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FINANCIAL PROFILES, DIVIDENDS AND STOCK RETURNS

Abeyratna Gunasekarage,
Monash University, Melbourne, Australia
Kurt Hess
Independent Credit View AG, Zürich, Switzerland
David Power
University of Dundee, United Kingdom

Abstract

The aims of this paper are (a) to examine whether changes in dividend can be forecasted from past financial statement information and (b) to investigate whether such forecasts can be exploited to yield abnormal returns. A two-step approach is adopted. First, a logit model is developed to predict one year-ahead changes in dividends. Second, the buy-and-hold returns for a trading strategy based on the dividend forecasts are calculated. The logit model developed has some success in predicting future dividend changes. However, attempts to exploit these predictions proved unsuccessful; a strategy of buying (selling) shares where dividends were predicted to increase (decrease) would earn a negative abnormal return of -2.34% over 24 months. This is one of the first studies to forecast dividend changes for a sample of New Zealand companies using past financial statement data and to test if the market is semi-strong-form efficient with respect to these dividend predictions.

Keywords: Dividend; Financial Profiles; Logit Model; Stock Return; New Zealand
JEL Classification: G14;

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1. Introduction

The extant literature argues that a company's decision to change the existing dividend policy is influenced to a significant extent by the past and present financial profiles of the firm (see, for example, Lintner, 1956; Wansley & Lane, 1987; Healey & Palepu, 1988; Jensen & Johnson, 1995; Lonie et al., 1996; Benartzi et al., 1997). In addition, the dividend signalling hypothesis suggests that any changes in current dividend levels provide information about the future performance of the firm; firms that increase dividends demonstrate an improvement in their financial performance over the long run while those that decrease dividends experience deterioration in their future performance.

In this context, if future dividend changes could be predicted using past and present financial profiles, then investors should be able to implement potentially lucrative trading strategies. In particular, they could use such predictions to categorise companies into two groups: 'good future performers' and 'bad future performers'; they could then take a long position in the first group and a short position in the second group. The objective of this study is twofold. First, we test the predictability of subsequent dividend changes and second, we examine the profitability of an investment strategy based on these forecasted variations in dividends.

In terms of methodology, we evaluate logit models that use past and present financial profiles for a sample of firms to predict the probability of one year-ahead changes in dividend policy. Specifically, we use financial information for New Zealand companies for the six-year period 1995-2000 to determine financial ratios which, ex-post, are found to be good indicators of subsequent dividend changes. Employing a stepwise approach, we determine the multi-logit model that provides the best explanatory power for upcoming dividend changes during this model development period. Thereafter, we use this model to forecast the probability of a company altering its annual dividends in the subsequent 2001 to 2006 testing period and compare the results from these forecasts to the dividend changes actually observed. Next, probability predictions are pooled and then ranked with the top 40 per cent of observations (where the model suggests that a dividend increase is most likely) assigned to a long portfolio, while the bottom 40 per cent (where the model indicates that a dividend increase is unlikely) are included in a short portfolio. The profitability of this investment strategy is finally examined by calculating market adjusted buy-and-hold returns for these two portfolios over holding periods of up to 24 months. In addition, we attempt to explain whether the characteristics of these two portfolios contribute to the performances which they achieve.

The remainder of the paper proceeds as follows: section 2 provides a review of the relevant literature. Section 3 describes the data and methodology. The logit models generated and their prediction accuracies are explained in section 4. Section 5 presents the results relating to the returns generated by the investment strategy. The last section offers some conclusions.

2. Literature Review and Hypothesis Development

2.1 The Influence of Past Financial Profiles on Current Dividends

The argument that past and present financial profiles influence the current dividend decision of a firm, and provide signals about its future profitability to the market, has a well established pedigree. Lintner (1956) was the first researcher to adopt a behavioural approach where US executives were asked about their perceptions of corporate dividend decisions. He found that the most influential determinant of company dividend policy was corporate earnings – both past and

present. He developed a behavioural model which explained how companies partially adjusted their dividend payout ratios in the direction of a previously set target payout. Fama and Babiak (1968), who evaluated a number of alternative models, concluded that Lintner's behavioural model performed well relative to its competitors and any change in a firm's current dividend payout was a function of its target payout, current earnings, past earnings and past dividend payout. Survey-based studies conducted subsequent to Lintner's pioneering work provide overwhelming support for the argument that corporate managers place a significant emphasis on the level of past and current earnings as well as on the variability of expected future earnings when they alter the existing dividend policy of the firm (see for example, Baker et al., 1985; Partington, 1989; Baker et al., 2001).

This phenomenon of basing dividend decision on past earnings performance has been empirically observed by researchers. For example, Healey and Palepu (1988) found that the decision to initiate dividend payments was preceded by an improvement in earnings growth that started at least one year before the announcement while the decision to omit a dividend was preceded by a significant decline in earnings which started two years before the announcement date; these earning trends prevailed in the year of the dividend initiation or omission as well. Benartzi et al. (1997) corroborated Healey and Palepu's (1988) findings using a sample of regular dividend changes. They found that the firms that increased (decreased) dividends experienced significant increases (decreases) in their earnings in the year before and the year of the announcement.

A number of studies have uncovered evidence that the other elements of a company's financial performance also influence the dividend policy of the firm. For example, Wansley and Lane (1987) found that the dividend initiating firms in their sample experienced a significant reduction in their debt levels in the years prior to the payment of their first dividend. In a number of survey-based studies, the maintenance of a target capital structure has been identified as an important determinant of the dividend policy by corporate managers (see Baker et al., 1985; Baker &Powell, 2000; Baker et al., 2001). In particular, Baker et al. (2001) found a NASDAQ firm's debt-equity mix to be the sixth most important determinant of its dividend policy; companies tended not to pay large dividends relative to reported earnings if such dividends had to be financed by the issuance of new debt which might alter the existing target capital structure of the firm. They also found that highly levered firms that paid a high proportion of their earnings as interest were more likely to cut dividends than their low-geared counterparts. Lonie et al. (1992), who analysed the pressure exerted by interest rate rises on firms, found that the incidence of a dividend cut was more common among companies with 'high' interest-to-operating profit ratios compared to their peers with 'low' interest-to-operating profit ratios. The results of De Angelo and De Angelo (1990) corroborate this evidence; a minority of firms in their sample indicated that a rising level of interest expenses forced them to cut dividends, indicating that such firms used the cash saved from dividend

reductions to service debt obligations. Large and mature companies tended to pay high and stable dividends while small, fast-growth firms maintained low payout ratios.

