Why dividends disappear in the UK – liquidity, risk or catering?

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Abstract

This study examines the role of liquidity, risk and catering in explaining the disappearing dividends phenomenon among UK firms, using an extended sample period from 1989 to 2009. We observe a declining percentage of dividend-payers in the UK after 1990 but an upward trend after 2007, suggesting the signalling role of dividends during the recent recessionary period. Different from US studies, our results indicate that the link between dividend policy and stock market liquidity is weak in the UK, and stock market liquidity fails to replace the role of catering theory in explaining disappearing dividends puzzle. By contrast, risk provides a significant (around 50 percent) explanation to the disappearing dividends; and after adjusting for risk, we find that catering incentives no longer explain the changes in propensity to pay in the UK.

JEL classification: D22, G15, G30, G35

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1. Introduction

"The harder we look at the dividends picture, the more it seems like a puzzle, with pieces that just do not fit together." (Black, 1976, pp.8)

Although research on dividends has proliferated over the last decade, the dividend policy remains an open "puzzle" as stated in Black (1976). In fact, Miller and Modigliani (1961) first put forward the dividend irrelevance theory, which postulates that dividend policy does not matter when enhancing shareholders' wealth in a frictionless market. Research has since followed with several possible explanations as to why some firms pay dividends and others don't in a market driven by imperfections.

Most of the literature focuses on the determinants of dividend policy and the impact of dividend policy on stock price; few study the time-trends in dividend payment. Fama and French (2001) observe the incidence of dividend payments by firms listed on NYSE, AMEX, and NASDAQ over the period 1926-1999 and find that the percentage of dividend-payers declined significantly from 66.5% in 1978 to 20.8% in 1999. They argue that the swelling of newly listed small firms with low profitability and great investment opportunity during that period could explain the decreasing dividends. However, even after controlling those firm characteristics such as size, profitability and investment opportunity, the percentage of dividend-payers between 1978 and 1999 still presents a dramatic decline pattern. This phenomenon of unexplained percentage of declining dividend-payers is termed the "disappearing dividends puzzle" by Fama and French (2001).

Unlike the United States, before July 1997, the UK provided dividend tax credits to tax-exempt shareholders such as pension funds and charities. Since these institutions could claim back a tax credit of 20% on dividends received, a strong preference for high dividend-payers should be seen. However, the disappearing propensity to pay dividends is also observed in the UK by Benito and Young (2003), who investigate firm-level data of UK companies and document that the proportion of firms not paying dividends increases from 14.3% to 25.2% during the period 1974-1995. Nevertheless, the July 1997 tax reform could reduce the attractiveness of dividends for these firms and further accelerate the disappearance

of dividend-paying firms in the UK. Benito and Young (2003) observe that the proportion of UK dividend-payers drops significantly from 83.9% and 82.1%, in the recessionary years of 1982 and 1992 respectively to 74.8% in 1999. A similar phenomenon in the UK is also identified by Renneboog and Trojanowski (2011) and Ferris et al. (2006). International evidence of this dividend abandonment phenomenon is documented by Denis and Osobov (2008), who examine the dividend payments over 1989-2002 in Canada, France, Germany, Japan, the UK, and the US. They report that, although the magnitude of the decline in the propensity to pay differs across the six countries, the fraction of dividend-payers always shows a downward trend.

Subsequently, a number of studies provide possible explanations for the disappearing dividends phenomenon. Baker and Wurgler (2004a) provide a possible behavioral explanation known as “catering theory”. Based on the theory of investment sentiment, Baker and Wurgler (2004a) suggest that managers execute the dividend policy that caters to irrational investors’ demand to boost their stock price above the fundamentals (see Baker and Kolb, 2009). They will choose to pay dividends when investors prefer dividend-payers; likewise, they will omit dividends when investors put a discount on dividend-payers.

The empirical evidence for the presence of catering theory is rather inconclusive. With respect to US evidence, studies find that catering incentives explain the declining propensity to pay (Baker and Wurgler, 2004b; Ali and Urcan, 2006; Hsieh and Wang, 2006; Twu and Shen, 2006; Kale et al., 2006 and Neves et al., 2006). However, Julio and Ikenberry (2004) and Hoberg and Prabhala (2009) find no evidence on the presence of catering incentives among US firms. For the UK market, Ferris et al. (2006) identify a remarkable decline in the portion of dividend-payers in the UK from 75.9% in 1988 to 54.5% in 2001 and report that after considering firm characteristic variables, catering incentives still hold a significant explanatory power over the changes in propensity to pay. Contradictory to this, Denis and Osobov (2008) find that catering incentives are insignificantly associated with the declining dividend payouts among UK firms. Similar mixed evidence on the presence of catering theory is reported for other countries (see Savov and Weber, 2006; Renneboog and Szilagyi,

2008; Denis and Osobov, 2008; Ferris et al., 2009, among others).

Meanwhile, liquidity and risk factors have been advanced recently as possible explanations of the puzzle in the US market. Banerjee et al. (2007) provide evidence on the link between liquidity and dividend policy using a large sample of firms from AMEX and NYSE over a 40-year period from 1963 to 2003. They adopt turnover ratio, illiquidity ratio, trading volume and proportion of days with no trading as liquidity measures and conclude that liquidity holds a pronounced explanatory power in dividend payout policy after controlling for the firm characteristics. This is in line with Bulan et al.'s (2007) claim that the incidence of dividend initiations is relatively higher in the illiquidity market. However, they show that market illiquidity is not an indicator for a firm's dividend initiations. Hoberg and Prabhala (2009) study the relationship between risk and dividend policy for US firms between 1963 and 2004 and find that both systematic and idiosyncratic risks could explain the disappearing dividends puzzle. They report that risk could explain roughly 40% of the decreasing incidence in dividend-payers observed. Moreover, they argue that after accounting for risk, the explanatory power of catering incentive disappears for the US market. That is, the dividend premium, proxy for catering incentives, actually measures the risk difference between dividend-payers and non-dividend-payers. Nevertheless, this argument contradicts Bulan et al.'s (2007) evidence that catering incentive is significantly associated with fluctuations in the idiosyncratic risk adjusted propensity to pay.

In this study we examine whether the disappearing dividends puzzle observed in the UK can be explained by catering, liquidity or risk. In so doing, we provide several contributions to the existing literature. First, we bridge the gap in the existing literature on the relationship between dividend policy and liquidity for UK stock market. Theoretically, stock market liquidity and the likelihood of firms paying dividends are negatively related. As rational investors prefer firms with high liquidity, they impose high discount rates when evaluating firms with low liquidity, thereby lowering their valuations on such firms. In order to raise their valuations, firms with low liquidity are more likely to pay dividends. To investigate this hypothesis, we employ several liquidity measures including turnover ratio, Amihud's (2002)

illiquidity ratio, bid-ask spread and Liu's (2006) liquidity measure; capturing the different dimensions of liquidity. The turnover ratio captures the trading quantity dimension, illiquidity ratio captures the price impact dimension, bid-ask spread captures the trading costs dimension and Liu's (2006) liquidity measure is constructed to capture all the above three dimensions of liquidity. Unlike the conclusions drawn from the US market, we find that the traditional liquidity measures - illiquidity ratio and bid-ask spread - do not explain the disappearing dividends phenomenon among UK firms. However, turnover ratio and Liu's liquidity measure can significantly explain the probability for a firm being a dividend-payer. This means that only one dimension (trading quantity) of liquidity can explain the dividend policy among UK firms during the sample period considered.

Second, we test whether risk can explain the disappearing dividends phenomenon observed in the UK market and we reexamine the validity of the catering theory in the UK after adjusting the propensity to pay for liquidity, risk and both of these. This is the first study, to the best of our knowledge, that examines whether dividend premium, proxy for catering incentives, can explain the declining propensity to pay after accounting for stock market liquidity. We find that catering incentives persist after adjusting the change in propensity to pay with stock market liquidity. However, after controlling risk, the dividend premium is not able to explain the dividend payment pattern among UK firms. This result corroborates the findings of Hoberg and Prabhala (2009) from the US market and provides independent evidence that catering incentives actually measure the risk difference between dividend-paying groups and non-dividend-paying groups. We find that 49.61% of the disappearing dividends phenomenon can be explained by risk in the UK market. Further, the previous findings of catering effects in the UK by Ferris et al. (2006) was largely based on evidence from two years (2001 and 2002), a criticism pointed out by Denis and Osobov (2008). Our sample period (from 1989 to 2009) is much longer than that of any other previous study, making it possible to provide robust empirical evidence of catering theory in the UK.

