The Payout Ratio, Earnings Growth and Returns:

UK Industry Evidence.

Andrew Vivian[1]

Corresponding Author:

School Of Economics, Finance and Business

University of Durham

23-26 Old Elvet

Durham

DH1 3HY

Tel: 0191-334-6335

Email: a.j.vivian@durham.ac.uk

Accepted for presentation at the
EFM Behavioural Finance Symposium 2006

January 2006

[1] We thank Antonios Antoniou, John Doukas and Krishna Paudyal for helpful comments.We alone are responsible for any errors or omissions.

The Payout Ratio, Earnings Growth and Returns:

UK Industry Evidence.

January 2006

Abstract:

This paper examines the role of the Payout Ratio as a predictor of future earnings growth and returns in UK industry data. We find, contrary to the suppositions of many practitioners, industries that have low payout ratios (relative to the industry time-series mean) have low subsequent earnings growth. This suggests that corporate managers are either over-investing or using dividends to 'signal' future earnings or simply that markets are competitive and excess profits within markets are rapidly competed away.

Using a panel of 20 UK industries we provide evidence the relationship between the payout ratio and subsequent earnings growth remains positive throughout our sample period contrary to the perceived wisdom. At the five-year horizon the results are highly statistically significant and more than 30% of the variation in earnings growth can be captured by the payout ratio alone during any 10-year rolling window period.

Novelly, we examine if dividing the dividend-price ratio into payout ratio and earnings-price ratio components enhances its ability to predict future returns. Panel evidence provides support that this leads to stronger return predictability for some sample periods. During these periods, it is found that returns tend to respond more strongly to the payout ratio than the earnings-price ratio consistent with favourable earnings growth predicted by payout ratio not being fully incorporated into current prices.

Our main finding is that there is a robust, positive and statistically significant relationship between an industry's payout ratio and its subsequent earnings growth, which is especially strong at the five-year horizon.

INTRODUCTION

The Payout ratio has long attracted the attention of practitioners and academics alike. Ever since the ground-breaking field research of Lintner (1956), corporate payout policy has courted controversy and been subject to intense debate in the literature. In this paper we examine the industry level information contained by the payout ratio. Particularly, we provide empirical evidence of a potentially anomalous positive relationship between the payout ratio and long-run earnings growth in UK industries. Previous studies found this result at the market level in the US (Arnott & Asness (2003)) and internationally (Ap Gwilym et al. (2004)).

Historically and certainly until recently the debate and interest in payout policy has mainly focussed upon dividend policy, as Lintner himself did. Famously, Miller and Modigliani (1961) outlined theoretical conditions under which dividend policy (and thus payout policy) would be rendered irrelevant. Subsequent research, argued that the payment of any dividends at all was anomalous since dividends were taxed at a higher rate than capital gains (Black (1976)). Although a defence of dividend payments came with the development of agency theory and the concern that free cashflow left within the company could be mis-appropriated by mangers who were given insufficient incentives to behave so as to maximise the financial profits of the firm (Easterbrook (1984), Jensen (1986)). Alternatively, dividends can be used as a signalling mechanism, which managers increase in anticipation of future earnings growth (Bhattacharya (1979), Miller & Rock (1985)).

Contemporary research by Arnott & Asness (2003) and Ap Gwilym et al. (2004) has indicated that the payout ratio is positively associated with earnings growth at the market level. There are several potential explanations for these findings.

It simply could be indicative of competitive industry markets where excess profits are rapidly competed away, alternatively managers could be using dividends to signal their expectations of future earnings or CEO's could be over-investing either due to 'empire building' or because of managerial over-confidence. Certainly the findings of these recent papers, and indeed the findings of this paper, seem to be in opposition with the view of many practitioners and the view that dividends are simply determined by a firm's residual earnings, after it has decided its optimal investment policy.

Recent research has also highlighted the relationship between the payout ratio and returns, both at the market level (Lamont (1998), Ap Gwilym et al. (2004)) and at the firm-level (McManus et al. (2004)). Thus far research has indicated that the payout ratio might have some role for predicting short-run future returns. McManus et al. (2004) indicate that the payout ratio is a useful adjunct to the dividend-price ratio in explaining monthly UK returns, although the sign of the relationship is time-varying. Lamont (1998), demonstrates that the payout ratio can be useful for predicting quarterly US market equity and bond returns. Although, in international data, Ap Gwilym et al. (2004) find limited use for the payout ratio to forecast future returns at 1-year to 10-year horizons.

In this paper we extend previous analyses of the payout ratio. Firstly, we consider the industry dynamic of the payout ratio across 20 economic sectors and its ability to predict future earnings and returns in these industries. This area appears to have been wholly neglected in the prior literature. To some extent this is surprising given the recent interest in industry studies. Moskowitz & Grinblatt (1999) demonstrated that momentum in returns was strongly related to the performance of industry sectors, Gebhardt et al. (2001) illustrated that industry membership was an

important factor in determining a firm's cost of capital, while Hong et al. (2006) find evidence that industry returns often lead the market and can have explanatory power for future market returns.

Firstly, we examine if the relationship between the payout ratio and subsequent earnings growth over the period 1966-2002, which previous studies of the whole market have asserted is contrary to perceived wisdom, is evident across industries. Are we able to generalise the finding of the positive relationship between the payout ratio and earnings growth across the majority of industries? We then perform some simple tests to help differentiate between the competing hypotheses for the positive relationship between industry payout ratio and future earnings growth.

Secondly, our industry panel enables easy examination of the time-variation in the relationship between payout and earnings or dividends using a rolling window method. This also demonstrates the main results are robust across sub-sample periods, specifically in the panel setting the relationship between payout and earnings growth is positive throughout our sample.

Thirdly, we examine if the payout ratio is able to predict stock prices, particularly in light of its predictability of earnings growth. Ap Gwilym et al. (2004) found, contrary Lamont's (1998) US findings, that there was little empirical support for the payout ratio being of use to predict returns in international markets. Ap Gwilym et al. (2004), only consider the ability of the payout ratio alone to predict returns. We find a slightly different modelling specification provides results more favourable for a relationship between the two in our industry panel. Particularly, if the dividend-price ratio is divided into its earnings-price and payout ratio components then this aids predictability during some periods our rolling regression analysis reveals.

HYPOTHESES OF THE RELATIONSHIP BETWEEN PAYOUT RATIO AND EARNINGS GROWTH.

Perceived Wisdom and Optimal Investment Theory

The perceived wisdom amongst practitioners appears to be that a low payout ratio indicates high future earnings growth. Particularly since firms in that industry appear to be retaining a high proportion of their earnings and so are likely to be investing heavily, in projects thought to be beneficial to the firm. This position can be presented theoretically also as the case where financial constraints prevent firms using external finance and dividends are simply the residual earnings after rational managers have decided their optimal investment policy[2]. Such simple analysis also suggests that if the relationship between payout and earnings growth isn't negative then this is likely to be because either external finance is readily available or because managers follow sub-optimal investment policies.

Over-investment Hypotheses

The positive relationship between payout ratio and subsequent earnings growth could be due to corporate executives making sub-optimal investment decisions. The 'empire building' hypothesis of Jensen (1986) suggests that companies might over-invest if CEO's are insufficiently monitored by shareholders. Particularly, sometimes corporations retain copious amounts of cash, which managers could use to

[2] Clean-surplus accounting is also assumed.

undertake investment projects which seek to bolster the status of the company and the management. The opportunities for managers to exploit this would be particularly apparent when earnings are higher than usual, and thus when the payout ratio is lower than normal.

However, it's also possible that corporate investment decisions could be distorted by CEO overconfidence (Tate & Malmendier (2005a, 2005b)). If CEO's are overconfident and over-optimistic then this might lead to errors in their expectations of the future payoffs of investment projects. Thus, when optimistic about future prospects, managers would over-invest in projects which they perceived would earn positive NPV's, but are actually likely to have a detrimental impact upon shareholder wealth. For instance, managers within an industry might become over-optimistic during periods when recent earnings growth has been high and thus when it's likely the payout ratio will be low.