Fox and Green's (1992) study revealed that the members of FT-100 Index (FTSE) with large market capitalisations maintained a high dividend payout ratio of 50 per cent between 1984 and 1990 while the members of the Unlisted Securities Market (USM) with much smaller market capitalisations paid only 30 per cent of their earnings as dividends. An earlier study of Chowdhury and Miles (1987) found that small firms (i.e. total assets less than £181 million) were more likely to cut their dividend levels when faced with severe financial pressure than their larger-sized counterparts.

Lintner (1956) observed that the management employed flexible standards on their firms' current liquidity position in order to provide a buffer between the current investment programme of the firm and a more definite dividend policy. Darling (1957) found that Lintner's behavioural model worked well during periods of improved firm liquidity and business sentiments; he documented that the availability of liquid assets was an important determinant of a firm's capacity to pay dividends. Baker et al. (1985) agreed with this notion; in their study, managers ranked the availability of cash as the third most important determinant of their firms' dividend policy. Wansley and Lane (1987) also observed that the competing demand for cash in their sample firms declined in the years prior to the initiation of dividends.

Two empirical studies – one for the UK, the other for the US – analysed various financial profiles of dividend changing companies in the years prior to regular dividend changes. Lonie et al. (1996) analysed profitability, operating activity, gearing, liquidity and size measures of 617 UK firms during the six-year period prior to the announcement of changes in dividends and earnings. Their findings revealed that companies which increased both dividends and earnings reported a statistically significant higher level of profitability (represented by return on equity, return on capital employed and net profit margin) compared to those that announced a decrease in both dividends and earnings.

Also, the companies that reduced dividends while reporting a reduction in earnings were found to have significantly higher leverage levels and interest/operating profit ratios than their counterparts who reported increases in both dividends and earnings. The latter group demonstrated an extreme level of operational efficiency by holding stocks for fewer days and extracting more trade credit from suppliers than the former group. The dividend–increasing firms were much larger and more liquid than their dividend decreasing counterparts during the periods leading up to the change in their regular dividend payments. Jensen and Johnson (1995) analysed a sample of US firms which reduced their dividends. They found that the decision to cut dividends was accompanied by a deterioration in the overall financial performance of the firm; in the years prior to the dividend drop, a typical firm experienced a significant decrease in profitability, stock price, current assets, cash position, number of employees and new external financing and an increase in leverage and rising operating expenses.

On the basis of the evidence reported in relation to the influence of the past financial profiles on current dividend changes, we propose the following testable hypothesis:

Hypothesis 1: Past and present financial profiles can be used to predict one year-ahead changes in dividends.

2.2 The Relationship between Dividend Changes and Future Performance

The dividend signalling hypothesis asserts that the changes in a firm's current dividend level convey information about the future performance of the firm. The theoretical models in the dividend signalling literature suggest that in a world of information asymmetry where managers have superior information about the current operations and future prospects of the firm compared to outside investors, the announcements of changes in current dividend levels convey information about the future payoffs from current investments. Accordingly, dividend increases are regarded as positive signals that convey favourable news to the market while dividend decreases are regarded as negative signals that convey unfavourable information (Bhattacharya, 1979 & 1980; John & Williams, 1985; Miller & Rock, 1985). The bulk of the supporting evidence for this hypothesis comes from the studies that have employed an event study methodology to observe the market reaction to dividend news during the period when a dividend change is announced to investors. The existing evidence suggests that dividend increases are associated with statistically significant positive abnormal returns while dividend decreases are associated with statistically significant negative abnormal returns (see, for US evidence, Pettit, 1972; Charest, 1978; Aharony & Swary, 1980; Woolridge, 1982; Asquith & Mullins, 1983; Brickley, 1983; Divecha & Morse, 1983; Benesh et al. 1984; Dielman & Oppenheimer, 1984; Eades et al., 1985; Wansley & Lane, 1987; Ghosh & Woolridge, 1988; Aharony et al., 1988; Healey & Palepu, 1988; Ghosh & Woolridge, 1991; & for UK evidence, Lonie et al., 1996; Gunasekarage & Power, 2001).

The studies that have analysed the post-announcement financial performance of dividend changing companies, however, do not provide overwhelming support for the dividend signalling hypothesis. While there is some evidence to suggest that dividend–increasing firms perform well in the subsequent years, the evidence does not necessarily suggest that the performance of dividend–decreasing companies deteriorates during the same period. For example, Healey and Palepu (1988) analysed the earnings performance of firms after an initiation, and omission of dividends had taken place. They found that dividend–initiating firms demonstrated a sustained improvement in their earnings over subsequent years. However, dividend–omitting firms reported a rebound in their earnings and went on to report positive earnings in the two years after the omission was announced. Nissim and Ziv (2001) used a sample of ordinary dividend changes in their examination of the relationship between current dividend changes and the subsequent earnings performances of dividend

changing firms. The authors found strong evidence that dividend changes were positively related to the future earnings of the firm - irrespective of whether the earnings performance was measured by the change in earnings, the absolute level of earnings or abnormal earnings – and thereby provided strong evidence in support of the prediction of the dividend–signalling hypothesis.

On the basis of the dividend–signalling hypothesis and the related empirical evidence we argue that the dividend increasing companies will outperform their dividend–decreasing counterparts in the long run. Therefore, we propose the following hypothesis:

Hypothesis 2: Taking a long position in dividend increasing shares and a short position in dividend decreasing shares will generate abnormal returns for investors.

