 prices. The median amount spent yearly by the repurchasing firms on buying back their shares equals approximately £ 0.8 million, which is much lower than the median dividend (£ 1.4 million) distributed by dividend-paying firms.[14] The median size of the total payout (among paying firms) amounts to £ 1.5 million. Both the median and the average firm are profitable: their earnings before interest and taxes (EBIT) equal £ 4.2 million and £ 28.7 million, respectively. The market value of the average (median) firm equals £ 503 million (£ 73 million). The mean and median book values of total assets equal £ 301 million and £ 43 million, respectively. Because of the considerable skewness of those size measures, we employ logarithm of the book value of the total assets as a proxy for firm size. A typical firm is moderately levered – the average leverage ratios equal 59% in book-value terms and 40% in market-value terms. Finally, the sample mean and median values of Tobin's Q proxy equal 1.87 and 1.45, respectively.

[Insert Tables 1 and 2 about here]

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[12] State ownership is rare: over all the firm-years, the government was a block holder in only 22 observations (related to 14 firms). The largest stake held by the State was 13.1%. Given the marginal nature of governmental ownership, we do not report this category of shareholders in subsequent sections.

[13] The control structure of the analyzed firms is discussed in Section 3.2.

[14] This result is at odds with the implications of the adverse selection models that predict that larger distributions should be made via the repurchase channel (e.g. Lucas and McDonald, 1998). However, while in the respective subsamples, *median* dividend is larger than *median* value of the repurchased equity in every single sample year, there are no substantial differences in *average* sizes of dividends (among dividend-paying firms) and repurchases (among repurchasing firms).

Table 2 shows that total payout as a fraction of earnings oscillates around 20-25% with the average for the pooled sample equal to 22.75%. The corresponding number for dividend payout (20.28%), is only slightly lower.[15] Section 4 examines the impact of the control structure on those payout ratios.

3.2. Ownership concentration and the measurement of voting power

Panel A of Table 3 illustrates the distribution of equity blocks across different classes of shareholders. Financial institutions are the most important category of block holders. The average cumulative stake of this investor group approximately equal that of all other block holdings combined. In an average company, institutional block holders control about one fifth of the total equity outstanding. Table 3 also shows that in the average sample firm, executive directors hold a non-negligible fraction of the equity outstanding, namely 10%, by means of share blocks of at least 5%. Averaging the block holdings controlled by industrial firms, we find a considerably smaller stake (of about 4%). Equity blocks held by other groups of owners (non-executive directors or outside individuals) are typically smaller. In addition to the dispersion of blocks across various types of shareholders, Table 3 analyses also ownership concentration *per se* (see Panel B). The average sizes of the largest, 2nd largest, and 3rd largest blocks equal 17.23%, 7.33%, and 4.04% of the equity outstanding, respectively.

[Insert Table 3 about here]

As one of the focal points of this paper is the relation between payout policy and the control power of specific types of shareholders, we construct various measures of voting control. We follow the Crespi and Renneboog (2003) approach and analyze a two-stage voting game. We assume that in the first stage, all the shareholders of a particular type (e.g. all financial institutions) form a coalition. Only in the second stage, such coalitions participate in a voting

[15] This number should be contrasted with the payout ratio based on repurchases only. In the analyzed period, only a tiny fraction of aggregate firm earnings (on average 2.33%) was distributed to shareholders via share buyback programs.

game with the intention to influence (or even to determine) the payout policy. Several arguments can be invoked to justify such an approach. Different categories of shareholders may have different incentives or abilities to monitor the firm such that it may be easier to create coalitions with shareholders of the same type. For example, given that executive directors enjoy similar private benefits of control, they may combine their shareholdings into one voting block to safeguard their discretion on managerial decisions. Moreover, the two-stage approach advocated here seems relevant in the context of payout decisions due to the existence of different clienteles. For instance, it is not unlikely that institutions collectively signal to the firm's management their preference for a specific payout policy (e.g. regular dividends every year due to asset-liability management considerations).[16]

The measurement of voting power is the topic of an ongoing debate in game theory and corporate finance (Felsenthal and Machover, 1998; Leech, 2002). Examples of measures used in the literature include Banzhaf indices (Banzhaf, 1965; Dubey and Shapley, 1979), different versions of Shapley values (Shapley and Shubik, 1954; Milnor and Shapley, 1978), and contestability indices (Bloch and Hege, 2001). Despite the recent popularity of Shapley values in empirical corporate finance research (e.g. Eckbo and Verma, 1994; Crespi and Renneboog, 2003), Leech (2002) argues that the underlying notion of power (i.e. P-power, or power as the prize in a voting game) appears inappropriate in the analysis of shareholder voting behavior. Instead, he argues that shareholder voting games can be better described by policy-seeking motives (rather than office-seeking motive implicit in Shapley values) such that I-power[17]

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[16] Furthermore, the casting of votes by institutions has been on the rise, although it is a relatively recent phenomenon (since the second half of the 1990s). Surveys reveal that many UK institutions have established voting policies. The PIRC (1999) survey on institutional voting trends concludes that overall proxy voting levels have increased to over 50%. These observations and the fact that institutional investors regularly meet through the national associations (like i.e., the National Association of Pension Funds), may justify the calculation of voting measures for accumulated share blocks as if bank managed funds, of investment and pension funds and of funds managed by insurance companies were forming coalitions.