The final contribution of this study is to provide evidence on the dividend payment patterns observed during the recent global financial crisis. We find a decrease in the percentage of

dividend-payers from 1990 to 2006 but a steady statistically significant increase in the dividend payouts from 2007 onwards. The results further indicate that the global financial crisis exerts significant positive influence on the UK firms' dividend payment practice. This supports the signaling hypothesis where firms are reluctant to cut their dividend payouts as they provide an indication of the financial health of the firm. Similar evidence is reported by Acharya et al. (2009). Further, we also test for the presence of life-cycle effect (advocated by DeAngelo et al., 2006) and find no evidence of life-cycle explanations for the declining dividends in the UK. Our results are robust to different sample periods.

The remainder of this paper is organized as follows. Section 2 presents the sample selection and data description. In Section 3 we examine the role of liquidity and risk in explaining the probability of being a dividend payer. Section 4 tests the validity of catering theory in the UK after accounting for risk and liquidity factors. Section 5 concludes.

2. Sample selection and data description

2.1 Sample selection

We obtain the sample from Worldscope. To ensure a sufficiently large sample base and avoid survivorship bias, we consider all UK firms, both active and dead in Worldscope, that have the following information available: dividends per share, market-to-book value, earnings per share, assets per share, net debt, total equity, retained earnings to book equity ratio, total assets, market value, stock price, turnover by volume, number of shares outstanding, bid price and ask price. Meanwhile, all financial and utility firms are excluded to avoid the possibility that these firms' dividend payment decisions may be restricted by regulations (similar to Fama and French, 2001).

Our overall sample period extends from 1989 through 2009.[1] The data between 1989 and 1997 serves as the base period, while those during 1998 to 2009 are used as the out-of-sample

[1] We consider firm-level data from 1988 onwards but for empirical analysis we use data from 1989 onwards since data for liquidity were not available before then.

period[2]. During the sub-period 1989 to 1992, the UK experiences a low growth in economy with average GDP growth of only 0.45%. The subsequent period 1993 to 1994 represents the recovery of economic growth, followed by stable GDP growth from 1995 to 2006. Over the remaining period of our sample, the 2007 financial crisis triggers a dramatic decrease in GDP growth with a nadir of -2.4% in 2008.

2.2 Data description

Consistent with Ferris et al. (2006), Table 1 and Figure 1 shows that during the period 1990 to 2002, the percentage of dividend-payers among UK firms falls sharply from 88% to 57%, with much of the decline concentrating after 1997. The figure also depicts that after 2002, the proportion of firms paying dividends continues to decrease and reaches the nadir of 51% in 2006, before increasing to 55% in 2009.

[Insert Figure 1 around here]

[Insert Table 1 around here]

When we consider the results of Table 1 and Figure 1, in the light of previous findings from the US market, we see two important differences in the dividend payout patterns between the US and the UK. First, for the US markets, the percentage of dividend-payers recovers from 2001 and increases sharply from 15% in 2001 to 20% in 2004 (Julio and Ikenberry, 2004). By contrast, the proportion of UK firms paying dividends declines until 2006. Meanwhile, a small increase in the percentage after 2007 is observed. Second, the magnitude of the decline in the percentage of dividend-payers is much smaller in the UK than that in the US. Julio and Ikenberry (2004) report that only 15% of US firms pay dividends in 2001, while, in the same year, the percentage of dividend-payers is still 61% in UK.

[Insert Table 2 around here]

[2] For robustness, we also considered the sample periods and empirical framework analogous to Ferris et al. (2006), drawing similar conclusions.

Table 2 presents equally weighted and book-value weighted market-to-book ratio for payers and non-payers as well as the corresponding dividend premium each year from 1989 through 2009. Dividend premium, estimated as the difference between the market values of dividend-payers and non-dividend-payers, can proxy investors' preference for dividend-payers and capture the presence of possible catering incentives (Baker and Wurgler 2004a and 2004b). From Table 2 we see that the dividend premium fluctuates around zero before 1995, and then it tends to be negative until 2001. After that, the dividend premium is generally positive.

3. Determinants of propensity to pay

Following Fama and French (2001), we employ a logit model to examine the role of liquidity and risk variables in explaining the probability of paying dividends. The logit regression takes the following form:

$$y_{it} = logit\left(a + b\frac{M}{B}_{it} + c\frac{dA}{A}_{it} + d\frac{E}{A}_{it} + eSIZE\%_{it} + f\frac{D}{E}_{it} + g\frac{RE}{BE}_{it} + hSYS_{it} + iID_{it} + jLiq_{it}\right) + \mu_{it} \quad (1)$$

where y_{it} is set to one when firm *i* pay dividends in year *t*, and zero otherwise. The coefficients of the model are estimated as time series averages of Fama and MacBeth's (1973) annual cross-sectional regressions with Newey-West *t* statistics. The independent variables in this logit model can be categorized into four groups: a.) firm characteristic variables including market-to-book ratio (M/B_{it}), asset growth (dA/A_{it}), earnings-to-assets ratio (E/A_{it}), size percentile ($SIZE\%_{it}$) and debt-to-equity ratio (D/E_{it}); b.) life-cycle variable proxied by the ratio of retained earnings to book value of total equity (RE/BE_{it}); c.) liquidity variable (Liq_{it}) proxied by four different liquidity measures, namely turnover ratio (ToR_{it}), illiquidity ratio ($ILLIQ_{it}$), bid-ask spread (PS_{it}) and Liu's (2006) liquidity measure (LM_{it}); d.) risk variable group including systematic risk (SYS_{it}) and idiosyncratic risk (ID_{it}). Below we explain the variables used in the logit regression.

3.1 Firm characteristic variables

Barclay et al. (1995) point out the significant relation between dividend policy and firm characteristic variables including size, profitability, and investment opportunities. These variables are significant in explaining the disappearing dividends in the US (Fama and French, 2001). Thus, to investigate the determinants of the dividend payout trends in the UK, we include size, profitability and investment opportunity variables, as defined in Fama and French (2001) in our analysis. Size characteristics are captured by the market capitalization percentile ($SIZE\%_{it}$). This variable is calculated as the fraction of UK firms with equal or smaller market value than firm *i* in a given year *t*. Earnings-to-assets ratio is considered as a proxy for profitability and the measure of firm's investment opportunity is constructed with market-to-book value and asset growth, which is the proportionate change in total assets for year *t*. Additionally, since leverage ratio can impact a firm's dividend policy (Neves et al., 2006), we include the debt-to-equity ratio in our analysis.

3.2 Life-cycle variable

DeAngelo et al. (2004) find that the dividends in the US tend to be more concentrated among a small number of large payers. To explain this phenomenon, DeAngelo et al. (2006) advance the life-cycle theory. According to this theory, firms adopt the optimal dividend policy in accordance with the evolution of their opportunity set. In the early years, firms pay fewer dividends as their investment opportunities exceed their internally generated capital. Conversely, in the later years, firms pay more dividends to mitigate the possibility of free cash flows being wasted due to internal funds exceeding investment opportunities. The life-cycle theory is empirically evidenced by DeAngelo et al. (2006), who use the company's earned-to-contributed equity mix to proxy for the firm's life-cycle stage. This proxy is the proportion of the internally generated firm's equity, and measured as the ratio of retained earnings to the book value of total equity (RE/BE). DeAngelo et al. (2006) and Denis and Osobov (2008) find a positive link between the propensity to pay dividends and the company's earned-to-contributed equity mix. Hence we incorporate this variable to study the

corporate dividend payout practice.

3.3 Liquidity factor

Banerjee et al. (2007) find that the liquidity could in part account for the changes in dividend-payers. In markets with low liquidity, the high transaction costs incline investors to receive dividends rather than acquire the same amount of homemade dividends by selling their investment. Meanwhile, rational investors prefer liquid stocks and lower the valuation of illiquid stocks. Thus firms with low liquidity would more likely pay dividends to increase their valuation. This is empirically evidenced by Banerjee et al. (2007) with a large sample of US data over the period 1963-2003. Their findings are consistent with Bulan et al.'s (2007) observation that dividend initiations occur more frequently in illiquidity markets.