Competitive Markets / Mean Reversion Hypothesis

A potential explanation for the positive relationship between payout ratio and earnings growth is offered by the theory of competitive markets (as championed by Fama & French, 2000). A payout ratio below that industries average could be caused by temporarily high supernormal profits within an industry. As new firms enter the market these abnormal profits would be competed away and thus subsequent earnings growth would be low / negative. Thus, the behaviour reported and findings of predictability by the payout ratio could simply relate to mean-reversion in earnings combined with sticky dividends.

Signalling Hypothesis

Since there is an information asymmetry between corporate executives and shareholders then dividends can be used a device to 'signal' managerial expectations of future earnings growth (Bhattacharya (1979), Miller & Rock (1985)). Consequently, when managers expect earnings to rise in the future they would increase dividends to intimate this information to investors. Thus, a higher payout ratio could simply result from managers raising dividends to signal future earnings are expected to be high. Consequently, this is another possible explanation for the positive association between the payout ratio and future earnings growth.

DATA

Data Description

Our data was collected from Datastream for the period 1966-2002 on every firm in their database that traded on the LSE; we include dead companies in our sample as well as those still trading. We collected price, dividend-price, price-earnings and market capitalisation data. Firms were then split into industries based upon the Financial Times Industry Groupings.[3] We discarded all financial industries and those industries which had no companies at the sample start date. This left 20 industry groupings; listed in Table 1. Annually rebalanced value-weighted price, earnings, dividend, earnings-price, dividend-price were then calculated for all

[3] Datastream Level 4 industry classifications are identical to those used by the Financial Times

industries. Our industry level sample covers all 20 sectors for which data were available for the entire sample. These industries cover a vast array of diverse sectors be it services, consumer goods or industrial products. The data also encompasses cyclical and non-cyclical sectors. Consequently our industry dataset is comprehensive and very rich providing us with an especially wide cross-section for us to make our empirical investigations.

Importantly, our dataset is free from much of the survivor bias inherent in the Datastream quoted industry indices, which have been used in many previous studies (including Hong et al. (2006)). The Datastream quoted indices only include firms that are currently trading, excluding all firms which traded on the LSE but which have subsequently ceased trading. Moreover, this sample of firms is limited to the 550 largest firms, which are then split into industry groupings. This means that some industry indices have as few as 10 companies comprising them, a number which will only fall as you move back to the sample start, and could lead to problems with inference due to the potential for idiosyncratic shocks to an individual company to affect the industry-level variable.

UK data on the consumer price index were gathered from the IMF's International Financial Statistics database. We examine the data in real terms throughout since we believe economic agents are primarily concerned about the purchasing power of their income, although our methodology is equally applicable to nominal values.

We perform our analysis using log transformations of the variables. This helps with interpretation when we predict returns using the payout ratio and earnings-price ratio, as well as to link the return results to the dividend-price predictability literature in a log-linear framework. Using logs for growth rates also has the attractive property

of being a geometric average for any horizon examined. It also means that outlying observations receive less weight than under arithmetic averages, as well as negative and positive growth rates being treated in a more symmetric manner than under arithmetic calculations.

Descriptive Statistics

INSERT TABLE 1: DESCRIPTIVE STATISTICS

Descriptive statistics for the data series were generated using RATS. We simply report the statistics for the payout ratio and single year growth rates for earnings and prices. Since we use log growth rates the longer term growth rates of earnings and prices will simply be smoother versions of the single year data and thus we omit these for space considerations. The minimum negative single year growth rates of earnings and prices of less than –1 are not erroneous given we are using logs. This aside the most striking features of the data are the large standard deviations of all the variables in the sample and the variation in the mean values of the payout ratio across industries. The variation in mean payouts would suggest that analysis using a within-groups panel method is likely to be appropriate since the current payout ratio of industry i could be analysed relative to the mean of industry i. This would be better than tacitly assuming that all industries have an identical mean payout ratio, which in our sample doesn't seem to be the case or more closely examining the cross-sectional effects of the payout ratio which isn't the focus of this study.

Panel Data Regression Method

Panel regressions have the great advantage that they allow time-series and cross-sectional data to be pooled together into a single much larger and more informative dataset. Specifically, panels enable much greater reliability and precision in co-efficient estimation and greater statistical power for hypothesis testing. In our panel data regressions we focus upon the use of fixed effects within groups estimation, which since we have a balanced panel provide identical estimates to those provided by the least squares dummy variable method (LSDV). Individual industries have very different mean values of our predictor variables, especially the payout ratio. For example, one would expect the payout ratio to be high in mature industries such as food retailers, but lower in growing industries such as pharmaceuticals. However, we are not concerned about uncovering cross-sectional variation in mean earnings growth or returns across industries. Rather, we are concerned about time-series predictability of earnings growth or returns, but since there is substantial cross-sectional variation in industry payouts then it would be extremely restrictive to model the data on the basis that all industries tend to revert to the same payout ratio. Hence it is natural to use within groups estimators which de-mean the predictor variables and so consider the payout ratio for industry i at time t relative to the sample mean payout ratio for industry i.

EARNINGS GROWTH PREDICTABILITY

The Payout Ratio and Future Earnings Growth

The conventional wisdom and view held by many practitioners is that the relationship between earnings growth and the payout ratio should be negative. This

relationship can also be justified theoretically in a world where external finance is difficult to obtain and in which management optimally invests the funds available to it. Firms with low payout ratios retain a large portion of their earnings. Since retained earnings for most companies are the primary source of investment funds this suggests that firms with low dividend payouts should be investing heavily in projects beneficial to the firm and thus future earnings should rise.

INSERT TABLE 2:

(1) $$GY_{i,t} = \alpha + \beta.(D_{i,t-1}/Y_{i,t-1}) + \varepsilon_{i,t}$$

Contrary to the perceived wisdom, Table 2 provides a strong and compelling evidence for a positive relation between the payout ratio and future earnings growth. In fact, in only one industry at the one-year horizon do we find a negative parameter estimate. However, for one-year earnings growth, the relationship is largely statistically insignificant, although this could be partly due to imprecision in estimating standard errors which can be overcome by our panel sample.

For five-year earnings growth, not only is there a statistically significant positive relationship in every single industry at the 5% level, but moreover a large proportion of the variation in earnings growth can be explained. In the majority of industries more than 30% of five-year earnings growth can be explained by the payout ratio alone. This suggests that longer-term industry earnings growth is highly predictable by the industry de-meaned payout ratio in the UK which could potentially be a useful and perhaps previously overlooked variable for analysts attempting to forecast future earnings growth.

INSERT TABLE 3: PANEL DATA EARNINGS GROWTH RESULTS

FIGURE 1 & 2.

Table 3 Panel A shows a pervasive positive and highly statistically significant relationship between payout and future earnings growth at all horizons from one-year through five-years. Of particular interest is the finding that this is statistically significant for one-year earnings growth in the panel setting, since when analysing the industries individually we were unable to reject the payout ratio co-efficient was zero, although across industries all except one was positive. $\bar{R}^2$ increases with the forecasting horizon from a modest 3.6% for one-year to a substantial 18.5% and 29.7% at the three and five-year horizons respectively. The estimated co-efficients rise gradually as we progress from the one-year to the five-year horizon. In fact, the five-year horizon co-efficient indicates that earnings are expected to almost fully restore the payout ratio to its mean within five years. For instance, if the payout ratio is 10% above mean, real earnings growth are expected to rise 9.5% over the next five years. These results are contrary to the conventional wisdom that there should be a negative association between payout ratio and future earnings growth.

We examine the robustness of the panel data results across time through use of a rolling window approach. Given the cross-section of 20 industries, a window of 10 years results in the availability of 200 observations, which is much more than sufficient to enable appropriate precision in the estimation of both parameters and variance. These results at the one and five-year horizon are illustrated graphically in Figures 1 and 2.