3. Data and Methodology

We employed data on New Zealand companies to examine the two hypotheses outlined in the previous section. Our sample included all the companies listed on the New Zealand Stock Exchange (NZX) for which the relevant accounting and share price data were available for analysis. The period under investigation spanned the years from 1995 to 2006 with the annual financial statement information sourced from the NZX Deep Archive Service. This online archive contains extensive details of company financial statement information. The monthly adjusted stock prices together with the market index were obtained from Datastream Advance Database.

We used the six-year period 1995-2000 to develop a multiple logit model to predict the probability of the one-year-ahead dividend changes according to a stepwise procedure. Specifically, we identified significant elements in the companies' financial profiles as measured by a total of 59 financial ratios for 261 firm-year observations during this calibration period. The multiple logit model with maximum explanatory power was then used to forecast one year-ahead dividend changes during the 2001 to 2006 testing period. To study hypothesis 1, we examined the accuracy of the dividend change prediction during the testing period. Hypothesis 2 was explored by analysing market excess returns for two investment portfolios formed on the basis of dividend change signals generated during the testing period. We assumed that we invested in a portfolio of shares with high probabilities of forecast dividend increases but take short positions in shares where the probabilities of dividend increases are low.

In the remainder of this section, this analytical procedure is explained in detail. The method of calibrating the prediction model is outlined and then its forecasts described. This is followed by a description of the technique for determining market excess returns when testing hypothesis 2.

We hypothesized that a multiple logit model could help us predict probabilities of one-year-ahead dividend changes. Explanatory variables were

historic financial ratios for a firm. We started with 75 accounting ratios that have been discussed in text books and employed in prior research articles to capture the financial profiles of a firm. For example, Ou and Penman (1989) used similar accounting descriptors to predict the future changes in earnings per share. However, only 59 of these were included in the final analysis (Appendix 1 provides the definitions of these accounting ratios); 16 ratios were dropped purely due to the unavailability of complete data. It was our objective "to let the data speak"; i.e. we did not make any conscious attempt to pick suitable accounting descriptors ourselves but rather seek the broadest possible selection of potential drivers of dividend changes as a starting point for the model development. As discussed in the literature review section, previous studies suggest that firms use both present and past financial profiles as the basis for changing existing dividend levels. Accordingly, our explanatory variables became the three-year averages of each financial ratio. Therefore, we averaged the current observation of the ratio, assumed to be disclosed 3 months after the end of the accounting period, to which it relates, with the observations of the previous two accounting periods.

The dependent variable in the model was a binary variable which took the value 0 for firms which decreased dividends and 1 for firms that increased dividends. We did not use a naive definition of dividend change however, since observations with absolute dividend decreases are relatively rare. Instead we compared dividend changes observed relative to the drift in past dividend changes. If it is above (below) the drift, this binary variable $\prod$ becomes one (zero). The definition of $\prod$ is shown in the equation [1] below.

$$\Pi_t = \begin{cases} 1 & \text{if } \Delta DPS_{i,t} > \left(\Delta DPS_{i,t-1} + \Delta DPS_{i,t-2} + \Delta DPS_{i,t-3}\right)/3 \\ 0 & \text{if } \Delta DPS_{i,t} < \left(\Delta DPS_{i,t-1} + \Delta DPS_{i,t-2} + \Delta DPS_{i,t-3}\right)/3 \end{cases} \quad [1]$$

where $\Delta DPS_{i,t} = DPS_{i,t} - DPS_{i,t-1}$ is the absolute change in dividend per share for firm i in year t compared to year t-1[1].

To identify financial ratios with explanatory power during the 1995-2000 model development period, we first ran univariate logit models individually on all 59 ratios included in this analysis. Unless the ratio was found to be significant at least at the 10 per cent level, it was disregarded in the subsequent analyses.

The next step was to include all ratios found to generate significant coefficients into a multivariate logit model. Using a stepwise procedure, non-significant regressors were then eliminated one by one. Removal of regressors stoped once all of the remaining variables were significant at the 20 per cent level or if the goodness of fit as measured by the Schwarz information criterion deteriorated. The coefficients of this best-fit multivariate logit model were subsequently used to forecast dividend changes during the 2001 to 2006 testing period. The predicted probability of dividend changes (PR) for time t+1 based on observations at time t is shown in equation [2].

$$PR_{i,t+1} = \frac{1}{1+e^{-(\alpha+\beta_1 X_{1,t}+\beta_2 X_{2,t}+\ldots+\beta_j X_{j,t})}} \quad [2]$$

where $X_{1,t}$ to $X_{j,t}$ is a vector of j accounting variables at time t, β_1 and β_j to is a vector of coefficients from the multiple logit model for the 1995 to 2000 period. To test hypothesis 1, we compared these forecasted PR values to the ones actually observed in the subsequent period. For this purpose we conducted a Chi-Squared Test to see whether our model had superior forecasting abilities beyond a model of random dividend changes.

The PR values were then used to rank observations with the highest (lowest) PR values, being those with highest (lowest) likelihood for upcoming dividend increases. For the purpose of this analysis, we allocated the top 40 per cent of the observations to the expected dividend increase portfolio and the bottom 40 per cent to the dividend decrease portfolio; for both of these portfolios, we explored return performance for holding periods of up to 24 months. For this purpose, we used monthly returns for the companies in the sample and the return on the market index to generate the market-adjusted buy-and-hold return as follows[2]:

$$MABHR_{P,M} = \frac{1}{N}\sum_{i=1}^{N}\left[\prod_{t=1}^{M}(1+R_{i,t}) - \prod_{t=1}^{M}(1+R_{m,t})\right] \quad [3]$$

In equation [3], $MABHR_{P,M}$ is the market-adjusted buy-and-hold return for portfolio P from month 1 (which is the fourth month after the accounting year end of a firm[3]) to month M; $R_{i,t}$ is the return of firm i in month t; $R_{m,t}$ is the return of the market index in month t and *N* is the number of observations in the portfolio.

