The information content of cashflows in the context of dividend smoothing

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ABSTRACT

This paper aims to investigate the information content of cash flows in the context of dividend smoothing. Unlike previous studies, we propose a novel partial adjustment model based on cash flows, and compare it to Lintner's (1956) model. The results show that UK firms smooth their cash flows and that cash flows are the key determinant of dividend policy. Moreover, our proposed dividend partial adjustment model has a lower adjustment coefficient than Lintner's model, suggesting that our estimates are much closer to reality. The results are consistent across different measures of cash flows.

1. INTRODUCTION

IN THEIR SEMINAL WORK, Miller and Modigliani (1961) argue that changes in dividends depend largely on management's expectations of future earnings and cash flows. Subsequent studies provide evidence of the association between earnings and dividends (see Fama and Babiak, 1968; Brav *et al*, 2005). However, with respect to the association between cash flows and dividends, prior studies have been inconclusive (Simons, 1994; Charitou and Vafeas, 1998). These results are somehow at odds with the argument of the superiority of cash flows over earnings in explaining dividend policy (see among others, Healy, 1985; Charitou and Vafeas, 1998), suggesting that further inquiry is warranted. This paper employs a behavioural model and provides new insights into the cash flow-dividend relation.

It is generally held that cash flows are important in determining the value of a firm (Belghitar et al, 2008). Given this and improvements in financial reporting — in particular cash flow reporting — in the last decade or so, some studies have questioned whether earnings provide superior information content than cash flows in explaining dividend policy. For instance, Healy (1985) argues that cash flows are more reliable in determining firm value than earnings because the latter can easily be manipulated by managers to maximise their own compensation. In a similar vein, Lee (1983) points out that div-

idend payments should be based on cash flows, not on earnings, because cash flows better reflect the position of the firm. In addition, Charitou and Vafeas (1998) argue that cash flows are a direct measure of liquidity and hence are likely to be a contributing factor in determining dividend payments. However, their empirical analysis does not support a significant relation between cash flows and dividends. Similar findings are also reported by Crum *et al* (1988) and Simons (1994). Despite employing different refined measures of cash flows, the above relationship was not significant in these studies, suggesting that earnings may have better incremental information in explaining dividend policy. One possible explanation for this weak relationship is that earnings and cash flows are included simultaneously in the investigated models, and this could have weakened the significance of cash flows in these studies. Another possible explanation is that prior studies used static models to explain the cash flow-dividend relation.

In this paper, we propose a basic but versatile partial adjustment model based on cash flows, and compare it to Lintner's (1956)[2] model to assess the effect of cash flows on dividends. In particular, we modify Lintner's model to include cash flows. The main rationale for comparing the two models is to see whether cash flows or earnings increase/decrease the adjustment coefficient. Another important feature of this paper is that we control for the potential correlation of both the previous year's dividends and cash flows, or earnings in the case of Lintner's model, with the unobserved firm-specific effect in our models, by employing Generalised Method of Moments (GMM) panel estimation, as suggested by Arellano and Bover (1995) and Blundell and Bond (1998). Our results are consistent across the different models and show that cash flows are superior to earnings in dividend smoothing, suggesting that cash flows are the key determinant of dividend payments.

The remainder of this paper is structured as follows: Section 2 covers the previous empirical work; Section 3 discusses the data and methodology; Section 4 presents the results; and Section 5 concludes.

