Smoothed or not smoothed: the impact of the 2008 global financial crisis on dividend stability in the UK

Abstract

This study examines the cash dividend behaviour of a panel dataset of 1,178 firms traded in the London Stock Exchange (LSE) for the period 2008-2017. Using a modified version of Lintner's (1956) partial adjustment model, it attempts to ascertain whether they follow a stable dividend policy and how the 2008 global financial crisis affects the dividend stability in the UK. The results in general show that LSE firms have long-term payout ratios and slowly adjust their cash dividends to their target as suggested by Lintner. The study findings also detect a negative impact of the financial crisis on dividend payments and a tendency to adjust dividends immediately in response to earnings changes in the first five-year period 2008-2012. More specifically, despite the credit crunch and volatile earnings, UK firms set high payout rates but adopt stable dividend policies with a serious degree of dividend smoothing in early years. When UK-listed firms have a better chance to recover from the initial impact of the crisis, they however set even higher payout rates but distribute much more smoothed cash dividends (exhibiting more stability) over the second five-year period 2013-2017.

JEL Classification: G01; G30; G35.

Keywords: Dividend stability; dividend smoothing; financial crisis; speed of adjustment; the UK.

1. Introduction

There is a large body of literature documenting substantial evidence across many countries and different time periods that publicly listed firms often tend to follow a traditional Lintner (1956) style dividend smoothing policy (see, e.g., Fama and Babiak, 1968; Dewenter and Warther, 1998; Aivazian et al., 2003; Benavides et al., 2016; Al-Najjar and Kilincarslan, 2017; Ha et al., 2017; Kilincarslan, 2017) – that is, they prefer a stable dividend policy and thus make partial adjustments towards a target payout ratio to smooth dividend payment streams in the short-run. This is because firms perceive that volatile dividend distributions and dividend cuts are bad signals but stable dividend payments are credible insider indicators to reflect their good financial performance to the market. It is further argued that Lintner type dividend smoothing is not only a useful device to signal insider information but can also be a solution to reduce agency problems (Dewenter and Warther, 1998; Aivazian et al., 2003; 2006). Paying stable cash dividends to shareholders reduces the amount of internal free cash under managers' discretion that they might invest in unprofitable projects or even misuse for their own interest. Especially, in the highly diffused ownership settings such as the "Anglo-Saxon" capital markets where the control is concentrated in the hands of managers, the Lintner style dividends can be a useful tool to lessen agency problems. In fact, previous studies report that UK-listed firms generally have a record of significantly high dividend payout rates (e.g., Short et al., 2002; Khan, 2006; Kilincarslan and Ozdemir, 2018). Based on the above discussion, dividend smoothing may be an optimal pre-commitment mechanism to minimise agency problems and convey insider information to investors in the UK market. Thus, we conjecture that UK firms are more likely to adopt stable dividend payments.

Moreover, although the ownership is highly dispersed and it is uncommon for investors to hold very large shareholdings, financial institutions are the major investor group in the UK equity market. According to the Office for National Statistics (2017), UK-based financial institutions have about 29.4% of all ordinary shares in UK quoted firms, whereas overseas financial investors hold around 42% of the beneficial ownership at the end of 2016. Hence, it is commonly disputed that financial investors have a strong positive influence in maintaining high levels of dividend payout of UK firms due to the dividend preferences of tax-exempt institutions (e.g., pension funds and insurance companies). Financial organisations may also have other motivations to desire for dividends such as the common institutional charter and prudent-man rule restrictions (Bond et al., 1995; Allen et al., 2000; Short et al., 2002). If this is the case, we again posit that steady and stable cash dividend payments of UK firms would help satisfy for the dividend income requirements and therefore the liquidity needs of financial investors on ongoing basis.

Nevertheless, it is the fact that other factors such as regulations, legal environment, recessions in economy and financial crises might have a significant impact on a publicly listed firm's dividend policy. For instance, it has now been a decade since the 2008 global financial crisis. The UK economy suffered hardest immediate hit by the crisis as UK banks experienced bigger losses than any other economies. This in turn triggered a near meltdown in the banking system and led to a huge credit crunch especially for UK publicly listed companies which have generally largely relied on banks as a source of financing (Akbar et al., 2017; Marshall et al., 2019). Given the restricted access to external finance and credit supply and considering the volatile earnings, even losses, as a results of the global financial crisis, one can argue that UK firms would have made more use of the internal funds for their liquidity needs and thus deferring dividend payments during and post crisis period. For example, firms may choose to pursue residual dividend payments by paying out whatever remains after funding desired investment projects. Indeed, this situation provides an interesting setting for the study of dividend policy behaviour of UK-listed firms. In particular, it allows investigating how conservative UK-firms are in pursuing stable cash dividends and preventing spectacular changes in the short-run, or whether they are less concerned about dividend smoothing and hence cut, even omit, dividends easily regardless of the fears of bad signalling to the market.