Thus, the liquidity variable is applied to test the prediction that stock liquidity is negatively related to dividend payment decisions. In this study, we adopt four proxies for liquidity. The first is turnover ratio (*ToR*), defined as the number of shares traded scaled by the number of shares outstanding, and is an alternative widely-used proxy for liquidity which focuses on the trading quantity dimension of liquidity. Datar et al. (1998) point out that turnover ratio is the inverse of expected holding period, and liquidity is highly correlated with trading frequency. Thus they hypothesize that turnover rate could be used to capture the liquidity. The second liquidity measure is the illiquidity ratio (ILLIQ) put forward by Amihud (2002). He uses this measure to proxy for price impact of a trade, which is defined as the average of the ratio of daily absolute return to the daily volume:

$$ILLIQ_i = \frac{1}{D_i}\sum_{d=1}^{D_i}\frac{|R_{id}|}{VOLD_{id}} \quad (2)$$

where R_{id} is the return on stock i on day d, $VOLD_{id}$ is the corresponding daily volume in pounds, and D_i is the number of days with data available for stock i during the pre- and post-addition measurement periods. The third liquidity proxy is the bid-ask spread (*PS*), which is defined as the amount that ask price exceeds bid price. It is first used by Amihud and Mendelson (1986), who state that an asset with higher bid-ask spread has a longer holding

horizon, and thus less trading activity and lower liquidity. Stoll's (2000) empirical evidence supports Amihud and Mendelson's (1986) theory, where he observes that the variance in bid-ask spreads could partly be explained by the changes in the frequency of trading activities. However, the bid-ask spread proxy is criticized as being poor in the measurement of actual transaction cost (Peterson and Fialkowski, 1994).

The fourth measure to capture stock liquidity is the standardized turnover adjusted number of zero daily trading volumes. This liquidity measure (*LM*) put forward by Liu (2006) is defined as the standardized turnover adjusted number of zero daily trading volumes over the previous 12 months. Specifically, this liquidity measure is calculated using the following equation:

$$LM = \left[NoDV + \frac{\frac{1}{12\_month\ turnover}}{Deflator} \right] \times \frac{21x12}{NoTD} \quad (3)$$

where *NoDV* denotes the number of zero daily volumes in previous 12 months, *12_month turnover* is the turnover over the prior 12 months, calculated as the sum of daily turnover over the previous 12 months and *NoTD* is the total number of trading days in the market over the previous 12 months. The second term in the brackets is the turnover adjustment, which distinguishes two stocks with the same integer number of zero daily trading volumes. The one with the larger turnover ratio is more liquid. High values of *LM* are associated with illiquid stocks that tend to be small, value, low-turnover stocks with large bid-ask spreads and high return-to-volume ratios. As in Liu (2006), we multiply $21 \times 12 / NoTD$ in order to standardize the number of trading days in a month to 21 in order to make the liquidity measure comparable over time. The deflator is chosen such that the following inequality is satisfied for all sample stocks:[3]

$$0 < \frac{1/(12\_month\ turnover)}{Deflator} < 1 \quad (4)$$

Liu defines liquidity as the "ability to trade large quantities quickly with little price impact at low cost" (Liu, 2006). This definition presents the four dimensions of liquidity: trading quantity, trading speed, trading cost and price impact. Compared with the other three liquidity measures, Liu's liquidity proxy captures the multidimensional features of liquidity. First, it

[3] We use 11000 as the deflator.

particularly emphasizes trading speed, which is the continuity of trading and potential delay or difficulty in executing an order. Second, the turnover adjustment term enables the new liquidity measure to capture the dimension of trading quantity. This measure first sorts stocks based on the number of zero daily trading volumes over the previous 12 months (the speed dimension), and then performs a second sort on turnover (the quantity dimension). Third, this liquidity measure reflects the trading cost dimension of liquidity, since the number of zero trading volume is a good proxy for transaction cost. Lesmond et al. (1999) model the transaction cost based on the number of zero daily returns, which may result from no trade. In their model, the absence of trade occurs when the transaction cost is high. Additionally, Liu's (2006) liquidity measure is shown to be highly correlated with bid-ask spread, illiquidity ratio and turnover ratio. Other liquidity proxies inevitably present a limited ability to capture all the dimensions of liquidity. For example, the turnover ratio (Datar et al., 1998) focuses on trading quantity dimension, and the illiquidity measure advanced by Amihud (2002) and Pastor and Stambaugh (2003) only captures the price impact on trading volume.

3.4 Risk factor

Studies on the relationship between risk and dividend policy indicate a negative relationship between risk and dividend payments. One strand of literature builds on the maturity theory proposed by Venkatesh (1989) that find firm maturity, characterized by less risk, is able to motivate firms to pay dividends. This theory is supported by Grullon et al.'s (2002) work. Through investigating announcements of dividend reductions and increases by NYSE and AMEX listed firms over the period 1982 to 1993, Grullon et al. (2002) find that dividend changes are accompanied by the changes in systematic risk, and the increase in dividends leads to a decline in firm's systematic risk. Similar results are reported by Koch and Sun (2004). Moreover, Fama and French (2001) suggest that the disappearing dividends puzzle over 1978 to 1998 could be partly explained by the changes in firm characteristics over that period, and one of the pronounced changes is the decrease in the profitability of newly listed small firms during the same period. Thus it could be inferred that the increase in the risk level of newly listed firms partly leads to the decrease in the incidence of dividend-payers. Based on large sample of US data from 1963 to 2000, Pastor and Veronesi (2003) advocate that the

increase in idiosyncratic risk prevailing in the 1990s is accompanied by the rise in cash flow risk, which is supposed to limit a firm's dividend payment. Meanwhile, Malkiel and Xu (2003) argue that the increased firm-specific risk reflects a firm's growth potential in the future, indicating that firms with increased idiosyncratic risk may decrease their dividend payment for the sake of future growth.

In a recent paper, Hoberg and Prabhala (2009) analyze a large sample of US data from 1963 to 2004, pointing out that both systematic and idiosyncratic risks have significant explanatory power for the disappearing dividends puzzle. They find that risk factor, in the US, could explain roughly 40% of the decreasing incidence of dividend-payers. In order to examine the role of risk factors in explaining dividend policy, our analysis includes systematic risk and idiosyncratic risk variables. Following Hoberg and Prabhala (2009), the former is defined as the standard deviation of the predicted value from a CAPM regression while the latter is defined as the standard deviation of residuals from the above regression.

3.5 Results of the logit regression

[Insert Table 3 around here]

We first use the logit regression with basic firm characteristics variables (Fama and French, 2001) and liquidity variables to test whether liquidity can explain the likelihood of a firm paying dividends. Table 3 presents the estimated coefficients and Newey-West *t*-statistics for the logit regression during the sample periods 1989-2009, 1989-1997 and 1998-2009. The results reported in Table 3 are categorized into three panels according to different time frames. Each panel contains four specifications with Liu's (2006) liquidity measure, turnover ratio, Amihud's (2002) illiquidity ratio, and bid-ask price spread as proxies for liquidity.

The specification in Row (1) of each panel reports the estimates for Liu's (2006) liquidity measure *LM* and firm characteristic explanatory variables. The results show that *LM* is positive and significant after controlling for firm characteristic variables in all the sample

periods considered. This means that Liu's (2006) liquidity measure is able to predict the probability of a firm paying dividends. In Row (2) of each panel, we use turnover ratio as a proxy of liquidity and also find that in all the time periods considered turnover ratio can successfully predict a firm's propensity to pay dividends. However, in the last two specifications in Rows (3) and (4) of each panel, we see that illiquidity ratio and bid-ask spread proxies of liquidity have no significance for explaining the probability of being a dividend payer. The results indicate that only the trading quantity dimension of liquidity captured by *LM* and turnover ratio can explain the dividend payout policy for UK firms. The price impact dimension of liquidity captured by the illiquidity ratio and the trading costs dimension of liquidity captured by bid-ask spreads cannot predict which firms trading in the market are more likely to pay dividends. This result is different from the evidence observed in the US market by Banerjee et al. (2007) that liquidity, as proxied by turnover ratio, illiquidity ratio, trading volume and proportion of days with no trading, can explain the likelihood of a firm paying dividends in AMEX/NYSE. Therefore, compared with the results for the US market (Banerjee et al., 2007), the explanatory power of liquidity over the dividend payout policy is found to be weak for the UK market and depends on the proxy for liquidity.

Since the *LM* proxy of liquidity captures multiple dimensions of liquidity and is found to be significant in all the time period considered, we adopt Liu's (2006) *LM* liquidity measure when examining the role of liquidity in determining dividend policy.

[Insert Table 4 around here]

Table 4 reports the estimates of the logit regression in Equation (1) that predicts the probability of a firm being a dividend-payer. We organize the table into three panels according to the different time periods 1989-2009, 1989-1997 and 1998-2009, with each panel covering six specifications with different explanatory variables included in the regression. Row (1) of Table 4 reports the estimates from the baseline regression with firm characteristic explanatory variables advanced by Fama and French (2001). In all the sample

periods considered, most of the firm characteristic variables are significant. That is, the probability for a firm paying dividends increases with the decrease in market-to-book value and asset growth, and the increase in earnings-to-assets ratio and size percentile. This confirms Fama and French's (2001) hypothesis that larger, more profitable firms with less investment opportunity are more likely to pay dividends.