(2) $GY_{i,t} = \alpha_{i,t} + \beta_t(D_{i,t-1}/Y_{i,t-1}) + \varepsilon_t$ estimated for t=t-9,....,t

The rolling results of (2) displayed in figure 1 demonstrate considerable time-variation in the relationship between the payout ratio and 1-year earnings growth. For sample periods ending prior to 1985, panel regressions capture around 20% of the variation in earnings growth, the co-efficient on payout is positive and relatively large as well as highly statistically significant. However, since 1985 the relationship between the payout ratio and earnings growth weakened, particularly it struggled to capture earnings variation, although the co-efficient remained positive and statistically significant for most periods.

At five-year horizons there is a robust strong, positive and statistically significant relationship between the payout ratio and subsequent earnings growth. The conventional t-test statistic is highly significant for all 10-year rolling periods and the plot of $\bar{R}^2$ indicates the payout ratio captures a substantial portion of the variability in 5-year earnings growth; which is a minimum of 35%. There are long swings though in the co-efficient on the payout ratio, which is substantially above 1 for long periods, specifically for samples ending between 1982 and 1992. The importance of this is that is suggests that earnings adjusted by more than enough in order to bring the payout ratio back to its mean; in fact they over-adjusted during this period.

The Mean-reversion of Earnings Growth Hypothesis

Panel B of Table 3 demonstrates the tendency of industry earnings growth to mean-revert. The co-efficients at all horizons is negative indicating mean-reversion and the strength of mean reversion increases with the horizon studied. Although the

relationship is statistically significant at all horizons, $\bar{R}^2$ is miniscule for one and two-year future earnings growth. However, at longer horizons a larger proportion of variation is captured $\bar{R}^2$ rises to 12.6% and 26.1% for four and five-year earnings growth respectively. Mean-reversion in earnings is claimed to be caused by competitive pressures within markets due to the actions of rational agents (see e.g. Fama & French (2000)). Possibly the payout ratio predicts earnings growth simply because it captures this mean-reversion in earnings. If this is the case then the payout ratio shouldn't be able to add explanatory power to a regression that includes a regressor that captures this mean-reversion.

We examine whether the payout ratio contains information about future earnings growth incremental to that captured by lagged earnings growth in panel C of Table 3. We find at horizons between one and four years the payout ratio dominates the information contained by lagged earnings growth. At these horizons the payout ratio co-efficient estimates remain positive, reasonably close to those in bi-variate regressions (reported in Panel A) and highly statistically significant. In contrast, lagged earnings growth co-efficients are statistically insignificant and actually have the wrong sign. This indicates the payout ratio seems to capture the information contained by lagged earnings growth for one through four-year future earnings growth. At the five-year horizon, however, the payout ratio doesn't seem to fully capture the mean-reversion information captured by the previous five-years earnings growth. Lagged earnings growth is negatively and statistically significantly related to five-year future earnings, however, the payout ratio retains its strong, positive, statistically significant relationship with earnings.

Generally the payout ratio does appear to contain information relating to the mean-reversion of earnings growth. For one to four-year future earnings growth, the

payout ratio subsumes information contained by lagged earnings. However, the payout ratio appears to contain information above and beyond that of simple mean-reversion in earnings. The inclusion of the payout ratio, in the relationship between lagged earnings and future earnings leads to a large increase in the predictive power of the regression. Comparing $\bar{R}^2$ between panel B and C of Table 3 indicates a substantial increase when the payout ratio is included, which is more than 10% at all horizons save one-year earnings growth. Consequently, whilst we do find support for the hypothesis that the payout ratio does capture mean-reversion in earnings, this appears only to provide a partial explanation for the predictive power of the payout ratio. The payout ratio appears to include information regarding other variables relevant for predicting future earnings growth as well.

Dividend Growth and The Signalling Hypothesis

Signalling theories suggest that corporate managers use dividends to signal future earnings growth. Consequently, there should be a positive relationship between current dividend growth and future earnings growth. However, at the industry level there is likely to be a lot of noise in the relationship between dividends and earnings meaning it is difficult to test the 'signalling' hypothesis directly. Nevertheless, the results reported here still serve to demonstrate that the relationship between the payout ratio and future earnings growth is robust to the inclusion of prior dividend growth.

Panel D of Table 3, indicates that dividend growth isn't positively associated with future earnings growth as would be consistent with signalling theory. Actually, the relationship is statistically significantly negative in three cases. This is entirely

contrary to the view that dividends signal future earnings. However, Nissim & Ziv (2001) suggest that the poor evidence in favour of dividend signalling can be attributed to an endogeneity problem due to the tendency of earnings to mean-revert. However, in our regressions of panel D, we include the payout ratio, which we've demonstrated does capture information relating to the mean reversion of earnings. Furthermore, we can report without showing the details here, that in regressions of dividend growth alone or including lagged earnings growth instead of payout ratio we find no evidence whatsoever of a statistically significant positive relationship between dividend growth and future earnings.

Rather than being due to an endogeneity issue the results reported here are most likely explained by there being a great deal on noise at the industry level between these variables. Not all firms within an industry will necessarily attempt to use dividends to signal future earnings, and the information contained by a dividend change could will be intended and interpreted by the market differently depending upon firm-specific factors. Consequently, it is unsurprising, particularly given the mixed evidence found in firm studies that we don't find a positive relationship between dividend growth and future earnings growth.

However, the relationship between the payout ratio and future earnings growth is robust to the inclusion of dividend growth. In fact, the payout co-efficient estimates remain very close to those estimated for regressions excluding dividend growth. This adds further to the weight of evidence in favour of the payout ratio being able to robustly predict future earnings growth.

Summary of Earnings Growth Predictability

Our findings indicate a pervasive positive relationship between the payout ratio and earnings growth across industry sectors, which is especially strong at longer horizons. These results provide fresh evidence to supplement the research using aggregate market data which also demonstrates a significant positive relationship between the payout ratio and future earnings growth in the US market (Arnott & Asness (2003)) and in 7 developed markets (Ap Gwilym et al. (2004)). The relationship is robust across sub-samples as illustrated by the rolling regression results and is also robust to the inclusion of dividend growth or lagged earnings growth.

However, these findings are contrary to the perceived wisdom and also theoretical expectations from a model where external financing is absent and rational agents pursue optimal investment policies. Both propose a negative relationship between payout and future earnings.

A positive relationship could be justified by dividend signalling, mean-reversion of earnings or over-investment by management. There is a tendency for earnings to mean-revert consistent with theories of competitive markets where excess profits are competed away by new entrants. The payout ratio appears to capture a lot of the mean-reversion information, in fact at horizons apart from five-years mean-reversion in earnings is subsumed by payout. However, the payout ratio does contain information supplementary to mean-reversion. Although, we don’t find any evidence to suggest that dividends are being used effectively to signal future performance this hypothesis alludes reliable testing in an industry setting. It is also plausible that the payout ratio also contains information regarding CEO over-investment. This could be due to agency issues and the tendency for managers to ‘empire build’, but equally could be due to behavioural issues of over-confidence and over-optimism leading to

the distortion of the investment decision due to behavioural biases. The over-investment hypothesis issue in particular appears to warrant further research.

In short, we find a pervasive positive relationship between an industry's de-meaned payout ratio and its subsequent earnings growth. This finding can be partially explained simply by mean-reversion of earnings, consistent with economic theories of competitive markets. However, hypotheses of over-investment or the 'signalling' theory could also have a role to play in fully explaining our results.

STOCK PRICE PREDICTABILITY

Since, we find the payout ratio contains information about long-term future industry earnings growth then an important issue is whether or not this information has already been fully impounded into share prices. Or has the information contained in the industry payout ratio been overlooked by market participants. Perhaps they have been aware of the information but they have mis-interpreted it and have either over-reacted thereby adjusting their expectations of growth too far upwards or under-reacted and not adjusted their growth expectations far enough?

