Dividend policy and investor pressure

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ABSTRACT

The economics of dividend policy has focused on the single tight narrative that dividends keep managers honest, mitigating concerns that they over-invest. This article provides a critique of that agency narrative, arguing that pressure from short-term focused investors, executives and board members pushes the firm into preemptive actions of returning too much cash via dividends. We analyze three channels of influence for investor pressure through 1) threat of takeovers, 2) shareholder value oriented corporate governance, measured by director independence and board equity incentives, and 3) trading and institutional ownership patterns. We find that firms adopt a higher dividend payout to discourage takeover bids. Also, FTSE 100 firms, that are most focused on shareholder value governance in the form of equity-based compensation and a higher share of independent directors, display a higher dividend payout. Frequency of trading and ownership by transient investors seeking current profits also predict increased dividend payout. Traditional agency theory, focused on dividends as a tool for managerial discipline, is not strongly supported by the results, which rather support a narrative of short-term investor pressure on firms irrespective of investment opportunities.

There is no better way to ensure a chief executive's swift and brutal defenestration from a board room than cutting or cancelling a dividend. British shareholders have for generations cherished the payment of dividends above all else, prizing those companies that increase payouts and punishing those that dare cut back.

Miles Johnson, Capital Markets Editor of the Financial Times, 20 January 2018

1. Introduction

There is no single encompassing theory of dividend payout. Much of what we know about the propensity to pay - and the intensity of - cash dividends has been established through surveys of company executives (Lintner, 1956; Graham and Harvey, 2001; Baker et al., 2002; Brav et al., 2005; Servaes and Tufano, 2006). There is some consistency over time, with many early ideas appearing in the survey responses tabulated in

Brav et al. (2005) *viz.* the importance of the historical level of dividends, the existence of payout ratios, the tendency to smooth dividends with regard to earnings, and an asymmetric penalty for cutting or ceasing payments. Theoretical work has informed the interpretation of these practitioner surveys. Empirical econometric work has reported results from specifications based on these theories (Allen and Michaely, 2003; Benito and Young, 2003; Von Eije and Megginson, 2008; Leary and Michaely, 2011; Farre-Mensa et al., 2014).

What consensus there is on dividend behavior appears to rest on a number of stylised facts centring around the concept of dividends playing a role in keeping managers "honest". The most common and enduring *theoretical* narrative – principal agency theory – rests on misalignment of incentives between principals (shareholders) and agents (managers) often due to agents possessing superior information and/or self-dealing. This narrative views dividends in a positive light, as a means of pressuring managers to reject unprofitable projects and return cash for efficient allocation by the stock-market (Easterbrook, 1984). In recent years a rival narrative has emerged in practitioner accounts and this is

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beginning to spill over into academic theory. This counter-narrative tends to see dividends more negatively, observing that excessive pressure from short-term focused owners, executives and board members pushes the firm into returning too much cash to shareholders, thereby starving the company of the funds required for profitable growth. This failing may originate in increasingly complex layers of intermediation between institutional investors and firms resulting in a focus on quick returns.

These two contrasting narratives are exemplified by differing views as to why having a higher proportion of independent directors might result in a higher dividend payout. For the traditional principal-agent approach that views independent directors as efficient monitors of self-dealing managers, such a pattern seems to provide evidence that a *downward* bias in dividend payout is merely being corrected. For the rival approach, however, independent directors raising dividends may simply mirror the short-termist views of investors (or their intermediaries) and accentuate an *upward* bias in payout.[1]

The principal-agent view of the first narrative has continued to dominate as the standard approach. But the rival view has won an audience, as is revealed by a check of word usage in practitioner sources. The average annual use of "short-termism" in the Financial Times newspaper over the available archive period from 2004 to 2018 more than doubled between the first and second halves of this period. This has been mirrored in the academic literature with "short-termism" recording more hits in the Web of Science database for the 5 years up to 2018 than were recorded in the entire previous cumulative total from 1958. Such shifts in the opinion about financial market efficiency are of course understandable as a reaction to recent macroeconomic events. But what interests us here is that they open the door for us to debate and test the investor pressure view of dividends as against the standard agency approach.

As an abstract concept it is hard to dispute the importance of the principal agency theory. But its power and relevance depend on the institutional context and, in particular, on whether a basic level of investor protection and transparency is already present. Beyond that threshold, the interesting question is whether taking steps to counter agency problems – say, through liberal takeover rules or a shareholder-friendly corporate governance code – tends to exacerbate short-term investor pressure so that the cure may be worse than the disease. The scope of principal-agency theory implicitly excludes any consideration of short-termism unless it arises from *managerial* preferences (Stein, 2003). It has no role for shareholders themselves imposing a short-term horizon on management, despite the prevalence of this view in recent academic studies (McSweeney, 2009; Armitage, 2012; He and Tian, 2013; Asker et al., 2015).

Practitioners and policy advisors have made similar points over many years. The financial consultancy firm EY (2014) has identified an increased short-horizon pressure on firms from investors due to "new technologies, reduced trading times and transaction costs, market volatility, media coverage, and the increasing role of institutional investors – all adding to short-term performance pressure" (p.1). The increased market efficiency through technology provided a greater scope for arbitrage profits, and hence less of a need for a firm in which investment was made to grow over time. The OECD has warned that shareholder activism often takes the form of exerting pressure for the return of cash and may be deterring productive investments (OECD, 2015). Directors of the Bank of England have cautioned that high dividend payouts may reflect a long-term bias against productive investment (Haldane, 2015). These concerns point towards an alternative explanation for dividend behavior, one that is distinct from the traditional agency view that generally portray dividends in a positive light.

This paper explores the idea that dividends reflect short-term investor pressure for payout over strategic capital investments (David et al., 2001; McSweeney, 2009; Chung and Talaulicar, 2010; Mina et al., 2013; Lazonick, 2018).

Investor pressure for higher payout can manifest itself in different ways. We focus on three main channels, namely pressure arising from acquisitions activity; pressure arising from stricter formal governance standards; and pressure through institutional short-term trading. We capture the influence of these channels by use of proxy variables. First, investor pressure, experienced by firms in the form of a perceived threat of takeover, can be measured with the extent of acquisition activity taking place in a given industry (Lomax, 1990; Dickerson et al., 1998). The intuition behind such type of investor pressure is the following: if a firm in a given year is characterised by a high threat of takeover, dividend payout should rise to support the share price and thus discourage bids. Indeed, we find that industry acquisition activity in a given year, our measure for investor pressure in the form of takeover threat, increases dividend payout for a firm in that industry.

Second, the UK corporate governance reforms aimed at strengthening the firm's focus on shareholder value have created a presumption that payout is to be favored over retention. (Graham et al., 2005; Roychowdhury, 2006; Acharya et al. 2011; He and Tian, 2013; Asker et al., 2015; Brochet et al., 2015). We capture these corporate governance influences by the weight of independent directors; and in the weight of the stock-based component of executive remuneration. For FTSE100 firms where the UK governance code applies most strictly, we find that a higher share of independent directors and a higher reliance on equity-based compensation both lead to increased dividends.

Third, increased intermediation by institutional investors and asset managers has tended to reduce the holding period for stocks and increased the focus on quick returns and dividend payout (Kay, 2012; Hughes, 2013). A stock experiencing heightened turnover is more likely than others to consider defensive action to stabilize the share price. Relatedly, the same is true of stocks that are being targeted by transient investors who trade frequently to chase current profits (Gallagher et al., 2013). We use indicators of trading activity and patterns of short-term trading to test these influences and find that these proxies for investor pressure are positively associated with dividends.

The paper is structured as follows. In Section 2 we discuss investor pressure theory in the institutional context of the UK, amplifying the explanation of the channels of influence and providing hypotheses for testing. Section 3 describes the data. Section 4 offers a specification for empirical work. Section 5 presents the results. In Section 6 we provide robustness tests, including a treatment of sample selection bias using a Heckman estimator to obtain unconditional estimates of the determinants of dividend payments. We show that our findings on investor pressure are robust to this estimation form and to other issues. Conclusions are contained in Section 7.

2. Investor pressure theory and hypotheses

2.1. Agency theory critique

Agency theory generally assumes that managers have a preference for retention, resulting in over-investment or mis-allocated investment as a base case. In our view this assumption is likely to be context specific and will have most relevance when other constraints on managerial behavior, such as legal protection for investors, transparency, corporate governance codes, and inter-firm competition are weak.

The UK case is distinct in that corporate law allows executives little scope for managerial entrenchment and in particular, a liberal takeover code distinguishes it from other jurisdictions such as the US (Short and Keasey, 1999; Guest, 2008; Bruner, 2010). Investor pressure in support of payout – while appropriate when agency problems are severe - may encourage excessive payout in contrary cases such as the UK.

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[1] That dividends reflect agency concerns is often assumed as a maintained hypothesis; exceptionally, a wider interpretation is explored (Short and Keasey, 1999; Farinha, 2003). There is also disagreement within agency theory as to whether dividends are a good way to control agency costs (Rossi et al., 2018).

The institutional context can, to some extent, differentiate when and where agency theory is most applicable. However, it is also important to check empirically how investor pressure operates in any given context. That is what we do for the UK case in this paper. We build on a limited literature that has studied the UK dividend decision from a similar perspective to ours i.e. that it reflects investor preferences for payout. Our paper generalizes the arguments in Armitage (2012) who found there was *persistent* pressure on UK water firms to pay dividends, a finding that could not be explained by other theories since agency costs, asymmetric information, and tax effects were not powerful in that context.[2] We now take a closer look at three possible channels of investor pressure in such a context.

2.2. Investor pressure arising from acquisitions activity

Previous literature, including Lomax (1990) has identified fear of takeover as an important factor pushing UK firms towards higher dividend payout. Dickerson et al. (1998) found a positive relationship between UK dividends and the threat of takeover, noting that a marginal allocation to dividends from investment reduced the hazard of takeover. Furthermore, since the impact of capital investment on the hazard is never positive, even for those firms most likely to be suffering from agency problems, higher dividends do not counter agency problems but are more "aimed at inducing shareholder loyalty [under] short-termist behavior" (p.285). Subsequent work, however, has produced conflicting empirical results (Nuttall, 1999; Dickerson et al., 2002); in short, the issue remains unresolved and has received little recent attention. The threat of takeover can be assessed from the extent of acquisitions activity at a given time in any given industry which leads to hypothesis *HA*:

HA: Industry acquisition activity increases dividend payout

2.3. Investor pressure and corporate governance

We noted in the introduction that the UK corporate governance code – which was operative from the 1990s and put into statute as a combined code in 2000 – has strengthened a shareholder value orientation by firms which may have resulted in a short-term focus that militates against cash-flow retention and in favour of payout. Here we note potential effects of two aspects of the code: an increased role for independent directors and equity-based pay for executives.

Independent directors have less detailed knowledge of the firm's operations than executives but nevertheless need to make a judgement between retention and payout of profits. Where the balance of the board composition shifts in favour of independent directors, decisions will tend more to reflect current value metrics at the expense of internal firm information that executives alone possess (Deakin, 2018). The chain of reasoning we are proposing here is that increased formality and shareholder orientation of governance oversight – in the form of more independent members – leads to a preference for transparent measures of performance rather than soft expectations of future cash-flows which require expert interpretation (Bushee, 1998). A preference for dividends is a corollary of this focus on short-term shareholder value.[3]

Short-termism may also be induced by an increased reliance on

equity-based compensation where executives are incentivised not to challenge investor pressure due to their pay being linked to the current share price (Dhanani and Roberts, 2009; Brochet et al., 2015). Both of these corporate governance influences bring us to hypothesis *HB*:

HB: The composition of the board in favour of independent directors and the intensity of equity in total compensation increase dividend payout.