Rows (2) and (3) of Table 4 report the results when the leverage ratio and earned-to-contributed equity mix are respectively added to Fama and French's (2001) baseline model. The results in Row (2) of Table 4 show insignificant coefficient for leverage during the whole sample period but significant effect at 10 percent and 5 percent levels during the two subsample periods. This means that the leverage of firms does impact dividend payout policy among UK firms. This supports Neves et al.'s (2006) evidence from the US market that debt-to-equity ratio, proxy for leverage, predicts firms' dividend payout patterns. Further, in Row (3) of Table 4, we see that the earned-to-contributed equity mix variable has weak significance (only at 10 percent level in one of the time periods) in predicting dividend policy. This means that the life-cycle theory advanced by DeAngelo et al. (2006) provides no independent impact on the dividend practice among UK companies. This is different from DeAngelo et al.'s (2006) and Denis and Osobov's (2008) prediction that the life-cycle proxy should be positively related to the dividend payout. Therefore we conclude that leverage ratio can explain the dividend payment decisions among UK firms. However, we find limited evidence of the life-cycle theory in the UK.

In Rows (4), (5) and (6) we examine whether liquidity, risk, or both can respectively explain the probability of being a dividend payer in the UK market. We find that in all the time periods considered the liquidity variable is significant and for most of the sample periods, it does not alter the significance of the firm characteristic variables of Fama and French (2001). This means that liquidity is an important determinant of being a dividend payer, consistent with the findings of Banerjee et al. (2007).

When incorporating risk variables into the regression we find that both the systematic risk

and idiosyncratic risk have strong explanatory power, and those significantly negative coefficients on risks are in line with Hoberg and Prabhala's (2009) finding in the US market that firm-specific and market-driven risks have a negative impact on the probability of a firm being a dividend-payer. Furthermore, for most time periods considered, the risk variables do not reduce the significance of those firm characteristic variables, indicating that firm characteristics and risk are important variables in explaining dividend payment. Therefore, the findings suggest that as in the case of the US market, both market-driven and firm-specific risks inversely affect the probability of UK firms being dividend-payers.

In Row (6) of Table 4 we include risk and liquidity variables along with the Fama and French (2001) firm characteristic variables and find that firm-specific-driven risk and liquidity variables still hold significant explanatory power in most of the sample periods considered, even after including firm characteristic variables. Therefore, risk variables and liquidity measure provide additional information to the basic firm characteristic variables in explaining the probability of being a dividend payer, and hence are important determinants of dividend policy.

4. Propensity to pay and the catering theory

4.1 Propensity to pay

To examine the unexplained proportion of declining dividend-payers in the UK, we estimate the propensity to pay (PTP_t), which is measured as the actual percentage of dividend-payers minus expected percentage of dividend-payers in year *t*. The expected percentage of dividend payers is computed using logit regressions with the basic firm characteristic proxies as the independent variables during the base period 1989-1997. To compare the propensity to pay after accounting for risk and liquidity, we also estimate the expected probability using the logit regressions embedded with risk and liquidity variables.

[Insert Figure 2 around here]

Figure 2 plots the propensity to pay with and without risk and liquidity adjustments for the sample period from 1989 to 2009. The solid line in the figure reveals a declining propensity to pay when considering the expected proportion of dividend-payers using only firm characteristic variables. A substantial decline from -1.833% in 1997 to -27.764% in 2003 is observed in the sample period. After 2003 the unexpected portion of payers fluctuates around the nadir of -28.691% in 2006 and then reverses slightly to -25.886% in 2009. Noticeably, the pronounced decreasing trend in the UK from 1997 to 2003 confirms Ferris et al.'s (2006) finding. During 2007-2009, we observe an upward trend in the propensity to pay. This shows that firms continue to pay dividends during the global financial crisis. This supports the signaling hypothesis, where firms are reluctant to cut dividend payments as they provide an indication of the financial health of the firm. Similar evidence of improved dividend payments during the financial crisis is reported by Acharya et al. (2009).

When we examine the effect of liquidity and risk on the propensity to pay, we find that liquidity does not explain the declining propensity to pay. However, when the propensity to pay is adjusted for risk (dashed line), we obtain a different picture. We find that the propensity to pay is relatively flat until 2000, with a subsequent decline until 2007 and a sharp increase during the global financial crisis. We see that after adjusting for risk, the propensity to pay remains positive throughout the whole sample period. This means that the actual percentage of dividend-payers has always been greater than the risk-adjusted expected proportion of dividend-payers in the UK. Comparing the spread between the propensity to pay with and without risk adjustments, we observe that the spread has widened after 2000 and increased during the financial crisis, suggesting that risk is increasingly an important factor in explaining the declining proportion of dividend-payers in the UK. This conclusion is in line with Hoberg and Prabhala's (2009) findings for the US market.

Next, in order to quantitatively measure the extent to which disappearing dividends could be explained by risk and/or liquidity variables, we adopt the three methods used by Hoberg and Prabhala (2009). The first method is the difference in difference method, where the percentage of propensity to pay explained by risk and/or liquidity is measured as the difference between propensity to pay between 1998 and 2009, based on the fitted logit regressions from the 1989-1997 base period with and without risk and/or liquidity controls. The second method measures the rate of disappearing dividends, which is defined as the

difference in the slope coefficients of the regression of propensities (estimated from fitted logit regressions with and without risk and/or liquidity controls) on the time-trend. The difference in the slope coefficients captures the percentage of disappearing dividends explained by risk and/or liquidity. The third method is the integrated propensity to pay, which is equal to the average propensity to pay. Under this method, the percentage of disappearing dividends explained by risk and/or liquidity is measured through the difference between the integrated propensities based on fitted logit regressions with and without risk and/or liquidity controls.

[Insert Table 5 around here]

Table 5 shows results of the three methods discussed above over the whole sample period. Rows (1), (2) and (3) report the percentage of disappearing dividends explained respectively by liquidity, risk and both using the three methods. Using the difference in difference approach, we find that the liquidity is able to explain 10% of the declining propensity to pay, while liquidity and risk taken together explains around 43%, but risk alone can explain around 50% of the declining propensity to pay. This result is much stronger than the evidence found in the US market, where risk explains around 40% of disappearing dividends (Hoberg and Prabhala, 2009). Overall from the test results, we conclude that risk plays a much more important role than liquidity in explaining the declining propensity to pay observed in the UK, and this confirms the conclusions drawn from Figure 2.

4.2 Catering incentives

In this section, we examine whether catering incentives advocated by Baker and Wurgler (2004a, 2004b) can explain the unexpected percentage of dividend-payers in the UK. According to the catering hypothesis, market prices of dividend-paying firms and non-dividend-paying firms with similar characteristics are driven by investor sentiment. Investors place a premium or a discount on dividend-payers or non-payers according to their preference for dividends. This premium (discount) will draw firms to cater to the prevailing demand by altering their dividend policy. Moreover, the change in dividend payment policy caused by investment sentiment is not captured by firm characteristics. Thus, the change in the unexpected proportion of dividend-payers is suggested to be positively related to the

premium (discount) at the beginning of the period. Thus, to capture the changes in the propensity to pay, Baker and Wurgler (2004a, 2004b) define several proxies for the catering incentives (premium or discount), such as dividend premium. Dividend premium is the differences in the market values of dividend-payers and non-dividend-payers and is defined as the difference between log of the equally- or value-weighted market-to-book ratio for dividend-payers and non-dividend-payers[4]. Baker and Wurgler (2004b) show that dividend premium can substantially explain the declining propensity to pay in the US market.

[Insert Figure 3 around here]

In Figure 3 we visually depict whether dividend premium (capturing catering incentives) in year *t-1* can predict the changes in the propensity to pay for a firm in year *t*. Figure 3 (A) plots the lagged dividend premium and the annual changes in the propensity to pay without risk and liquidity controls over the full sample period. We see that the movements of the two series exhibit a high degree of consistency. This indicates that dividend premium does influence the dividend decisions made by firms. Overall a similar picture emerges when adjusting changes in the propensity to pay for liquidity in Figure 3 (B). However, risk adjusted changes in the propensity to pay in Figure 3 (C) and (D) presents a different picture. We see the relationship between lagged dividend premium and the changes in the propensity to pay has weakened considerably after adjusting for risk. Hence, a visual conclusion we can draw is that the catering hypothesis is weakened once changes in the propensity to pay are adjusted for the risk element in dividend policy.

We statistically test for the presence of catering hypothesis by regressing the changes in propensity to pay against the lagged dividend premium and relevant control variables. The regression is defined as follows:

$$\Delta PTP_t = \alpha + \beta P_{t-1}^{D-ND} + \gamma Time_t + \theta CRISIS_t + \varepsilon_t \qquad (5)$$

where ΔPTP_t is the changes in propensity to pay, P_{t-1}^{D-ND} is the lagged dividend premium

[4] Following Baker and Wurgler (2004b), we use the book-value weighted dividend premium for our analysis. The equally-weighted dividend premium is also considered (but not reported here) for robustness and we find similar conclusions.