INSERT TABLE 4:

(3) $$GP_{i,t} = \alpha + \beta.(D_{i,t-1}/Y_{i,t-1}) + \varepsilon_{i,t}$$

In common with the international evidence provided by Ap Gwilym et al. (2004), we find that the payout ratio alone provides little useful information about future capital gains. Table 6 reveals, panel within-groups regressions of (3) can

explain virtually none of the variation in industry capital gains at any horizon between one and five years. At the one, two and three-year horizons $\bar{R}^2$, is negative, whilst at the four and five-year horizon it is less than 0.01.

However, the predictability of returns and capital gains by the dividend-price ratio has been long-documented in the literature (since Fama & French (1988) and Campbell & Shiller (1988)). We consider if a slight modification to the log-linear present value model proposed by Campbell & Shiller can shed light upon the capital gain predictability.

$$d_t - p_t = -\frac{k}{1-\rho} + E_t\left[\sum_{j=0}^{\infty} \rho^j [-\Delta d_{t+1+j} + r_{t+1+j}\right] \tag{4}$$

$$GP_t = \alpha + \beta(D_{t-1}/P_{t-1}) + \varepsilon_t \tag{5}$$

The log-linear present-value model given by (4) implies that the log dividend-price ratio contains information about either future dividend growth or future returns or both. We simply propose normalising both left-hand side variables by earnings which will give us the payout ratio plus the earnings price ratio on the left-hand side as given by (6). This simple manipulation suggests that together the payout ratio and the earnings-price ratio should be able to predict future returns. For simplicity and ease of analysis, we focus purely on the capital gain portion of returns which is by far the largest, thus in our regressions we estimate (7).

$$(d_t - y_t) + (y_t - p_t) = -\frac{k}{1-\rho} + E_t\left[\sum_{j=0}^{\infty} \rho^j [-\Delta d_{t+1+j} + r_{t+1+j}\right] \tag{6}$$

$$GP_t = \alpha + \beta_1.(D_{t-1}/Y_{t-1}) + \beta_2.(Y_{t-1}/P_{t-1}) + \varepsilon_t \tag{7}$$

If the earnings information contained by the payout ratio doesn't contain any additional information about returns to that in the dividend-price ratio then in regressions of (7) B_1 will equal B_2. This is equivalent to simply regressing capital gains upon the dividend-price ratio. However, if co-efficients B_1 and B_2 are different then this suggests that earnings does contain information important for predicting future returns. Since, we find that the payout ratio has a strong positive relationship with future earnings then if this information has not been fully reacted to by investors then we would expect that B_1 will be greater than B_2. If the payout ratio is high, this is associated with high long-term earnings growth (as we found in Tables 2&3), then share prices in the industry will rise if this information hasn't already been incorporated into prices.

However, it is also possible that investors could have over-reacted to the information contained by the industry payout ratio for future earnings and thus if earnings transpire to be lower than expected then this could lead to a negative price reaction. In this scenario, we would expect B_1 to be less than B_2.

Our panel results from (7) reported in Table 4, indicate that for the full sample period the estimates of B_1 and B_2 are fairly close to each other at all horizons. At the one, two and three-years horizon B_1 is slightly bigger B_2 while the reverse is true at the four and five-year horizon. The differences between the co-efficient estimates are not large and certainly they are not statistically different from one another, which suggests that earnings information is subsumed by the dividend-price ratio.

INSERT FIGURES 3 & 4:

However, the finding that earnings information is not able to aid in the prediction of future returns is not robust to sub-sample analysis. We find there is substantial time-variation in the return predictability relationship. Specifically, figures 3 and 4 illustrate this time-variation by estimating (7) using 10-year rolling windows for one and five-year real capital gains respectively. Interestingly we find that (7) can explain around 20% of the variation in one-year capital gains for rolling window periods up to that ending in 1984. Prior to 1984 we also find that the payout ratio co-efficient (B_1) is above the earnings-price ratio co-efficient (B_2), throughout, evidence consistent with the hypothesis that earnings information contained by the payout ratio hadn't been fully incorporated into the share price.

For one-year capital gains for sample window estimates ending after 1984, (7) can detect virtually none of the price variation. We also find that the B_1 and B_2 co-efficients were very similar over this period, which given the findings from figure 1 that the payout ratio captured little, if any, of the variation in short-term earnings growth since 1985, is actually what would be expected. If the payout ratio doesn't contain additional information about earnings during this period then there's no reason why the payout ratio should be able to predict prices either. The results since 1985 are actually in-line with those reported in other studies, which find the predictive power of the dividend-price ratio to have diminished or disappeared over more recent time periods particularly since the early 1990's (see e.g. Goyal & Welch (2003)).

Particularly interesting is the time-variation in the co-efficients on payout and earnings-price at the 5-year price growth horizon. For rolling 10-year periods ending between 1982 and 1991, the co-efficient of the payout ratio is larger than that on earnings-price suggesting that earnings information contained by the payout information is additional to that included in the dividend-price ratio. This is consistent

with the view proposed at the beginning of this section that perhaps the market fails to (fully) account for the earnings information contained by the payout ratio and so that is why payout predicts prices during this period.

Furthermore, the period 1982-1991 is when the relationship between the payout ratio and 5-year earnings growth was also somewhat extraordinary, since the co-efficient on the payout ratio was substantially above 1, indicating the tendency for earnings to overshoot the level necessary to restore the payout ratio to its mean. This would seem to strengthen the case that the strong relationship between payout and future price growth during this period is because if payout was high then unusually high future earnings growth was predicted which when it materialised lead to a rise in prices.

However, aside from periods ending between 1982-91, the co-efficients of both components of the dividend-price ratio seem to be fairly similar indicating little benefit for predicting returns from decomposing dividend-price into payout and earnings-price components. The only exception to this are the sample years ending in 1978 and 1979 during which prices responded more strongly to earnings-price than to payout, which could be due over-optimism to the information contained by payout or perhaps more likely this is simply a period-specific effect. Over recent years, particularly, information contained by the payout ratio seems currently to be of little additional use for predicting returns relative to the dividend-price ratio alone.

Overall, we find some evidence that the earnings information contained by the dividend-payout during certain periods is a useful adjunct to the earnings-price in predicting industry returns even at horizons as long as five years. However, the payout ratio alone has little explanatory power over returns at the industry level, a finding that mirrors the results of Ap Gwilym et al. (2004) at the market level.

CONCLUSION

Our main finding is that, contrary to the supposition of many practitioners, there is a positive and statistically significant relationship between an industry's payout ratio and its subsequent earnings growth. This time-series relationship is evident at all horizons between one and five-years, although it is strongest at longer horizons. In fact, the payout ratio predicts five-year earnings growth robustly in all 10-year sub-samples examined via rolling window panel regressions. A high proportion, more than 35% in any rolling sub-sample, of five-year industry earnings growth variability can be explained by its payout ratio. We also find evidence that one-year earnings growth is predictable by the payout ratio, although this relationship is most evident prior to 1985 and has faded over recent years.

We attempt to distinguish between the potential explanations for the pervasive and seemingly robust positive relationship between the payout ratio and subsequent earnings growth. Firstly, we find that the payout ratio tends to capture a large portion of the tendency of earnings growth to mean-revert as postulated by the operation of competitive markets; however, the payout ratio contains more information than the simple mean-reversion of earnings.

Secondly, the findings that payout ratio is positively related with subsequent earnings growth is also consistent with signalling or over-investment. Although we find no evidence in favour of the 'signalling' hypothesis, i.e. that dividends are being used by managers to effectively intimate expectations of future earnings growth, we can't rule this out as being a contributory factor due to the difficulties in testing this hypothesis using industry data. Over-investment could be due to agency considerations whereby insufficiently monitored executives undertake seemingly

benign empire building projects (Jensen ,1986). Perhaps, more likely over-investment could be due to CEO over-confidence and over-optimism (Malmendier & Tate (2005a , 2005b)). Industries which have low payout ratios relative to their mean tend also to have enjoyed high past earnings growth; it's perfectly plausible that CEO's in such industries would become over-optimistic about the industry's growth prospects and over-estimate the payoffs to future investment projects. Hence, CEO's would over-invest in projects they perceived to be profitable but which subsequently prove to be loss-makers contributing to the decline in earnings, and thus the observed positive relationship between payout ratio and earnings growth.