2.4. Investor pressure and investor trading behavior

UK executives have much less autonomy than their US counterparts and so find it harder to challenge the short-term perspective that often affects market trading (Tylecote and Ramirez, 2006; Guest, 2008; Bruner, 2010).[4] Firm's concern with their share price becomes heightened when there is increased activity by short-term traders and this may increase dividend payout. We note from Fang et al. (2014: 2123) that "high liquidity attracts transient investors who trade frequently to chase current profits …". When this occurs – and share churn rises – the affected firms experience short-term market pressure and may become more receptive to pleasing investors with higher dividends, so as to increase holding times, with some firms possibly even aiming to attract a different, long-holding clientele.

There is a particular form of high frequency trading, swing trade, which is differentiated from the standard buy and hold pattern in that the asset is held for a short period of days before it is sold for an intended gain. Traders choose stocks whose liquidity allows them to be traded easily (such as those of large companies), where volatility ensures that informed trades can be disguised, and where the transaction costs are low. According to Gallagher et al. (2013) the characteristics of swing trades are: large stocks with high turnover and low bid-ask spreads (p. 454). Our hypothesis here is that firms most vulnerable to swing trades will tend to defend their share price by higher payout. These considerations on trading patterns suggest Hypothesis *HC*.

HC: Investor pressure reflected in a rising churn and a high score for the swing trades indicator will result in higher payout.

3. Data description

We focus on the dividend behavior of listed firms in the UK over the period 1997–2012. Our dataset is taken from six different sources: *Compustat Global*; *Datastream*; *Zephyr*; *Fame*; *I/B/E/S;* and *Boardex*. From the Compustat Global database we extract financial and accounting data on FTSE All-Share companies, using active as well as inactive and suspended listings in order to avoid survivors' bias. Compustat fundamentals are widely used in studies of payout channels e.g. Skinner (2008). We complement this database with market data and dividend data from Datastream. We include share repurchasing data from Bureau van Dijk's Zephyr, a database of deal information; share ownership data from Bureau van Dijk's Fame, a database of companies in the UK and Ireland; analysts' forecasts of earnings per share from I/B/E/S; and board directors' data from Boardex.

We use Datastream dividend data as our dependent variable in this study because a change in Compustat methodology in 2006 resulted in an inability to distinguish zero payments from missing values. Fig. 1 shows

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[2] The notion of persistent pressure is distinct from the behavioural finance theory of a time-varying premium on dividend paying stocks (Baker and Wurgler, 2004).

[3] This is not just an academic view but has been openly expressed by corporate executives. See the evidence to the House of Commons Select Committee on Trade and Industry from UK large firms cited in Blackburn (2003). Similar views are found in the Bank of England (2016) where the possibility is raised that low company investment reflects firms' preference "… to increase payouts to shareholders, given that 'shareholder orientation' has become the key principle of corporate governance" (p.28). The UK pensions regulator complained in 2017 that dividends were increasingly being privileged over pension deficit repair.

[4] Takeover defenses such as poison pills are not permitted in the UK. Transparency too is greater, with short-term disclosure requirements more severe than in the US. These features constrain executive management and explain the unusually high intensity of mergers and acquisitions activity in the UK (Conn et al., 2005) and the relatively high proportion of hostile takeovers, historically, compared with the US (Short and Keasey, 1999). The UK governance system thus "emphasizes the power of shareholders …. the range of acceptable managerial actions is more proscribed in the UK than in the US" (Siepel and Nightingale, 2014, p. 33).
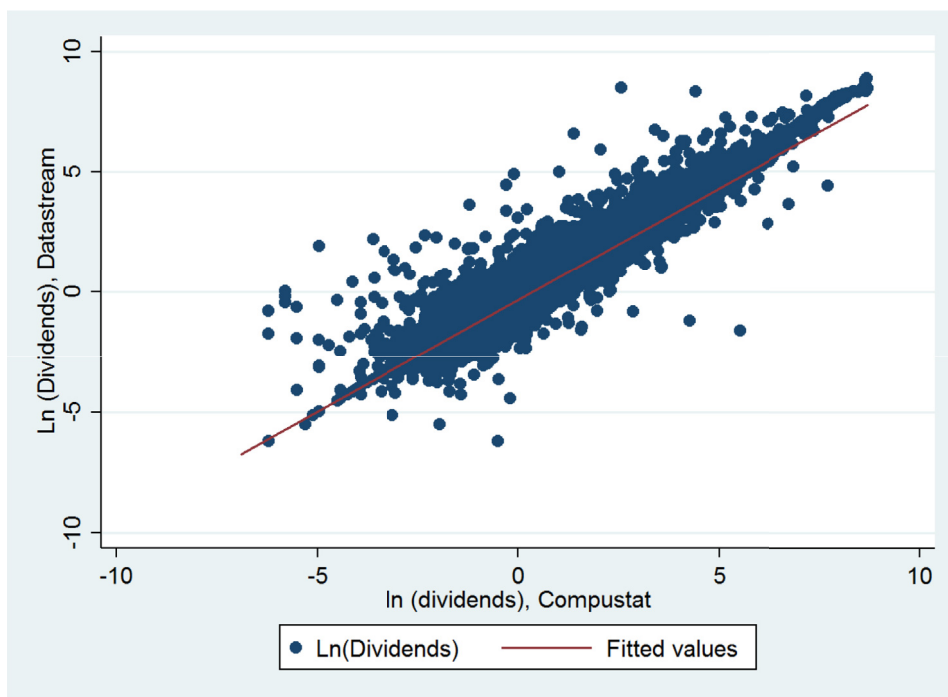
*Note*s: Dividends in nominal values and in millions of GBP, in natural logarithms, and transformed (we add 0.001 to these values before logging them). We exclude 0 dividends and missing values for both Compustat and Datastream samples. Source: Compustat Global and Datastream

Fig. 1. Dividends declared in Compustat sample plotted against dividends paid in Datastream sample for all UK firms 1997–2012.

that for *dividend paying firms* present in both samples, the relationship between the two series is very close, with a Spearman's rank correlation coefficient of 0.950. In line with previous studies, we have excluded firms in the utilities and financial sectors from our results. Our final data sample contains 3296 companies as of 2012.

Table 1 presents the dividend payments, the number and proportion of payers each year between 1997 and 2012. The amount paid shows both a strong upward trend and a business cycle effect. This conforms to

Table 1
The amount of dividends per annum, number of dividend payers, and the percentage of dividend payers in 1997–2012.

Year	The total value of dividends (GBP million)	Number of dividend-paying firms	Percentage of dividend-paying firms
1997	34,322	1221	91%
1998	40,679	1266	89%
1999	47,147	1172	77%
2000	45,981	1082	70%
2001	58,658	1037	66%
2002	51,349	1000	63%
2003	49,065	986	61%
2004	53,504	984	60%
2005	58,644	989	57%
2006	69,537	980	55%
2007	67,762	967	53%
2008	74,534	925	49%
2009	67,399	809	42%
2010	66,623	764	39%
2011	66,779	752	37%
2012	77,099	743	37%
Total sample	929,081	15,677	

Notes: The percentage of dividend-paying firms is calculated as the number of dividend-paying firms divided by the total number of firms in the sample. We exclude from the sample firms belonging to financial and utilities sectors. *Source*: Datastream.

the picture of a rising total dividend payout documented for Europe and for the United States (DeAngelo et al., 2006). The number of dividend payers falls almost monotonically from a peak of 1266 in 1998 to 743 in 2012, reflecting similar trends noted elsewhere (Denis and Osobov, 2008). The contrasting movement of payers and non-payers is graphed in Fig. 2, from which it is clear that the total increase in payout over time is accounted for by a smaller number of dividend paying firms, as discussed in Fama and French (2001). The selection equation that we report in Section 6.1 investigates the choice of dividend payer status. For much of the paper however we focus on the payout behavior of dividend-paying firms.

Detailed definitions of variables are given in Table 2. Descriptive statistics are given in Table 3. A correlation table is provided in Table 4 from which it may be noted that some coefficients are statistically significant, but their magnitude is usually very low. Among the independent variables, the highest 1% of entries comprise just three of between 0.5 and 0.6. Multicollinearity diagnostics are discussed in Section 5 (footnote 18).

4. Specification

The majority of previous empirical studies examine payout levels using the insights of Lintner (1956), which, despite imprecise theoretical foundations, is still the workhorse model for both dividends and total payout (Lintner, 1956; Fama and Babiak, 1968; Brav et al., 2005; Aivazian et al., 2006; Khan, 2006).

Much empirical work has confined estimation to regular dividend payers so as to avoid the need for "a theory of everything" (Lambrecht and Myers, 2012: 1764). Our research follows this approach by excluding zero-dividend observations along with missing observations. We complement this in Section 6.1 with a Heckman analysis to counter sample selection bias; this accounts for the propensity of firms to pay dividends and constitutes an important check on the significance of both the standard variables common in the literature and our set of new variables,
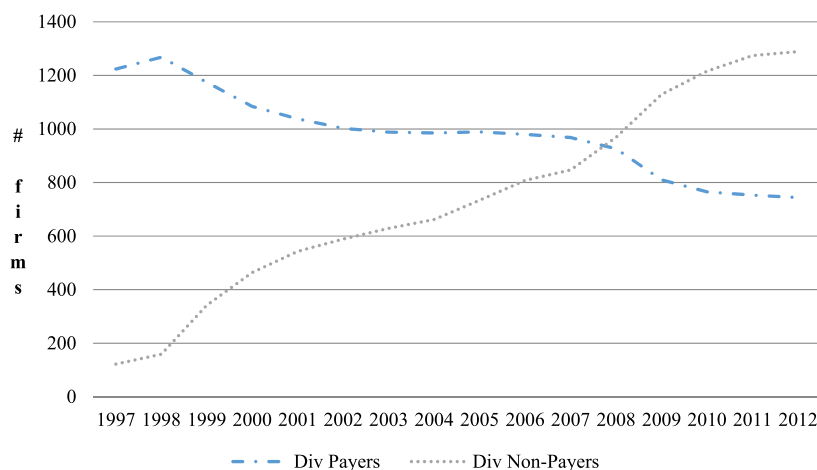
Fig. 2. Comparison of dividend payers and non-payers, total sample of UK firms 1997–2012.
Source: Datastream

introduced to test the investor pressure theory.