2. Previous related work

We aim in this section to discuss briefly the previous related literature. Lintner (1956) proposes a partial-dividend model which shows that firms are reluctant to cut dividends and have a strong propensity to smooth dividends. These findings are confirmed in both developed markets (e.g. Fama and Babiak, 1968; McDonald *et al*, 1975; Baker *et al,* 1985; Behm and Zimmermann, 1993; Lasfer 1996; Goergen *et al*, 2004; Brav *et al,* 2005) and developing markets (e.g. Pandey and Bhat, 2007; Al-Najjar, 2009). For example, in a recent study, Lambrecht and Myers (2010) show that dividend payments follow the pattern of the Lintner Model. Andres *et al* (2009) suggest that UK and US firms adjust slowly to their dividends compared to their German counterparts. Thus there is general empirical support for Lintner's partial adjustment specification.[3]

Other studies have attempted to provide explanations for the so-called dividend policy puzzle (e.g., Holder *et al*, 1998; Short *et al*, 2002; Ho, 2003; Aivazian *et al*, 2003). These studies stress the fact that there are different factors that affect the decisions on dividend policy. In other words, the results support the notion that different theories can explain dividend policy decisions, including agency theory, signalling theory, and the pecking order hypothesis, suggesting that there is no single theory that can explain dividend policy or the behavioural aspect of dividend payments.

Cash flows are considered to be an important factor in determining a firm's value. Bowen et al (1986) are among the first to assess the relationship between earnings and cash flows. They find that current earnings have no significant predictive ability compared to current cash flows. However, Dechow et al (1998) find support for a positive correlation between current earnings and firms' operating cycles. When applying non-linear regression models, Hodgson and Stevenson-Clarke (2000) find that cash flows and earnings have higher information content, and they conclude that cash flows have greater explanatory power for large firms. Kim and Kross (2005) find that the relationship between current earnings and future cash flows increases with time.

Attempts to assess the relationship between dividend payments and cash flows have been inconclusive (Fama and Babiak, 1968; Hagerman and Huefner, 1980; Crum et al, 1988; Simons, 1994; Charitou and Vafeas, 1998). For example, Simons (1994) investigates the relationship between dividends and cash flows, and concludes that this relationship is ambiguous. In a similar vein, Crum et al (1988) find that the most important factors affecting dividends are the previous year's dividends and income. Other studies investigate the free cash flow hypothesis against signalling theory, among them, Maquieira and Megginson (1992) and Moh'd *et al* (1995).

3. Data and methodology

3.1 Data

The sample for this study is taken from the ICCSR UK Environmental & Financial Dataset.[4] The sample includes listed firms with rich information of dividend payments over a considerable period of time. Consistent with the previous literature, the study excludes financial firms from the analyses. The sample includes firms regardless of whether they paid dividends or not during the period of time of the dataset. The sample does not exclude any non-survived firms, and hence there is no survivorship bias in our study. This gives us a final unbalanced sample of around 432 non-financial firm-year observations from 1991 to 2007 inclusive.

Table 1 shows the descriptive statistics for the data and the empirical definition of the variables used in this study. The mean of the free cash flows per share and net cash flows from operating activities per share are almost identical (0.42 and 0.41, respectively). This is consistent with the developed

Table 1 Descriptive Statistics

Variables	*Worldscope Item code*	*Min.*	*Max.*	*Mean*	Std. Dev.
Dividend per share (DPS)	Item 05101	0	394	10.78	15.32
Earnings per share (EPS)	Item 05201	0	1237.94	23.45	35.39
FCF	Item 05507	-11.82	43.95	0.42	1.31
CFO	Item 04860	-11.82	43.94	0.41	1.22

DPS is measured as total cash dividends divided by total number of company ordinary shares. EPS is measured as the annual earnings reported by the company divided by total number of company ordinary shares. FCF is measured as (funds from operations — capital expenditures — cash dividends paid) divided by total number of company ordinary shares. CFO is measured as the sum of funds from operations, funds from/used for other operating activities and extraordinary items scaled by total number of company ordinary shares. FCF is measured as (funds from operations — capital expenditures — cash dividends paid) divided by total number of shares.

models of cash flows and dividend payments in the methodology section. In addition, the descriptive statistics show that UK firms pay on average £15.32, with a maximum dividend per share of £394.44. The dividend-payout ratio represents, on average, 50 times the earnings per share. Finally, the average earnings per share are not high for our sample, at around £23.