Subsequent analysis of returns indicates that the industry payout ratio, alone, is unable predict virtually any of variation in stock prices, as found by Ap Gwilym et al. (2004) for international market data. However, we do find during certain periods that decomposing the dividend-price ratio into payout and earnings-price ratio components can enhance return predictability. Particularly, we find a stronger reaction of prices to the payout ratio prior to 1985 for one-year earnings growth and between for 1982-1991 sample ending periods for five-years earnings growth. We propose the stronger reaction of returns to the payout ratio, is consistent with the hypothesis that the information it contains about future earnings hasn't been fully incorporated into prices by market participants during these periods. Since 1992, however, the payout ratio hasn't been able to enhance the ability of the dividend-price ratio to predict returns. Although the dividend-price ratio remains able to predict a substantial proportion of long-horizon stock price changes throughout the 1990's contrary to previous evidence suggesting it's ability to predict returns had faded over recent years.

Our main conclusion is that there's a strong positive time-series relationship between an industry's payout ratio and its future earnings growth.

REFERENCES

Ap Gwilym O, Seaton J, Suddason K & Thomas S (2004), "International Evidence on Payout Ratio, Returns, Earnings and Dividends", Financial Analysts Journal, *forthcoming*

Arnott R & Asness C (2003), "Surprise! Higher Dividends = Higher Earnings", Financial Analysts Journal 59 (1): 70-87

Bhattacharya S (1979), "Imperfect Information, Dividend Policy, and 'The Bird In The Hand' Fallacy", Bell Journal of Economics, 10: 259-270

Black F (1976), "The Dividend Puzzle", Journal of Portfolio Management, 2: 5-8

Campbell J and Shiller R (1988), "Stock Prices, Earnings and Expected Dividends", Journal of Finance, 43: 661-76

Cochrane J (1994), "Permanent and Transitory Components of GNP and Stock Prices", Quarterly Journal of Economics (February 1994): 241-265

Easterbrook F (1984), "Two Agency-Cost Explanations of Dividends", American Economic Review, 74: 650-659.

Fama E and French K (1988), "Dividend Yields and Expected Stock Returns", Journal of Financial Economics, 22: 3-27

Fama E & French K (2000), "Forecasting Profitability and Earnings", Journal of Business 73: 161-175

Fama E & French K (2001), "Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay?", Journal of Finance Economics 60: 3-44

Gebhardt W, Lee C & Swaminathan B (2001), "Toward an Implied Cost of Capital", Journal of Accounting Research 39: 135-176

Goyal A & Welch I (2003), "The Myth of Predictability: Does the Dividend Yield Forecast the Equity Premium?" Management Science, 49: 639-654

Hong H, Torous W & Valkanov R (2006), "Do Industries Lead Stock Markets?", Journal of Financial Economics, *forthcoming*

Jensen M (1986), "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers", American Economic Review, 76: 323-329.

Lamont O (1998), "Earnings and Expected Returns", Journal of Finance, 53: 1563-1587

Lintner J (1956), "Distribution of Incomes of Corporations Among Dividends, Retained Earnings and Taxes", American Economic Review, 46: 97-113.

Malmendier U & Tate G (2005a), "CEO Overconfidence and Corporate Investment", Journal of Finance, 60: 2661-2700

Malmendier U & Tate G (2005b), "Does Overconfidence Affect Corporate Investment? CEO Overconfidence Measures Revisited", European Financial Management, 11: 649-659

McManus I, Ap Gwilym O & Thomas S (2004), "The Role of Payout Ratio in the Relationship between Stock Returns and Dividend Yield", Journal of Business Finance and Accounting 31: 1355-87

Miller M & Modigliani F (1961), "Dividend Policy, Growth and the Valuation of Shares", Journal of Business, 34: 411-433.

Miller M & Rock K (1985), "Dividend Policy Under Asymmetric Information", Journal of Finance, 40: 1031-1051.

Nissim D & Ziv A (2001), "Dividend changes and future profitability", Journal of Finance, 61: (6), 2111-2134

Table 1: Descriptive Statistics of Variables

Payout Ratio (Ln Dt - Ln Yt)

Industry	Observations	Mean	Std. Dev	Minimum	Maximum
Mining	36	-0.6170	0.2462	-1.3244	-0.1086
Oil & Gas	36	-0.5033	0.4116	-1.7817	0.1608
Chem	36	-0.3782	0.3115	-0.8454	0.7373
Construction & Building	36	-0.5124	0.2750	-0.9497	0.1300
Aerospace & Defence	36	-0.5289	0.2231	-0.8631	0.0190
Electrical Eq.	36	-0.6481	0.2311	-1.0617	-0.2164
Engineering & Machinery	36	-0.3915	0.1920	-0.6844	-0.0211
Beverages	36	-0.4051	0.1782	-0.7845	-0.0905
Food Producers	36	-0.5797	0.1440	-0.9023	-0.3393
Health	36	-0.4818	0.2157	-0.9345	-0.0642
Personal Care	36	-0.7079	0.2303	-1.1809	-0.1540
Pharmaceuticals & Biotecl	36	-0.5529	0.2492	-1.3258	-0.1065
Tobacco	36	-0.5366	0.2583	-0.9914	0.2300
General Retailers	36	-0.4661	0.1478	-0.7353	-0.2069
Leisure & Hotels	36	-0.5273	0.3559	-2.2645	-0.0935
Media & Entertainment	36	-0.5357	0.2516	-0.9355	0.3023
Support	36	-0.5152	0.2032	-0.8518	-0.1606
Transport	36	-0.3563	0.2544	-0.8415	0.0980
Food & Drug Retailers	36	-0.5895	0.1400	-0.8650	-0.1823
Auto & Parts	36	-0.4348	0.4275	-1.4760	0.5358

Earnings Growth (1yr)

Industry	Observations	Mean	Std. Dev	Minimum	Maximum
Mining	36	0.0180	0.2405	-0.4970	0.5379
Oil & Gas	36	0.0138	0.4838	-1.1412	1.1270
Chem	36	-0.0055	0.3237	-1.0706	0.8383
Construction & Building	36	0.0156	0.1990	-0.5468	0.3930
Aerospace & Defence	36	0.0186	0.2533	-0.7908	0.6311
Electrical Eq.	36	0.0056	0.2052	-0.8332	0.2940
Engineering & Machinery	36	-0.0097	0.1719	-0.4754	0.2686
Beverages	36	0.0180	0.1743	-0.3670	0.6299
Food Producers	36	0.0231	0.1568	-0.4186	0.3104
Health	36	0.0189	0.1566	-0.3804	0.4296
Personal Care	36	0.0249	0.2249	-0.5859	0.4800
Pharmaceuticals & Biotecl	36	0.0671	0.1342	-0.4283	0.2946
Tobacco	36	0.0538	0.2051	-0.6642	0.4719
General Retailers	36	0.0256	0.1358	-0.2304	0.2775
Leisure & Hotels	36	0.0225	0.1908	-0.4954	0.3495
Media & Entertainment	36	-0.0005	0.2070	-0.6725	0.3083
Support	36	-0.0038	0.1785	-0.4886	0.3204
Transport	36	-0.0063	0.2570	-0.5470	0.4311
Food & Drug Retailers	36	0.0638	0.1212	-0.2106	0.2669
Auto & Parts	36	-0.0041	0.4606	-1.5998	0.8425

Capital Gain (1yr)