4. The Logit Model and its Prediction Accuracy

As mentioned in the previous section, we used the financial statement information for the six-year period from 1995 to 2000 to develop the multiple logit models; 55 companies were used for this purpose with annual observations ranging between 34 and 52 firms.

When the univariate logit models were estimated, 10 accounting descriptors emerged as important variables because they had significant coefficients at the 10 per cent level; six of these had coefficients that were significant at the 5 per cent level while the remaining four were significant at the 10 per cent level. Columns 3, 4 and 5 of Appendix 1 provide the results for the coefficient and their significance level for each ratio. In addition, the final column indicates whether or not a variable has been accepted or rejected for inclusion in

the final model. The accounting ratios that emerged as the important measures in predicting the year-ahead dividend change encompassed a number of aspects of a firm's financial profile (which have been found to influence the dividend policy of the firm). They included profitability, leverage, liquidity, operating activity, capital expenditure (assets base) and sales volume. These accounting descriptors were then included in the model using a stepwise procedure, in order to derive the final multiple logit model. This was then used to predict the direction of the one-year-ahead dividend change.

Table 1 presents the coefficient estimates for the final logit model. Our dividend change prediction model contains the six financial ratios which capture four important financial attributes of the firm – i.e. profitability (represented by percentage change in net profit to EBITDA), liquidity (represented by percentage change in working capital), operating activity (represented by percentage change in inventory level and percentage change in sales to average total assets) and capital expenditure (represented by percentage change in depreciation and percentage change in average fixed assets and depreciation). Interestingly, three coefficients for these accounting variables are significant at the five per cent level; out of the remaining coefficients, two are significant at the 10 per cent level while the remaining one is significant at the 20 per cent level.

Table 1: Multiple Logit Model Parameters

Accounting Descriptor	Coefficient	*z*-statistic	*p*-value
Intercept	1.1234	2.99	0.00
%Δ in Inventory Level (absolute)	-2.0497	-1.77	0.08
%Δ in Depreciation	0.4660	2.25	0.03
%Δ in Average Fixed Assets & Investments (excl. land)	-0.0395	-1.90	0.06
%Δ in Sales to Average Total Average Assets	-1.0689	-1.30	0.19
%Δ in Net Profit to EBITDA	-39.3090	-2.67	0.01
%Δ in Working Capital	0.0001	2.00	0.05

Note: This table reports the output for the final Logit regression model which was developed through a step-by-step process by dropping explanatory variables which failed to generate significant slope coefficients at each step. Selection criteria: p-value <= 20 per cent but stops if Schwarz information criteria no longer decreases. It reports the accounting ratios that entered into the final model, the slope coefficients of the explanatory variables, and the associated *z*-statistics and *p*-values.

Table 2 reports the results of the observed versus the predicted dividend changes for the test period (i.e. 2001-2006). As Panel A of this table reveals, 338 occurrences of dividend changes were observed during this six-year period; 54.44 per cent of these observations (or 184 firm years) were related to dividend increases while the remaining 45.56 per cent (or 154 firm years)

were related to announcements of dividends below the historical trend. Using the logit model generated for the estimation period 1995-2000 together with the relevant accounting information, PR values based on equation [2] were calculated. Subsequently, the sample was assigned to two groups as 'predicted dividend increasing companies' (top 40 per cent) and 'predicted dividend decreasing companies' (lowest 40 per cent) as described in the previous section. Information on 337 predicted dividend changes is provided in Panel B of Table 2. Out of these, our model identified 135 observations as dividend increasing firms (i.e. they were classified in the top 40 per cent); these companies had an average PR value of 0.715. The model identified another 135 companies as dividend decreasing firms; these companies had an average PR value of 0.245. The remaining 67 observations were in the middle 20 per cent category and they were classified as inconclusive; they had an average PR value of 0.467.

Table 2: Prediction Accuracy

Panel A: Observed Dividend Changes (2001-2006)	
No. of observed dividend changes	338
No. of dividend increases	184
No. of dividend decreases	154
% actual DPS increasing firms	54.4%
% actual DPS decreasing firms	45.6%
Panel B: Predicted Dividend Changes	
Calibration period	1995-2000
Prediction period	2001-2006
No. of accounting variables in logit model	6
Selection Rule: Top 40% = Dividend Increase; Bottom 40% = Dividend decrease	
Total no. of signals generated	337
of which	
No. of dividend increase signals generated (top 40%)	135
No. of dividend decrease signals generated (bottom 40%)	135
No. of inconclusive signals generated (middle 20%)	67
Panel C: Accuracy of Dividend Change Predictions	
Total no. of signals for which we can check accuracy (i.e. they are matched with subsequent dividend observations)	198

(continued)

Details:	No. of Dividends		
	Increases	Decreases	Total
Cases	111	87	198
% correct predictions	60.0%	46.9%	52.5%
	Chi-squared (d.f. 1)/*p*-value		3.83*/0.05

Notes:

The table reports information relating to the prediction accuracy of the multiple logit model. The * indicates statistical significance at the 10 per cent level. The following calibration parameters were applied in the prediction model:

Unilogit models: Variable selection is based on the rule *p*-value <= 10 per cent. An explanatory accounting variable must have at least 75 per cent of the observations.

Multilogit model: Variable selection is based on the step-by-step process and the rule of *p*-value <= 20 per cent.

The next step was to test the accuracy of the dividend forecasts. We matched the dividend predictions with their corresponding actual dividend change observations. However, subsequent dividend information was not available for 72 observations and these observations were disregarded for the purpose of this comparison. The evaluation of prediction accuracy was thus based on a final sample of 198 matched observations with the results shown in Panel C of Table 2. The overall prediction accuracy rate was 52.5 per cent. As the chi-squared statistic reveals, this prediction accuracy is significant at the 10 per cent level. However, our logit model seemed to be able to classify dividend increases more accurately than dividend decreases; this model predicted 60.0 per cent (46.9 per cent) DPS increases (DPS decreases) correctly. These prediction accuracy rates are in line with the actual dividend changes observed for this market during the 2001-2006 period.