Accordingly, we empirically examine the cash dividend payments of 1,178 UK publicly listed firms with 10,360 firm-year observations between 2008 and 2017, and contribute to the dividend policy literature in several ways. Particularly, using a modified version of the Lintner model based on a recent large-scale panel dataset, we endeavour to provide new insights into the dividend smoothing practices of UK firms. By doing so, our study presents evidence that despite a severe turmoil and volatile earnings, UK firms have set high dividend payouts but smoothed their cash dividend payments, and thus followed stable dividend policies in the post 2008 global financial crisis period. Second, we provide valuable evidence on how the 2008 global financial crisis affects the dividend stability in the UK market since there is none or very little research on this subject. In general, the 2008 crisis had a negative impact forcing UK-listed firms to adjust dividends immediately in response to earnings changes in early years (2008-2012), although they have attempted to make steady cash dividend distributions with a serious degree of smoothing. Nevertheless, UK firms have targeted even higher payouts but paid much more stable dividends – hence, more stable dividend policies, when they had a better chance to recover from the initial impact of the financial crunch in later years (2013-2017). Third, unlike the majority of extant studies usually focus on non-financial firms but exclude financial institutions and utilities, we however include all types of companies in our analysis by controlling for the industry-specific effects. Therefore, our study provides a more complete picture and therefore a better understanding about corporate dividend payments of UK-listed firms. To the best of our knowledge, this paper is the first to investigate the effect of the 2008 financial crisis on the degree of dividend smoothing in the UK market.

The paper proceeds as follows. Section 2 describes the data and methodology. Section 3 presents the empirical results and Section 4 concludes.

2. Data and methodology

2.1 Data sample

As of October, 31, 2018, we identify 2,152 companies listed on the London Stock Exchange (LSE) (2018). We then exclude firms that are incorporated outside the UK and this results in 1,492 UK corporations. Next, we obtain the financial data from OSIRIS database for the period 2008-2017. We further narrow our initial sample down to companies whose data are available on OSIRIS and only select firms that have at least five years of listing history on the LSE during the research period. The reason for this selection is to have sufficient number of years to examine the level of dividend smoothing (in other words, dividend stability) over time. After all, our final sample covers a panel dataset of 10,360 firm-year observations from 1,178 unique LSE-listed firms representing 11 broad industries (including financials, utilities and non-financial companies) between 2008 and 2017.

2.2 Measuring dividend smoothing

More than six decades ago, Lintner (1956) published a pioneering study in which he proposed that US companies make partial adjustments to a long-term target payout level to smooth dividend payment streams in the short-run instead of reflecting changes immediately in earnings – hence, pursuing stable dividend policies. Lintner then developed a mathematical model in order to test for the stability of cash dividend payments, as below:

$$D^*_{i,t} = r_i \, E_{i,t} \qquad (1)$$

Where $D^*_{i,t}$ is the target dividend payment, r_i is the target payout ratio (TPR hereafter) and $E_{i,t}$ is the net earnings for firm *i* at time *t*, illustrating that the firm will only adjust dividends towards a target payout level. Accordingly, the difference in dividend payments from year $t-1$ to year *t* can be expressed by:

$$D_{i,t} - D_{i,t-1} = \alpha_i + c_i \, (D^*_{i,t} - D_{i,t-1}) + \varepsilon_{i,t} \qquad (2)$$

Where α_i is the intercept term, c_i is the speed of adjustment (SOA hereafter) coefficient, $\varepsilon_{i,t}$ is the error term, $D_{i,t}$ is the actual dividend payment and $D_{i,t-1}$ is the previous year's ($t-1$) dividend payment. By substituting $r_i \, E_{i,t}$ for the target dividend payment $D^*_{i,t}$ and rearranging Equation (2), the model can be equivalently obtained:

$$D_{i,t} = \alpha_i + c_i r_i E_{i,t} + (1-c_i) \, D_{i,t-1} + \varepsilon_{i,t} \qquad (3)$$

Moreover, Equation (3) can also be re-written as:

$$D_{i,t} = \alpha_i + \beta_1 E_{i,t} + \beta_2 D_{i,t-1} + \varepsilon_{i,t} \qquad (4)$$

Where $\beta_1 = c_i \, r_i$ and $\beta_2 = (1-c_i)$. According to Lintner (1956), the SOA coefficient (c_i) reflects the stability in dividend changes and calculates the adjustment speed to the TPR (r_i). Thus, the value c_i shows the dividend smoothing behaviour of firm *i* to the variations in the earnings levels – that is, a higher value of c_i implies less dividend smoothing, in other words unstable dividend policy, and vice-versa.