Industry	Observations	Mean	Std. Dev	Minimum	Maximum
Mining	36	0.0243	0.3017	-0.4457	0.8419
Oil & Gas	36	0.0287	0.2889	-0.9331	0.8174
Chem	36	-0.0112	0.2615	-0.8110	0.6758
Construction & Building	36	0.0005	0.2909	-0.9602	0.7490
Aerospace & Defence	36	0.0069	0.3195	-0.9243	0.7754
Electrical Eq.	36	-0.0067	0.3306	-1.0175	0.5733
Engineering & Machinery	36	-0.0183	0.2679	-0.8210	0.6243
Beverages	36	0.0170	0.2582	-0.9183	0.4758
Food Producers	36	0.0245	0.2699	-0.8890	0.7383
Health	36	0.0296	0.2629	-0.7873	0.5037
Personal Care	36	0.0356	0.2718	-0.8447	0.7275
Pharmaceuticals & Biotecl	36	0.0706	0.3117	-0.8981	0.7190
Tobacco	36	0.0515	0.2998	-0.7242	0.5467
General Retailers	36	0.0164	0.2722	-0.9927	0.5635
Leisure & Hotels	36	0.0339	0.2843	-1.0393	0.7455
Media & Entertainment	36	0.0144	0.3228	-1.0868	0.5792
Support	36	0.0000	0.2664	-0.8722	0.5979
Transport	36	-0.0056	0.2459	-0.8344	0.4466
Food & Drug Retailers	36	0.0566	0.3098	-1.0258	0.7540
Auto & Parts	36	-0.0145	0.3305	-0.9931	0.7991

Table 2: Predictability of Earnings Growth With The Payout Ratio

Panel A: Predictability of One-year Earnings Growth (1966-2002)

Industry	Constant	T-Value Constant	D_{t-1}-Y_{t-1}	T-Value D_{t-1}-Y_{t-1}	$\bar{R}^2$
Mining	0.15	1.28	0.22	1.14	2.2%
Oil & Gas	0.29	2.54	0.54	2.83	19.2%
Chemicals	0.11	0.84	0.30	1.22	5.6%
Construction & Building	0.03	0.43	0.02	0.21	-2.8%
Aerospace & Defence	0.19	1.49	0.33	1.69	5.9%
Electrical Eq.	0.08	0.97	0.11	0.92	-1.2%
Engineering & Machinery	0.04	0.82	0.14	1.13	-0.6%
Beverages	0.10	1.31	0.21	1.33	1.7%
Food Producers	0.15	1.82	0.23	1.67	1.5%
Health	0.07	1.74	0.11	1.31	-0.6%
Personal Care	0.30	3.27	0.39	3.25	13.2%
Pharmaceuticals & Biotech	0.09	1.84	0.03	0.43	-2.5%
Tobacco	0.19	2.43	0.25	2.13	7.6%
General Retailers	0.12	1.98	0.20	1.50	1.8%
Leisure & Hotels	0.00	-0.03	-0.05	-0.41	-2.2%
Media & Entertainment	0.12	2.22	0.23	2.20	5.1%
Support	0.00	0.43	0.01	0.12	-2.9%
Transport	0.17	3.10	0.50	4.06	22.0%
Food & Drug Retailers	0.19	2.20	0.21	1.47	3.1%
Auto & Parts	0.11	1.15	0.26	1.81	3.0%

Panel B: Predictability of Five-year Earnings Growth (1966-1998)

Industry	Constant	T-Value Constant	D_{t-1}-Y_{t-1}	T-Value D_{t-1}-Y_{t-1}	$\bar{R}^2$
Mining	0.64	5.22	0.94	6.15	35.3%
Oil & Gas	0.33	2.42	0.44	2.78	10.6%
Chemicals	0.54	5.96	1.54	8.20	57.1%
Construction & Building	0.57	2.08	1.02	2.52	30.8%
Aerospace & Defence	1.03	5.48	1.83	5.04	54.5%
Electrical Eq.	0.83	6.97	1.12	5.12	36.7%
Engineering & Machinery	0.70	3.57	1.76	4.47	49.0%
Beverages	0.30	1.68	0.48	2.10	2.8%
Food Producers	0.79	4.00	1.17	3.89	36.1%
Health	0.45	2.02	0.83	2.63	15.5%
Personal Care	0.53	2.94	0.54	2.51	10.5%
Pharmaceuticals & Biotech	0.88	5.44	0.97	4.60	47.2%
Tobacco	0.59	4.98	0.68	2.99	16.6%
General Retailers	0.83	3.12	1.48	3.32	38.7%
Leisure & Hotels	0.74	4.37	1.30	4.59	51.8%
Media & Entertainment	0.59	3.93	0.97	5.05	38.7%
Support	0.56	2.24	1.07	2.46	27.6%
Transport	0.44	2.73	1.37	5.38	41.5%
Food & Drug Retailers	1.23	4.22	1.52	3.93	38.9%
Auto & Parts	0.48	3.97	1.28	3.23	26.4%

Notes:
D_t is the natural logarithm of real dividends at time t and Y_t is the natural logarithm of real earnings at time t. D_t-Y_t is the payout ratio at time t. $GY1_t$ is the real growth of earnings from t-1 to t (Y_t- Y_{t-1}), and $GY5_t$ is the real growth rate of earnings from t-1 to t+4 (Y_{t+4}- Y_{t-1}). R-bar squared is the adjusted goodness of fit. T-values are calculated using Newey-West (1987) standard errors.

Table 3: Panel Predictability of Earnings Growth

Panel A: Earnings Growth Predictability with Payout Ratio

Dependent Variable	Sample Period	Industries (N)	Panel Observations	Panel D_{t-1}-Y_{t-1}	T-Value D_{t-1}-Y_{t-1}	R-bar squared
Panel GYt	1967-2002	20	720	0.24	6.86	3.6%
Panel GY2t	1967-2001	20	700	0.45	9.75	11.1%
Panel GY3t	1967-2000	20	680	0.65	12.45	18.5%
Panel GY4t	1967-1999	20	660	0.86	15.04	26.3%
Panel GY5t	1967-1998	20	640	0.95	15.81	29.7%

Panel B: Simple Mean-Reversion

Dependent Variable	Sample Period	Industries (N)	Panel Observations	Panel GYn_{t-n}	T-Value GYn_{t-n}	R-bar squared
Panel GYt	1968-2002	20	700	-0.09	-2.18	-1.5%
Panel GY2t	1969-2001	20	660	-0.16	-4.09	1.1%
Panel GY3t	1970-2000	20	620	-0.27	-6.73	6.1%
Panel GY4t	1971-1999	20	580	-0.37	-9.15	12.6%
Panel GY5t	1972-1998	20	540	-0.52	-13.39	26.1%

Panel C: Mean-Reversion And Payout

Dependent Variable	Sample Period	Industries (N)	Panel Observations	Panel D_{t-1}-Y_{t-1}	T-Value D_{t-1}-Y_{t-1}	Panel GYn_{t-n}	T-Value GYn_{t-n}	R-bar squared
Panel GYt	1968-2002	20	700	0.31	7.60	0.08	1.76	6.3%
Panel GY2t	1969-2001	20	660	0.55	8.87	0.08	1.61	11.8%
Panel GY3t	1970-2000	20	620	0.83	10.65	0.06	1.31	20.9%
Panel GY4t	1971-1999	20	580	1.02	11.84	0.01	0.11	30.0%
Panel GY5t	1972-1998	20	540	0.88	9.86	-0.22	-4.83	37.6%

Panel D: Dividend Growth and 'Signalling'

Dependent Variable	Sample Period	Industries (N)	Panel Observations	Panel D_{t-1}-Y_{t-1}	T-Value D_{t-1}-Y_{t-1}	Panel GD_{t-1}	T-Value GD_{t-1}	R-bar squared
Panel GYt	1968-2002	20	700	0.28	7.59	-0.05	-0.88	6.0%
Panel GY2t	1968-2001	20	680	0.46	9.44	-0.31	-3.89	13.6%
Panel GY3t	1968-2000	20	660	0.68	12.15	-0.32	-3.48	21.1%
Panel GY4t	1968-1999	20	640	0.93	15.30	-0.23	-2.29	29.6%
Panel GY5t	1968-1998	20	620	1.04	16.32	-0.19	-1.85	33.2%

Notes:
GY_t is the one-year real growth of earnings (Y_t-Y_{t-1}). GD_t is the one-year real growth of dividends (D_t-D_{t-1}). D_t-Y_t is the payout ratio. GYn_t is the real growth of earnings for n years from t-1 to t+n-1 (Y_{t+n-1}-Y_{t-1}). GYn_{t-n} is the n-period lagged real growth of earnings (over the next n-years).