[17] According to this notion, power is defined as the ability to influence the decision (i.e. the outcome of the vote), but it is not interpreted as the prize in a voting game (Felsenthal and Machover, 1998).

measures are more relevant in such a context. This is particularly relevant in the study that analyzes payout choices, which, by their very nature, have the character of a policy decision.

The most frequently used measure of voting power for such (policy) games are Banzhaf (1965) values (Felsenthal and Machover, 1998). A Banzhaf absolute value for a particular player is defined as the probability that - in a randomly chosen bisection of a set of game participants - the vote outcome changes if this particular player switches the coalitions.[18] The analyzed game can be considered an oceanic one. In game theory, oceanic games involve a few relatively large players and a continuum of infinitesimal players (Milnor and Shapley, 1978). Most of the UK companies have a few block holders, while the remaining shareholdings are widely dispersed. Hence, we consider an oceanic representation to approximate the actual distribution of votes. Therefore, we employ the generalization of Banzhaf values as proposed by Dubey and Shapley (1979).[19]

The naïve approach - often followed in the corporate finance literature – consists of including the size of the equity stakes controlled by different block holders into the empirical models. Those stakes are only a crude proxy for the strength of a particular investor and the main problem is that the stakes controlled by other shareholders (and hence the relative control power) are ignored. For instance, a block representing 20% of the votes in a company with otherwise widely dispersed ownership is likely to yield effective control over the company (Crama et al., 2003). A block of 25% in a company with a majority shareholder may not give its holder significant influence (apart from the advantage of possessing a blocking minority). Hence, it is the relative rather than the absolute voting power of a given investor, which determines his ability

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[18]The indices we employ are often referred to as absolute Banzhaf indices (Felsenthal and Machover, 1998). Relative indices are obtained by normalizing the absolute ones. As a result of this normalization, relative Banzhaf indices for a game sum up to 1. We briefly discuss the models employing relative indices in our robustness checks (see Section 5.2). An example of a Banzhaf index calculation is given in the Appendix.

[19] Under some regularity conditions, Banzhaf indices in an oceanic game can be obtained as the Banzhaf indices for the modified, finite game consisting only of the major players with an appropriate adjustment of the required majority threshold (Dubey and Shapley, 1979).

to influence the firm's policies (Crespi and Renneboog, 2003). Consequently, we invoke a solution resulting from game-theoretical approach.

Table 4 shows the absolute Banzhaf indices and confirms the considerable potential of financial institutions and executive directors to influence corporate policies (see Panel A).[20] Despite the relatively small size of the largest block (on average 17.23%, see Table 3), the voting power of its holder is substantial (compared to the power of other block holders): on average, the absolute index for the largest shareholder exceeds 0.5 (see Panel B of Table 4).

[Insert Table 4 about here]

3.3. Model specifications and estimation techniques

In order to analyze the dynamics of payout policy, we extend the partial-adjustment model proposed by Lintner (1956). The model assumes that all that companies maintain a target payout ratio and that the shocks in earnings are reflected in payout changes over the number of years after they actually occur. This gradual adjustment feature is with the widely observed practice of dividend smoothing (Allen and Michaely, 2003). We use partial-adjustment models to explain not only the dividends, but also the total payout. The basic specification is given by:

(1) $$D_{it} - D_{i(t-1)} = \alpha_i + \beta_1 \cdot E_{it} + \beta_2 \cdot D_{i(t-1)} + \varepsilon_{it}\,,$$

where D_{it} denotes a payout (dividends or total payout) made by i-th company in year t. E_{it} denotes earnings (EBIT) of i-th company in year t. α_i is the firm-specific effect, β_1 and β_2 are model parameters, and ε_{it} is the error term. In this model, the target payout is related to earnings (E_{it}) via

[20] In our empirical setting, we distinguish five categories of shareholders and compute the measures of voting power for each of those categories. Although Hypotheses 1 and 3 predict that the presence of blocks controlled by industrial firms, outside individuals, or financial institutions has a positive effect on payout ratios, we do not find a convincing *a priori* argument why this effect should be of the same magnitude for all those groups of shareholders. The heterogeneity may stem from differing investment motives, investment horizons, tax preferences, monitoring skills, etc. Therefore, in the regression models discussed in Section 4, we include Banzhaf measures for all five categories of block holders.

the desired payout ratio equal to $\frac{\beta_1}{-\beta_2}$. The immediate adjustment of actual payout to the earnings shock is only partial with the speed of adjustment is given by $-\beta_2$.