2.3 Research design and model

Numerous studies have examined dividend policy behaviour across many markets and different periods of time by applying Lintner's (1956) partial adjustment model and its variants. Consistent with the extant literature, we also employ a modified version of the Lintner model. First, we attempt to identify if there is a significant impact of the 2008 global financial crisis on the level of dividend smoothing of LSE-listed firms. Hence, we add a crisis dummy representing the two sub-periods 2008-2012 and 2013-2017 – this is because we conjecture that the first impact of the financial crisis on UK firms would have been more severe in early years but then they might have a better chance to recover from the recession in later years. Second, we introduce two interaction terms between the crisis dummy and the explanatory variables to provide further insight on the moderating effects of the global financial crisis on current earnings and lagged dividends. Given that our sample is drawn from 11 different industries, we third include industry dummies to control for the industry-specific effects. Consequently, we formulate the following modified specification of the Lintner model (Model 1):

$$D_{i,t} = \alpha_i + \beta_1 E_{i,t} + \beta_2 D_{i,t-1} + \beta_3 P_{i,t} + \beta_4 (P_{i,t} \times E_{i,t}) + \beta_5 (P_{i,t} \times D_{i,t-1}) + \sum_{j=1}^{N} \beta_j \text{INDUSTRY}_{j,i,t} + \varepsilon_{i,t} \qquad (5)$$

Where $D_{i,t}$ is the current cash dividend payments; $E_{i,t}$ is the current year earnings; $D_{i,t-1}$ is the lagged cash dividends; $P_{i,t}$ is a dummy taking the value of 1 for the sub-period 2008-2012 and 0 for the sub-period 2013-2017; ($P_{i,t}$ x $E_{i,t}$) and ($P_{i,t}$ x $D_{i,t-1}$) are the interaction terms between the crisis dummy and current earnings and lagged dividends, respectively; $INDUSTRY_{j,i,t}$ is a vector of dummy variables representing 11 broad industries (based on the Global Industry Classification Standard (GICS)).

Since we significantly modify the basic Lintner model, it is vital to understand how to calculate the Lintner parameters (i.e., the SOA and TPR) in order to interpret these coefficients and identify their effects on dividend stability.

Accordingly, if we let $P_{i,t}$ = 1, which reflect the sub-period 2008-2012, in Equation (5):

$$D_{i,t} = \alpha_i + \beta_1 E_{i,t} + \beta_2 D_{i,t-1} + \beta_3 \times 1 + \beta_4(1 \times E_{i,t}) + \beta_5(1 \times D_{i,t-1}) + \sum_{j=1}^{N} \beta_j INDUSTRY_{j,i,t} + \varepsilon_{i,t} \quad (5a)$$

Equation (5a) can be re-arranged as follows:

$$D_{i,t} = (\alpha_i + \beta_3) + (\beta_1 + \beta_4)E_{i,t} + (\beta_2 + \beta_5)D_{i,t-1} + \sum_{j=1}^{N} \beta_j INDUSTRY_{j,i,t} + \varepsilon_{i,t} \quad (5b)$$

Where $(\beta_1 + \beta_4) = c_i r_i$ and $(\beta_2 + \beta_5) = (1–c_i)$. Thus, the calculations of SOA and TPR values change when $P_{i,t}$ = 1, as we must also consider the interaction term coefficients to capture the impacts of earnings and lagged dividends through the interaction with the crisis dummy on current year dividend payments. Then, the SOA can now be calculated as $c_i = 1–(\beta_2 + \beta_5)$, and the TPR can be measured by $r_i = (\beta_1 + \beta_4)/(1–(\beta_2 + \beta_5))$ from Equation (5b) for the sub-period 2008-2012.

Next, if we let $P_{i,t}$ = 0, which reflects the sub-period 2013-2017:

$$D_{i,t} = \alpha_i + \beta_1 E_{i,t} + \beta_2 D_{i,t-1} + \beta_3 \times 0 + \beta_4(0 \times E_{i,t}) + \beta_5(0 \times D_{i,t-1}) + \sum_{j=1}^{N} \beta_j INDUSTRY_{j,i,t} + \varepsilon_{i,t} \quad (5c)$$

Equation (5c) can be re-arranged as follows:

$$D_{i,t} = \alpha_i + \beta_1 E_{i,t} + \beta_2 D_{i,t-1} + \sum_{j=1}^{N} \beta_j INDUSTRY_{j,i,t} + \varepsilon_{i,t} \quad (5d)$$

Where $\beta_1 = c_i r_i$ and $\beta_2 = (1 – c_i)$. In this case, the calculations of SOA and TPR remain the same as in the original Lintner model and can be obtained by $c_i = 1–\beta_2$ and $r_i = \beta_1/(1– \beta_2)$, respectively.