Lintner's smoothed adjustment model may be expressed by an equation that is now recognized as an equilibrium correction model, where the dynamics are nested in a target equilibrium ratio for dividends, but with the added twist that the adjustment is non-linear. Formally, for a representative firm in a case where the earnings variable is the only target variable and debt is not used to support dividend payments:

$$\Delta D_t = \begin{cases} \alpha + \beta(\gamma E_t - D_{t-1}) + \varepsilon_t & if \quad \alpha + (\gamma E_t - D_{t-1}) > 0 \\ \varepsilon_t & if \quad \alpha + (\gamma E_t - D_{t-1}) < 0 \end{cases} \quad (1)$$

where D_t is dividend level at time t, E_t is earnings, and the parameters α, β, γ represent respectively: (earnings independent) trend growth in dividends; the adjustment coefficient that may vary with the direction of adjustment; and the target ratio of dividends to earnings. The lower the adjustment parameter $\beta < 1$, the lower the variance in dividends and the lower the risk of having to suspend payments.[5]

As dividends are partially irreversible, we expect lagged, smoothed adjustment both upwards (because of the need to exceed a threshold) and downwards (because of institutional stickiness). Most dividend specifications also include firm characteristics. Age and size are often found to be good predictors of dividend payout, perhaps reflecting a lifecycle influence.[6]

The specification, augmented with investor pressure variables, that we adopt for estimation is a semi-log version of (1) with a lagged dependent variable (LDV) and may be arrived at by manipulating (1) through successive substitutions. In panel data form where the firm is indexed by subscript i:

$$D_{i,t} = \alpha_0 + \lambda D_{i,t-1} + \beta IP_{i,t-j} + \rho X_{i,t-1} + \partial_t + \varepsilon_{it} \quad (2)$$

where D is the natural log of dividends, IP is a vector of contemporaneous or lagged regressors measuring investor pressure, X is a vector of controls (including earnings variables), generally lagged by one period to mini-

mize endogeneity, ∂_t are time dummies, and where the error term ε_{it} comprises time-invariant unobserved firm-level characteristics and a white noise term. We log the dependent variable (as in Von Eije and Megginson, 2008) rather than scaling it by assets or profits.[7] Unlagged size and lagged profitability are included on the right-hand side. Note that in the results table we will replace the vector IP with the specific proxies relevant to each of the hypotheses introduced in Section 2.

4.1. The dependent variable

The dependent variable D is the sterling equivalent dividend amounts but since all variables are nominal, we include time dummies to adjust for inflation.[8]

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[5] This model appears to perform well in different contexts, although the non-linearities are often ignored; an exception being Leary and Michaely (2011) who find that firms adjust dividends more quickly when they are below their target than when they are above.

[6] Survey evidence in Baker et al. (2002) reports relatively weak support for any lifecycle pattern but this may reflect the preponderance of financial groups in the sample.

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[7] Some previous papers have scaled the dividend dependent variable, often by sales (coverage) and occasionally by earnings, equity or assets. As noted in Aivazian, Booth and Cleary (2003), the results can be sensitive to inappropriate scaling. One problem with scaling dividends is that the variation in sales or assets is likely to exceed that in dividends. A priori dividends are only partially adjusted to profits or value; they are usually smoothed so that the variation in the scaled dependent variable largely reflects that of the scaling factor. Some statistical literature also cautions against scaling of independent variables where the scaling candidates – in our case, size – enter the specification on a priori grounds. The use of scaling may then lead to bias (Kronmal, 1993). For these reasons we prefer to continue with the unrestricted specification adopted by Von Eije and Megginson (2008) and other earlier researchers including Fama and Babiak (1968), Short et al. (2002), Brav et al. (2005), and Geiler and Renneboog (2015).

[8] Dividends can be defined as a nominal or real cash sum dividend, or as a ratio reflecting some target objectives such as a stable dividend payout ratio. The survey evidence shows great variety in the target objective, and it varies by country and firm. The most common approaches, globally, are to target: stable or increasing dividend per share; stable or increasing dividend payout ratio; setting dividends in line with cash-flow; or stable or increasing dividend yield (Servaes and Tufano, 2006). For US firms, Brav et al. (2005) report a variety of different targets for dividends and also find evidence that targets are often fairly relaxed. Given the array of targets, the most general approach is to estimate dividends as a cash level, with consideration being given to inflation and exchange rate adjustments. Lomax (1990) comments that nominal rather than real dividends per share are targeted (p.4). Given our log-level specification, time dummies should adequately control for inflation, unless the relevant price index is industry specific. See also comments under robustness effects in Section 6.7.

Table 2
Variable names, sources and descriptions. All regressors lagged one period unless otherwise indicated.

Variables	Source	Description
Dependent Variables		
DIVIDEND Cash dividends	Datastream	Amounts paid by cash dividend payers, in nominal values and in millions of GBP, in *natural logarithms*, and transformed (we add 0.001 to these values before logging them). Less than ten percent of our dividends are paid in non-sterling denominations and these have been converted using the relevant 2005 conversion rates to GBP, with 2005 being the mid-point of our sample.
DIVS	Datastream and Compustat Global	Ratio of cash dividends to total sales.
Independent Variables		
ACQ	Compustat Global	The sum of acquisitions, by industry (six-digit GIC industries) and year. This measure is in million GBP and is not lagged.
AGE	Compustat Global	The age of the company, not lagged.
BAP	Datastream	Percentage of bid-ask spread (in absolute values), e.g. the difference between average annual bid and average annual ask price divided by average annual share price.
DAA	Compustat Global	Ratio of change in total assets to total assets.
DCHURN	Fame	Ratio of annual trading volume (number of shares) to total number of shares outstanding, in first difference.
EA	Compustat Global	The earnings ratio of a company defined as the earnings before interest but after tax divided by the book value of assets.
EAQ1	Compustat Global	A threshold dummy variable taking the value of 1 when EA is greater than the sample's first quartile value, and 0 otherwise.
EXRAT	Boardex	Equity component in compensation structure of board directors, measured as average equity to total compensation paid.
FT100	London Stock Exchange	A dummy (1/0) for a firm belonging to FTSE100 Index in a given year.
EBIAT	Compustat Global	(Earnings before interest and taxes) – (total income taxes) in million GBP and in natural logarithms.
FY1	I/B/E/S	Average one-year forward EPS analyst forecast, not lagged.
FY2	I/B/E/S	Average two-year forward EPS analyst forecast, not lagged.
FY12	I/B/E/S	Used in tables to report the joint test of the variables FY1 and FY2, and also to present the summed coefficients on these variables. Not lagged.
INDRAT	Boardex	Percentage of independent directors is calculated as the number of independent directors divided by the total number of directors on a firm's board.
LEV	Compustat Global	[(Total long-term debt) + (total debt in current liabilities)]/(total assets).
MBF	Datastream and Compustat Global	Market-to-book value of the firm, lagged. Market value is calculated as a product of average annual share price and number of shares outstanding, both from Datastream. Book value is total assets as per balance sheet in a given year, from Compustat Global.
PEER	Compustat Global	Total dividends of firm's industry over total sales of firm's industry in a given year. GIC industries codes are used.
SIZE	Datastream	Percentile ranking of a company in the range of market values in the respective years.
SWING	Compustat Global and Datastream	SWING is a dummy variable equal to 1 if and only if SIZE and DCHURN are in the top quartile and BAP is in the bottom quartile. SWING0 is unlagged; SWING1 is lagged.
YEAR	n/a	Time dummies.

4.2. Explanatory variables of investor pressure

The vector IP represents measures of investor pressure used for the hypotheses. For hypothesis *HA*, we proxy investor pressure (the fear of takeover) by the current annual total value of gross acquisitions in the firm's six-digit industry (ACQ). As acquisitions need considerable time to mount, and as the database definition indicates that it includes planned acquisitions, we use the current observations for this variable rather than lagged. For hypothesis *HB*, we proxy investor pressure by the share of independent directors (INDRAT) and the ratio of board directors' equity-based pay to their total compensation (EXRAT).

To test for the hypothesis *HC*, additional measures of investor pressure are constructed using investor-specific data linked to the dividend data. However, these data are only available for a limited time period (from 2006) and with fewer observations per period. Accordingly, we use a truncated specification (reported in Table 6) in which we dispense with the lagged dependent variable and report results with a restricted set of controls.[9]

To test for hypothesis *HC,* we first proxy investor pressure with the firm's share turnover or churn (CHURN) measured as the ratio of the total dealing volume in the year divided by the number of shares outstanding: these data are available in the Fame databank from 2007 to 2012 and we use the first difference (DCHURN) to denote a change.

We also proxy investor pressure with a composite indicator (SWING) that denotes membership of the top quartile of each of the variables SIZE, DCHURN and the bottom quartile of the percentage bid-ask spread, documented in Table 2 (with details also in Tables 3 and 4).

4.3. Control variables

The set of control variables is mainly drawn from the literature.

Expanding the X vector we obtain the specification reported in our first set of results.

$$D_{i,t} = \alpha_0 + \alpha_1 D_{i,t-1} + \alpha_2 IP_{i,t-1} + \alpha_2 EA_{i,t-1} + \alpha_3 MBF_{i,t-1} + \alpha_4 DAA_{i,t-1}$$
$$+ \alpha_5 LEV_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 AGE_{i,t} + \alpha_8 PEER_{i,t-1} + + \alpha_9 FY12_{i,t} + \partial_t$$
$$+ \varepsilon_{it}$$

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We use the earnings to asset ratio (EA) as one indicator of the affordability or desirability of dividends. The Market-to-Book ratio (MBF) is taken as an indicator of the opportunity cost of investment. A further proxy for opportunity cost is the rate of growth of assets (DAA). Leverage (LEV) may be regarded as a proxy for the marginal cost of funds, although others interpret it differently, whether that be in agency terms or as a general control variable (Chirinko and Phillips, 1999).[10] Tax effects in our sample should be minor because there were no major UK tax changes to dividends after April 1999, although the relative attractive-

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[9] The full results are very similar for the reported variables; the omitted variables are generally insignificant for this shorter sample.

[10] Acknowledging the standard agency view, Von Eije and Megginson (2008, p.363) add the caveat that "higher leverage might simply proxy for older, larger, more stable, and more profitable companies that are better able to afford paying dividends and buying back shares".

Table 3
Summary statistics.