In order to test our hypotheses pertaining to the impact of ownership structure variables on payout ratios, we extend the specification outlined by Equation 1 by including as regressors k interactions of the ownership variables (e.g. Banzhaf indices for executive directors and financial institutions) with the earnings differential. We also include a vector of additional regressors (denoted by X_{it}) such as e.g. industry dummies. Thus, the regression equation describing the extended full-adjustment model can be written as:

(2) $$D_{it} - D_{i(t-1)} = \alpha_i + \beta_1 \cdot E_{it} + \beta_2 \cdot D_{i(t-1)} + \sum_{j=1}^{k} \lambda_j \cdot Own_{j,it} \cdot E_{it} + \gamma \cdot X_{it} + \varepsilon_{it}.$$

$Own_{j,it}$ is the value of j-th ownership variable for i-th firm in year t. λ's and the vector γ are model parameters. Since we expect the ownership variables to have an effect on target payout ratios (see Section 2), we hypothesize that λ's are significantly different from zero. Our hypotheses do not impose any restrictions on the other model parameters.

Finally, we re-arrange the terms in the equation above and estimate the following model in Section 4:

(3) $$D_{it} = \alpha_i + \beta_1 \cdot E_{it} + (1+\beta_2) \cdot D_{i(t-1)} + \sum_{j=1}^{k} \lambda_j \cdot Own_{j,it} \cdot E_{it} + \gamma \cdot X_{it} + \varepsilon_{it}.$$

Partial-adjustment specifications are dynamic panel data models with the lagged dependent variable as a regressor. Hence, traditional estimators, such as fixed-effect within-estimators, are biased (Baltagi, 2001). This bias is the most severe when the time dimension of the panel is relatively small (as it is the case in our study). The inferences based on such estimates are likely to lead to spurious conclusions. This may be one of the main reasons for the differences in results between our paper and some other studies (e.g. Moh'd et al., 1995; Short et al., 2002). The more appropriate methodological approach is a dynamic panel data estimation technique. Several (mostly GMM-type) estimators have been proposed in the literature to address this problem (Baltagi, 2001). The simplest estimator is based on a first-differenced equation where the differences are instrumented by lagged levels of the regressors (Arellano and Bond, 1991). However, such an estimator has been found to have large finite sample bias and poor precision in simulation studies (Blundell and Bond, 1998). This problem appears most acute in dynamic panel data models where the autoregressive parameter is moderately large and the time dimension of the panel is relatively small. Most of the payout studies are likely to suffer from at least one of those problems. For instance, payout levels are relatively persistent, since most of the companies are reluctant to alter dramatically their dividend policy from year to year (Allen and Michaely, 2003). Furthermore, the efficiency problem stems from the fact that lagged levels of the series are weak instruments for the first differences. The Blundell and Bond (1998) approach extends the linear Arellano and Bond (1991) GMM-procedure. More specifically, the Blundell and Bond (1998) estimation technique employs lagged differences of the dependent variable as instruments for equations in levels (in addition to using levels as instruments for the differences). Blundell and Bond (1998) demonstrate that there are substantial efficiency gains resulting from the use of their system GMM estimator as compared to other dynamic panel data estimators.

We apply the GMM-in-systems estimator developed by Blundell and Bond (1998) to obtain the results for partial-adjustment models (Equation 3). DPD for Ox software is employed to estimate those models. Following Doornik et al. (2002), we use up to two lagged levels of the regressors as the instruments in the first-differenced equation (rather than using all the lags available) because remote lagged levels are likely to be weak instruments for the first differences.[21]

The estimates reported in Section 4 are the output of a two-step optimization procedure (Doornik et al., 2002). We employ Sargan test for overidentifying restrictions to assess the validity of the imposed moment conditions. A robust covariance matrix of the estimators is employed in all the reported models to account for potential heteroscedasticity. Additionally, we

[21] We experimented with other lag structures as well (e.g. using up to 3 or all available lags as instruments). The parameter estimates (as well as the confidence intervals) are very close to the ones reported in the text. However, the specifications with more lags require a larger number of moment restrictions to be satisfied, which affects the outcomes of the Sargan tests for overidentifying restrictions.

report the results of the autoregressive (AR) tests for residuals. These tests allow us to check for potential higher-order dependence in partial-adjustment models.

4. Dynamics of payout-profitability relationship

Tables 5 and 6 present the estimation results for partial-adjustment models explaining the dynamics of dividends and of the total payout, respectively. In each table, the first model reported corresponds to the basic specification (without variables characterizing firms' ownership structure), while the other two regressions are the extended specifications as described by Equation 3.

[Insert Tables 5 and 6 about here]

For the basic dividend model (Model 1 in Table 5), the Sargan test indicates that (at the conventional 5% significance level) the reported estimates fail to match the moment conditions imposed by the GMM-based Blundell and Bond (1998) procedure. Hence, we do not interpret the corresponding estimation results and report them for reasons of comparison only. The basic model for the total payout (Model 3 in Table 6) passes the Sargan test, but it does not describe the dynamics of the dependent variable satisfactorily. As to the t-statistics, only the lagged payout variable is significant at 5% level, which suggests path-dependence in payout policies. Surprisingly, the coefficient corresponding to the earnings falls short of statistical significance, though it is positive as expected.