2.4 Endogeneity and heteroscedasticity concerns

We apply our research model on the UK panel dataset using the pooled ordinary least squares (OLS) regression technique, following various studies such as Fama and Babiak (1968), Aivazian et al. (2003) and Al-Najjar and Kilincarslan (2017). Although Gujarati (2003) suggests that the partial adjustment model can be consistently estimated by the OLS, there is a critical concern of endogeneity. This is because the inclusion of a lagged dependent variable in the model as an explanatory variable may lead to complications if the lagged dependent variable is correlated with the error term – in other words, endogeneity problem. Hence, we also employ an alternative estimation approach – the system Generalised Method of Moments (GMM), which is developed by Blundell and Bond (1998) to specifically deal with the potential endogeneity problem of a dynamic panel model where a lagged dependent variable is added into the equation as an explanatory variable. Also, employing the system GMM seems the most appropriate econometric technique in the presence of heteroscedasticity. Consequently, the usage of the system GMM not only enables to address endogeneity and heteroscedasticity issues but allows us to check whether our findings from the two estimation procedures are consistent or significantly different from one another.

3. Results

We provide summary statistics of various sample characteristics related to cash dividend payments and net earnings over the research period, as presented in Table 1.

(Insert Table 1 about here)

The results show that sampled LSE-listed firms distributed cash dividends in almost half of the total observations (49.3%) – the proportion of dividend-paying UK firms was about 53% when the global financial crisis took place in 2008 and then followed a gradually decreasing pattern to around 46% in 2013 but then increased steadily to almost 51% in 2017. We further observe that both the aggregate net earnings and average earnings per share figures showed major fluctuations over the entire period. On the other hand, the aggregate cash dividends and mean dividend per share data indicated a slow but solid increasing trend after an initial drop due to the 2008 financial crisis. At first glance, this finding may infer the preference of stable dividend payments and the existence of dividend smoothing despite the spectacular changes in earnings in the UK. Also, the average dividend payout ratio of the sample exhibited some fluctuations around 30% between 2008 and 2017. Additionally, we provide graphical illustrations for the above explained patterns in Figure 1 and Figure 2.

(Insert Figure 1 & Figure 2 about here)

Moreover, Panel A in Table 2 reports the results of the pooled OLS estimates for applying our research model (Model 1) on a UK panel dataset of 1,178 firms listed on the LSE over the period 2008-2017. It is worth noting that our preliminary analysis indicates the occurrence of heteroscedasticity and therefore we use White's corrected heteroscedasticity robust regression to alleviate the problem of heteroscedasticity.

(Insert Table 2 about here)

The *F*-test shows that the pooled OLS model is overall statistically significant at the 1% level. The high R^2 value of 91.35 illustrates a high level of goodness-of-fit that suggests about 91% of the variation in cash dividend payments is explained by the model. The results detect that the coefficients on current earnings ($E_{i,t}$; $t = 5.75$, $p < 0.01$) and lagged dividend payments ($D_{i,t-1}$; $t = 21.76$, $p < 0.01$) are both statistically significant and positive. This evidence provides empirical support for the validity of traditional Lintner style managed dividend policy in the UK market between 2008 and 2017. The results also show that the coefficient on crisis period dummy is negative and highly significant ($P_{i,t}$; $t = -3.71$, $p < 0.01$), indicating the negative impact of the 2008 global financial crisis during the first five-year sub-period (2008-2012) and suggesting that there is a tendency to decrease dividends in early years over the research period. Furthermore, the estimated coefficient on the interaction term between the crisis dummy and current earnings is significantly positive ($P_{i,t} \times E_{i,t}$; $t = 3.17$, $p < 0.01$), whereas the interaction term between the crisis dummy and lagged cash dividends exhibits a solid negative moderating effect on current year dividend payments ($P_{i,t} \times D_{i,t-1}$; $t = -2.85$, $p < 0.01$). These findings imply that although LSE-listed firms tend to make stabilised dividend payments over the period, the increases (losses) in current earnings encourage them to increase (decrease) current year dividend payments in the first sub-period 2008-2012. Considering the inverse impact of lagged dividends through the interaction with crisis dummy; however, LSE firms do not increase (decrease) their current year dividend payments immediately in response to earnings increases (losses). Thus, they attempt to balance stable dividends and prevent spectacular changes in the short-run. Next, we will look at the SOA and TPR parameters more closely in order to interpret these coefficients and to identify their effects on dividend policies of UK firms.

