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Dividend payout and executive compensation: theory and Canadian evidence

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Abstract

Purpose – This paper seeks to present and test a model of the association between dividend payout and executive compensation.

Design/methodology/approach – The authors develop a model based on Bhattacharyya whereby managerial quality is unobservable to shareholders, and therefore first-best contracts are not possible. In the second-best world, compensation contracts motivate high quality managers to retain and invest firm earnings, while low quality managers are motivated to distribute income to shareholders. These hypotheses arising from the model are tested on data for Canadian firms' dividend payouts over the period 1993-1995 using tobit regression analyses.

Findings – Consistent with the predictions of the Bhattacharyya model, the results show that, *ceteris paribus*, earnings retention (dividend payout) is positively (negatively) associated with executive compensation. These results hold when payout is defined as common dividends plus common share repurchases.

Research limitations/implications – The Canadian data provide only limited information on the components of executive compensation. A more useful test would be possible with more detailed information on, for example, salary, bonus, and benefits.

Originality/value – Several recent papers have documented an association between dividends and executive compensation. This paper presents and tests a model that provides a potential explanation for this link.

Keywords Senior management, Earnings, Compensation, Dividends, Canada

Paper type Research paper

Why do corporations pay dividends? Despite decades of study, we have yet to understand completely the factors that influence dividend policy and the manner in which these factors interact. A quarter of a century ago, Black (1976) wrote that "... the harder we look at the dividend picture, the more it seems like a puzzle, with pieces that just don't fit together" (p. 5). The situation is not much different today, where Brealey and Myers (2003) list dividends as one of the ten important unsolved problems in finance.

To date, finance researchers have advanced three principal paradigms to explain the dividend puzzle. Miller and Modigliani (1961) offered the tax clientele theory, according

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to which investors select portfolios with reference to their marginal tax rates. A change in dividends changes the tax position of shareholders and induces trading as investors rebalance their portfolios. Signalling theory (e.g. Bhattacharya, 1979; Miller and Rock, 1985; John and Williams, 1985) suggests that managers use dividends to signal their private information to investors. Finally, the free cash flow hypothesis (Easterbrook, 1984; Jensen, 1986) posits that an increase in dividends is favorably received by investors because it means that managers will have less cash to invest in negative net present value (NPV) projects.

Bhattacharyya (2003) develops a model of dividend payout that is based in the principal-agent paradigm. Bhattacharyya's model is rooted in the asymmetric information context and assumes that agents differ in their ability to identify and/or access positive NPV projects. Consistent with economic intuition, the equilibrium result from the model shows that principal-owners prefer that agent-managers invest available cash in positive NPV projects; and if no positive NPV projects are available, principals prefer that the agents distribute surplus cash as dividends. In his model, uninformed principals (shareholders) set up a menu of contracts to screen agents according to productivity type (which is known to the agent). Higher quality agents are those who have access to more positive NPV projects. These agents are induced to invest the firm's cash rather than pay out dividends. Lower quality agents do not have the same access to positive NPV projects, and the compensation contract they choose induces them to pay out higher dividends[1]. In equilibrium, high quality managers receive higher compensation than do low quality managers and pay out lower dividends.

Empirically, Bhattacharyya's model predicts that dividend payout and managerial compensation are negatively correlated. We perform tobit analyses of managerial compensation and dividend payout in Canadian firms over the period 1993-1995. Our results are consistent with the predictions of Bhattacharyya's model.

The rest of the paper is organized as follows. The next section presents Bhattacharyya's dividend payout model. Then, the sample data and results of empirical analyses are presented. Finally, conclusions are drawn.

A theory of dividend payout and managerial compensation

Background

The main contribution of this study is to describe a formal model that explicitly links managerial compensation to the proportion of earnings paid out as dividends, and to document empirical support for hypotheses arising from the theoretical model. While other studies have documented evidence in related areas, they differ in the variables selected for empirical constructs as well as in their underlying models.

For example, Fenn and Liang (2001) find that the ratio of cash dividends paid to the market value of the common stock (or the dividend yield from the investor's perspective) is negatively linked to managerial stock incentives as proxied by the level of stock and stock options held by executives as a percentage of shares outstanding. In contrast, our dependent variable is the ratio of dividends paid to earnings to reflect the choice variables faced by managers – i.e. what proportion of earnings should be paid out as dividends? We believe that the dividend yield (as measured by the ratio of cash dividends paid to the market value of the common stock) is more influenced by the vagaries of the stock market, and less within the control of managers. In addition, unlike Fenn and Liang, our explanatory compensation variable is a flow variable consisting of cash compensation and options granted in the same period in which the

decision to payout a certain percentage of earnings as dividends is made. In contrast, Fenn and Liang use the level of cumulative stock and stock options (as a percentage of total shares outstanding) as their explanatory compensation variable.