The partial-adjustment models including the ownership variables (Models 2 and 4) perform considerably better in statistical terms and capture the dynamics of dividends and total payout reasonably well (with realistic implied payout ratios). For instance, Model 2 implies that for a widely held firm (i.e. for a firm where the measures of voting power for all block holders' coalitions take a value of zero), the target dividend payout ratio equals 31.9% (i.e. $\frac{0.23}{1-0.27}$; see Section 3.3), which exceeds the sample average (i.e. 20.3%; see Table 2). The same model implies that in a firm controlled by financial institutions (i.e. a firm where Banzhaf measure for this group of investors equals one, while voting power of other coalitions is zero), the target dividend payout ratio is much lower and amounts to 14.3% only. With regard to the total payout policy, the results imply that the corresponding numbers for the total payout ratio equal 27.3% for a widely-held firm and 15.6% for a firm controlled by financial institutions. These implied payout ratios are reasonably close to the observed average (i.e. 22.8%).

Changes in earnings translate only gradually into (dividend) payout adjustments. The coefficients for the lagged dividends and lagged total payout are significant in the models reported in Tables 5 and 6, respectively. Therefore, the models seem to be consistent not only with 'dividend smoothing', but also – more generally – with 'payout smoothing'.

The estimates of the coefficients corresponding to the interactions between profitability and the power of industrial firms as well as between profitability and the power of individual block holders are negative and at least marginally significant in the models reported in Tables 5 and 6. Hence, contrary to which was predicted by Hypothesis 1, outside shareholders seem to prefer relatively low payout ratios and to approve shielding of payout from earnings shocks. This result is consistent with the implications of the financial constraints model (see Section 2). Apparently, large outside shareholders acknowledge the potential cost of underinvestment and allow firms to extend their financial slack. At the same time, as those shareholders are likely to actively monitor the management (see Section 2), they can curb potential overinvestment problems in firms with substantial free cash flow.

As predicted by Hypothesis 2, the interaction of earnings and the voting power enjoyed by executive directors is significantly negative in Model 2.[22] Apparently, strong managers are able to weaken the positive link between corporate profitability and dividend payout. The values of estimates imply that in firms where executive directors constitute a controlling block holder

[22] The corresponding coefficient is also negative in Model 4 that explains the dynamics of total payout (see Table 6), though it falls short of statistical significance.

coalition (with corresponding Banzhaf indices equal to 1), the implied payout ratio is less than a half the payout ratio of a widely held firm.[23]

As indicated by Model 2 (in Table 5) the dividend payout ratio tends to be significantly lower in firms with dominating financial institutions than in widely-held firms (although the corresponding coefficients in the total payout models are not statistically significant; see Table 6). Somewhat surprisingly, the tax preference for dividends by financial institutions does not dominate the payout decision; it seems that this type of block holders realizes the costs of excessive payout and is ready to mitigate their demand for a high dividend payout (in spite of its tax advantages).[24] Consequently, the evidence fails to support Hypothesis 3.

Models 1-4 also illustrate the impact of other firm characteristics on the dynamics of payout. In line with our earlier expectations, larger firms distribute more funds to their shareholders than small firms do. Unexpectedly, the firms' investment opportunities seem not to matter for the payout decisions as the impact of the Tobin's Q proxy appears insignificant in any of the models reported in Tables 5 and 6. Finally, payout decisions and leverage are significantly related. Still, the positive sign of the effect of this variable is a bit puzzling: apparently, more levered firms maintain higher payout ratios than less levered firm.

5. Extensions and robustness checks

5.1. One-stage voting game

The theoretical considerations summarized in Section 2 imply that the preferences with respect to the payout policy differ by type of shareholder. However, our empirical results do not support such a prediction. In relation to the corporate earnings distribution policy, block holders appear to behave similarly (at least, from a qualitative point of view) irrespectively of their

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[23] Notably, a similar (yet stronger) effect can be observed for the power of non-executive directors. Substantial voting power of this group of shareholders significantly weakens the earnings-sensitivity of payout. The magnitude of this effect is comparable to that for outside block holders (see above).

[24] Importantly, the fact that block holders prefer payout not to be sensitive to earning changes does not necessarily imply that this payout should be as low as zero (cf. Trojanowski, 2004). The results suggest that block holders (irrespectively of their type) are pleased with a stable payout policy (not affected by short-run earnings shocks).

identity. This finding may suggest that our two-stage approach to the voting game may be incorrect. Rather than forming type-based coalitions first, and participating in the voting game only afterwards, block holders may attempt to achieve their payout policy goals on their own. In the models summarized in Table 7 below, we verify such a claim empirically. We consider a one-stage oceanic voting game, where each block holder is treated as a separate player. Then, we compute the corresponding Banzhaf indices to measure block holders' voting power. We employ those measures and re-estimate partial-adjustment models for the dividends and for the total payout.