(capturing catering incentives), Time_t denotes the time-trend variable, and $CRISIS_t$ denotes the 2007-2009 financial crisis dummy variable. The financial crisis dummy is equal to one in the years from 2007 and captures the impact of the unexpected economic recession initiating in 2007 on a firm's dividend policy. In Figure 2, we notice an upward trend in the propensity to pay as firms prefer to pay dividends to increase the confidence of investors during the financial crisis. Thus, the financial crisis dummy is expected to have a positive influence on the dividend payout decisions.

[Insert Table 6 around here]

Table 6 presents the results of regression Equation (5) for the sample period 1998-2009 and is organized in four panels. Panel A reports the estimates of the regression where the propensity to pay is based on the fitted logit regression, with Fama and French's (2001) firm characteristic variables. Panels B, C and D presents the regression results where the above propensity to pay is adjusted for liquidity[5], risk and both respectively. The results in Panel A indicate that before adjusting for liquidity and/or risk, catering incentive has a significantly positive impact on the changes in the unpredicted proportion of dividend-payers. This is similar to the conclusion drawn by Ferris et al. (2006). From the Panel B results we find that, even after accounting for liquidity, the coefficient on catering incentives still remains significant in explaining the adjusted propensity to pay. However, once the propensity to pay has been adjusted for risk, the results in Panel C show that catering incentives no longer explain the changes in propensity to pay. Hence we do not find evidence of catering theory once we control for risk. Our results corroborate Hoberg and Prabhala's (2009) finding in the US market. In Panel D, we test the significance of catering incentives after controlling for both risk and liquidity and confirm the conclusion drawn from the previous panel that once risk is adjusted, catering theory cannot explain the disappearing dividends puzzle in the UK market. Further, the results in most of the regressions considered show that time trends in the UK do not contribute towards explaining changes in propensity to pay in the UK. This is

[5] We use the Liu's (2006) *LM* measure of liquidity for our analysis reported here. We also consider other liquidity proxies including turnover ratio, illiquidity ratio and bid-ask spread for robustness and the results (not reported here) are similar.

similar to the finding in Ferris et al. (2006). Meanwhile, the positive significance of financial crisis dummy in all regressions considered indicate that there has been a significant increase in dividend payouts among UK firms during the recent financial crisis.

Overall, the results show that risk is significant in explaining the declining changes in propensity of dividend payments in the UK. Once we adjust the propensity to pay for risk, we see that dividend premium loses its explanatory power and hence we find no support for the presence of catering incentives among UK firms. Further we find evidence of a significant increase in the propensity to pay among UK firms during the recent financial crisis suggesting the presence of signaling hypothesis during the recent recessionary times.

5. Conclusion

In this paper we study the empirical determinants of the propensity to pay dividends among UK firms using the extended sample period from 1989 to 2009. We test the impact of liquidity, risk and other variables such as leverage ratio and life-cycle variable on the probability of being a dividend-payer in the UK and provide four main conclusions. First, unlike the US market, we find liquidity provides a weaker influence on the dividend payout policy among UK firms. We employ the four different liquidity proxies including Liu's (2006) liquidity measure, turnover ratio, Amihud's (2002) illiquidity ratio, and bid-ask price spread capturing the various dimensions of liquidity. The results indicate that only the trading quantity dimension of liquidity captured by Liu's (2006) liquidity measure and turnover ratio can explain the dividend payout policy for UK firms. The price impact dimension of liquidity captured by the illiquidity ratio and the trading costs dimension of liquidity captured by bid-ask spreads cannot predict dividend policy in the UK. Second, consistent with Hoberg and Prabhala's (2009) finding in the US market, we find that market-driven and firm-specific risk is significant and negatively related to the probability of being a dividend-payer among UK firms. Third, we find that leverage ratio of firms can significantly explain dividend payout policy among UK firms, supporting the evidence found by Neves et al. (2006) in the US. Finally, we see that the life-cycle theory advanced by DeAngelo et al. (2006) does not provide any independent impact on the dividend payout practice in the UK.

Next, we study the changes in the propensity to pay and test whether liquidity, risk or catering theory can explain the disappearing dividends puzzle observed in the UK. We find that liquidity fails to replace catering incentives for explaining the changes in propensity to pay. However, when the propensity to pay is adjusted for risk, we obtain a different picture. The results indicate that risk is significant in explaining the declining propensity of dividend payments in the UK. Risk can explain around 50% of the disappearing dividends phenomenon observed in the UK, which is greater than that - around 40% - observed in the US market. Once we adjust for risk, we see that dividend premium (capturing the catering incentives) cannot explain changes in propensity to pay anymore and hence we find no support for the presence of catering incentives among UK firms after adjusting for risk.

Further, we document evidence of a significant upward trend in the propensity to pay among UK firms during the recent 2007-2009 financial crisis. This shows that firms tend to pay more dividends during the global financial crisis, supporting the signaling hypothesis, where firms are reluctant to cut dividend payments as it provides an indication of the financial health of the firm.

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Table 1: Number of dividend-paying firms, non-dividend-paying firms and the total sample of UK firms, 1989-2009. The sample includes all the UK non-financial and non-utility companies in the Worldscope database over the period 1989-2009 that satisfy the data availability requirements. A firm is a dividend-payer if it has a positive dividend per share and otherwise it is a non-payer.

Year	Dividend-payers	Non-payers	Total
1989	880	121	1001
1990	894	127	1021
1991	873	158	1031
1992	814	222	1036
1993	812	263	1075
1994	860	286	1146
1995	930	274	1204
1996	1003	282	1285
1997	1029	329	1358
1998	1019	348	1367
1999	969	358	1327
2000	931	378	1309
2001	777	495	1272
2002	716	539	1255
2003	663	546	1209
2004	711	533	1244
2005	688	594	1282
2006	648	624	1272
2007	655	568	1223
2008	608	527	1135
2009	566	467	1033

Figure 1: Percentage of dividend-paying firms among UK firms, 1989-2009. The sample includes all the UK non-financial and non-utility companies in the Worldscope database over the period 1989-2009 that satisfy the data availability requirements. Firms classified as payers have positive dividends per share.

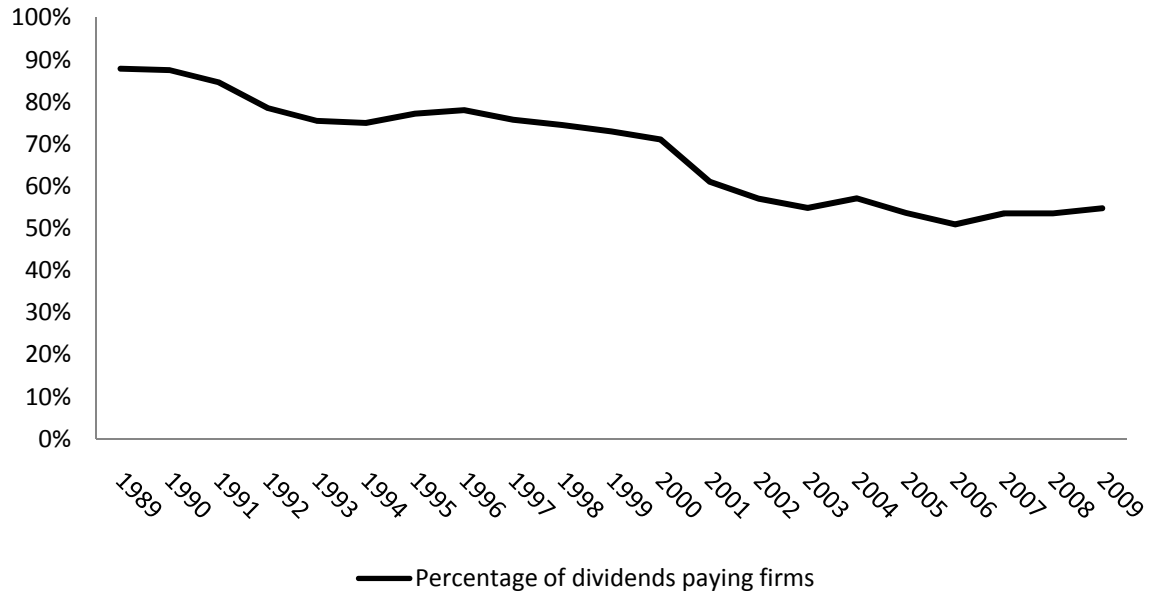


Table 2: Dividend premium, 1989-2009. A firm is a dividend-payer if it has a positive dividend per share and otherwise it is a non-payer. The EW column reports the average equal-weighted market-to-book ratio for firms each year and the BVW column reports the average book-value-weighted market-to-book ratio for firms each year. The dividend premium is the log difference between the average market-to-book ratio of payers and that of non-payers.