Lambert *et al.* (1989) find a negative link between changes in the level of cash dividends paid and the adoption of employee stock option plans for executives. In contrast, we examine dividend payouts instead of levels or changes in levels, and test for an association with the annual flow of compensation from options and cash compensation instead of an association with a one-time (stock option plan) adoption event. White (1996) finds that dividend payments are linked to management's stock ownership. Unlike this study, she does not examine dividend payouts, nor does she examine the link with stock options or with total compensation.

Past research has documented a strong link between the compensation of CEOs and firm outputs, measured as firm earnings (e.g. Healy, 1985) and/or firm stock price and returns (e.g. Jensen and Murphy, 1990; see Pavlik *et al.*, 1993, for a review of this literature). Some researchers have also noted a positive link between dividend payment and executive compensation, implying that dividend payments are, under certain circumstances at least, rewarded by shareholders. Lewellen *et al.* (1987) find a significant positive association between executive cash compensation (salary and bonus) and dividend payout, a result that is consistent with Healy's (1985) observation that the upper limit on amounts transferred to the executive bonus pool is often a function of cash dividends paid on common stock. Other mechanisms that directly link executive compensation to dividend payments include dividend units (Larcker, 1983) and restricted stock (Crystal, 1989)[2].

We also examine the evidence in a Canadian setting, which, to the best of our knowledge, has not been documented before. Using Canadian data has both important advantages and disadvantages. Disclosure of Canadian executive compensation only became mandatory in the early 1990s and only limited disclosure of the components of executive compensation were required. In our sample, for example, bonus compensation is not disclosed separately but is instead combined with salary as total cash compensation. The advantage in using Canadian data immediately after it became available is that Canadian executive compensation was less likely to be subject to the same scrutiny as in the USA, scrutiny that has caused political and economic pressures that can lead to inefficient compensation structures (Murphy, 1997). This argument is consistent with evidence provided by Tolbert and Zucker (1983) that political pressures can obscure and even counter efficiency concerns in organizational design issues. Following from this argument, we propose that Canadian data from the early 1990s can provide a more powerful test of the efficiency-based Bhattacharyya dividend payout model.

Bhattacharyya (2003) models the dividend-compensation link identified in the empirical studies cited above to understand the impact of such linkages on the dividend policies followed by firms. He starts by positing a linear compensation contract[3] where managerial compensation is a function of dividends and output. If the compensation contract is a linear function of dividends alone, then the rational action for the manager is to have a 100 per cent dividend payout ratio. Having both dividends and outputs as components of linear compensation contracts ensures that managers try to achieve a proper balance between dividend payments and investments.

When managers are of different productive qualities (which are privately known to managers but are essentially unobservable attributes), then compensation contracts

will be set up in a way such that managers with the lowest level of acceptable quality will be paid the reservation wage *ex ante* and managers of higher quality will be paid information rent *ex ante*. The amount of rent will depend, *inter alia*, on the probability distribution of managerial quality. In equilibrium, the optimal compensation contract will be such that, *ceteris paribus* (and in particular for a given amount of available cash), managers of the highest quality get the most rent and invest the most in productive projects, while managers with the least acceptable productive quality will get just the reservation wage and will invest the least.

It therefore follows that compensation contracts will ensure that, for a given amount of available cash, managers with higher quality will get more information rents (i.e. more compensation), will invest more in productive enterprises and, as a result, will have less money to distribute as dividends. Similarly, managers with the lowest acceptable quality will get the participation wage and invest less, thereby leaving more cash for distribution as dividends. The payout ratio, i.e. the fraction of available cash paid out as dividends, will thus be negatively related to agent quality, which, in turn, is positively related to managerial compensation. Therefore, a testable hypothesis of the model is that the dividend payout ratio will be negatively related to managerial compensation.