[Insert Table 7 about here]

In Models 5 and 6 (see Table 7), we include the measures of voting power for the two largest block holders.[25] The results obtained here demonstrate the pattern similar to those obtained earlier for block holder coalitions. The presence of a large shareholder considerably decreases the implied payout ratios, in particular when dividends are considered.[26] For instance, Model 5 implies a dividend payout ratio of 32.2% for a widely-held firm, while for a firm with median control concentration the corresponding number amounts to merely 18.5%. The direction of the effect is the same for both the largest and the second largest shareholder, which distinguishes our results from those obtained by Gugler and Yurtoglu (2003) for Germany.[27] In contrast to the German firms most of which are dominated by one shareholder with an absolute voting majority, the overwhelming majority of our sample firms are minority-controlled: only about 6% of the companies analyzed here have a majority owner. Consequently, it is difficult to compare our qualitative results with those obtained by Gugler and Yurtoglu (2003), as their conclusions are largely based on the comparisons of two types of majority-controlled firms and a

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[25] We estimated the models where we considered also the power of the third largest shareholder, but the corresponding coefficients for the interactions of Banzhaf indices with the earnings proved insignificant.

[26] Moreover, it appears that it is not just the most powerful shareholder who tries to impose a specific payout policy. In a typical company, a coalition of at least two leading shareholders influences the choice of the payout ratio.

[27] In their study, the control power of the largest equity holder reduces the dividend payout ratio whereas the control power of the second largest shareholder increases the payout.

group of companies without a majority block holder. In our paper, we apply a more refined measure of block holders' power and we document that within minority-controlled firms, a strong relationship between ownership concentration and chosen payout policies can be observed.[28] Finally, Models 5 and 6 support the earlier results pertaining to the impact of the other firm characteristics on payout. Payout is higher in larger and more levered firms, while Tobin's Q proxy does not appear to affect the amount of funds that are distributed to shareholders.

5.2. Other extensions and robustness checks

We tried several model specifications alternative to those reported in the text. First, we verified whether the partial-adjustment mechanism implied by the Lintner (1956) model captures the payout dynamics well. We checked two alternative types of specification: Waud models (1966) and full-adjustment models (cf. Short et al., 2002).[29] As the data clearly indicate that payout adjusts to earnings shocks only gradually, full-adjustment models appear clearly misspecified. There is no support for a complicated adjustment mechanism implied by the Waud model either. Hence, the partial-adjustment specification is a clear winner of this horse-race exercise. Second, we verified whether the payout adjustment to earning changes is symmetric for positive and negative shocks to profitability. Following Gugler and Yurtoglu (2003), we allowed for adjustment of payout to earning changes to be asymmetric, but the models obtained were strongly rejected.

Third, we tried alternative proxies for some of the variables. For instance, rather than employing leverage, we estimated the models that incorporate interest coverage as a regressor. Since high interest obligations may reduce the amount of funds available for payout to shareholders, we expect the parameter corresponding to this variable to be negative. We do not find the support for such a claim, since the estimate is insignificant while the remaining results remain similar to those reported. Finally, we re-estimated Models 2, 4, and 6 reported in the text

[28] In the robustness checks (not reported), we find that the results of the paper are not driven by observations on firms that have a majority shareholder.

[29] The corresponding estimation results are available upon request.

with alternative proxies for the voting power; the models employing relative Banzhaf indices instead of the absolute ones render the results that are virtually identical to those reported in the text.

6. Conclusions

We analyze a large panel of UK firms for the 1990s and find that the payout policy is significantly related to control concentration. The application of the state-of-the-art dynamic panel data estimation procedure allows us to avoid biases plaguing many empirical studies of corporate payout. Our analysis of payout dynamics reveals that companies adjust payout policies to earnings changes only gradually, which is consistent with the 'dividend smoothing' documented in the literature. In fact, our results suggest a presence of a more general phenomenon of the 'total payout smoothing'.

Profitability indeed drives payout decisions of the analyzed companies, but the presence of strong block holders or block holder coalitions weakens the relationship between the corporate earnings and the payout dynamics. This paper also contributes to the methodological debate on the measurement of voting power. We advocate the use of Banzhaf indices as a relevant measure of voting power in analyses of corporate policy choices. According to our best knowledge, it is the first study employing those game theory-based concepts in the context of corporate payout policies.

The reduced earnings sensitivity of dividends in the presence of control concentration suggests that controlling shareholders trade off the agency costs of free cash flow against the risk of underinvestment. Strong block holders (or a block holder coalition) mitigate the agency conflict between management and shareholders and, consequently, render the internal sources of financing attractive. At the same time, block holders appear to realize that overly generous payout may render the company to be liquidity constrained, and, consequently, result in suboptimal investment policy. Thus, the results challenge some of the implications of the agency theories of payout, and favor a pecking-order explanation for the observed patterns. While the impact of the voting power of shareholders' coalitions on payout ratios is found to be always negative, the magnitude of this effect differs across different categories of block holders (i.e. industrial firms, outside individuals, directors, financial institutions). In particular, industrial firms and outside individuals are those groups of block holders that appear most likely to restrain their demand for high payout.