3.2 Methodology

The first model that we consider is Lintner's (1956) model. In his work, Lintner conducts a series of interviews with US corporate managers about their dividend policy decisions. Lintner assumes that the process of determining dividend policies in firms is based on the fact that firms have long-run target dividend payouts, and that mature firms with stable earnings are more likely to pay dividends than growing firms. This implies that changes in dividends are more important for managers than absolute dividend levels. Changes in dividends are also expected to follow a shift in long-run sustainable earnings, suggesting that firms smooth their dividends. Finally, managers are reluctant to cut dividend payments as they consider that any cut in dividends may give a negative signal about the firm in the market. It is also worth noting that Lintner's model assumes that firms tend to move to their target payouts and do not make any instant response to any changes in earnings.

Accordingly, Lintner develops a statistical partial adjustment model to consider the smoothing process in dividend payments, under the assumption that firms will always keep their target payout ratios. Thus, the target dividend payments are a proportion of the firms' earnings per share.

$$DPS_{it}^{*} = \tilde{n}_i \,\mathrm{EPS}_{\mathrm{it}} \qquad (1)$$

where DPS^*_{it} is the expected dividend payments per share for firm i in period t, ρi is the target payout ratio; EPS_{it} is the earnings per share for firm i in period t.

The change in dividends is equal to:

$$DPS_{it} - DPS_{it-1} = \ddot{e}_i (DPS^*_{it} - DPS_{it-1}), \quad (2)$$

$$DPS_{it} - DPS_{it-1} = \ddot{e}_i DPS^*_{it} - \ddot{e}_i DPS_{i(t-1)}, \quad (3)$$

knowing that $DPS^*_{it} = \rho_i EPS_{it}$, equation (3) becomes

$$DPS_{it} - DPS_{it-1} = \ddot{e}_i \tilde{n}_i EPS_{it} - \ddot{e}_i DPS_{it-1} \quad (4)$$

Re-arranging equation (4), Lintner's partial adjustment model is:

$$DPS_{it} = \acute{a}_1 EPS_{it} + \acute{a}_2 DPS_{it-1} \quad (5)$$

where α_1 is $\lambda_i\rho_i$ (where λ_i is the speed of adjustment coefficient), ρ_i is the target payout ratio, and α_2 is (1- λ_i). Empirically, the adjustment model of equation (5) can be estimated as:

$$DPS_{it} = \acute{a}_0 + \acute{a}_1 EPS_{it} + \acute{a}_2 DPS_{it-1} + \grave{\imath}_{it} \quad (6)$$

After investigating Lintner's model, the study modifies the model to include two different measures of cash flows.[5] The first model captures the effect of the cash flows from operating activities, under the assumption that such cash flows are a rich source for paying dividends. The following empirical model reflects this effect:

$$DPS_{it} = \acute{a}_0 + \acute{a}_1 CFO_{it} + \acute{a}_2 DPS_{it-1} + \grave{\imath}_{it} \quad (7)$$

where CFO is the cash flows from operating activities. Goergen *et al* (2004) apply a similar model when they investigate dividend policy in Germany. A positive significant coefficient may indicate that cash flows from operating activities are considered as the main source of paying dividends. We use panel data estimations, fixed effects and random effects techniques to estimate the model.

The second empirical model investigates the free cash flows hypothesis and is expressed as follows:

$$DPS_{it} = \acute{a}_0 + \acute{a}_1 FCF_{it} + \acute{a}_2 DPS_{it-1} + \grave{\imath}_{it} \quad (8)$$

where FCF is free cash flows. A positive significant coefficient on FCF indicates that UK firms tend to minimise agency conflicts between managers and share-

holders by paying dividends from free cash flows. Hence, this model reflects agency conflicts, as we assume that firms pay dividends from their cash flows to reduce agency problems (Jensen, 1986).