Lintner (1956) suggests that the SOA parameter lies between 0 and 1 ($0 < c \leq 1$) in where the SOA of 1 indicates that the firm does not smooth cash dividends but relies on the long-run TPR, thus pursuing highly volatile dividend payments in response to earning changes. Whereas a SOA value closed to zero shows that the firm smooth dividend payments and slowly adjusts to the TPR, hence following an extremely stable dividend policy. In his pioneering study, Lintner reported the SOA of 0.30 and the TPR of 50% for US firms and interpreted this finding as the evidence that US firms opt for stable dividend policies although they aim for high dividend payouts. Accordingly, Panel A in Table 2 displays our SOA and TPR estimates for the two sub-periods based on the pooled OLS model. It is worth noting that we use "the delta method" to estimate these structural parameters (i.e., SOAs (c_1 and c_2) and TPRs (r_1 and r_2)) as linear or nonlinear combinations of the OLS regression coefficients (i.e., β_1, β_2, β_4 and β_5) using the aforementioned formulas in sub-section 2.3. Since the coefficients of SOAs and TPRs are the transformations of the other estimated coefficients, we also report the standard errors, *t*-values and significance levels of these structural parameters. As can be observed from the table, the coefficients of SOAs and TPRs for the two sub-periods are all statistically significant (at least, at the 5% significance level).

More specifically, it is estimated that the SOA is 0.394 (c_1= 1–(0.826−0.220)) and TPR is 60.9% (r_1 = (0.112 + 0.128)/(1–(0.826−0.220)) for the sub-period 2008-2012, when the 2008 global crisis markedly hit the financial markets world-wide. These findings illustrate that UK firms aim to pay out almost 61% of their earnings to shareholders in the form of cash dividends, which is consistent with the notion that UK companies generally tend to have higher payout rates than their counterparts operated in other developed markets. Despite this high long-term payout ratio and spectacular volatility in net earnings figures due to the financial recession, UK firms however seem to follow stable dividend policies with a serious degree of dividend smoothing of 0.394. Moreover, our estimates reveal that the SOA is 0.174 (c_2 = 1–0.826) and TPR is 64.4% (r_2 = (0.112/(1–0.826)) for the second sub-period 2013-2017. This evidence indicates that when UK listed-firms had a chance to recover from the initial impact of the crisis, they even set higher payout ratios but distribute more smoothed cash dividends, in other words pursuing more stable dividend policies. Finally, it is observed that although the estimated TPRs of both sub-periods are above 60%, the actual mean dividend payout ratio of the sample remains around 30% (see Table 1) over the research period. This evidence also suggests that the LSE firms set binding long-term target payout ratios by moving gradually to their target, consistent with Lintner's prediction.

We further re-perform the above tests using the system GMM regression in order to address endogeneity and heteroscedasticity issues. By doing this, we also check if the pooled OLS estimates are robust or sensitive to the usage of an alternative estimation technique. Panel B in Table 2 reports the estimates from the system GMM model, which are very similar to the estimates from the pooled OLS model that are shown in Panel A in the same table. Overall, this evidence confirms more robust and reliable results from both econometric approaches.

Lastly, following studies such as Fama and Babak (1968), Aivazian et al. (2003) and Al-Najjar and Kilincarslan (2017), we also carry out additional tests by using firm-level data (i.e., per share data). The reason for this is because each company makes their dividend policy decision individually, thus it is argued that firm-level data are more suitable for studying firm-specific choices. Accordingly, we replicate the previous analysis by using per share data in order to identify whether the main results also hold for the firm-level data (and not only the aggregate data). Table 3 illustrates the results of the pooled OLS estimates in Panel A and the system GMM estimates in Panel B for re-running the research model using firm-level data (Model 2). These results are consistent with what we previously report using aggregate data because the independent variables have the same directional signs, exhibit similar statistical significance behaviour and provide relatively close SOAs and TPRs. Consequently, this evidence further shows the robustness of our main findings.

(Insert Table 3 about here)

4. Conclusion

In this paper, we examine the cash dividend behaviour of UK publicly listed companies. We attempt to identify whether they follow a stable dividend policy and how the 2008 global financial crisis affects the dividend stability in the UK market. Based on a sample of 1,178 LSE-listed firms between 2008 and 2017, we find, in general, that LSE firms have long-term payout ratios and slowly adjust their cash dividends to their target as suggested by Lintner (1956). Our results also show a negative impact of the 2008 global financial crisis and a tendency to adjust dividends immediately in response to earnings changes in early years (between 2008 and 2012) over the research period. In particular, we detect that despite the credit crunch and volatile earnings, UK firms set high payout rates but adopt stable dividend policies with a serious degree of dividend smoothing during the sub-period 2008-2012. Our results further illustrate that UK firms however set even higher payout rates but distribute much more smoothed cash dividends, in other words exhibiting more stability, over the second five-year sub-period 2013-2017 when they had a chance to recover from the initial impact of the financial crisis. With these important findings in mind, investigating the impact of the 2008 global financial crisis on corporate dividend smoothing practices across different countries (both developed and emerging markets) could be an interesting topic for further research and is surely next on our future research agenda.