	Dividend-Payers					Dividend Non-Payers				
	Mean	Median	Min	Max	Sd.	Mean	Median	Min	Max	Sd.
DIVIDEND	1.3125***	1.1464***	−6.2146	8.8951	2.1816	−6.9078	−6.9078	−6.9078	−6.9078	0.0000
DIVS	0.0462***	0.0209***	0.0000	41.9639	0.5112	0.0000	0.0000	0.0000	41.9639	0.0000
ACQ	430171***	0.0000***	−912916	48160914	2275518	1591750	1700	−912916	48160914	5654357
AGE	23.4690***	21.0000***	1.0000	48.0000	14.3346	15.2131	12.0000	1.0000	48.0000	12.1659
BAP	0.0379***	0.0225***	0.0000	7.1716	0.0773	0.1223	0.0721	0.0000	145.2417	1.4843
DAA	0.1624***	0.0610	−1.0000	20.4738	0.6190	1.8385	0.0529	−1.0000	20.4738	21.8132
DCHURN	−0.0760	−0.0410**	−8.2428	19.2365	1.0954	0.2802	−0.0063	−135.0652	19.2365	22.4037
EA	0.0598***	0.0658***	−46.2500	3.7163	0.4739	−0.3429	−0.0543	−279.0000	3.7163	3.7478
EAQ1	0.9664***	1.0000***	0.0000	1.0000	0.1801	0.5388	1.0000	0.0000	1.0000	0.4985
EBIAT	2.418***	2.1987***	−6.9078	10.1533	2.1597	0.5880	0.3971	−6.9078	8.2522	2.1229
EXRAT	0.2235***	0.1811***	0.0000	1.0000	0.2256	0.2030	0.0545	0.0000	1.0000	0.2658
FY1	20.5453***	13.7457***	−159.3243	3700.0000	48.0058	1.1302	0.2807	−590.0000	3700.0000	27.0187
FY2	22.8338***	15.6303***	−56.6772	3700.0000	50.5881	5.4081	1.6000	−105.0000	3700.0000	43.5967
INDRAT	0.2905***	0.2857***	0.0000	0.8750	0.1836	0.1775	0.1667	0.0000	0.8750	0.1900
LEV	0.1916**	0.1678***	0.0000	7.5000	0.1914	0.3192	0.0596	0.0000	7.5000	3.9772
MBF	2.2259***	0.7383***	0.0107	597.1779	22.6249	8.3548	0.9778	0.0480	597.1779	52.2461
PEER	0.0271*	0.0218**	0.0000	0.3748	0.0207	0.0278	0.0232	0.0000	0.3748	0.0207
SIZE	48.5704*	47.0588*	0.0000	100.0000	31.9553	49.6644	50.0000	0.0000	100.0000	33.1136
SWING	0.0433***	0.0000***	0.0000	1.0000	0.2036	0.1258	0.0000	0.0000	1.0000	0.3316

Notes: Definitions of variables are provided in Table 2. Sample excludes firms from the financial and utilities sectors. +, *, **, and *** denote statistical significance at 10%, 5%, 1% and 0.1% respectively. Statistical significance levels are for mean-comparison t-tests of the difference between the mean values of variables (*ttest* stata command) for dividend-payers and dividend non-payers (significance levels on 'dividend-payers' mean column); and for median-comparison tests of the difference between the median values of variables (Wilcoxon (Mann-Whitney) rank-sum test, *ranksum* stata command) for dividend-payers and dividend non-payers (significance levels on 'dividend-payers' median column).

ness of dividends as compared with buy-backs decreased from 2002, and dividends may have been accelerated by the introduction of a new higher-rate domestic income tax band in 2010.[11] Time dummies are included in all specifications to capture tax effects and other shocks such as behavior provoked by the financial crisis (Tran et al., 2017). We use the lagged dependent variable LDV to capture dividend smoothing; given the partial adjustment specification, the equation would be mis-specified without it. Unless otherwise noted, lags are also used for all regressors (except AGE) to lessen endogeneity and to reflect information lags. We control also for the characteristics of SIZE and AGE. SIZE is defined as percentile ranking of a company in the range of market values in the respective years.

We expect to find clustering effects by industry and to test for this we introduce a variable PEER, defined as a ratio of total dividends over total revenues of a firm's industry for a given year. Such a clustering effect could arise due to similarities in leverage, age, or size of firms within a particular industry; however, such variables are already reflected in the regressor set. A separate possibility is that firms in certain industries are exposed at various times to common investor pressure.[12] Finally, we augment the specification with a forward-looking target for dividends that supplements the backward-looking indicators of profitability or earnings (which capture adaptive control actions). Specifically, we supplement the earnings ratio with the mean estimate (at time t over the set of analysts following a company) of one-year and two-year ahead earnings per share, which we combine for reporting purposes under the compound variable FY12 and where we indicate significance by an F-test.

5. Results

Our results with the investor pressure explanatory variables testing for hypotheses *HA* and *HB* are presented in Table 5.

We start with the discussion of the most interesting results reported in columns (iv) to (vi). Column (iv) represents the specification for *HA* with acquisition activity for the narrow (6-digit) industry (ACQ) as a measure of investor pressure. We confirm a positive effect of payout for ACQ, which is highly significant (1% level), thus confirming Hypothesis *HA*.[13]

In columns (v) to (vi) we test Hypothesis *HB* by including our chosen measures of corporate governance, INDRAT and EXRAT. These results confirm the role of the two governance variables in increasing investor pressure, with both variables (proportion of independent directors, and proportion of equity in total pay) being positively significant at the 5% level but only within the FTSE 100 firms. UK governance codes are of the "comply or explain" variety and are both more restrictive – and more complied with – by companies in the FTSE 100. We thus find support for a mediated version of *HB*.

Overall, these results give support for the practitioners' views cited in

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[11] Dividend taxation is held to have a neutral effect on dividend payout under the "new view" (Gordon and Dietz, 2008). Nevertheless, a higher tax rate may bias dividend payout downwards under the "traditional view" that is appropriate for firms raising additional equity. Between 1997 and 1999, pension funds may have benefited from the passing on of tax savings for a set of multinationals that were able to elect for a particular form of dividend between 1997 and 1999 (Bond et al., 2005). The attractiveness of dividends was reduced in the reforms of 1997 and increased after April 1999 with the abolition of the Advanced Corporation Tax system (which did however adversely affect non-resident investors (Geiler and Renneboog (2010)). The typical investor in UK firms also changed over the sample period, with domestic pension funds diversifying into foreign assets while the share of foreign owners, subject to a variety of tax arrangements increased. For these owners the fact that the main corporate tax rate was gradually reduced – from 28% in 2008 to 24% by the end of the sample in 2012–may have changed their preferences for UK dividend income. The level and path of exchange rate movements may also have had an impact on this. Changes to individual capital gains tax relative to dividend tax may have had some effect but the variety of circumstances of the investors makes this difficult to model and equally difficult to take into account by firms (Geiler and Renneboog, 2010). It appears that UK firms do not use dividend policy to cater to the tax preferences of their shareholders (Geiler and Renneboog (2015).

[12] This argument gets support in Brav et al. (2005) who report the view that firms may delay dividend reductions until "air cover" is provided by competitors (p.501). We distinguish herding among peers from common events (Farre-Mensa et al., 2014) by including time dummies.

[13] As acquisition activity is an industry variable, we also used estimation clustered by industry and again obtained significance at the 0.1% level. The same level of significance is also obtained if ACQ is replaced by its natural log. Note that while the ACQ variable has a significant correlation coefficient of 0.1 with size, we are conditioning for size in these regressions.

Table 4
Correlation matrix.

	DIVIDEND	DIV/SALES	ACQ	AGE	BAP	DAA	DCHURN	EA	EAQ1	EBIAT	EXRAT	FY1	FY2	INDRAT	LEV	MBF	PEER	SIZE	SWING
DIVIDEND	1																		
DIV/SALES	0.0678	1																	
ACQ	-0.1154	0.0033	1																
AGE	0.2810	0.0407	0.0027	1															
BAP	-0.0484	-0.0016	0.0004	-0.0416	1														
DAA	-0.0523	-0.0031	0.0049	-0.0879	0.0009	1													
DCHURN	-0.0122	-0.0023	0.0040	-0.0235	0.0003	-0.0067	1												
EA	0.0741	0.0012	-0.0022	0.1044	-0.0064	0.0009	-0.0107	1											
EAQ1	0.4826	0.0105	-0.1117	0.1567	-0.0220	-0.0467	-0.0351	0.1098	1										
EBIAT	0.6410	0.0754	0.1180	0.1887	-0.0250	-0.0205	-0.0127	0.1072	0.0384	1									
EXRAT	0.1536	0.0023	0.0207	0.0381	-0.1444	0.0420	-0.0482	0.0112	0.1551	0.4098	1								
FY1	0.2488	0.0610	-0.0235	0.1673	-0.1448	-0.0080	0.0104	0.1347	0.1163	0.2992	0.0506	1							
FY2	0.2052	0.0456	-0.0250	0.1550	-0.1304	-0.0147	0.0053	0.0864	0.2030	0.2191	0.0618	0.5345	1						
INDRAT	0.3776	0.0142	-0.0759	0.1429	-0.2365	-0.0209	0.0200	0.0448		0.5367	0.0458	0.0786	0.0692	1					
LEV	-0.0174	-0.0016	-0.0055	-0.0484	0.0063	-0.0039	0.0004	-0.5678	-0.1435	0.1122	-0.0097	0.0382	0.0192	0.0057	1				
MBF	-0.0889	-0.0144	-0.0129	-0.0616	0.1078	-0.0045	0.0300	-0.0990	-0.0311	-0.0651	-0.0254	-0.0367	-0.0296	-0.0477	-0.0078	1			
PEER	0.0345	0.0164	0.1183	0.1108	0.0002	-0.0050	0.0268	-0.0008	-0.0790	0.1407	0.0245	0.0108	0.0109	0.0159	0.0041	-0.0236	1		
SIZE	-0.0093	0.0152	0.0978	0.0251	-0.0040	0.0207	0.0099	-0.0178	-0.0934	0.0309	0.0583	0.0551	0.0572	0.0422	-0.0157	0.0816	-0.0036	1	
SWING	-0.1354	-0.0107	-0.0408		-0.0023	0.0205	0.0031	-0.0389		-0.0460	-0.0482	-0.0133	0.0468	0.0343	0.0233	-0.0083	0.0108	0.1956	1

Notes.
(i) Pairwise correlation coefficients matrix.
(ii) Definitions of variables are provided in Table 2.

the introduction that firms use dividends as a way of responding to investor pressure experienced when the takeover threat is high or where codified corporate governance rules are given most weight.

Now we turn to the discussion of our control variables. In columns (i) to (iii) of Table 5, we report several variants on a basic fixed effects specification with robust standard errors, as supported by the reported Hausman test statistics.[14] The first column effectively replicates the specification in Von Eije and Megginson (2008) to show that our data are consistent with previous work. Column (i) shows that the earnings ratio (EA), SIZE, AGE, MBF, DAA, and industry clustering of dividends (PEER) are all significant at least at ($p < 0.1$) in two-sided testing. All these signs are as expected. Leverage LEV is insignificant throughout; furthermore, interacting leverage with ten sector dummies to reflect industry-specific targets (Graham and Harvey, 2001, Table 12) produces only one interaction at $p < 0.1$ (un-tabulated results). There is thus no evidence for the agency view that leverage and dividends are substitutes, reinforcing other recent dividend studies that find only mixed evidence for the agency view (Farre-Mensa et al., 2014: 92). In un-tabulated results we find that asymmetric information does not significantly affect dividends either.[15] Overall, these results suggest that the standard agency view is inappropriate for the UK institutional context.

Column (ii) supplements column (i) with a lagged dependent variable (LDV). This normally indicates the need for special dynamic panel methods, but any bias in the LDV coefficient will be limited on account of the panel length (average T = 9) and the relatively small coefficient on the LDV (Hsiao, 2014: 73).[16] We improve the specification further in column (ii) by entering the forward-looking forecast of earnings per share calculated as the mean over following analysts at one and two-year horizons (FY1 and FY2) obtained from the I/B/E/S databank. We enter both variables but report a joint test using the compound variable FY12. The joint effect for both years (coefficients on FY12) is strongly significant, showing that forward-looking expectations matter for dividends. The inclusion of this variable has the effect of increasing the significance of MBF while rendering that of the PEER variable insignificant; the latter effect may be due to analyst forecasts being themselves affected by herding.[17] The general pattern of the results is similar between columns (i) and (ii) indicating robustness to the addition of the LDV and FY12.