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Tables

Table 1. Sample characteristics.

Variable	Mean	Median	St. dev.
Amount spent on dividends by dividend-paying firms	10218	1449	44271
Amount spent on share repurchases by repurchasing firms	15989	799	62858
Average amount paid out by firms reimbursing the funds	11318	1502	49575
Earnings	28720	4209	160391
Market value of the firm (in £ thousands)	503325	72755	2476283
Book value of the total assets (in £ thousands)	301153	43468	1445710
Firm size (log of the book value of the total assets)	4.7214	4.6382	0.7166
Leverage (in book value terms)	0.5856	0.5541	0.3597
Leverage (in market value terms)	0.3978	0.3728	0.2069
Tobin's Q	1.8724	1.4505	1.8410

Note to Table 1: All numbers are expressed in constant 1992 prices. The descriptive statistics for the amounts paid are conditional on the particular type of payout being employed as an earnings distribution channel. All the numbers are expressed in £ thousands. The remaining summary statistics are computed for the full sample of 5547 firm-years. Earnings are defined as EBIT in a particular year and are expressed in £ thousands. The market value of the firm is expressed in £ thousands and defined as the sum of the market value of equity and the book value of debt at the end of a given year. Firm size is defined as a natural logarithm of the book value of the total assets (expressed in £ thousands). Leverage in book value terms is defined as the ratio of total debt to the book value of the total assets and is measured at the end of the year. Leverage in market value terms is defined as the ratio of total debt to the market value of the firm and is measured at the end of the year. Tobin's Q proxy is defined as the ratio of the market value of the firm to the book value of the total assets.

Table 2. Earning payout ratios: average values.

Year	Payout as a fraction of EBIT			Payout as a fraction of EBIT (if EBIT >0)		
	Repurchases	Dividends	Total payout	Repurchases	Dividends	Total payout
1992	1.00 %	28.07 %	29.19 %	1.78 %	38.54 %	40.32 %
1993	4.69 %	21.07 %	25.81 %	5.89 %	31.17 %	37.11 %
1994	2.92 %	26.22 %	29.23 %	3.40 %	32.21 %	35.75 %
1995	1.23 %	20.90 %	22.22 %	1.44 %	34.84 %	36.44 %
1996	2.11 %	21.93 %	24.29 %	2.53 %	36.22 %	39.18 %
1997	2.09 %	7.42 %	9.52 %	3.28 %	30.27 %	33.75 %
1998	2.41 %	11.64 %	14.19 %	2.83 %	36.79 %	40.47 %
Total	2.33 %	20.28 %	22.75 %	3.02 %	33.92 %	37.13 %

Note to Table 2: The last row presents the statistics for the pooled sample.

Table 3. Distribution of equity blocks.

Variable	Mean	Median	St. dev.
Panel A: Distribution of equity blocks across different classes of shareholders			
Executive directors	0.1000	0.0000	0.1740
Financial institutions	0.1899	0.1615	0.1670
Industrial firms	0.0405	0.0000	0.1132
Non-executive directors	0.0167	0.0000	0.0608
Outside individuals	0.0231	0.0000	0.0649
Panel B: Sizes of the largest blocks			
Largest block	0.1723	0.1358	0.1586
2nd largest block	0.0733	0.0740	0.0640
3rd largest block	0.0404	0.0500	0.0437

Note to Table 3: Summary statistics are computed for the pooled sample of 5547 firm-years.

Table 4. Voting power of the largest block holders.

Variable	Mean	Median	St. dev.
Panel A: Two-stage voting game (voting power measures for shareholder coalitions)			
Absolute Banzhaf indices			
Executive directors	0.2199	0.0000	0.3979
Financial institutions	0.5766	1.0000	0.4793
Industrial firms	0.0904	0.0000	0.2761
Non-executive directors	0.0378	0.0000	0.1706
Outside individuals	0.0508	0.0000	0.1966
Panel B: One-stage voting game (voting power measures for the largest shareholders)			
Absolute Banzhaf indices			
Largest block	0.6486	0.7500	0.3754
2nd largest block	0.1432	0.0000	0.1948
3rd largest block	0.1337	0.0000	0.1843

Note to Table 4: Summary statistics are computed for the pooled sample of 5547 firm-years. Construction of the Banzhaf indices is explained in Section 3.2.

Table 5. Partial-adjustment models explaining dividend dynamics.