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Table 1. Cash dividends and net income trends over the period 2008-2017

This table shows the patterns of cash dividends and earnings of the sample of 1,178 different firms listed on the LSE with 10,360 firm-year observations over the period 2008-2017. Osiris database serves as the source of the data. Column 2 displays the number of listed-firms in our sample over time. Column 3 presents the percentage of dividend-paying LSE firms. Columns 4 and 5 report the real aggregate cash dividends paid and net earnings (after taxes). Columns 6 and 7 illustrate average dividends per share and earnings per share, respectively. Columns 8 shows average dividend payout ratio for the sampled firms across each year during the period 2008-2017.

Year	Number of Firms	Cash Dividend Payers (%)	Cash Dividends (million £)	Net Earnings (million £)	Dividends per Share (£)	Earnings per Share (£)	Dividend Payout Ratio (%)
2008	829	53.44	39.70	46.11	0.105	−0.132	31.55
2009	845	48.17	29.80	55.56	0.075	−0.031	32.97
2010	870	48.96	33.63	72.88	0.070	0.094	26.69
2011	950	48.63	36.79	76.35	0.079	0.102	28.67
2012	1,023	47.99	36.35	56.84	0.086	0.086	29.76
2013	1,168	46.40	35.85	56.34	0.085	0.129	28.41
2014	1,171	47.74	36.74	57.51	0.084	0.122	26.67
2015	1,168	50.00	36.07	51.16	0.087	0.115	31.47
2016	1,169	50.64	37.63	56.62	0.089	0.175	32.01
2017	1,167	50.99	41.20	74.94	0.097	0.229	30.37
Mean	1,036	49.30	36.38	60.43	0.086	0.132	29.86
S.D.	149.95	2.02	3.12	10.47	0.010	0.070	2.10

Figure 1. Propensity of dividend payers, aggregate cash dividends and net earnings over the period 2008-2017

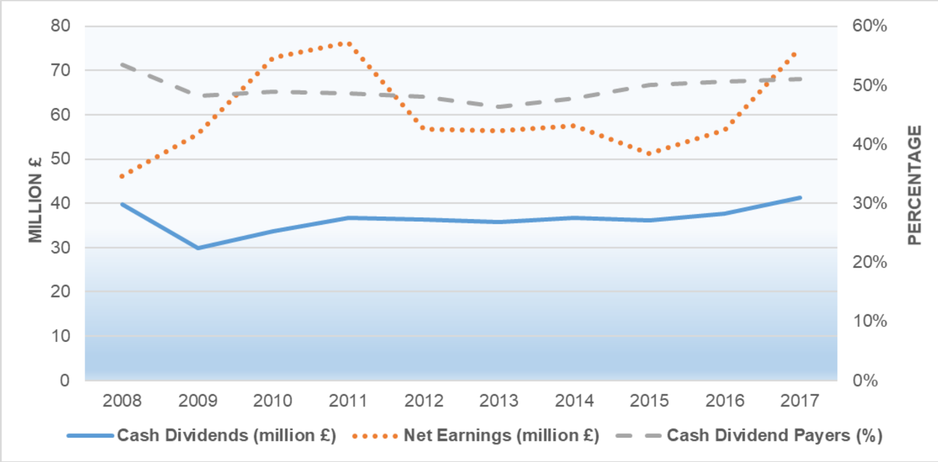

Figure 2. Propensity of mean dividend per share, earnings per share and dividend payout ratio over the period 2008-2017