Table 4: Panel Predictability of Price Growth

Panel A: Price Growth Predictability with Payout

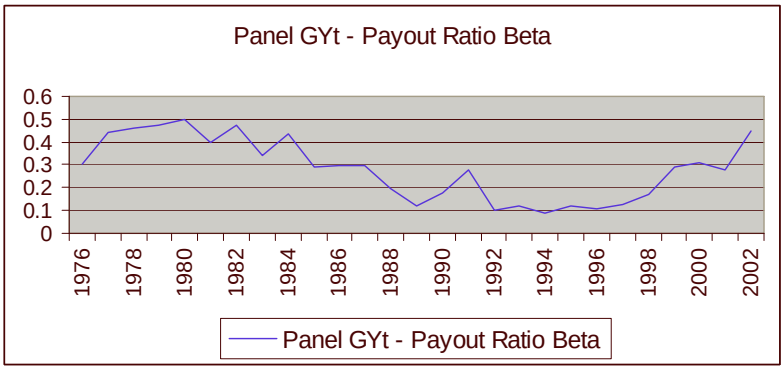
Dependent Variable	Sample Period	Industries (N)	Panel Observations	Panel D_{t-1}-Y_{t-1}	T-Value D_{t-1}-Y_{t-1}	R-bar squared
Panel GP1t	1967-2002	20	720	0.08	1.97	-1.6%
Panel GP2t	1967-2001	20	700	0.13	2.25	-0.7%
Panel GP3t	1967-2000	20	680	0.11	1.59	-0.2%
Panel GP4t	1967-1999	20	660	0.05	0.71	0.3%
Panel GP5t	1967-1998	20	640	-0.01	-0.07	1.0%

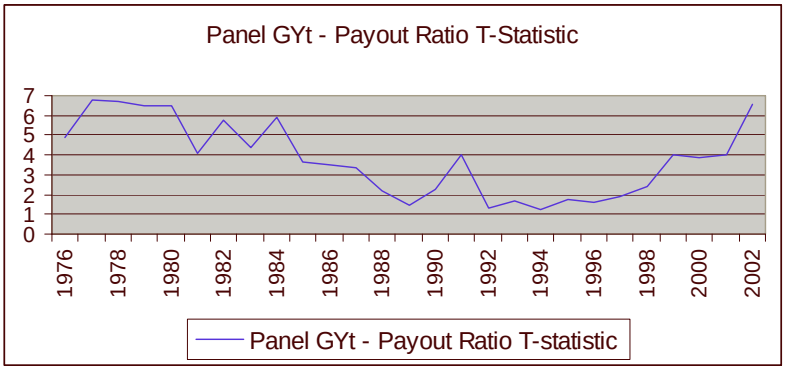
Panel B: Price Growth Predictability with Payout and Earnings-price

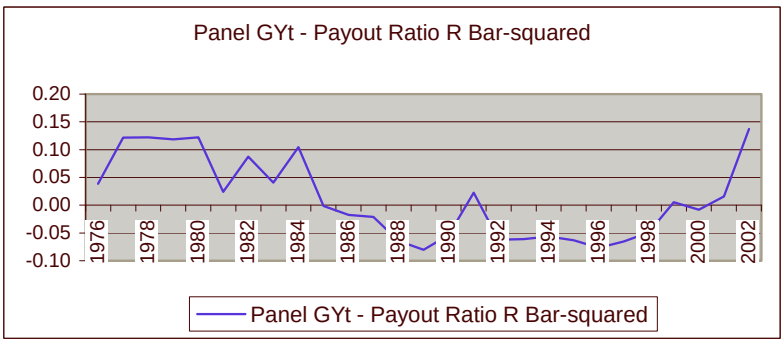
Dependent Variable	Sample Period	Industries (N)	Panel Observations	Panel D_{t-1}-Y_{t-1}	T-Value D_{t-1}-Y_{t-1}	Panel Y_{t-1}-P_{t-1}	T-Value Y_{t-1}-P_{t-1}	R-bar squared
Panel GP1t	1967-2002	20	720	0.30	6.30	0.26	8.42	7.6%
Panel GP2t	1967-2001	20	700	0.52	8.31	0.47	11.34	15.2%
Panel GP3t	1967-2000	20	680	0.63	8.77	0.60	12.82	19.7%
Panel GP4t	1967-1999	20	660	0.65	8.10	0.67	12.81	20.6%
Panel GP5t	1967-1998	20	640	0.76	8.45	0.84	14.55	26.1%

Notes:
D_t-Y_t is the payout ratio. GPn_t is the real growth of earnings for n years from t-1 to t+n-1 (P_{t+n-1}-P_{t-1}).
Y_t-P_t is the earnings-price ratio.

Figure 1: Rolling Panel Data Regression Results – 1 Year Earnings Growth.



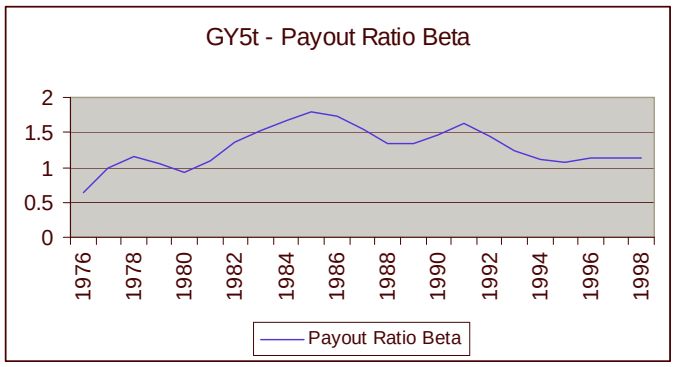


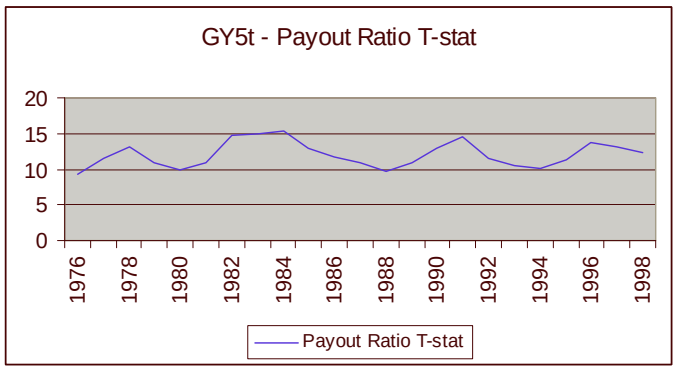


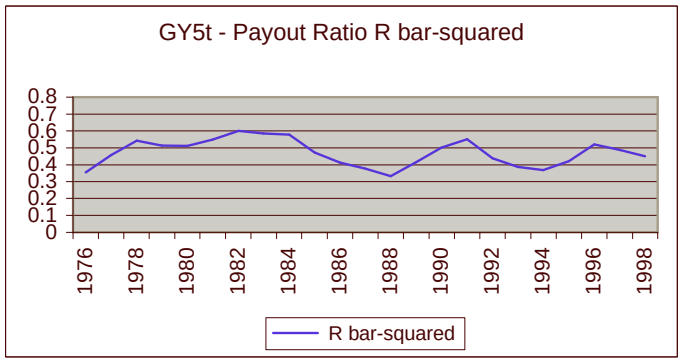
Notes:

The regression equation is: $GY_{i,t} = \alpha + \beta(D_{i,t-1} - Y_{i,t-1}) + \varepsilon_{i,t}$, where $GY_{i,t}$ is one-year earnings growth ($Y_{i,t}$-$Y_{i,t-1}$). $D_{i,t-1}$-$Y_{i,t-1}$ is the trailing years de-meaned payout ratio, that is the payout ratio for industry i minus its time-series mean.