	Payers		**Non-payers**		**Dividend premium**	
	EW	**BVW**	**EW**	**BVW**	**EW**	**BVW**
1989	2.381	1.958	3.206	2.438	-29.742	-21.927
1990	2.091	1.879	3.034	2.142	-37.219	-13.101
1991	1.910	1.964	2.201	2.506	-14.175	-24.388
1992	2.096	2.200	1.834	2.390	13.357	-8.261
1993	2.328	2.327	2.017	2.666	14.376	-13.585
1994	2.956	2.641	2.385	2.336	21.468	12.277
1995	2.494	2.335	1.664	2.473	40.466	-5.722
1996	2.758	2.729	2.607	2.963	5.620	-8.241
1997	3.393	2.943	3.215	4.504	5.393	-42.539
1998	3.475	3.323	3.859	3.102	-10.479	6.877
1999	2.705	2.751	2.560	2.495	5.515	9.779
2000	3.561	2.473	5.138	5.505	-36.672	-80.015
2001	2.610	3.194	2.979	3.111	-13.232	2.648
2002	2.364	2.500	1.866	1.684	23.645	39.498
2003	1.541	1.735	1.301	0.922	16.914	63.215
2004	2.564	2.438	2.569	1.835	-0.223	28.430
2005	2.830	2.625	2.569	1.955	9.661	29.464
2006	3.094	2.972	2.565	2.326	18.759	24.519
2007	3.116	2.877	2.450	2.486	24.052	14.622
2008	2.421	2.523	1.443	1.964	51.766	25.041
2009	1.365	1.857	1.037	0.989	27.550	63.005

Table 3: Logit estimation with different liquidity measures explaining the probability of being a dividend-payer. This table reports the logit regression results using Fama and MacBeth (1973) style estimation, with Newey –West *t* statistics reported in parentheses. The results from the full period 1989-2009 are organized in Panel A, results from the base period 1989-1997 are organized in Panel B, and 1998-2009 sub-period results are organized in Panel C. The dependent variable is equal to one if the firm pays dividend that year and zero otherwise. The explanatory variables are market-to-book ratio (*M/B*), assets growth (*dA/A*), earnings-to-asset ratio (*E/A*), size percentile (*Size*), and liquidity measures including standardized turnover adjusted number of zero trading days (*LM*), turnover ratio (*ToR*), illiquidity ratio (*ILLIQ*) and bid-ask spread (*PS*). Rows (1) – (4) report the estimates of the various logit regressions with Fama and French (2001) firm characteristic variables and different proxies of liquidity. *** indicates significance at 1%, ** indicates significance at 5%, * indicates significance at 10%.

Row	Firm characteristics				Liquidity			
	M/B	***dA/A***	***E/A***	***Size***	***LM***	***ToR***	***ILLIQ***	***PS***
				Panel A: 1989-2009				
(1)	-0.046***	-0.171**	0.997***	4.769***	0.020**			
	(-5.11)	(-2.75)	(3.40)	(12.59)	(2.27)			
(2)	-0.046***	-0.181***	0.973***	4.653***		-122.901***		
	(-5.01)	(-2.93)	(3.31)	(19.54)		(-5.75)		
(3)	-0.031***	-0.210***	0.618***	4.664***			-3.678	
	(-5.74)	(-5.29)	(4.06)	(16.27)			(-1.74)	
(4)	-0.025***	-0.172**	0.495***	4.231***				0.004
	(-4.08)	(-2.85)	(5.04)	(24.38)				(1.21)
				Panel B: 1989-1997				
(1)	-0.059**	-0.058	1.496**	5.185***	0.008***			
	(-2.80)	(-0.66)	(2.35)	(6.56)	(3.96)			
(2)	-0.060**	-0.066	1.512**	4.550***		-98.369*		
	(-2.90)	(-0.75)	(2.42)	(9.24)		(-2.44)		
(3)	-0.043***	-0.134***	0.978	4.932***			-7.002	
	(-4.60)	(-3.58)	(4.54)	(8.67)			(-1.62)	
(4)	-0.019*	-0.032	0.676***	4.126***				-0.000
	(-1.95)	(-0.47)	(4.19)	(18.02)				(-0.48)
				Panel C: 1998-2009				
(1)	-0.037***	-0.255***	0.623***	4.458***	0.027*			
	(-5.60)	(-4.56)	(4.03)	(26.31)	(2.10)			
(2)	-0.035***	-0.267***	0.569***	4.731***		-137.211***		
	(-5.75)	(-5.21)	(4.19)	(21.30)		(7.24)		
(3)	-0.021***	-0.272***	0.324***	4.444***			-1.563	
	(-8.78)	(-5.89)	(4.38)	(25.96)			(-1.45)	
(4)	-0.029***	-0.278***	0.360***	4.311***				0.007
	(-3.89)	(-6.43)	(4.07)	(17.00)				(1.32)

Table 4: Logit estimation explaining the probability of being a dividend-payer. This table reports the logit regression results using Fama and MacBeth (1973) style estimation, with Newey –West *t* statistics reported in parentheses. The results from the full period 1989-2009 are organized in Panel A, results from the base period 1989-1997 are organized in Panel B, and 1998-2009 sub-period results are organized in Panel C. The dependent variable is equal to one if the firm pays dividend that year and zero otherwise. The explanatory variables are market-to-book ratio (*M/B*), assets growth (*dA/A*), earnings-to-asset ratio (*E/A*), size percentile (*Size*), debt-to-equity ratio (*D/E*), retained earnings-to-book equity ratio (*RE/BE*), liquidity measure proxied by 'standardized turnover adjusted number of zero trading days' (*LM*), systematic risk, and idiosyncratic risk. Rows (1) - (6) report the estimates of the various logit regressions with Fama and French (2001) firm characteristic variables and other explanatory variables. *** indicates significance at 1%, ** indicates significance at 5%, * indicates significance at 10%.

Row	Firm characteristics					Life-cycle	Liquidity	Risk	
	M/B	*dA/A*	*E/A*	*Size*	*D/E*	*RE/BE*	*LM*	Systematic	Idiosyncratic
				Panel A: 1989-2009					
(1)	-0.022***	-0.179***	0.418***	4.138***					
	(-7.26)	(-2.97)	(5.19)	(19.20)					
(2)	-0.022***	-0.181***	0.419***	4.135***	-0.015				
	(-7.13)	(-3.04)	(5.13)	(19.12)	(-1.19)				
(3)	-0.021***	-0.194***	0.715***	3.958***		0.112*			
	(-3.94)	(-3.63)	(5.47)	(16.40)		(1.79)			
(4)	-0.046***	-0.171**	0.997***	4.769***			0.020**		
	(-5.11)	(-2.75)	(3.40)	(12.59)			(2.27)		
(5)	-0.021***	-0.188***	0.382***	3.755***				-54.167***	-52.354***
	(-7.00)	(-4.90)	(4.88)	(11.83)				(-2.87)	(-9.24)
(6)	-0.041***	-0.165***	0.891***	4.324***			0.015**	-49.208**	-40.437***
	(-5.05)	(-3.08)	(3.38)	(12.27)			(2.35)	(-2.39)	(-6.40)
				Panel B: 1989-1997					
(1)	-0.021***	-0.053	0.565***	3.854***					
	(-3.54)	(-0.81)	(4.15)	(10.92)					
(2)	-0.021***	-0.057	0.569***	3.847***	-0.042*				
	(-3.47)	(-0.88)	(4.10)	(10.86)	(-1.99)				
(3)	-0.015	-0.069	1.002***	3.627***		0.222			
	(-1.50)	(-1.32)	(6.55)	(9.54)		(1.69)			
(4)	-0.059**	-0.058	1.496**	5.185***			0.008***		
	(-2.80)	(-0.66)	(2.35)	(6.56)			(3.96)		
(5)	-0.021***	-0.110**	0.535***	3.044***				-34.042	-60.504***
	(-4.62)	(-2.64)	(3.86)	(7.82)				(-0.94)	(-8.93)
(6)	-0.055**	-0.071	1.397**	4.190***			0.006***	-8.145	-39.963***
	(-3.18)	(-0.88)	(2.53)	(5.44)			(3.98)	(-0.33)	(-4.64)