5. Profitability of the Dividend-based Investment Strategy

5.1 Perfect Foresight Returns

Before showing the returns for our own strategy, we first present the excess return generated for the perfect foresight strategy, i.e. the return earned by an investor if he/she knew the direction of the actual dividend change before that news was announced and took a long position in dividend increasing firms and a short position in dividend decreasing firms. As the previous section highlighted, during this six-year period there were 338 dividend change observations; of these, 184 were related to dividend increases and 154 involved dividend decreases. We calculated the market-adjusted buy-and-hold return for a number of holding periods for these two groups. The results are presented in Table 3, Panel A. According to the statistics reported in this table, dividend increasing companies reported gradually increasing positive returns across the different

holding periods examined. Even though the dividend decreasing firms reported negative returns across all the holding periods analysed, a decreasing trend in negative returns could be observed for this category.

Table 3: Market-Adjusted Buy-and-hold Returns for Perfect Foresight Strategy and Dividend Prediction Model Based Strategy (2001-2006 Investment Period)

Portfolio	No. of Firms	Investment Horizon			
		6 Months	12 Months	18 Months	24 Months
Panel A: Perfect Foresight Strategy					
Observed Increase	184	2.74%	4.68%	4.76%	7.11%
Observed Decrease	154	-3.47%	-3.10%	-2.62%	-0.59%
Strategy		6.22%	7.78%	7.38%	7.70%
Panel B: Dividend Prediction Model-based Strategy					
Long Position	136	-2.61%	-1.30%	-4.56%	-4.98%
Short Position	135	-1.75%	-2.31%	-4.02%	-2.65%
Strategy		-0.86%	1.01%	-0.54%	-2.34%

Notes: Panel A assumes perfect foresight and reports returns of shares which turned out to be dividend increasers and dividend decreasers in an accounting period. Investment takes place 3 months after the end of the accounting period. The strategy return is the outcome of taking a long position in the 'dividend increase' portfolio and a short position of the 'dividend decrease' portfolio. Panel B shows buy– and– hold returns for portfolios of firms predicted to increase, respectively decrease dividends. Predictions are based on a multiple logit model using past company financial ratios. The model was calibrated during 1995 to 2000 and then used to forecast dividend increasing firms during the 2001 to 2006 investment period. Investment takes place 3 months after the end of the accounting period preceding the year of the predicted dividend; at this time company financial statements would be available to investors. Strategy returns are calculated as in panel A.

On average, the evidence supports the dividend signalling hypothesis – dividend increasing companies outperformed in the market subsequent to the announcement of a dividend change while dividend decreasing firms underperformed. Therefore, the strategy of investing in dividend increasing companies and short–selling stocks in dividend decreasing firms generated positive market adjusted returns for investors; for a 24-month holding period, for instance, this strategy earned a market adjusted return of 7.70 per cent. Therefore, if the information about the direction of future dividend changes had been available to investors, they could have earned positive market-adjusted returns by implementing this strategy. The annualised returns generated by this strategy for different holding periods were as follows: for a six-month holding period 12.43 per cent, for a 12-month holding period 7.78 per cent, for an 18-month holding period 4.92 per cent, and for a 24-month holding period 3.85 per cent. In this study we found an optimal holding period of 12 months when

the holding-period returns reached a peak. One reason for the decline in returns after 12 months for the strategy might be the loss of any information advantage when the dividends for the subsequent years became known to the market.

5.2 Dividend Prediction Model Based Strategy

We now analyse the market adjusted returns for a strategy based on our dividend change prediction model. In contrast to the evidence reported in Panel A, the statistics in Panel B reveal that the strategy did not produce any significant returns for investors. The return to the strategy demonstrated an inconsistent pattern as the holding period extended for up to 24 months. It generated a negative return of 0.86 per cent for a six–month holding period; this increased to a positive return of 1.01 per cent for a 12-month holding period and subsequently declined to a -0.54 per cent for an 18-month holding. An investor who implemented this dividend prediction– based strategy for a 24-month holding period would have earned a negative return of 2.34 per cent (or an annualized return of -1.17 per cent). The return behaviour of the dividend decreasing firms in Panel B is in agreement with the dividend signalling hypothesis. These firms reported negative market-adjusted returns for all the holding periods analysed where these negative returns increased for a period of 18 months. However, dividend increasing firms did not report positive returns as postulated by the dividend signalling hypothesis. Their returns were negative for all the holding periods analysed and, on average, these negative returns demonstrated an increasing trend as the length of the holding period expanded.

The general conclusion that emerges from this analysis is that, even though the multiple logit model is able to classify companies with some accuracy as dividend increasing firms and dividend decreasing firms based on their past and present financial profiles, a strategy of investing in firms which were predicted to be dividend increasers and short selling stocks of firms which were predicted to be dividend decreasers proved to be unprofitable. In our sample, such a strategy generated negative market adjusted returns. This may indicate that the market is semi-strong form efficient; the investors had interpreted the dividend prediction based on financial profiles correctly and impounded that information into share prices in a quick and unbiased manner so that a trading strategy based on such predictions did generate abnormal returns for investors.

5.3 Year-by-Year Analysis

In order to identify potential cycles in excess returns, we analysed the above portfolio returns by year of investment. This means the cumulative excess returns, say for 2001, is the return of an investment portfolio formed 3 months after the end of the 2000 financial year and then held for 24 months. The results of this analysis are shown in Figure 1. It shows extreme volatilities in the outcomes to investors in each year of investment. In 2003, for example, the strategy outperformed with an excess return of 11.4 per cent for the long

portfolio, -3.8 per cent for the short portfolio, resulting in a strategy return of 15.2 per cent. In the other years, however, the results are mixed; in only three of the six years (i.e. 2003, 2005; 2006) did the investor achieve positive returns for the long/short strategy.