Furthermore, the study proposes the following empirical models to test whether UK firms smooth their cash flows in order to use them as a source for paying dividends:

$$CFO_{it} = \acute{a}_0 + \acute{a}_1 \, EPS_{it} + \acute{a}_2 \, CFO_{it-1} + \grave{\imath}_{it} \quad (9)$$

$$FCF_{it} = \acute{a}_0 + \acute{a}_1 \, EPS_{it} + \acute{a}_2 \, FCF_{it-1} + \grave{\imath}_{it} \quad (10)$$

All the models used in this study are estimated using panel data techniques, in which the Lagrange Multiplier is used to test the effect of the pooled specifications against the random effects specifications. The Hausman test is also used to test the preferable form between random effects models and fixed effects models. In addition, for robustness, the GMM is also reported.

Table 2: Lintner Model

Independent variables	*F-E*	*R-E*	*GMM (DIF)*	*GMM (SYS)*
Constant	1.422a (0.101)	0.574a (0.090)	2.430a (0.139)	1.708a (0.093)
DPS_{t-1}	0.337a (0.008)	0.485a (0.007)	0.259a (0.011)	0.263a (0.007)
EPS	0.250a (0.003)	0.219a (0.003)	0.242a (0.003)	0.271a (0.003)
Adjustment coefficient	0.663	0.515	0.741	0.737
Payout ratio	0.377	0.425	0.326	0.367
No. of Obs.	6332	6332	5897	6332
R^2	0.85	0.86		
Hausman test $\chi^2(2)$	6649.83 a			
Breusch/Pagan LM Test $\chi^2(2)$	501.30 a			
Sargan test χ^2(df)			1406.08a(2)	2213.32a(43)

The dependent variable is DPS. For full definition of variables see Table 1.
Standard errors are in parentheses. Superscript a indicates statistical significance at 1%

4. RESULTS

Table 2 shows the estimation of the Lintner model. The Lagrange Multiplier test is statistically significant, suggesting that the random effects

model is preferable to the pooled model; hence the random effects model is reported in the above table. However, the Hausman test indicates that the fixed effects model is more appropriate than the random effects model, hence the fixed effects model is the preferable model for the dataset. The earnings per share and the previous dividends per share are both statistically significant in all models, with the expected positive sign. These results are consistent with the Lindner's original model. The constant is also significant and with a positive sign in all models, indicating that firms are reluctant to cut dividends. The adjustment coefficient in all models is high, above 0.50, suggesting that firms are adjusting relatively quickly to their targets. This gives only limited evidence that UK firms tend to smooth and stabilise their dividend policy. The target payout ratio varies between 0.326 and 0.425, which is lower than the average payout ratio (0.589, see Table 1). This shows that there is limited evidence that UK firms have target payout ratios and that they adjust to their targets. This result is consistent with the findings of Brav *et al* (2005), that the payout ratio is not as relevant as in Lintner's time. It is worth mentioning that the GMM models (models 3 and 4), which control for endogeneity, confirm the results of the partial adjustment Models, 1 and 2. However, the adjustment coefficients in the GMM models are slightly higher. In sum, one can argue that this version of Lintner's model indicates limited or no evidence that UK firms use dividends as a signalling tool.

Table 3: Lintner Modified (partial adjustemnt model)

Independent variables	*Model 1*	*Model 2*	*Model 3*	*Model 4*
Constant	3.953[a] (0.183)	4.038[a] (0.186)	1.557[a] (0.147)	1.549[a] (0.148)
DPS_{t-1}	0.653[a] (0.011)	0.652[a] (0.011)	0.883[a] (0.007)	0.886[a] (0.007)
FCF	0.559[a] (0.167)		0.368[a] (0.090)	
CFO		0.610[a] (0.181)		0.397[a] (0.097)
Adjustment coefficient	0.347	0.348	0.117	0.114
No. of Obs.	4806	4796	4806	4796
R^2	0.75	0.76	0.75	0.76
Hausman test $\chi^2(2)$			678.63[a]	690.82
Breusch/Pagan LM Test $\chi^2(2)$			13.45[a]	14.05