In column (iii) of Table 5, we show a variant of the results where the dependent variable DIVS is scaled by sales to take account of the size variation across firms, though we have also entered a control for size. The

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[14] The results (untabulated) are also robust to winsorization of the dependent variable.

[15] To test for information asymmetry, we utilise data from the I/B/E/S databank to obtain the forecast dispersion (standard deviations) across following analysts at one and two-year ahead horizons. The effect of dispersion across analysts is negative for dividends, although not significant. This suggests that, if anything, the effect being captured is a general uncertainty effect rather than an agency one involving asymmetric information; this is consistent with results in Li and Zhao (2008) and Chay and Suh (2009).

[16] Endogeneity is often countered by the use of Generalized Method of Moments (GMM). However, as noted in Baum et al. (2003), the use of GMM comes at a price and reasonable estimates may require very large samples. Thus, where heteroscedasticity is not present the instrumental variables method, where needed, may be superior. Using the specification in column (i) of Table 5 and selecting a STATA option for xtivreg2 that is robust to heteroscedasticity, we cannot reject the null hypothesis that the hypothesized set of endogenous regressors EA, MBF, DAA, LEV and PEER can be treated as exogenous (p = 0.1152).

[17] Note that because the I/B/E/S data are not available for all firms we lose approximately one-third of the observations for specifications that utilise this source.

Table 5
Fixed effects. Hypotheses *HA* (fear of takeover) and *HB* (board independence and equity-based compensation).

DV	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	DIVIDEND	DIVIDEND	DIVS	DIVIDEND	DIVIDEND	DIVIDEND
EXPLANATORY VARIABLES						
Hypothesis HA						
ACQ				0.008**	0.006**	0.008**
				(2.90)	(2.99)	(2.84)
Hypothesis HB						
INDRAT				–	0.048	–
					(0.23)	
INDRAT * FT100				–	0.914*	–
					(2.07)	
EXRAT				–	–	−0.040
						(0.57)
EXRAT * FT100				–	–	0.492*
						(2.45)
CONTROLS						
LDV		0.111***	0.162*	0.110***	0.109***	0.109***
		(9.36)	(1.98)	(9.27)	(8.73)	(8.75)
EA	0.735+	0.661	−0.004	0.601	0.430	0.465
	(1.84)	(1.41)	(0.92)	(1.30)	(0.96)	(1.02)
MBF	−0.003+	−0.116***	−0.0003+	−0.115***	−0.110***	−0.112***
	(1.79)	(4.70)	(1.66)	(4.61)	(4.26)	(4.37)
DAA	−0.043+	−0.048	−0.0003+	−0.049	−0.043	−0.036
	(1.75)	(1.52)	(1.78)	(1.56)	(1.37)	(1.15)
LEV	0.008	0.026	−0.002	0.052	−0.055	−0.053
	(0.04)	(0.14)	(1.31)	(0.28)	(0.31)	(0.29)
SIZE	0.009***	0.008***	0.000+	0.008***	0.007***	0.007***
	(12.98)	(9.90)	(1.76)	(9.87)	(8.83)	(8.90)
AGE	0.044***	0.028***	0.0001**	0.0028***	0.037***	0.037***
	(6.56)	(4.08)	(3.14)	(4.01)	(4.59)	(4.62)
PEER	2.818**	1.078	0.010	1.013	0.790	0.727
	(2.65)	(1.36)	(0.98)	(1.27)	(1.02)	(0.97)
FY12(sum of coefficients)	–	0.006***	0.000	0.006***	0.006***	0.006***
		(4.74)	(0.87)	(4.92)	(4.58)	(4.57)
Time dummies	YES	YES	YES	YES	YES	YES
No. obs.	3487	2697	2645	2697	2513	2501
R² within	0.327	0.462	0.125	0.464	0.458	0.458
F	57.16***	49.11***	8.63***	45.22***	30.05***	29.39***
Hausman	84.43***	390.93***	3103.95***	389.21***	459.57***	365.83***
Sigma(u)	1.625	1.445	0.007	1.441	1.352	1.379
Sigma(e)	0.490	0.394	0.003	0.394	0.388	0.387
Rho	0.917	0.931	0.869	0.931	0.924	0.927

(i) Legend: $+ \; p < 0.10$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$. Absolute *t* ratios based on heteroskedasticity robust standard errors in brackets. Sigma(u): standard deviation of residuals within groups. Sigma(e): standard deviation of residuals. Rho: proportion of the variance due to differences across groups.
(ii) Variable definitions: DV: dependent variable: DIVIDEND: ln(dividends+0.001); DIVS: DIVIDEND/Sales; LDV: lagged dependent variable; ACQ: the sum of acquisitions, by industry and year; EXRAT: [(average board equity-based compensation)/(board total compensation)]; FT100: a dummy (1/0) for a firm belonging to FTSE 100 index; INDRAT: [(number of independent directors)/(board size)]; EA: [(earnings before interest and taxes) – (total income taxes)]/(total assets); MBF: (price*share/ 1000 market cap)/(total assets); DAA: [(total assets) - (total assets)]/(total assets); LEV: [(total long-term debt) + (total debt in current liabilities)]/(total assets); SIZE: Percentile ranking of a company in the range of market values in the respective years, lagged; AGE: number of years since firm birthday; PEER: (total dividends by year and industry)/(total sales by year and industry); FY12: average one- and two-year forward EPS analyst forecasts; EA, MBF, DAA, LEV, SIZE and PEER are lagged one period.

effect of this change is that while the pattern of results seems similar, the fit is considerably poorer and only age and the lagged dependent variable are significant at the 5% level. Furthermore, the coefficient on the earnings ratio EA is now perversely signed, possibly reflecting the fact that sales and earnings are positively correlated. Accordingly, we maintain equation (3) as our main specification using the log level of dividends as the dependent variable, compatible with previous work (Fama and Babiak, 1968; Brav et al., 2005; Von Eije and Megginson, 2008; Geiler and Renneboog, 2015).[18]

Table 6 presents further results where investor trading patterns are hypothesized to affect dividend payout according to Hypothesis HC, discussed in Section 2.4. For this shorter sample the Nickell bias will be more serious, so we have omitted the lagged dependent variable and used a truncated specification. In these results *HC* is clearly supported – firm-years where there is a sudden increase in trading volume are characterised by higher dividends, significant at the 0.1% level. Column (ii) reports results for the current value (SWING0) and columns (iii), (iv) and (v) for the lagged value of SWING (SWING1). We obtain positive significance at levels of significance ranging from 1% to 10%. Column (v) shows that combining SWING1 with DCHURN, SIZE and AGE maintains significance. These results support Hypothesis *HC*.

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[18] The correlation coefficients in Table 4 do not show evidence of pairwise correlations among the main explanatory variables. In order to check for the presence of multicollinearity, however, we computed the Variance Inflation Factors (VIFs) for the equations estimated in Table 5. The VIFs tend to take low values for all the explanatory variables, with the only exception of the variable AGE for which the value is very large in all the specifications. This is however not due to collinearity with the other regressors but with the time dummies and the fixed effects, and arises by construction because of the way the variable is defined. This should not represent an issue however, because AGE is only included as a control and its presence can improve the quality of the estimates. The table with the VIF values is available from the authors upon request.

Table 6
Truncated sample due to data availability: fixed effects – dependent variable ln dividends (GBP million). Hypothesis *HC* (share churn and swing trades).

	(i)	(ii)	(iii)	(iv)	(v)
EXPLANATORY VARIABLES					
Hypothesis HC					
DCHURN	**0.074*****	-	-	**0.075*****	**0.078*****
	(4.07)			**(3.55)**	**(4.16)**
SWING0	-	**0.257****	-	-	-
		(2.80)			
SWING1	-	-	**0.157***	**0.223****	**0.116+**
			(2.29)	**(3.21)**	**(1.64)**
CONTROLS					
EA	0.041	0.868	0.934	0.787	0.040
	(0.04)	(0.81)	(0.86)	(0.72)	(0.04)
SIZE	0.007***	–	–	–	0.007***
	(6.44)				(6.21)
AGE	0.032*	0.016	0.015	0.018	0.030*
	(2.31)	(1.03)	(0.97)	(1.24)	(2.13)
FY12 (sum of	0.004+	0.006*	0.006*	0.006*	0.004+
coefficients)	(1.71)	(2.00)	(2.01)	(1.99)	(1.72)
Time Dummies	YES	YES	YES	YES	YES
No. obs.	773	773	773	773	773
R2 within	0.219	0.143	0.138	0.155	0.220
F	20.62***	5.41***	3.42**	6.47***	18.83***
Hausman	26.36**	38.46***	17.61*	42.49***	44.47***
Sigma(u)	1.620	1.602	1.603	1.604	1.615
Sigma(e)	0.419	0.438	0.439	0.435	0.419
Rho	0.937	0.930	0.930	0.931	0.937

(iii) Legend: $+ \; p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. Sample period: 2007-12. Sigma(u): standard deviation of residuals within groups. Sigma(e): standard deviation of residuals. Rho: proportion of the variance due to differences across groups.
(i) Variable definitions: dependent variable: DIVIDEND: ln(dividends+0.001); EA: [(earnings before interest and taxes) – (total income taxes)]/(total assets); SIZE: Percentile ranking of a company in the range of market values in the respective years, lagged; AGE: number of years since firm birthday; FY12: average one- and two-year forward EPS analyst forecasts; DCHURN: ratio of annual trading volume (number of shares) to total number of shares outstanding, in first difference. SWING: dummy variable equal to 1 if and only if SIZE and DCHURN are in the top quartile and BAP (percentage of bid-ask spread) is in the bottom quartile. SWING0 is unlagged; SWING1 is lagged. EA and SIZE are lagged one period.

6. Robustness and extensions

6.1. Addressing selection bias with heckman estimation

Oversampling of certain types of firms is commonly checked for in dividend studies to establish that median values of ratios are approximately similar to population values (Khan, 2006). However, not all non-random sampling is problematic. Sampling on the basis of age or size – a default position when attention is confined to listed firms – may not be problematic if age and size can be shown to be exogenous variables in the regression of interest: so-called exogenous sample selection (Wooldridge, 2013: 315).

Where the dependent variable registers zero for a sizeable fraction of the dependent variable observations, as is the case with firms paying zero dividends, estimation on that sample may need to consider the properties of the error term. The error distribution from a dividend payment equation of the conditional sample (of dividend payers) will be bounded in a way that could be addressed, for example, by Tobit estimation as in Al-Malkawi et al. (2014). However standard Tobit estimation requires the same continuous distribution of the desired dividend payment with respect to its determinants for payers and non-payers alike, which is something that may not apply to dividend behavior. A Heckman approach, combining the estimation of the payment level with a selection equation for dividend payment, may be preferable in the situation where the unobservable effects in one equation are not independent of the other, leading to sample selection bias.