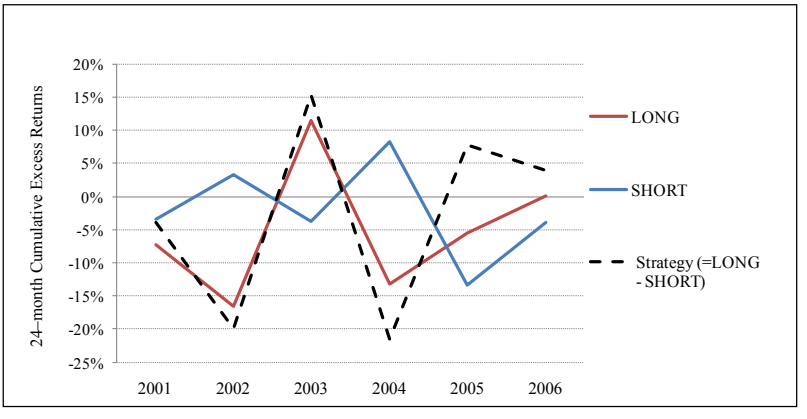

Figure 1: Analysis of Market Excess Returns by Year for Dividend Prediction Model Based Strategy (2001-2006 Investment Period)

Note: This chart shows year by year buy–and–hold returns for portfolios of firms predicted to increase, respectively decrease dividends. Predictions are based on a multiple logit model using past financial ratios. This model was calibrated during 1995 to 2000 and then used to forecast dividend increasing firms during the 2001 to 2006 investment period. Investment takes place 3 months after the end of the accounting period preceding the year of the predicted dividend; at this time company financial statements would be available to investors. The strategy return is the outcome of taking a long position in the 'dividend increase portfolio' and a short position of the 'dividend decrease' portfolio.

5.4 Stock Characteristics and the Return to Strategy

The finance literature has identified a number of firm characteristics that influence the stock returns for a sample of firms. Such variables include firm size (Banz, 1981), the book-to-market ratio (Fama & French, 1992), the price-earnings multiple (Basu, 1977) and momentum (Jagadeesh & Titman, 2001) among others. The analyses conducted so far in this study indicate that investors can only earn excess returns by taking a short position in companies which are predicted to announce a decrease in their dividends during the following year; we find no evidence that they are able to make any profits by taking a long position in companies that are predicted to increase their dividends in the next 12 months. Therefore, the overall strategy turned out to be inconsistent. One

question that remains open is 'what features' of a firm are captured by the PR values generated by the multiple logit model. In order to examine this issue, we tested the influence of a number of stock characteristics on the 24-month buy–and–hold returns for the portfolios that were formed. These firm-specific variables included firm beta (BETA) taking into account the risk-return trade off, the book-to-market value (B/M) accounting for book-to-market effect, the earnings-to-price ratio (E/P) capturing the price-earnings effect, the natural logarithm of market capitalisation (SIZE) representing the firm–size effect and the previous twelve months' cumulative raw returns (CRR12) representing a momentum effect. To be consistent with our previous analyses, these variables were calculated three months prior to the formation of long and short portfolios. The following regression equation was estimated:

$$MABHR_{i,t} = a_{0,t} + a_{1,t}PR_{i,t} + a_{2,t}BETA_{i,t} + a_{3,t}\left(B/M\right)_{i,t} + a_{4,t}\left(E/P\right)_{i,t} + a_{5,t}SIZE_{i,t} + a_{6,t}CRR12_{i,t} + e_{i,t} \quad [4]$$

where $MABHR_{i,t}$ is the 24-month market-adjusted buy-and-hold return for firm i (from three months after the end of the accounting year – i.e. month +4 - to month +27); $PR_{i,t}$ is the PR measure generated for the share (as defined in equation [2]); $BETA_{i,t}$, $B/M_{i,t}$, $E/P_{i,t}$, $SIZE_{i,t}$ and $CRR12_{i,t}$ are the stock characteristics introduced earlier in this section.

We first estimated univariate regressions and the results are reported in Table 4. Our findings reveal that only firm size has a significant influence on stock returns; this relationship is positive, however. Such evidence contradicts with the well known size effect which predicts a negative relationship between firm size and stock returns. None of the other variables generated significant coefficients; this generalisation applies to PR measures generated by our logit model. However, a different picture emerged when we estimated a multiple regression model. Four stock characteristics – beta, book-to-market ratio, earnings-price ratio and firm size – entered into the model with significant coefficients. High book-to-market and large firms tended to earn higher returns while low risk and low earnings-to-price firms earned higher returns. The PR coefficient was insignificant indicating no association between that measure and the subsequent stock returns.

The conclusion that emerges is that the New Zealand investors cannot use a dividend-based investment strategy to outperform the market (even though the model developed in this study is able to partially classify companies in advance as possible dividend increasing and decreasing firms with reasonable accuracy) but they may be able to use some stock characteristics to implement investment strategies. Another interpretation is that the PR value generated by our multiple logit model captures the effect of a number of stock characteristics and therefore, the strategy developed in this study cannot be implemented in this market to earn excess return.

Table 4: Regression Output

Constant (*t*-stat)	Pr (*t* -stat)	BETA (*t* -stat)	B/M (*t* -stat)	E/P (*t* -stat)	LOGMV (*t* -stat)	CRR12 (*t* -stat)
0.0300	-0.1380					
(0.46)	(-1.15)					
0.0151		-0.0925				
(0.32)		(-1.36)				
-0.0754*			0.4532			
(-1.91)			(1.52)			
-0.0372				-0.0115		
(-1.25)				(-1.06)		
-1.1999***					0.0619***	
(-4.19)					(4.09)	
-0.0384						0.3697
(-1.27)						(0.48)
-1.3069***	-0.1328	-0.1465**	0.6628**	-0.0216**	0.0719***	0.72314
(-4.31)	(-1.10)	(-2.18)	(2.23)	(-1.96)	(4.63)	(0.94)

Note: The table reports coefficient estimates and corresponding t-statistics in parentheses when the 24-month market-adjusted buy-and-hold return is regressed on a set of independent variables as defined in equation [4]. The independent variables considered in the estimation of the model include the dividend increase probability (PR) of the stock as defined in equation [2], firm beta (BETA), book-to-market value (B/M), earnings-to-price ratio (E/P), natural logarithm of market value (LOGMV) and the 12-month cumulative raw return (CRR12). The *, (**), (***) indicate statistical significance at the 10 per cent, 5 per cent and 1 per cent levels respectively.