Row	Firm characteristics					Earnings	Liquidity	Risk	
	M/B	*dA/A*	*E/A*	*Size*	*D/E*	*RE/BE*	*LM*	Systematic	Idiosyncratic
				Panel C: 1998-2009					
(1)	-0.022***	-0.282***	0.298***	4.370***					
	(-7.52)	(-5.56)	(4.98)	(19.12)					
(2)	-0.022***	-0.283***	0.296***	4.372***	0.006**				
	(-7.51)	(-5.58)	(5.00)	(19.19)	(2.67)				
(3)	-0.025***	-0.287***	0.499***	4.207***		0.030			
	(-5.37)	(-6.15)	(3.39)	(14.95)		(1.69)			
(4)	-0.037***	-0.255***	0.623***	4.458***			0.027*		
	(-5.60)	(-4.56)	(4.03)	(26.31)			(2.10)		
(5)	-0.021***	-0.246***	0.267***	4.288***				-69.260***	-46.242***
	(-4.91)	(-5.67)	(4.87)	(15.11)				(-4.29)	(-5.78)
(6)	-0.030***	-0.235***	0.511***	4.325***			0.021**	-80.004***	-40.793***
	(-5.60)	(-5.11)	(4.47)	(16.25)			(2.24)	(-4.18)	(-4.31)

Figure 2: Propensity to pay with and without risk and liquidity adjustments, 1989-2009. The solid line is the propensity to pay without risk and liquidity adjustments. It is derived from the logit model with explanatory variables of market-to-book ratio, asset growth, earnings-to-assets ratio and size percentile. The dotted line is the liquidity adjusted propensity to pay, the dashed line is the risk adjusted propensity to pay, and the dotted-dashed line is the risk and liquidity adjusted propensity to pay.

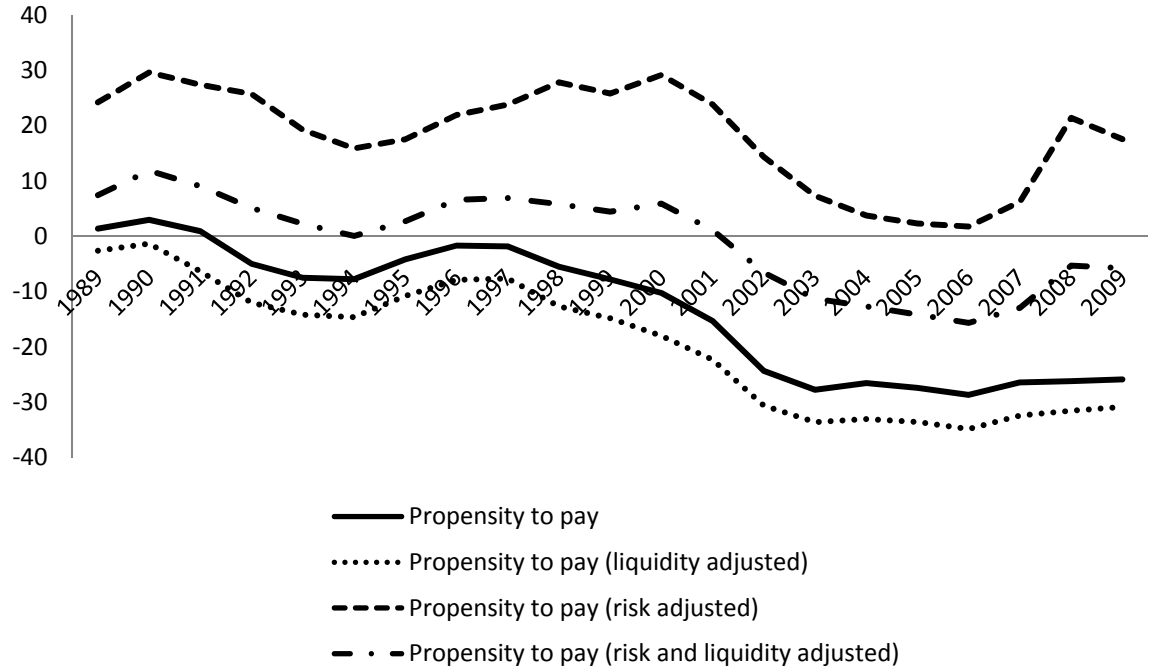
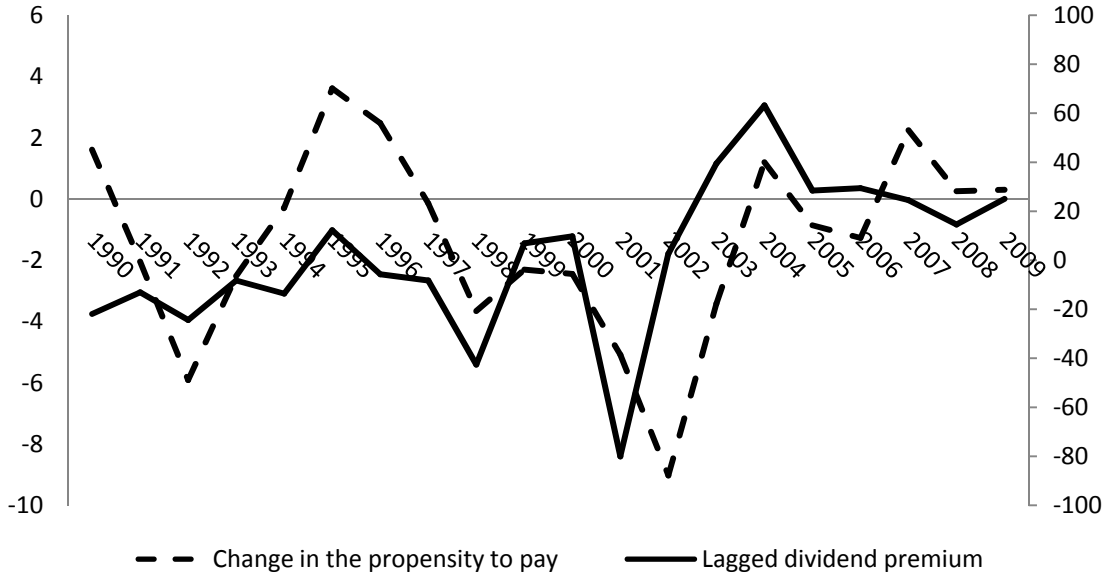


Table 5: Percentage of disappearing dividends explained by liquidity, risk and both. This table reports the percentage of disappearing dividends phenomenon explained by Liu's (2006) liquidity measure (in Row (1)), risk (in Row (2)) and both liquidity and risk (in Row (3)) during the period 1998-2009 using three methods. Column (2) reports the percentage of propensity to pay explained by risk and/or liquidity with the difference in difference measure, which is the difference between the 2009 and 1998 propensity to pay based on the logit regressions with and without risk and/or liquidity controls. Column (3) presents explained percentage of propensity to pay by risk and/or liquidity based on the estimated coefficients of the regression of the propensity on time-trend. And Column (4) shows the percentage of integrated propensities between 1998 and 2008 explained by risk and/or liquidity.

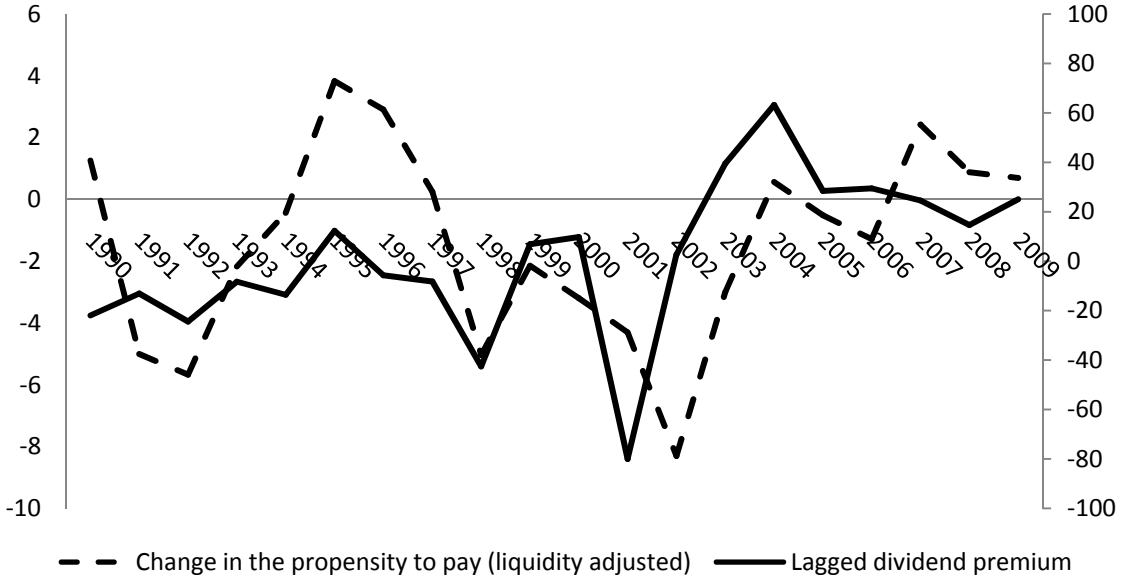
Disappearing dividends	**Disappearing dividends defined by**		
explained by	**Difference in propensity**	**Coefficient for time trend**	**Integrated propensity**
Liquidity	10.01%	9.78%	-22.09%
Risk	49.61%	19.90%	28.04%
Liquidity and Risk	43.20%	21.20%	59.65%

Figure 3: Lagged dividend premium and changes in propensity to pay dividends with and without risk and liquidity adjustments, 1989-2009. Figure (A) illustrates the relationship between book-value-weighted dividend premium (one lagged, the solid line) and the changes in propensity to pay dividends (the dashed line) when unadjusted for liquidity or risk. Figures (B) – (D) plot the lagged dividend premium and the adjusted changes in propensity to pay derived from logit regressions adjusted for liquidity, risk and both respectively.