There are few previous dividend studies that use Heckman selection. Kim and Jang (2010) reject the need for selection in a US industry study. Perhaps the Heckman approach is avoided because it is common to use the same set of variables as determinants of both the decision to pay and the amount paid, reflecting the difficulty of obtaining an additional variable for identification that is significant in the selection model but not significant in the main equation, conditions required for Heckman identification. Nevertheless, on a priori grounds there is reason to argue that the determinants may differ, at least in form, because commencing dividends entails an assumption that they will be continued – the process is partially irreversible. Retaining cash reserves, maintaining low borrowing, or even investing with a view to a steady income confers an option to pay dividends. Whether that option is exercised needs attention to variables such as the exercise price (transaction costs), the net benefits of dividends, and the underlying volatility of such net benefits. Initiation of dividends thus depends on some threshold criterion being exceeded. This opens the possibility of distinguishing variables that affect the

Table 7
Heckman estimation. Hypotheses *HA (fear of takeover)* and *HB (board independence and equity-based compensation)*.

	(i)		(ii)	
	Main equation	Selection equation	Main equation	Selection equation
Explanatory variables				
ACQ	**0.031*****	**0.008**	-	-
	(3.72)	**(0.76)**		
INDRAT	-	-	**2.062*****	**−1.050*****
			(6.36)	**(3.66)**
EXRAT	-	-	**0.812*****	**0.346***
			(4.04)	**(2.14)**
Controls				
LDV	0.665***	0.169***	0.590***	0.181***
	(21.16)	(17.70)	(15.64)	(17.36)
SIZE	0.003*	0.001	0.004**	0.001
	(2.30)	(0.69)	(3.02)	(0.66)
EA	1.315*	2.005**	1.864**	1.748*
	(2.10)	(2.58)	(2.66)	(2.21)
MBF	0.006	−0.048+	−0.026	−0.058*
	(0.15)	(1.93)	(0.62)	(2.21)
DAA	−0.033	−0.000	−0.048*	0.045
	(1.34)	(0.01)	(2.16)	(1.30)
LEV	0.345	−0.142	0.078	−0.093
	(1.60)	(0.77)	(0.37)	(0.46)
AGE	0.008***	0.002	0.006**	0.001
	(3.33)	(0.74)	(2.71)	(0.30)
PEER	4.761**	−2.404	4.908**	−1.803
	(3.11)	(1.38)	(3.24)	(0.99)
FY12(sum)	0.003***	0.005**	0.003***	0.005**
	(3.40)	(2.68)	(3.31)	(2.68)
EAQ1		1.161***		1.279***
		(4.78)		(4.98)
Constant		0.303		0.655+
		(0.84)		(1.80)
No. obs.	3334		2897	
Censored obs.	880		615	
Athrho		0.077***		0.067***
		(4.51)		(3.75)
Lnsigma		0.266***		0.252***
		(5.08)		(4.65)
ρ		0.077		0.067
σ		1.305		1.287
λ		0.100***		0.086***

Notes: Dependent variable in main equation: Ln dividends; Dependent variable in selection equation: Dum = 1 if DV > 0. Athrho: inverse hyperbolic tangent of ρ for numerical stability; Rho, ρ: estimated correlation between the disturbances in the main equation and in the selectivity equation; Sigma, σ: standard errors of residuals in the main equation; Lnsigma: natural logarithm of Sigma; $\lambda = \rho \times \sigma$: selectivity effect (inverse Mills ratio). All variables lagged except AGE and ACQ which are contemporaneous. *Legend*: +, *, **, and *** denote statistical significance at 10%, 5%, 1% and 0.1% respectively.

likelihood of paying dividends separately to the regressors in the dividend equation.

Table 7 reports Heckman results for the Datastream sample, where we use the threshold variable EAQ1, lagged, as an identifying selector. This is a dummy variable for the condition that the earnings-to-assets ratio (EA) is greater than the sample's first quartile value. This is justified by the anticipated damage from having to cease dividend payments in the future, so that a threshold effect is expected. This variable is not significant in the main equation and is thus a suitable candidate for an identifying selector. The correlation coefficient of EAQ1 with the earnings variable EA is only 0.63, confirming that it is a suitable identifying variable.

The diagnostics for the Heckman specification are reported in Table 7 giving σ (sigma), the standard error of the residual in the dividend equation and ρ (rho), the correlation between the error terms in both equations. The Chi-square test reported for $\rho = 0$ is a test of the joint likelihood of an independent probit model for the selection equation and a regression model for the dividend data, against the Heckman model. As this test statistic is always highly significant it supports the Heckman specification. The inverse Mills ratio λ, reported in the last row under the selection equations in Table 7, is obtained as the product of ρ and σ. It is given with its significance level, showing that it is significantly positive, as expected.

In the selection equation, EA and the identifying variable represented by the threshold effect EAQ1 are both significant, along with the LDV and MBF. The coefficients for the main Heckman dividend equation are interpreted as though we observed dividend data for all firms (unconditional estimates). The LDV coefficient is now much higher than that reported in the conditional specification, at about 0.67. This suggests that ignoring the non-random selection of payers may lead to a downward bias of the degree of persistence of dividends.

Columns (i) and (ii) of Table 7 are variants of Table 5 comprising robustness checks in the form of Heckman estimation results for the significance of ACQ and the corporate governance variables INDRAT and EXRAT obtained in Table 5. Each column is paired with the associated selection equation. These results show a consistent picture. Column (i) confirms the influence of ACQ, which is found to be highly significant in the main equation, thus supporting Hypothesis *HA* (takeover threat). Column (ii) shows strong support for the governance variables. The proportion of independent directors in the board of the company (INDRAT) is positive and highly significant, as is the equity share of director compensation (EXRAT).

6.2. Repurchases

We recognise that nowadays the study of dividends as a distinct entity demands justification. Dividends are after all just one method of payout and can be argued to be irrelevant when viewed in isolation. In the United States, the annual total of dividends paid has recently been overtaken by stock repurchases, so that the emphasis there tends to be on total payout to investors (Lazonick, 2010). Nevertheless, there is much to be said for continuing to separately study dividends.

First, dividends are normally conceived of as a set of future expected payments, and this implies a constraint on current decision-making. Partly because of this, it appears that the substitutability of dividends for repurchases is less than perfect, so that separate influences are operative.[19] Second, if survey evidence is to be believed, the proclivity to

marginally adjust dividends with respect to other financial flows, such as borrowing or real investment, seems to be different for dividends versus repurchases. For example, nearly 80% of firms record that the repurchase decision is made after real investment decisions – twice as many as for dividends (Brav et al., 2005). This decision order is confirmed in Bhargava (2010), who also found that repurchases were generally insignificant for dividends. Finally, the observed pattern for dividends and repurchases in the UK indicates distinct cyclical behavior. Fig. 3, depicting the dividends and repurchases in the UK for the period 1997–2012, shows little evidence of substitution between dividends and repurchases, except perhaps for the post-financial crisis period when repurchases continued with an upward trend while dividends retreated.

Although an increasing number of UK firms now combine dividends with share repurchases, the UK has not seen a sustained rise in stock repurchases since 2000, and dividends still remain the dominant channel for payout (Geiler and Renneboog, 2016). In view of these arguments it seems reasonable to examine dividend behavior independently of repurchases. To test whether our dividends model is affected by such share buybacks, we entered the log of buybacks as a regressor (untabulated results). Neither the repurchase variables, nor its lag, were close to significance.

6.3. Alternative data sets

The results reported above are for the Datastream sample of firms' actual payout. We obtained parallel results for the declarations of dividends available in the Compustat sample and the pattern of results is very similar. We have focused on the Datastream output because only these data distinguish zero dividends from missing data and so allow us to perform a Heckman analysis as in Section 6.1.

6.4. Alternative specification of controls

Our specification of control variables follows that of other studies e.g. Von Eije and Megginson (2008) with the addition of the innovations in the form of FY12 and PEER regressors. The specification may be argued to be superior to that derived directly from Lintner (1956), because earnings as a driver of dividends is now unpacked into two components: asset size (SIZE) and earnings per assets (EA), both of which appear as controls. As shown in Table 8, the results remain stable when EA is replaced by the simple log of earnings (EBIAT). We show in Table 8 that this is the case, with the previous results from Tables 5 and 6 for investor pressure continuing to hold. Nevertheless, our preferred specification is that reported in Section 5, for the econometric reasons that both endogeneity and Nickell bias are likely to be less of an issue.[20]

6.5. Analysts coverage

Institutional ownership has been shown in studies on US listed firms to be associated with analyst coverage (Bhushan, 1989) and thus the latter may proxy for institutional investors in increasing dividends. We standardized the number of following analysts by size as this is a major determinant (Hong et al., 2000) and (unreported) results are significantly positive, albeit only at the 10% level. If analyst coverage were simply an antidote to asymmetric information – i.e. information gathering – according to the agency theory, we would expect it to act as a substitute and thus be *negatively* signed in respect of dividends.

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[19] Several tax and governance-based reasons for limited substitutability are reviewed from the literature in Hu and Kumar (2004). Substitutability is supported for US data in Grullon and Michaely (2002), but other empirical results are conflicting. For German firms, Andres et al. (2015) find results inconsistent with dividends and repurchases being perfect substitutes. For the UK, evidence suggests only weak substitutability. at least up until the early 2000s (Benhamouda, 2007), or imperfect substitutability constrained by regulation.

[20] We also included the proportion of female directors as a control variable, which has been shown to be significant in recent papers based on agency theory considerations (Chen et al., 2017). The variable was positive but not significant at conventional levels for our sample which predates the big subsequent increase in female directors in response to a government commissioned report. We thank an anonymous referee for this suggestion.
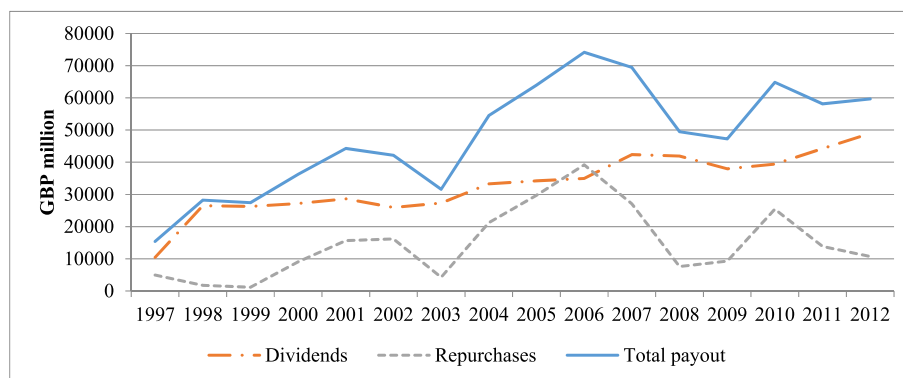
Fig. 3. The evolution of dividends, share repurchases and total payout amounts for all UK firms 1997–2012.
Source: Compustat Global

6.6. Alternative interpretation

The notion that dividend behavior is driven by investor pressure may seem at first sight to be a simple obverse of the standard agency theory of dividends, since both approaches argue that dividends act as a financial constraint on firms. However, our findings are not compatible with agency theory because the investor pressure effects that we identify are not confined to cases of low investment opportunity. Were investor pressure to be acting selectively on the worst performing firms and if firms in a high-M&A intensive industry had to convince the investors that they made "good" use of free cash flows (as suggested by agency theory), we would expect significance for an interaction between ACQ and measures of investment opportunity in Table 5. However, *t*-tests for such interactions failed to find any significance for three separate forms of interaction (with MBF, DAA or with the forward-looking earnings indicator FY12) across the specifications. A similar finding is obtained for the DCHURN variable when interacted with the indicator of firm performance (FY12) (results are available upon request). Thus, the agency interpretation for increased dividends is not supported by our results.