	Model 1		**Model 2**	
Voting power measure applied	None		Banzhaf absolute index	
Variable	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**
Lagged dividend	0.31	2.19*	0.27	1.86†
Earnings	0.09	3.51***	0.23	4.12***
Firm size * 1000	15.93	2.25*	13.75	2.19*
Tobin's Q proxy * 1000	0.43	1.64	0.31	1.24
Leverage * 1000	6.51	2.12*	6.65	1.92†
Earnings * Voting power of industrial firms			-0.21	-2.62**
Earnings * Voting power of outside individuals			-0.25	-1.96*
Earnings * Voting power of non-executive directors			-0.16	-2.01*
Earnings * Voting power of executive directors			-0.14	-2.13*
Earnings * Voting power of financial institutions			-0.13	-3.12**
Year dummies	Yes		Yes	
Industry dummies	Yes		Yes	
No. of observations	4435		4435	
No. of firms	928		928	
Wald test	$\chi^2(5) = 239.60^{***}$		$\chi^2(10) = 1314.00^{***}$	
Sargan test	$\chi^2(69) = 95.20^{*}$		$\chi^2(139) = 163.60^{\dagger}$	
AR(1) test z-statistic	-1.71†		-1.72†	
AR(2) test z-statistic	0.55		0.99	

Note to Table 5: †, *, **, and *** denote significance at 10, 5, 1, and 0.1% confidence level, respectively. Robust covariance matrix estimator is used to compute the t-statistics reported. Wald statistics are computed to verify joint significance of the model variables (other than year and industry dummies). The Sargan test for overidentifying restrictions verifies the appropriateness of moment conditions imposed in the estimation procedure. AR-test statistics asymptotically have a standard normal distribution. Year dummies determine the constant. All the numbers are expressed in constant 1992 prices. Dividends are expressed in £ thousands. Earnings are defined as EBIT in a particular year and are expressed in £ thousands. Firm size is defined as a natural logarithm of the book value of the total assets (expressed in £ thousands). Leverage is expressed in book value terms. It is defined as the ratio of total debt to the book value of the total assets and is measured at the end of the year. Tobin's Q proxy is defined as the ratio of the market value of the firm to the book value of the total assets. Construction of the voting power measures (Banzhaf values) is explained in Section 3.2.

Table 6. Partial-adjustment models explaining the dynamics of the total payout.

	Model 3		Model 4	
Voting power measure applied	None		Banzhaf absolute index	
Variable	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**
Lagged payout	0.37	2.87**	0.30	2.79**
Earnings	0.06	1.61	0.19	2.59**
Firm size * 1000	17.54	1.39	19.43	2.46*
Tobin's Q proxy * 1000	0.78	1.55	0.65	1.48
Leverage * 1000	7.26	1.38	10.48	2.06*
Earnings * Voting power of industrial firms			-0.29	-2.42*
Earnings * Voting power of outside individuals			-0.26	-1.69†
Earnings * Voting power of non-executive directors			-0.16	-1.71†
Earnings * Voting power of executive directors			-0.10	-1.33
Earnings * Voting power of financial institutions			-0.08	-1.28
Year dummies	Yes		Yes	
Industry dummies	Yes		Yes	
No. of observations	4394		4394	
No. of firms	918		918	
Wald test	$\chi^2(5) = 107.80$***		$\chi^2(10) = 691.00$***	
Sargan test	$\chi^2(69) = 75.40$		$\chi^2(139) = 157.40$	
AR(1) test z-statistic	-2.07*		-2.03*	
AR(2) test z-statistic	1.58		1.56	

Note to Table 6: †, *, **, and *** denote significance at 10, 5, 1, and 0.1% confidence level, respectively. Robust covariance matrix estimator is used to compute the t-statistics reported. Wald statistics are computed to verify joint significance of the model variables (other than year and industry dummies). The Sargan test for overidentifying restrictions verifies the appropriateness of moment conditions imposed in the estimation procedure. AR-test statistics asymptotically have a standard normal distribution. Year dummies determine the constant. All the numbers are expressed in constant 1992 prices. Total payouts are expressed in £ thousands. Earnings are defined as EBIT in a particular year and are expressed in £ thousands. Firm size is defined as a natural logarithm of the book value of the total assets (expressed in £ thousands). Leverage is expressed in book value terms. It is defined as the ratio of total debt to the book value of the total assets and is measured at the end of the year. Tobin's Q proxy is defined as the ratio of the market value of the firm to the book value of the total assets. Construction of the voting power measures (Banzhaf values) is explained in Section 3.2.

Table 7. Partial-adjustment models explaining dividend dynamics and total payout dynamics.