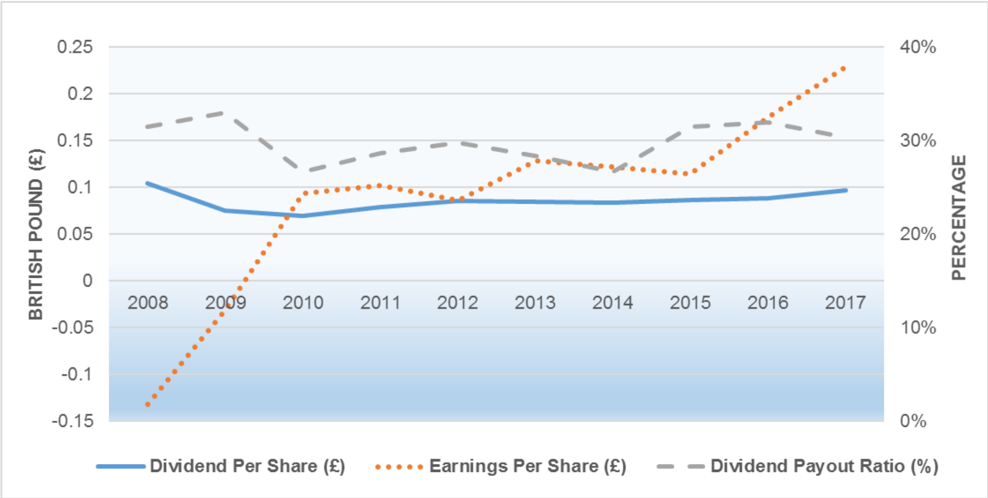

Table 2. Results of dividend smoothing tests

This table reports coefficients and standard errors in parentheses, and t-statistics. The pooled OLS model is tested using White's corrected heteroscedasticity robust regression. The two-step, robust (Windmeijer's standard error correction), small (corrections that results in *t* instead of *z* statistic for the coefficients and *F* instead of *Wald* X^2 test for overall fit) and orthogonal (maximising sample size in panels with gaps) commands are used to make the system GMM estimates even more robust. The *p*-values of AR(1) and AR(2) reported for first- and second-order tests for autocorrelation. The value for the Hansen *J*-test is the *p*-value for the null hypothesis of instrumental validity. The delta method is used to estimate structural parameters (i.e., SOAs (c_1 and c_2) and TPRs (r_1 and r_2)) as linear or nonlinear combinations of regression coefficients (i.e., β_1, β_2, β_4 and β_5).

Estimates for the modified specification of Lintner model				
Dependent variable: $D_{i,t}$				
Model 1	**Panel A:** Pooled OLS		**Panel B:** System GMM	
Independent variables (βs):	Coefficient (Std. error)	*t*-value	Coefficient (Std. error)	*t*-value
$E_{i,t}$ (β_1)	0.112 (0.0195)***	5.75	0.106 (0.0195)***	5.43
$D_{i,t-1}$ (β_2)	0.826 (0.0380)***	21.76	0.841 (0.0348)***	24.20
$P_{i,t}$ (β_3)	−2.510 (0.6765)***	−3.71	−2.153 (0.5726)***	−3.76
$P_{i,t}$ x $E_{i,t}$ (β_4)	0.128 (0.0404)***	3.17	0.127 (0.0419)***	3.03
$P_{i,t}$ x $D_{i,t-1}$ (β_5)	−0.220 (0.0772)***	−2.85	−0.225 (0.0738)***	−3.05
Constant	7.986 (5.7043)	1.40	7.162 (5.5519)	1.29
INDUSTRY	Yes		Yes	
Number of observations	9,141		9,141	
F-statistic	795.26***		101.83***	
R-squared	91.35%			
Arellano-Bond test for (AR1) [*p*-value]			[0.008]	
Arellano-Bond test for (AR2) [*p*-value]			[0.174]	
Hansen overidentifying test [*p*-value]			[0.273]	
Instruments:			60	
For first-differenced equations (orthogonal)			$D_{i,t-1}$,….., $D_{i,t-9}$	
For level equations			$E_{i,t}$, $P_{i,t}$, $P_{i,t}$ x $E_{i,t}$, $P_{i,t}$ x $D_{i,t-1}$, INDUSTRY	

Estimates of SOA and TPR using delta method				
	Coefficient (Std. error)	*t*-value	Coefficient (Std. error)	*t*-value
<u>P = 1 (Between 2008 and 2012)</u>				
Target payout ratio (r_1) $\left[r_1 = \frac{(\beta_1+\beta_4)}{1-(\beta_2+\beta_5)}\right]$	0.609 (0.1874)***	3.25	0.607 (0.2628)**	2.31
Speed of adjustment (c_1) $[c_1 = 1-(\beta_2+\beta_5)]$	0.394 (0.1885)**	2.09	0.384 (0.1692)**	2.27
<u>P = 0 (Between 2013 and 2017)</u>				
Target payout ratio (r_2) $\left[r_2 = \frac{\beta_1}{1-\beta_2}\right]$	0.644 (0.1630)***	3.95	0.667 (0.2711)**	2.46
Speed of adjustment (c_2) $[c_2 = 1-\beta_2]$	0.174 (0.0780)**	2.23	0.159 (0.0746)**	2.13

*** Statistical significance at the 1% level (p<0.01)
** Statistical significance at the 5% level (p<0.05)
* Statistical significance at the 10% level (p<0.10)