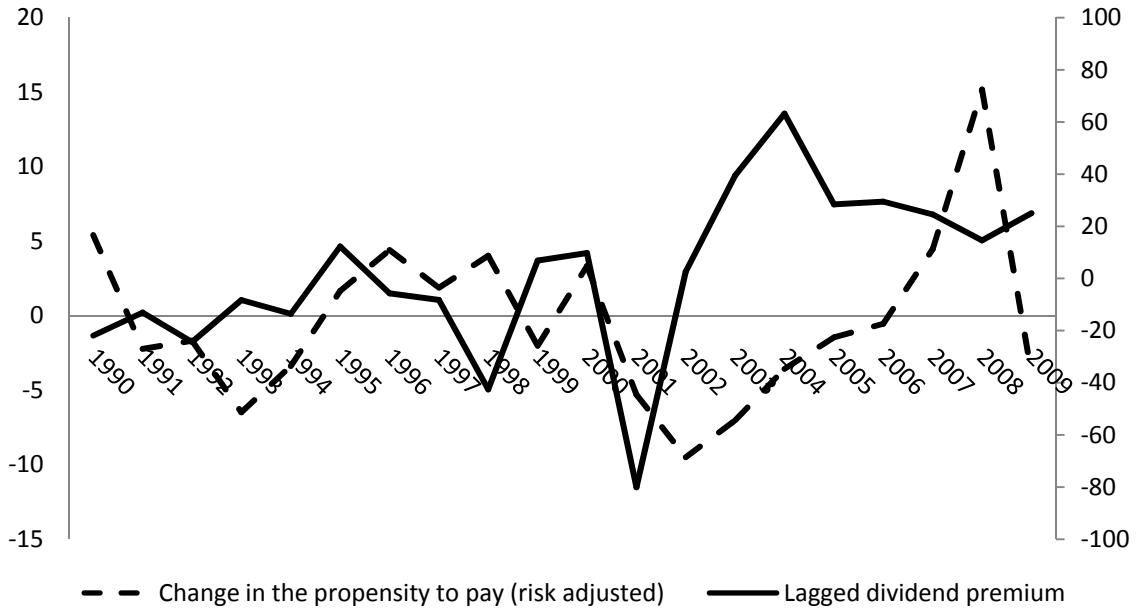
(A)



(B)



(C)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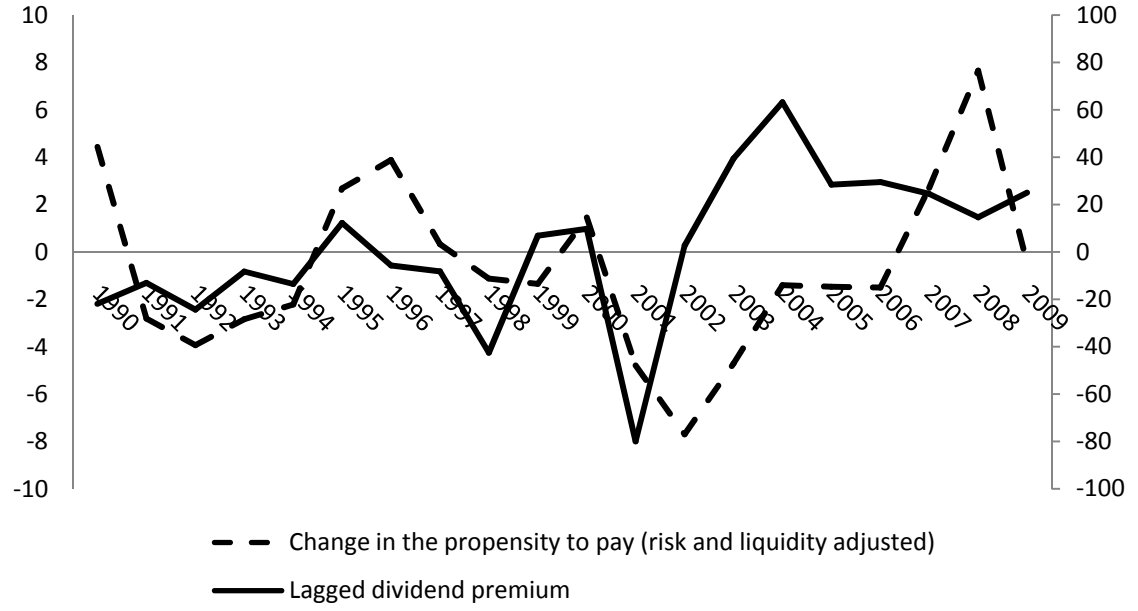
Change in the propensity to pay (risk adjusted)
Lagged dividend premium

(D)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Change in the propensity to pay (risk and liquidity adjusted)
Lagged dividend premium

Table 6: Test of catering incentives in explaining the change in propensity to pay from 1998 to 2009. This table reports the estimates of the time-series regression during 1998-2009 (Equation 5) with the explanatory variables including lagged dividend premium (Catering), the time-trend variable, and 2007-09 financial crisis dummy. The dependent variable is the change in propensity to pay, which is the difference between propensity to pay in year *t* and that in year *t-1*. The propensity to pay (PTP) is the difference between actual and predicted percentage of dividend-payers, the latter is calculated with mean estimates of annual logit regressions for the base period 1989-1997 (The explanatory variables in the logit regression are reported in the Column "Logit regression variables"). The numbers in parentheses are the t-statistics adjusted for heteroscedasticity and autocorrelation. *** indicates significance at 1%, ** indicates significance at 5%, * indicates significance at 10%.

Regression	Logit regression variables	Catering	Time-trend	Financial crisis
	Panel A: Unadjusted PTP			
(1)	**M/B, dA/A , E/A, Size**	0.044***		
		(5.42)		
(2)	**M/B, dA/A , E/A, Size**	0.024**	0.381*	
		(3.16)	(2.05)	
(3)	**M/B, dA/A , E/A, Size**	0.036**		3.374***
		(2.86)		(3.47)
(4)	**M/B, dA/A , E/A, Size**	0.036**	-0.003	3.391**
		(3.24)	(-0.02)	(-1.21)
	Panel B: PTP adjusted for Liquidity			
(1)	**M/B, dA/A, E/A, Size, Liquidity**	0.043***		
		(3.81)		
(2)	**M/B, dA/A, E/A, Size, Liquidity**	0.018**	0.500**	
		(2.37)	(2.99)	
(3)	**M/B, dA/A, E/A, Size, Liquidity**	0.035**		3.832***
		(2.41)		(4.47)
(4)	**M/B, dA/A, E/A, Size, Liquidity**	0.028*	0.170	2.908**
		(2.19)	(1.01)	(2.49)

Regression	Logit regression variables	Catering	Time-trend	Financial crisis
	Panel C: PTP adjusted for Risk			
(1)	**M/B, dA/A, E/A, Size, Risk**	-0.001		
		(-0.02)		
(2)	**M/B, dA/A, E/A, Size, Risk**	-0.032	0.619	
		(-0.52)	(0.87)	
(3)	**M/B, dA/A, E/A, Size, Risk**	-0.018		7.986**
		(-0.50)		(2.48)
(4)	**M/B, dA/A, E/A, Size, Risk**	0.010	-0.748	12.049*
		(0.28)	(-0.93)	(2.22)
	Panel D: PTP adjusted for Risk and Liquidity			
(1)	**M/B, dA/A , E/A, Size, Risk, Liquidity**	0.022		
		(1.29)		
(2)	**M/B, dA/A , E/A, Size, Risk, Liquidity**	-0.002	0.483	
		(-0.06)	(1.13)	
(3)	**M/B, dA/A , E/A, Size, Risk, Liquidity**	0.010		5.656***
		(0.81)		(3.51)
(4)	**M/B, dA/A , E/A, Size, Risk, Liquidity**	0.026	-0.413	7.902**
		(1.75)	(-1.01)	(2.82)