6.7. Nominal vs real dividends

It could be argued that the use of nominal dividends as the dependent variable is not appropriate, and that dividends should be deflated by an appropriate price index. This issue has been discussed in the literature. It is unclear what an appropriate deflator should be for dividends, because of the different geographical composition of shareholders and of the relevant reporting currency. Furthermore, as noted in footnote 8, it has been argued (see *e.g.* Lomax, 1990) that dividends are set in nominal terms and often with nominal targets, and therefore the correct dependent variable should be nominal dividends. At times, companies may still make dividend payments even when profits are declining. They may do so to maintain their established track record of making regular dividend payments. In this case, they would be maintaining the same nominal amount of dividends. In our panel regressions the use of time dummies should allay most of the concerns, because these would already control for non-idiosyncratic movements in prices. Not all companies of course make decisions in the same way and so there may be second order effects from inflation, where affordability may limit the nominal decision, particularly under high rates of inflation. However, consumer inflation for our main reporting currency (GBP used by 90% of firms) was (just) greater than 4% in only two years of the sample and never exceeded 4% for the second most important reporting currency (USD). In order to fully check the robustness of our results, we also re-ran all our regressions of Tables 5–8 in the Appendices (Tables A1-A4 correspondingly) after deflating nominal variables by a currency-specific consumer price deflator for the country that issues the relevant currency in which the

firm's dividends are paid. We have deflated all RHS variables, except for the ratios which will be invariant to inflation. All our main results are confirmed.

7. Conclusions

The standard model of dividends draws on principal agency theory. This is increasingly being challenged by the idea that investor pressure experienced by firms is more than a simple response to agency concerns. Rather, such pressure originates in malfunctioning financial markets and represents an elevated appetite for liquidity and short-term returns. We have shown that agency is not a central feature of dividend behavior in the UK. Using fixed effects estimation, we found evidence that dividend payout is positively influenced by a number of variables that can reasonably be interpreted as representing exposure to short-term investor pressure. We tested for the significance of proxy variables representing three channels of influence of investor pressure. The first of these is acquisition activity - a proxy for takeover risk in the firm's narrow industry: we find that dividend payout reacts positively and significantly to this. The latter finding accords with earlier UK studies such as Dickerson et al. (1998) and with recent concerns of policymakers, as noted in the text.

Second, corporate governance pressure for current shareholder value – proxied by the proportion of independent directors and the proportion of high-powered equity pay for directors – was also found to increase payout for FTSE firms. Third, we were able to test the effect of an increase in share turnover and the effect of investors strategically focused on short-term trading (swing trading) and the results here strongly supported our theory.

We carried out a number of robustness tests, the most important of which deals with selection bias in the sample of dividend-paying firms. This is treated with a Heckman specification. The investor pressure theory continues to be strongly supported. We also established that our investor pressure variables are not operative just for poorly performing firms, as would be the case for agency theory explanations. Furthermore, the lack of significance throughout for a leverage variable undermines the agency explanation.

Taken together, our results provide evidential support for a tilt away from agency theory in dividend research studies. We provide a unified framework for testing the consequences of investor pressure for dividend payout in the UK. Our results give credence to the idea that a review of the standard dividend specification is long overdue. Financial and economic studies of dividends should not be informed purely by theories developed half a century ago but rather should take account of the major changes that have occurred in the theory and practice of corporate governance in different institutional settings. Only then can we properly understand the determinants of dividends and judge whether the current

Table 8
Alternative specification of controls, fixed effects.

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
EXPLANATORY VARIABLES							
Hypothesis HA							
ACQ	0.007**	0.006**	0.006**	-	-	-	-
	(2.83)	(2.83)	(2.77)				
Hypothesis HB							
INDRAT	-	−0.091	-	-	-	-	-
		(0.55)					
IDRAT * FT100	-	0.744+	-	-	-	-	-
		(1.93)					
EXRAT	-	-	−0.046	-	-	-	-
			(0.67)				
EXRAT * FT100	-	-	0.410*	-	-	-	-
			(2.33)				
Hypothesis HC							
DCHURN				0.065***	-	-	0.062***
				(4.16)			(3.50)
SWING0				-	-	0.134+	-
						(1.73)	
SWING1				-	0.122+	-	0.178**
					(1.83)		(2.60)
CONTROLS							
LDV	0.101***	0.101***	0.101***	–	–	–	–
	(8.83)	(8.37)	(8.41)				
EBIAT	0.162***	0.140***	0.144***	0.200***	0.306***	0.301***	0.293***
MBF	(5.32)	(4.68)	(4.71)	(3.49)	(4.86)	(4.72)	(4.71)
	−0.092***	−0.093***	−0.093***	–	–	–	–
	(3.86)	(3.75)	(3.75)				
DAA	−0.070**	−0.065**	−0.058**	–	–	–	–
	(3.23)	(3.23)	(3.13)				
LEV	0.059	−0.043	−0.043	–	–	–	–
	(0.33)	(0.26)	(0.25)				
SIZE	0.006***	0.006***	0.006***	0.006***	–	–	–
	(9.83)	(9.28)	(9.16)	(6.81)			
AGE	0.023**	0.036***	0.034***	0.032**	0.012	0.013	0.015
	(3.32)	(4.43)	(4.30)	(2.99)	(1.01)	(1.13)	(1.36)
PEER	1.170	1.027	0.998	–	–	–	–
	(1.53)	(1.35)	(1.36)				
FY12 (sum of coefficients)	0.004***	0.005***	0.005***	0.003	0.004+	0.004+	0.003+
	(4.42)	(4.11)	(4.10)	(1.55)	(1.87)	(1.85)	(1.84)
Time dummies	YES	YES	YES	YES	YES	YES	YES
No. obs.	2609	2426	2414	760	760	760	760
R^2 within	0.529	0.522	0.523	0.316	0.245	0.246	0.260
F	61.89***	39.79***	39.17***	32.97***	14.60***	16.28***	17.35***
Hausman	1064.56***	910.14***	899.32***	234.89***	141.48***	142.29***	181.40
Sigma(u)	1.189	1.161	1.167	1.326	1.147	1.155	1.170
Sigma(e)	0.355	0.347	0.347	0.347	0.365	0.365	0.361
Rho	0.918	0.918	0.919	0.936	0.908	0.909	0.913

(i) Legend: + p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001. Absolute *t* ratios based on heteroskedasticity robust standard errors in brackets. Sigma(u): standard deviation of residuals within groups. Sigma(e): standard deviation of residuals. Rho: proportion of the variance due to differences across groups.
(ii) Variable definitions: DV: dependent variable; LDV: lagged dependent variable; DIVIDEND: ln(dividends+0.001); EXPLANATORY VARIABLES: ACQ: sum of acquisitions by industry and year; EXRAT: [(average board equity-based compensation)/(board total compensation)]; FT100: a dummy (1/0) for a firm belonging to FTSE 100 index; INDRAT: [(number of independent directors)/(board size)]; DCHURN: ratio of annual trading volume (number of shares) to total number of shares outstanding, in first difference. SWING: dummy variable equal to 1 if and only if SIZE and DCHURN are in the top quartile and BAP (percentage of bid-ask spread) is in the bottom quartile. SWING0 is unlagged; SWING1 is lagged; CONTROLS: MBF: (price*share/1000 market cap)/(total assets); DAA: [(total assets) - (total assets).₋₁]/(total assets); LEV: [(total long-term debt) + (total debt in current liabilities)]/(total assets); SIZE: percentile ranking of a company in the range of market values in the respective years, lagged; AGE: number of years since firm birthday; PEER: (total dividends by year and industry)/(total sales/turnover by year and industry); EBIAT: Ln of [(earnings before interest and taxes) – (total income taxes)]; FY12: average one- and two-year forward EPS analyst forecasts; EA, MBF, DAA, LEV, SIZE, EBIAT and PEER are lagged one period.

level of payout is benign or counterproductive for the firm and the macro-economy. This study gives support to the popular belief that systematic pressures exist in the UK context for the over-payment of dividends, leading to potential underinvestment.

The policy implications cannot be fully explored within the confines of this paper since there is considerable controversy over the effectiveness of policy levers. The effect of dividend taxation on investment, for example, differs theoretically depending on whether retentions or new capital are the main source of funds, while the estimated effects vary considerably across studies. Our paper has suggested that investor pressure stemming from short-term horizons leads to excessive payout, and

this suggests a research focus on the origin and transmission of short-termist pressure from investors and financial markets.

Appendices

Table A1
Real variables. Fixed effects.

DV	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	DIVIDEND	DIVIDEND	DIVS	DIVIDEND	DIVIDEND	DIVIDEND
EXPLANATORY VARIABLES						
Hypothesis HA						
ACQ				0.0002*	0.0001*	0.0002*
				(2.26)	(2.18)	(2.24)
Hypothesis HB						
INDRAT				–	0.005	–
					(0.03)	
INDRAT * FT100				–	0.828+	–
					(1.94)	
EXRAT				–	–	−0.030
						(0.43)
EXRAT * FT100				–	–	0.481*
						(2.39)
CONTROLS						
LDV		0.110***	0.162*	0.109***	0.109***	0.109***
		(9.76)	(1.98)	(9.62)	(9.07)	(9.10)
EA	0.652	0.568	−0.004	0.528	0.379	0.409
	(1.55)	(1.20)	(0.92)	(1.13)	(0.83)	(0.89)
MBF	−0.003+	−0.115***	−0.0003+	−0.114***	−0.112***	−0.113***
	(1.83)	(4.64)	(1.66)	(4.58)	(4.31)	(4.40)
DAA	−0.044+	−0.052	−0.0003+	−0.053+	−0.048	−0.040
	(1.74)	(1.64)	(1.78)	(1.66)	(1.50)	(1.29)
LEV	0.018	0.054	−0.002	0.076	−0.030	−0.029
	(0.09)	(0.28)	(1.31)	(0.40)	(0.17)	(0.16)
SIZE	0.009***	0.008***	0.000+	0.008***	0.007***	0.007***
	(12.92)	(9.97)	(1.76)	(9.96)	(8.94)	(9.02)
AGE	0.042***	0.026***	0.0001**	0.025***	0.037***	0.036***
	(6.07)	(3.66)	(3.14)	(3.59)	(4.24)	(4.15)
PEER	2.786**	0.903	0.010	0.845	0.653	0.583
	(2.63)	(1.16)	(0.98)	(1.09)	(0.87)	(0.80)
FY12						
(sum of coeff.)	–	0.006***	0.000	0.006***	0.006***	0.007***
		(4.95)	(0.87)	(5.07)	(4.67)	(4.68)
Time dummies	YES	YES	YES	YES	YES	YES
No. obs.	3420	2645	2645	2645	2462	2450
R^2 within	0.319	0.461	0.125	0.463	0.456	0.457
F	54.72***	52.49***	8.63***	48.22***	32.47***	32.36***
Hausman	77.94***	672.81***	3103.95***	674.55***	568.41***	540.48***
Sigma(u)	1.557	1.383	0.007	1.380	1.295	1.314
Sigma(e)	0.488	0.390	0.003	0.390	0.384	0.383
Rho	0.911	0.926	0.869	0.926	0.919	0.922

(iv) Legend: + p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001. Absolute *t* ratios based on heteroskedasticity robust standard errors in brackets. Sigma(u): standard deviation of residuals within groups. Sigma(e): standard deviation of residuals. Rho: proportion of the variance due to differences across groups.