Table 3. Results of dividend smoothing tests using firm-level data

This table reports coefficients and standard errors in parentheses, and t-statistics. The pooled OLS model is tested using White's corrected heteroscedasticity robust regression. The two-step, robust (Windmeijer's standard error correction), small (corrections that results in *t* instead of *z* statistic for the coefficients and *F* instead of *Wald* X^2 test for overall fit) and orthogonal (maximising sample size in panels with gaps) commands are used to make the system GMM estimates even more robust. The *p*-values of AR(1) and AR(2) are for first- and second-order tests for autocorrelation. The value for the Hansen *J*-test is the *p*-value for the null hypothesis of instrumental validity. The delta method is used to estimate structural parameters (i.e., SOAs (c_1 and c_2) and TPRs (r_1 and r_2)) as nonlinear combinations of regression coefficients (i.e., β_1, β_2, β_4 and β_5). The model using firm-level data (Model 2) is constructed as below:

$$DpS_{i,t} = \alpha_i + \beta_1 EpS_{i,t} + \beta_2 DpS_{i,t-1} + \beta_3 P_{i,t} + \beta_4 (P_{i,t} \times EpS_{i,t}) + \beta_5 (P_{i,t} \times DpS_{i,t-1}) + \sum_{j=1}^{N} \beta_j INDUSTRY_{j,i,t} + \varepsilon_{i,t} \quad (6)$$

Where $DpS_{i,t}$ is the current dividend per share; $E_{i,t}$ is the current year earnings per share; $D_{i,t-1}$ is the lagged dividend per share; $P_{i,t}$ is a dummy taking the value of 1 for the sub-period 2008-2012 and 0 for the sub-period 2013-2017; ($P_{i,t}$ x $EpS_{i,t}$) and ($P_{i,t}$ x $DpS_{i,t-1}$) are the interaction terms between the crisis dummy and current earnings per share and lagged dividend per share, respectively; $INDUSTRY_{j,i,t}$ is a vector of dummy variables representing 11 broad industries (based on the Global Industry Classification Standard (GICS)).

Estimates for the modified specification of Lintner model using firm-level data				
Dependent variable: $DpS_{i,t}$				
Model 2	**Panel A:** Pooled OLS		**Panel B:** System GMM	
Independent variables (βs):	Coefficient (Std. error)	*t*-value	Coefficient (Std. error)	*t*-value
$EpS_{i,t}$ (β_1)	0.069 (0.0109)***	6.36	0.084 (0.0258)***	3.25
$DpS_{i,t-1}$ (β_2)	0.884 (0.0265)***	33.33	0.862 (0.0811)***	10.63
$P_{i,t}$ (β_3)	−0.049 (0.0287)*	−1.71	−0.034 (0.0148)**	−2.29
$P_{i,t}$ x $EpS_{i,t}$ (β_4)	0.095 (0.0268)***	3.54	0.090 (0.0162)***	5.57
$P_{i,t}$ x $DpS_{i,t-1}$ (β_5)	−0.191 (0.0677)***	−2.82	−0.178 (0.0416)***	−4.28
Constant	0.023 (0.0128)*	1.79	0.044 (0.0208)**	2.12
INDUSTRY	Yes		Yes	
Number of observations	9,141		9,141	
F-statistic	308.08***		185.17***	
R-squared	81.75%			
Arellano-Bond test for (AR1) [*p*-value]			[0.000]	
Arellano-Bond test for (AR2) [*p*-value]			[0.185]	
Hansen overidentifying test [*p*-value]			[0.345]	
Instruments:			60	
For first-differenced equations (orthogonal)			$DpS_{i,t-1}$,….., $DpS_{i,t-9}$	
For level equations			$EpS_{i,t}$, $P_{i,t}$, $P_{i,t}$ x $EpS_{i,t}$, $P_{i,t}$ x $DpS_{i,t-1}$, INDUSTRY	

Estimates of SOA and TPR using delta method				
	Coefficient (Std. error)	*t*-value	Coefficient (Std. error)	*t*-value
<u>*P = 1 (Between 2008 and 2012)*</u>				
Target payout ratio (r_1) $\left[r_1 = \frac{(\beta_1+\beta_4)}{1-(\beta_2+\beta_5)}\right]$	0.534 (0.2438)**	2.19	0.551 (0.2728)**	2.02
Speed of adjustment (c_1) $[c_1 = 1-(\beta_2+\beta_5)]$	0.307 (0.1364)**	2.25	0.316 (0.1317)**	2.40
<u>*P = 0 (Between 2013 and 2017)*</u>				
Target payout ratio (r_2) $\left[r_2 = \frac{\beta_1}{1-\beta_2}\right]$	0.595 (0.2280)***	2.61	0.609 (0.1578)***	3.86
Speed of adjustment (c_2) $[c_2 = 1-\beta_2]$	0.116 (0.0383)***	3.03	0.138 (0.0266)***	5.19

*** Statistical significance at the 1% level (p<0.01)
** Statistical significance at the 5% level (p<0.05)
* Statistical significance at the 10% level (p<0.10)