5.5 Robustness Test

As a robustness test, we used alternative cut-off points to allocate companies into the predicted dividend increase group of firms and the predicted dividend decrease group of firms. As one example, we present here the results for a 30/30 portfolio, i.e. the top 30 per cent of observations were allocated to the former portfolio (long position) and the bottom 30 per cent combined to form the latter portfolio (short position). This process allocated 101 firms into each portfolio during this six-year period with a prediction accuracy of 55 per cent. This prediction accuracy was significant at just below 10 per cent level, i.e. slightly lower than the significance of the 40/40 portfolio presented earlier. Appendix 2 reports the buy–and–hold returns generated by these portfolios. According

to this table, both portfolios generate negative market-adjusted buy–and–hold returns for all the holding periods analysed. On average, this negative return increases as the holding period expands. For a 24 month holding period, our strategy with these new cut-off points generates -7.59 per cent for investors. Again, even though the logit model has some moderate power explaining future dividend changing companies, investors are unable to translate such knowledge into a profitable investment strategy.

6. Conclusion

Overall, the findings of this paper suggest that although past financial statement information may help investors to forecast future dividend changes (especially dividend increases), any attempt to exploit these predictions using a trading strategy is unsuccessful; buying shares in companies where the probability of a dividend increase is high and selling shares–where the probability of a dividend increase is low yield negative abnormal returns. One implication of these results is that the New Zealand stock market seems to be semi-strong form efficient in that attempts to exploit dividend forecasts based on publically available financial statement information does not offer risk-adjusted profits. This result is robust to variations in the cut-off used to identify those firms where a dividend increase (decrease) is most likely. However, an analysis over a longer time span and in different markets is needed before firm conclusions can be reached about profitability of a trading strategy based on a dividend prediction model.

Author Information:

[1] Abeyratna Gunasekarage is a senior lecturer in finance at the Department of Banking and Finance of Monash University, Australia. Prior to joining Monash university he has worked at the University of Canterbury and the University of Waikato in New Zealand. Abey received his BSc Honours from the University of Sri Jayewardenepura, Sri Lanka and MAcc and PhD from the University of Dundee, UK. He has published in international journals in the areas such as financial communication, performance of investment strategies, efficiency of emerging capital markets and corporate governance.

[2] Kurt Hess is a Senior Credit Advisor at the Independent Credit View, Zurich, Switzerland. Besides his applied financial consulting work, Kurt had been lecturing and researching as a senior fellow in Finance at the University of Waikato, New Zealand. Prior to this academic career Kurt was a director in Fixed Income and Credit Research at Credit Suisse First Boston. Kurt Hess holds a Masters in Industrial Engineering from ETH (Zurich, Switzerland), a PhD in Economics from the University of Waikato as well as an MBA from the University of British Columbia (Vancouver, Canada).

[3] David Power is Professor of Business Finance at the Department of Accounting and Finance of the University of Dundee, UK. He is a graduate on the National University of Ireland (BCom), the London School of Economics (MSc Econ) and the University of Dundee (PhD). He has published widely in the areas of emerging stock markets, market efficiency and the communication between companies and the financial markets

Appendix 1: Univariate Model Parameters

Ratio #	Ratio	Definition	Coefficient	*p*-value	Decision
1	Current Ratio	Current Assets/Current Liabilities	0.0403	0.76	Reject
2	%Δ in 1	%Δ = (t1 - t0)/t0	0.0012	0.27	Reject
3	Quick Ratio	(Current assets-Inventory)/ Current Liabilities	0.0033	0.04	Accept
4	%Δ in 3	%Δ = (t1 - t0)/t0	-0.9016	0.06	Accept
5	Days sales in Accounts Receivable	(Debtors/Sales)*365	0.0001	0.97	Reject
6	%Δ in 5	%Δ = (t1 - t0)/t0	-0.5677	0.15	Reject
7	Inventory Turnover	Turnover/Inventory	0.0099	0.33	Reject
8	%Δ in Inventory Turnover	%Δ = (t1-t0)/t0	-0.0382	0.82	Reject
9	Inventory to Total Assets	Inventory/Total Assets	0.1571	0.15	Reject
10	%Δ in Inventory to Total Assets	%Δ = (t1-t0)/t0	-0.0003	0.26	Reject
11	%Δ in Absolute Inventory Level	%Δ = (t1-t0)/t0	-2.9527	0.00	Accept
12	%Δ in Sales	%Δ = (t1-t0)/t0	-0.1527	0.62	Reject
13	%Δ in Depreciation	%Δ = (t1-t0)/t0	0.351	0.05	Accept
14	Δ in EPS	Δ = (EPS1-EPS0)	-0.0001	0.39	Reject
15	Depreciation to Average Fixed Assets & Investments (excluding land)	Depreciation/Average Fixed Assets & Investments (excluding land)	-0.0011	0.37	Reject
16	%Δ in average fixed assets & investments (excluding land)	%Δ = (t1-t0)/t0	-0.0346	0.07	Accept
17	Return on Opening Equity	Net Profit after Tax/Total Equity (t-1)	-0.1473	0.36	Reject
18	Δ in Return on Opening Equity	Δ = t1-t0	-0.0197	0.27	Reject
19	Capital Expenditure to Total Assets	Δ in (Fixed assets + Depreciation)/Total Assets	0.0145	0.35	Reject
20	%Δ in Capital Expenditure to Total Assets	%Δ = (t1-t0)/t0	-0.0087	0.25	Reject
21	Capital Expenditure to Total Assets One Year Lagged	One Year Lag in (Capital Expenditure/Total Assets)	-0.0031	0.99	Reject
22	Debt-Equity Ratio	Total Liabilities/Shareholders Equity	0.0025	0.03	Accept
23	%Δ in Debt-equity Ratio	%Δ = (t1-t0)/t0	0.7573	0.23	Reject
24	Long–term Debt to Equity	Non-current Liabilities/Total Equity	-0.2795	0.38	Reject
25	%Δ in LT debt-equity ratio	%Δ = (t1 - t0)/t0	-0.0158	0.31	Reject
26	Equity to Fixed Assets plus Investments	Total equity/(Fixed Assets + Investments)	0.0687	0.85	Reject
27	%Δ in Equity to Fixed Assets plus Investments	%Δ = (t1-t0)/t0	0.0064	0.51	Reject
28	Times Interest Earned	EBIT/Interest Paid	0.0776	0.36	Reject
29	%Δ in Times Interest Earned	%Δ = (t1-t0)/t0	0	0.98	Reject
30	Sales to Average Total Assets	Sales/Average of Opening & Ending Total Assets	-0.1633	0.12	Reject