Figure 2: Rolling Panel Data Regression Results – 5 Year Earnings Growth.



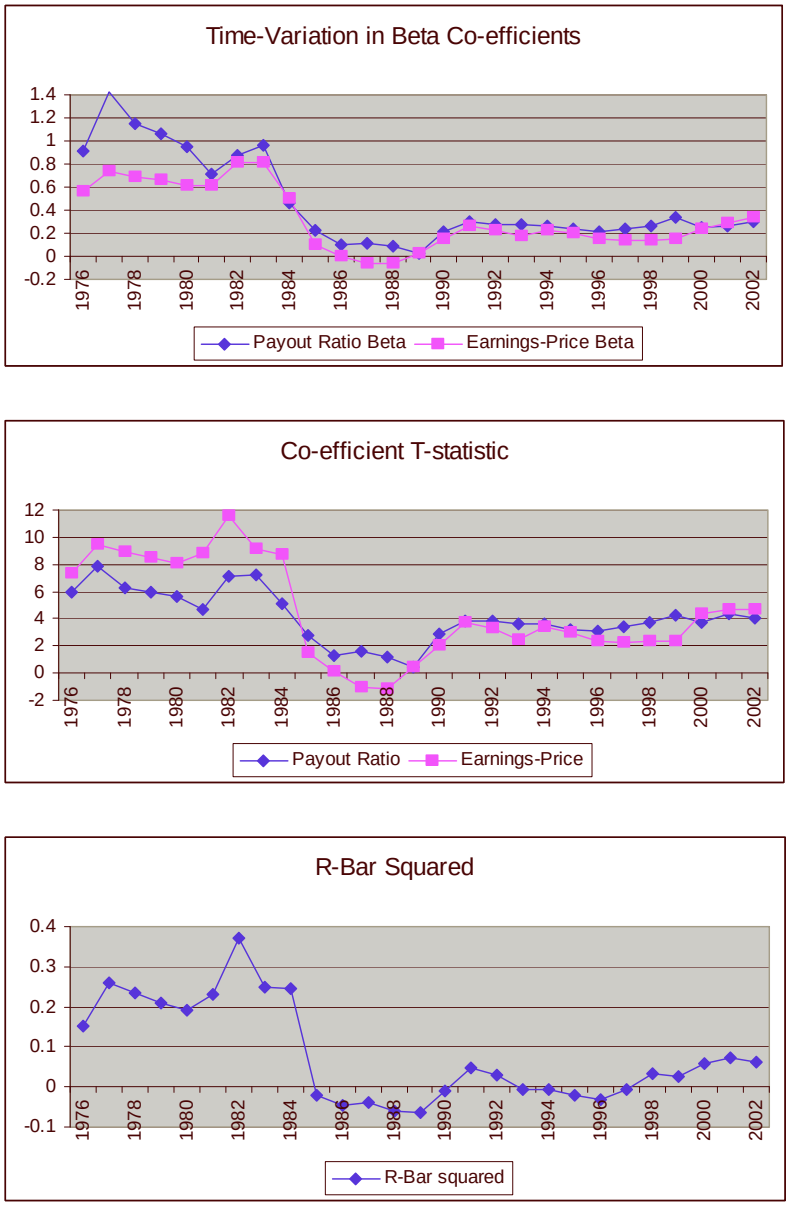




Notes:

The regression equation is: $GY5_{i,t} = \alpha + \beta(D_{i,t-1} - Y_{i,t-1}) + \varepsilon_{i,t}$, where $GY5_{i,t}$ is five-year earnings growth ($Y_{i,t+4}$-$Y_{i,t-1}$) and $D_{i,t-1}$-$Y_{i,t-1}$ is the trailing years payout ratio.

Figure 3: Rolling Panel Data Regression Results – 1 Year Price Growth.

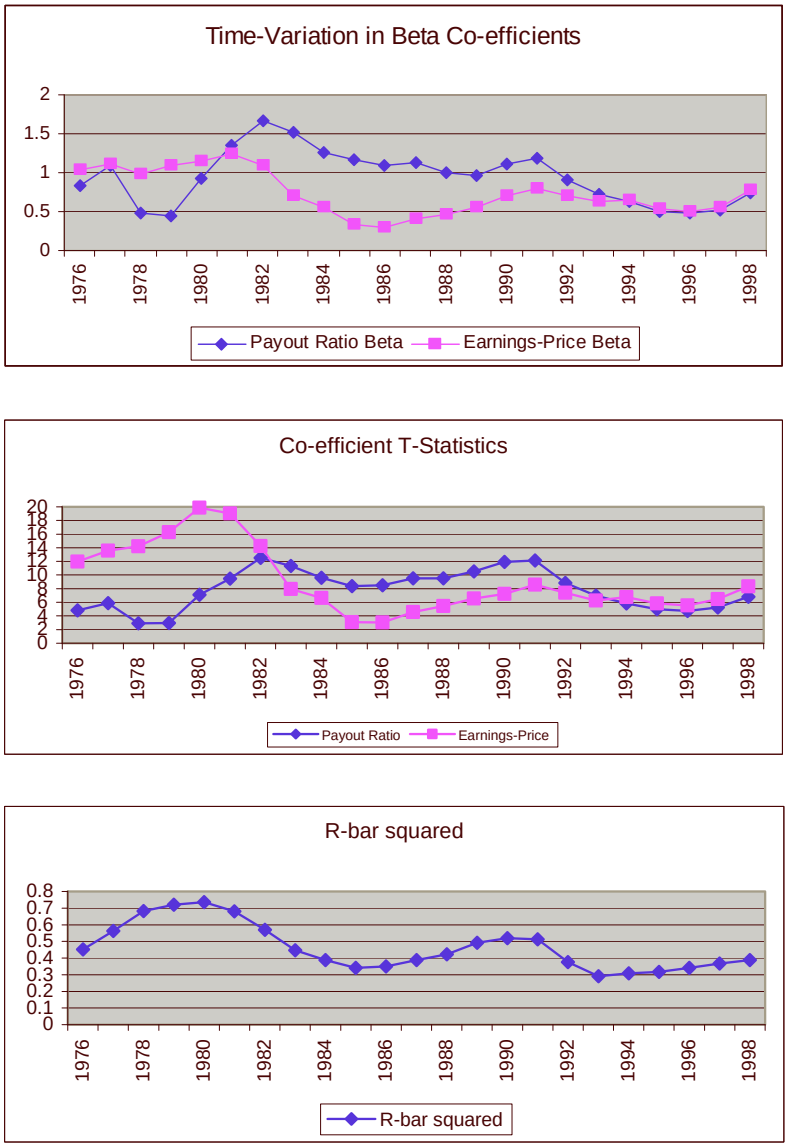


Notes:

The regression equation is: $GP_{i,t} = \alpha + \beta_1.(D_{i,t-1} - Y_{i,t-1}) + \beta_2.(Y_{i,t-1} - P_{i,t-1}) + \varepsilon_{i,t}$,

where $GP_{i,t}$ is the one-year capital gain ($P_{i,t}$-$P_{i,t-1}$). $D_{i,t-1}$-$Y_{i,t-1}$ is the trailing years payout ratio and $Y_{i,t-1}$-$P_{i,t-1}$ is the trailing years earnings-price ratio.

Figure 4: Rolling Panel Data Regression Results – 5 Year Price Growth.



Notes:

The regression equation is: $GP5_{i,t} = \alpha + \beta_1.(D_{i,t-1} - Y_{i,t-1}) + \beta_2.(Y_{i,t-1} - P_{i,t-1}) + \varepsilon_{i,t}$,

where $GP5_{i,t}$ is five-year capital gains ($P_{i,t+4}$-$P_{i,t-1}$). $D_{i,t-1}$-$Y_{i,t-1}$ is the trailing years payout ratio and $Y_{i,t-1}$-$P_{i,t-1}$ is the trailing years earnings-price ratio.