The dependent variable is DPS. For full definition of variables see Table 1.
Standard errors are in parentheses. Superscript a indicates statistical significance at 1%

Table 3 shows the results of our proposed modified partial adjustment models (see equations 7 and 8), where earnings per share are substituted with two measures of cash flows (free cash flows, and net cash flows from operating activities). The cash flows variables are positive and significant, suggesting they have an important effect on dividend payment decisions. The positive sign on free cash flows provides strong evidence that UK firms tend to pay dividends from their free cash flows to minimise the agency conflict between shareholders and mangers, consistent with the free cash flow hypothesis (Jensen, 1986; Easterbrook, 1984). Similarly, the positive sign on net cash flows from operating activities indicates that these cash flows are considered to be an important source for firms to pay dividends. This finding suggests that firms with more net cash flows from operating activities tend to pay dividends to their shareholders. Finally, the adjustment coefficient in the cash flow models is below 0.50, which shows that UK firms tend to smooth and stabilise their dividends when cash flows are considered as a source for paying dividends.

Table 4: Modified Lintner Modified GMM

	GMM (DIF)		*GMM (SYS)*	
Independent variables	*Model 1*	*Model 2*	*Model 3*	*Model 4*
Constant	6.865[a]	6.470[a]	3.984[a]	4.108[a]
	(0.238)	(0.233)	(0.184)	(0.182)
DPS_{t-1}	0.393[a]	0.454[a]	0.629[a]	0.641[a]
	(0.179)	(0.017)	(0.010)	(0.010)
FCF	0.288		1.091[a]	
	(0.218)		(0.233)	
CFO		0.026[a]		0.742[a]
		(0.216)		(0.228)
Adjustment coefficient	0.607	0.546	0.371	0.359
No. of Obs.	4398	4384	4806	4796
Sargan test χ^2(df)	1750.92[a]	1737.62[a]	3225.10[a]	3206.59[a]

The dependent variable is DPS. For full definition of variables see Table 1. Standard errors are in parentheses. Superscript a indicates statistical significance at 1%.

In Table 4 we report the results of equations 7 and 8 using the GMM estimator to control for potential endogeneity. The results are consistent with those in Table 3. However, free cash flow in Model 1 is not statistically significant, although it does have a positive sign. The adjustment coefficients are higher than those reported in Table 3. The overall conclusion from equations

7 and 8 is that there is some evidence that UK firms use dividends as a tool to minimise agency conflicts, a result consistent with our previous findings.

Table 5 Cash flow models

	FCF		*CFO*	
Independent variables	*Model 1 (F-E)*	*Model 2 (R-E)*	*Model 3 (F-E)*	*Model 4 (R-E)*
Constant	0 .181[a] (0.014)	0.048[a] (0.011)	0.195[a] (0.013)	0.048[a] (0.011)
EPS	0.0008[b] (0.0003)	0.0006[a] (0.0002)	0.001[a] (0.0003)	0.001[a] (0.0002)
FCF_{t-1}	0.529[a] (0.013)	0.859[a] (0.007)		
CFO_{t-1}			0.441[a] 0.013	0.839a (0.007)
Adjustment coefficient	0.471	0.141	0.559	0.161
No. of Obs.	4553	4553	4553	4553
R^2	0.75	0.75	0.71	0.71
Hausman test $\chi^2(2)$			874.81[a]	1201.62[a]
Breusch/Pagan LM $\chi^2(2)$			26.50[a]	6.65[a]

The dependent variable for models 1 and 2 is Free cash flow per share; the dependent variable for models 3 and 4 is Net operating cash flow per share. F-E stands for fixed effect estimator and R-E stands for random effect estimator. For full definition of variables see Table 1. Standard errors are in parentheses. Superscripts a and b indicate statistical significance at 1% and 5% respectively.