(v) Variable definitions: DV: dependent variable: cash dividends divided by CPI columns (i)-(ii) and (iv)-(vi), cash dividends/total sales column (iii); LDV: lagged dependent variable; DIVIDEND: ln(dividends+0.001); DIVS: DIVIDEND/Sales; ACQ: the sum of acquisitions, by industry and year, divided by CPI; EXRAT: [(average board equity-based compensation)/(board total compensation)]; FT100: a dummy (1/0) for a firm belonging to FTSE 100 index; INDRAT: [(number of independent directors)/(board size)]; EA: [(earnings before interest and taxes) – (total income taxes)]/(total assets); MBF: (price*share/1000 market cap)/(total assets); DAA: [(total assets) - (total assets)$_{-1}$]/(total assets)$_{-1}$; LEV: [(total long-term debt) + (total debt in current liabilities)/(total assets)]; SIZE: Percentile ranking of a company in the range of market values in the respective years, lagged; AGE: number of years since firm birthday; PEER: (total dividends by year and industry)/(total sales/turnover by year and industry); FY12: average one- and two-year forward EPS analyst forecasts; EA, MBF, DAA, LEV, SIZE and PEER are lagged one period.

Table A2
Real variables. Truncated sample due to data availability: fixed effects – dependent variable: ln dividends. Hypothesis *HC* (share churn and swing trades)

	(i)	(ii)	(iii)	(iv)	(v)
EXPLANATORY VARIABLES					
Hypothesis HC					
DCHURN	**0.072*****	-	-	**0.073*****	**0.076*****
	(3.94)			**(3.46)**	**(4.05)**
SWING0	-	**0.252****	-	-	-
		(2.77)			
SWING1	-	-	**0.162***	**0.226****	**0.121+**
			(2.35)	**(3.25)**	**(1.72)**
CONTROLS					
EA	0.071	0.876	0.940	0.797	0.070
	(0.07)	(0.82)	(0.87)	(0.73)	(0.07)
SIZE	0.007***	–	–	–	0.007***
	(6.27)				(6.04)
AGE	0.028*	0.012	0.011	0.014	0.026+
	(2.04)	(0.81)	(0.74)	(1.00)	(1.86)
FY12 (sum of coefficients)	0.004+	0.006*	0.006*	0.005*	0.004+
	(1.76)	(2.02)	(2.04)	(2.02)	(1.76)
Time Dummies	YES	YES	YES	YES	YES
No. obs.	773	773	773	773	773
R2 within	0.216	0.144	0.138	0.155	0.218
F	19.42***	5.11***	3.21**	6.09***	17.84***
Hausman	27.76***	147.74***	17.61*	40.26***	42.43***
Sigma(u)	1.570	1.564	1.565	1.562	1.567
Sigma(e)	0.418	0.436	0.437	0.433	0.417
Rho	0.934	0.928	0.928	0.929	0.934

(vi) Legend: $+ p < 0.10$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$. Sample period: 2007-12. Sigma(u): standard deviation of residuals within groups. Sigma(e): standard deviation of residuals. Rho: proportion of the variance due to differences across groups.
(ii) Variable definitions: dependent variable: DIVIDEND: ln(dividends+0.001) – ln(CPI); EA: [(earnings before interest and taxes) – (total income taxes)]/(total assets); SIZE: Percentile ranking of a company in the range of market values in the respective years, lagged; AGE: number of years since firm birthday; FY12: average one- and two-year forward EPS analyst forecasts; DCHURN: ratio of annual trading volume (number of shares) to total number of shares outstanding, in first difference. SWING: dummy variable equal to 1 if and only if SIZE and DCHURN are in the top quartile and BAP (percentage of bid-ask spread) is in the bottom quartile. SWING0 is unlagged; SWING1 is lagged. EA and SIZE are lagged one period.

Table A3
Real variables. Heckman estimation. Hypotheses *HA (fear of takeover)* and *HB (board independence and equity-based compensation)*.

	(i)		(ii)	
	Main equation	Selection equation	Main equation	Selection equation
Explanatory variables				
ACQ	**0.058****	0.0108	-	-
	(2.58)	(0.07)		
INDRAT	-	-	**1.997*****	**−1.011*****
			(6.25)	(3.54)
EXRAT	-	-	**0.803*****	0.356*
			(4.02)	(2.21)
Controls				
LDV	0.660***	0.175***	0.586***	0.181***
	(20.79)	(17.84)	(15.47)	(17.35)
SIZE	0.003*	0.001	0.004**	0.001
	(2.35)	(0.42)	(2.96)	(0.69)
EA	1.337*	2.059*	1.731*	1.813*
	(2.15)	(2.57)	(2.54)	(2.27)
MBF	0.005	−0.057*	−0.016	−0.061*
	(0.13)	(2.24)	(0.40)	(2.28)
DAA	−0.035	−0.001	−0.050*	0.048
	(1.44)	(0.04)	(2.39)	(1.15)
LEV	0.356+	−0.167	0.119	−0.104
	(1.65)	(0.87)	(0.56)	(0.52)
AGE	0.008***	0.000	0.007**	0.001
	(3.44)	(0.02)	(2.95)	(0.21)
PEER	4.745**	−2.316	4.508**	−1.596
	(3.11)	(1.28)	(3.04)	(0.87)
FY12(sum)	0.004***	0.033*	0.004***	0.036**
	(3.45)	(2.12)	(3.50)	(2.58)
EAQ1		1.128***		1.260***
		(4.63)		(4.91)
Constant		0.521		0.794*
		(1.44)		(2.19)
No. obs.		3056		2897
Censored obs.		602		615

Table A3 (*continued*)

	(i)		(ii)	
	Main equation	Selection equation	Main equation	Selection equation
Athrho		0.079***		0.063***
		(4.91)		(3.58)
Lnsigma		0.263***		0.248***
		(5.01)		(4.55)
ρ		0.079		0.063
σ		1.301		1.282
λ		0.102***		0.080***

Notes: Dependent variable in main equation: Ln dividends – Ln CPI; Dependent variable in selection equation: Dum = 1 if DV > 0. Athrho: inverse hyperbolic tangent of ρ for numerical stability; Rho, ρ: estimated correlation between the disturbances in the main equation and in the selectivity equation; Sigma, σ: standard errors of residuals in the main equation; Lnsigma: natural logarithm of Sigma; $\lambda = \rho \times \sigma$: selectivity effect (inverse Mills ratio). All variables lagged except AGE and ACQ which are contemporaneous. *Legend*: +, *, **, and *** denote statistical significance at 10%, 5%, 1% and 0.1% respectively.

Table A4
Real variables. Alternative specification of controls, fixed effects.

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
EXPLANATORY VARIABLES							
Hypothesis HA							
ACQ	0.0017**	0.0013*	0.0014**	–	–	–	–
	(2.60)	(2.22)	(2.34)				
Hypothesis HB							
INDRAT	–	−0.100	–	–	–	–	–
		(0.60)					
IDRAT * FT100		0.602	–	–	–	–	–
		(1.57)					
EXRAT	–	–	−0.014	–	–	–	–
			(0.21)				
EXRAT * FT100	–	–	0.379*	–	–	–	–
			(2.17)				
Hypothesis HC							
DCHURN				0.063***	–	–	0.060***
				(4.07)			(3.43)
SWING0				–	–	0.133+	–
						(1.69)	
SWING1				–	0.128+	–	0.183**
					(1.92)		(2.67)
CONTROLS							
LDV	0.102***	0.102***	0.102***	–	–	–	–
	(9.26)	(8.68)	(8.73)				
EBIAT	0.179***	0.149***	0.151***	0.190***	0.295***	0.289***	0.282***
	(6.36)	(5.63)	(5.67)	(3.28)	(4.60)	(4.47)	(4.45)
MBF	−0.097***	−0.098***	−0.097***	–	–	–	–
	(4.19)	(3.99)	(3.96)				
DAA	−0.068**	−0.071**	−0.064**	–	–	–	–
	(3.15)	(3.28)	(3.26)				
LEV	0.064	−0.029	−0.028	–	–	–	–
	(0.35)	(0.17)	(0.16)				
SIZE	0.007***	0.006***	0.006***	0.006***	–	–	–
	(10.03)	(9.44)	(9.29)	(6.73)			
AGE	0.020**	0.034***	0.032***	0.029**	0.008	0.010	0.012
	(3.00)	(4.09)	(3.88)	(2.67)	(0.73)	(0.86)	(1.07)
PEER	1.044	0.937	0.883	–	–	–	–
	(1.39)	(1.28)	(1.24)				
FY12 (sum of coefficients)	0.004***	0.005***	0.005***	0.003	0.004+	0.004+	0.004+
	(4.34)	(4.11)	(4.19)	(1.62)	(1.91)	(1.89)	(1.89)
Time dummies	YES	YES	YES	YES	YES	YES	YES
No. obs.	2560	2378	2366	760	760	760	760
R^2 within	0.540	0.522	0.524	0.307	0.238	0.238	0.279
F	72.26***	47.80***	48.99***	30.48***	12.88***	13.39***	15.55***
Hausman	997.04***	819.83***	823.59***	210.81***	152.62***	151.67***	163.73
Sigma(u)	1.157	1.115	1.112	1.295	1.140	1.146	1.157
Sigma(e)	0.350	0.345	0.344	0.348	0.364	0.364	0.361
Rho	0.916	0.913	0.913	0.933	0.907	0.908	0.911

(iii) Legend: + $p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. Absolute t ratios based on heteroskedasticity robust standard errors in brackets. Sigma(u): standard deviation of residuals within groups. Sigma(e): standard deviation of residuals. Rho: proportion of the variance due to differences across groups.
(iv) Variable definitions: DV: dependent variable: LDV: lagged dependent variable; DIVIDEND: ln(dividends+0.001) – ln(CPI); EXPLANATORY VARIABLES: ACQ: sum of acquisitions by industry divided by CPI; EXRAT: [(average board equity-based compensation)/(board total compensation)]; FT100: a dummy (1/0) for a firm belonging to FTSE 100 index; INDRAT: [(number of independent directors)/(board size)]; DCHURN: ratio of annual trading volume (number of shares) to total number of shares outstanding, in first difference. SWING: dummy variable equal to 1 if and only if SIZE and DCHURN are in the top quartile and BAP (percentage of bid-ask spread) is in the bottom quartile. SWING0 is unlagged; SWING1 is lagged; CONTROLS: MBF: (price*share/1000 market cap)/(total assets); DAA: [(total assets) - (total assets)$_{-1}$]/

(total assets)$_{-1}$; LEV: [(total long-term debt) + (total debt in current liabilities)/(total assets); SIZE: Percentile ranking of a company in the range of market values in the respective years, lagged; AGE: number of years since firm birthday; PEER: (total dividends by year and industry)/(total sales/turnover by year and industry); EBIAT: Ln of [(earnings before interest and taxes) – (total income taxes)]; FY12: average one- and two-year forward EPS analyst forecasts;; EA, MBF, DAA, LEV, SIZE, EBIAT and PEER are lagged one period.

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