(continued)

Ratio #	Ratio	Definition	Coefficient	*p*-value	Decision
31	%Δ in Sales to Average Total Assets	%Δ = (t1-t0)/t0	-2.6785	0.01	Accept
32	EBIT to Total Assets	EBIT/Total Assets	-0.2386	0.59	Reject
33	Net Profit on Closing Equity	Net Profit After Tax/Total Equity (t)	-0.0001	0.17	Reject
34	Operating Profit (before depreciation) to Sales	EBITDA/Sales	0.0044	0.10	Accept
35	%Δ in EBIT to Sales	%Δ = (t1 - t0)/t0	0.0061	0.14	Reject
36	Pre-tax Income to Sales	Pre-tax Profit/Sales	-1.8623	0.14	Reject
37	%Δ in Pre-tax Income to Sales	%Δ = (t1-t0)/t0	0.085	0.3	Reject
38	Net Profit to EBITDA	NPAT/EBITDA	0.0131	0.15	Reject
39	%Δ in Net Profit to EBITDA	%Δ = (t1 - t0)/t0	-43.1583	0.00	Accept
40	Sales to Total Cash & Deposits	Sales/(Cash+Deposits)	-0.0038	0.33	Reject
41	Sales to Accounts Receivables	Sales/Debtors	-0.0012	0.44	Reject
42	Sales to Inventory	Sales/Inventory	0.0051	0.15	Reject
43	%Δ in Sales to Inventory	%Δ = (t1-t0)/t0	-0.7392	0.23	Reject
44	Sale to Working Capital	Sales/(Current Assets-Current Liabilities)	-0.0042	0.11	Reject
45	%Δ in Sale to Net Working Capital	%Δ = (t1 - t0)/t0	-0.1682	0.23	Reject
46	Sales to Fixed Assets	Sales/Fixed assets	0.0024	0.76	Reject
47	%Δ in Total Assets	%Δ = (t1-t0)/t0	-0.0496	0.3	Reject
48	Net Operating Cash flow to Average Assets	Net Operating Cash flow/ Average Total Assets	0.0762	0.38	Reject
49	Working Capital to Total Assets	(Current Assets-Current Liabilities)/Total Assets	0	0.74	Reject
50	%Δ in Working Capital to Total Assets	%Δ = (t1-t0)/t0	-0.2149	0.24	Reject
51	Operating Income to Average Assets	EBIT/Average Total Assets	-0.7653	0.12	Reject
52	%Δ in Operating Income to Average Assets	%Δ = (t1-t0)/t0	0.2802	0.51	Reject
53	%Δ in Net Working Capital	%Δ = (t1-t0)/t0	0.0001	0.08	Accept
54	Net income to Operating Cash flow	NPAT/Net Operating Cash Flow	0.0016	0.32	Reject
55	P/E Ratio	Price/Earnings Per Share	-0.01	0.32	Reject
56	Total Asset Turnover	Sales/Total assets	0.0086	0.93	Reject
57	Price to Net Tangible Assets	Price/Net Tangible Assets Per Share	0.0203	0.14	Reject
58	Dividend Yield	Dividend Per Share/Share Price	-0.0141	0.15	Reject
59	Cash EPS	Operating cash flow / diluted shares outstanding	-0.0033	0.55	Reject

Appendix 2: Market-Adjusted Buy-and-hold Returns for Dividend Prediction Model Based Strategy (2001-2006 Investment Period, 30/30 Percentiles)

Portfolio	No. of Firms	Investment Horizon			
		6 Months	12 Months	18 Months	24 Months
Long Position	101	-4.64%	-3.02%	-8.50%	-10.42%
Short Position	101	-1.45%	-1.76%	-4.43%	-2.83%
Strategy		-3.19%	-1.26%	-4.07%	-7.59%

Note: The table shows buy–and–hold returns for portfolios of firms predicted to increase, respectively decrease dividends. Predictions are based on a multiple logit model using past company financial ratios. The model was calibrated during 1995 to 2000 and then used to forecast dividend increasing firms during the 2001 to 2006 investment period. Investment takes place 3 months after the end of the accounting period preceding the year of the predicted dividend; at this time company financial statements would be available to investors. The strategy return is the outcome of taking a long position in the 'dividend increase' portfolio (shares in top 30% of dividend increase predictions) and a short position of the 'dividend decrease' portfolio (shares in bottom 30% of dividend increase predictions).

End Notes

[1] Note that this definition implies that no $\prod$ value is defined for $\Delta DPS_{i,t} = (\Delta DPS_{i,t-1} + \Delta DPS_{i,t-2} + \Delta DPS_{i,t-3})/3$ - i.e. where current dividend changes are equal to the past three years' drift of changes.

[2] If a company is delisted during a holding period, such a company is assigned zero monthly returns for the remainder of the holding period.

[3] We keep a gap of three months in order to allow for the possible time gap between the end of the financial year of a firm and the publication of its annual reports. Conover et al. (2008), who analysed financial reporting lag for a sample of 22 industrialised nations, reported that during the 1992-96 period, the New Zealand firms in their sample took a median number of 87.5 days (nearly three months) to publish their financial statements.

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