Table 5 reports the results of whether the UK firms smooth and stabilise their cash flows to pay dividends, where cash flows are dependent variables, with lagged cash flows and earnings per share as the independent variables. The lagged dependent variables have the expected significant positive sign, indicating that the previous year's cash flows are important determinants of current cash flows. The adjustment coefficient is below 0.50, apart from Model 3, suggesting that UK firms smooth and stabilise their cash flows. This provides evidence that cash flows are used for paying dividends. Similarly, Table 6 confirms the results reported in Table 5 using GMM estimation.

Table 6 Cash flow models (GMM)

	FCF		*CFO*	
Independent variables	*Model 1*	*Model 2*	*Model 3*	*Model 4*
Constant	0.183[a] (0.017)	0.213[a] (0.016)	0.085[a] (0.018)	0.122[a] (0.017)
EPS	0.0003 (0.0005)	0.0006 (0.0005)	-0.0007 (0.0006)	-0.0003 (0.0005)
FCF_{t-1}	0.557[a] (0.014)		0.853[a] (0.009)	
CFO_{t-1}		0.461[a] (0.014)		0.743[a] (0.008)
Adjustment coefficient	0.443	0.539	0.539	0.257
No. of Obs.	4138	4116	4116	4533
Sargan test $\chi^2(2)$	3033.88[a]	3161.85[a]	3161.85[a]	5305.86[a]

The dependent variable is DPS. For full definition of variables see Table 1. Standard errors are in parentheses. Superscript a indicates statistical significance at 1%.

5. Summary and conclusions

This paper aims to shed new light on the relationship between cash flows and financial decisions, such as dividend policy. In particular, we investigate the relationship between cash flows from operating activities and free cash flows, and dividend payments in the UK setting. We apply dynamic modelling using partial adjustment models for both cash flow models and dividend payment models to assess the extent to which firms smooth their cash flows or dividends.

The results show that UK firms smooth their cash flows from operating activities and free cash flows, and hence we argue that these cash flows are used as a source for paying dividends. The original version of the Lintner model is not working effectively for our UK sample. However, the modified dividend partial adjustment model, which includes cash flows, is more suitable; both cash flows from operations and free cash flows affect dividend decisions. It is worth noting that our findings are consistent with the agency theory of dividend policy and with the free cash flows hypothesis. Hence, our analysis indicates that cash flows can replace earnings as a significant source for paying dividends.

Our paper contributes to the dividend policy literature by providing empirical evidence that UK firms rely on their cash flows to pay dividends.

This result is consistent with Jensen's (1986) agency theory. We also contribute to the behavioural aspect of dividend policy, as we modify Lintner's (1956) framework and provide empirical evidence that the modified version explains better the smoothing process of dividends for UK firms. Finally, our empirical analysis ended just before the global financial crisis, so it would be interesting if further studies investigated the impact of this crisis on the process of smoothing dividends. Investigating the relationship between corporate governance practices and dividend policies would also be of interest.

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ENDNOTES

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2. Lintner (1956) proposes a partial adjustment model to assess whether firms smooth their dividends. He provides empirical evidence that dividend payments are related to the previous year's dividend payments and current earnings. This implies that firms gradually adjust dividends in response to changes in earnings and hence smooth their dividends, which is similar to saying that firms set long-term target payout ratios and they adjust to their targets.

3. Most recently Michaely and Roberts (2012) provide evidence that dividend smoothing is prominent in UK public firms compared to UK private firms. Aivazian et al (2006) show that firms that have bond ratings smooth their dividends relative to those with private debts. It is worth mentioning that recent theoretical evidence has revealed 'renewed evidence' in the reasons behind smoothing dividends (see for example, Baker and Wurgler, 2010; Guttman et al, 2010). Lambrecht and Myers (2010) argue that the reasons behind smoothing are not clear in existing finance theory. Finally, Leary and Michaely (2011) show that dividend smoothing has increased over the last 80 years, and that firms with no financial constraints smooth their dividend and have a low level of information asymmetry.

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5. See Table 1 for the empirical definition of the cash flows.

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