	Model 5		**Model 6**	
Dependent variable	Dividend payout		Total payout	
Variable	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**
Lagged dividend	0.30	2.12*		
Lagged payout			0.33	3.02**
Earnings	0.23	3.70***	0.19	2.52*
Firm size * 1000	12.40	1.99*	16.58	1.97*
Tobin's Q proxy * 1000	0.29	1.41	0.60	1.49
Leverage * 1000	5.86	1.93†	6.40	1.78†
Earnings * Voting power of the largest shareholder	-0.13	-2.83**	-0.09	-1.32
Earnings * Voting power of the 2nd largest shareholder	-0.21	-2.49*	-0.14	-1.02
Year dummies	Yes		Yes	
Industry dummies	Yes		Yes	
No. of observations	4435		4394	
No. of firms	928		918	
Wald test	$\chi^2(7) = 668.10$***		$\chi^2(7) = 531.10$***	
Sargan test	$\chi^2(97) = 118.70$†		$\chi^2(97) = 108.40$	
AR(1) test z-statistic	-1.65†		-2.00*	
AR(2) test z-statistic	1.00		-1.55	

Note to Table 7: †, *, **, and *** denote significance at 10, 5, 1, and 0.1% confidence level, respectively. Robust covariance matrix estimator is used to compute the t-statistics reported. Wald statistics are computed to verify joint significance of the model variables (other than year and industry dummies). The Sargan test for overidentifying restrictions verifies the appropriateness of moment conditions imposed in the estimation procedure. AR-test statistics asymptotically have a standard normal distribution. Year dummies determine the constant. The construction of the voting power measures (Banzhaf values) is outlined in Section 3.2 (see Table 4). Other variables are defined in the same way as those used in the models reported in Tables 5 and 6.

Appendix: Computation of Banzhaf values – an example

This example illustrates the computation of the Banzhaf absolute and relative indices. Consider a company where a simple majority voting rule holds and where four large block holders own 21, 12, 10, and 7 per cent of the outstanding equity, respectively. Henceforth we will refer to these block holders as *a*, *b*, *c*, and *d*. The remaining shares (i.e. 50% of the equity outstanding) are widely held. Thus, we consider an oceanic representation to approximate the actual distribution of votes and employ the generalization of Banzhaf values as proposed by Dubey and Shapley (1979).[30]

As explained in Section 3.2, the first stage in calculations involves rescaling of all the block holdings so they sum up to 100%. In the analyzed example, it can simply be done by multiplying the sizes of the blocks by two, i.e. the rescaled stakes of shareholders *a*, *b*, *c*, and *d* equal 42, 24, 20, and 14 per cent, respectively. Second, the adjustment of the majority threshold (see footnote 19) means that in order to approve a proposal, at least 50% of votes *cast by block holders* should be in favor of such a proposal.

In order to compute Banzhaf indices, all the bisections of the set of players $\{a,b,c,d\}$ have to be considered. There exist eight such bisections as illustrated in Table A1 below.[31] The right-hand side of the table illustrates that the decision by player *a* to switch coalitions reverses the outcome of the vote in six cases (out of eight possible ones). Thus, according to the definition, the absolute Banzhaf index describing the voting power of block holder *a* equals to $\frac{6}{8}=\frac{3}{4}$. Banzhaf indices for block holders *b*, *c*, and *d* can be computed in a similar manner. For each of these block holders, their decision to switch coalitions reverses the outcome of the vote in two out of eight cases. Consequently, the corresponding index values equal to $\frac{2}{8}=\frac{1}{4}$.

[Insert Table A1 about here]

[30] Technically, we assume that those shares are held by a continuum of infinitesimal players.

[31] More precisely, in addition to eight cases analyzed in Table A1, eight additional cases exist. They are, however, symmetrical to those outlined in the table. For instance, the case where all the block holders vote 'Yes' and none of them votes 'No' is symmetrical to Bisection 1 shown in the table. Thus, it is sufficient to analyze Bisections 1-8 to compute Banzhaf indices.

Relative Banzhaf indices can be obtained by rescaling the absolute values, so they sum up to one. The sum of the absolute Banzhaf indices equal to $\frac{3}{2}$ (i.e. $\frac{3}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$). The relative Banzhaf indices can therefore be obtained by multiplying the values of absolute indices by $\frac{2}{3}$. Thus, the relative Banhaf indices for players *a*, *b*, *c*, and *d* equal $\frac{1}{2}$, $\frac{1}{6}$, $\frac{1}{6}$, and $\frac{1}{6}$, respectively.

Table A1. Computation of Banzhaf absolute values.

	Bisection		Voting outcome	Suppose one of the block holders changed the coalition. Would the outcome of the vote change if such a switch was made by block holder			
No.	**Voting 'Yes'**	**Voting 'No'**		***a*?**	***b*?**	***c*?**	***d*?**
1	$\varnothing$	$\{a,b,c,d\}$	'No'	–	–	–	–
2	$\{a\}$	$\{b,c,d\}$	'No'	–	+	+	+
3	$\{b\}$	$\{a,c,d\}$	'No'	+	–	–	–
4	$\{c\}$	$\{a,b,d\}$	'No'	+	–	–	–
5	$\{d\}$	$\{a,b,c\}$	'No'	+	–	–	–
6	$\{a,b\}$	$\{c,d\}$	'Yes'	+	+	–	–
7	$\{a,c\}$	$\{b,d\}$	'Yes'	+	–	+	–
8	$\{a,d\}$	$\{b,c\}$	'Yes'	+	–	–	+