The key links in the Bhattacharyya model are laid out in Figure 1. It is important to note that the observable link between executive compensation and dividend payout does not denote a causal relationship between these two elements. Rather, the model suggests that both compensation and payout are driven by a common

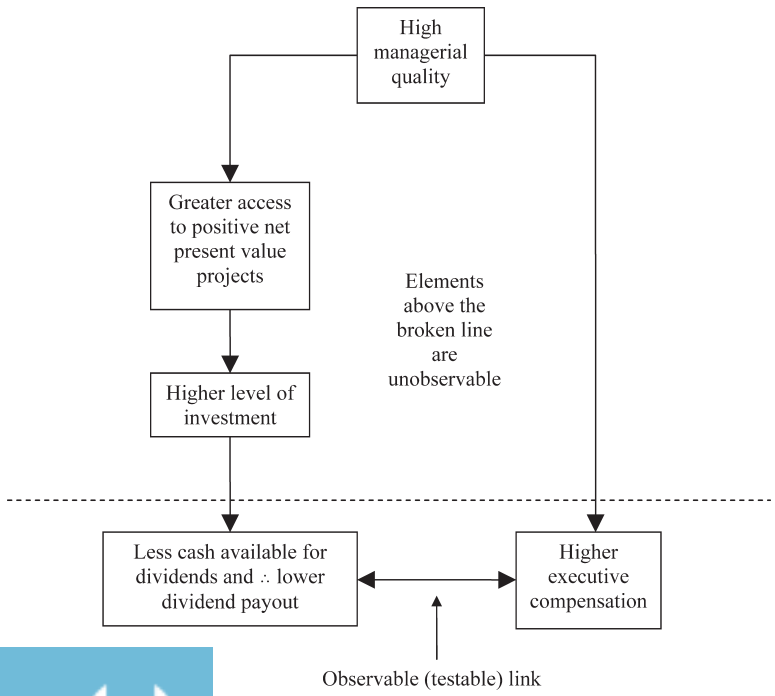

Figure 1.
A model of executive compensation and dividend payout

latent variable, i.e. managerial quality. A more specific description of the model is presented below.

The model

Bhattacharyya's (2003) one-period model is used as a starting point to motivate our empirical hypothesis. The manager of firm j is presented with a menu of linear wage contracts that determine total compensation ϖ_j. Each member of the menu of wage contracts is a linear function of the dividend declared and stochastic output to be realized. The general form of the contract is presented in Equation (1) below:

$$\varpi_j = b_0 + b_D D_j + b_Y \tilde{Y}_j \tag{1}$$

where b_0 is the fixed component of managerial compensation, D_j is the dividend declared for the period, $\tilde{Y}_j$ is the stochastic output for the period, and b_D and b_Y are nonnegative coefficients (this is discussed below).

Different contracts will have different coefficients b_0, b_D, and b_Y. The manager is presented with a menu of contracts and the manager selects a contract. The menu of contracts is designed so as to be separating in agent types. Having picked the contract that is most beneficial to him/her, the manager will then (simultaneously) declare a dividend D_j and invest the balance of the available amount.

Cash available for the period is partially distributed as D_j at the manager's discretion, and the rest is invested in the production process. The stochastic output from the production process is given by

$$\tilde{Y}_j = \theta_j \ln(C_j - D_j) + \tilde{\varepsilon}_j \tag{2}$$

where θ_j is the productivity or quality of the manager (i.e. the manager's ability to identify NPV projects; managerial quality is assumed to be unknown to the principal), C_j is the cash available for the period and the final term is random noise[4]. Output is dependent on the logarithm of the net investment, implying diminishing marginal returns to investment. Substituting (2) into (1), we get

$$\varpi_j = b_0 + b_D D_j + b_Y(\theta_j \ln(C_j - D_j) + \tilde{\varepsilon}_j) \tag{3}$$

We should note here that the signs of both b_D and b_Y must be positive because if either is negative, then the manager will ensure that the expected value of that component is zero. To illustrate, suppose b_D is negative, i.e. the manager is penalized for paying dividends. Then the manager will always set the dividend equal to zero. Similarly, if b_Y is negative, then the manager will not invest anything (i.e. will distribute all of the cash as a dividend), which will make the expected value of production zero. The sign of b_0 will be indeterminate and b_0 will be adjusted to ensure that the *ex ante* expected compensation for the manager with the lowest acceptable quality is set at the participation constraint[5]. For managers of higher quality, the intercept term b_0 will be adjusted to minimise the information rent payable.

Rearranging the terms in (3), we get

$$\varpi_j = b_0 + b_D D_j + b_Y \theta_j \left[\ln C_j + \ln\left(1 - \frac{D_j}{C_j}\right)\right] + b_Y \tilde{\varepsilon}_j \tag{4}$$

Note that D_j/C_j is a dividend payout ratio. Transposing and simplifying, we get

$$\ln\left(1 - \text{Payout Ratio}_j\right) = -\frac{b_0}{b_Y\theta_j} - \frac{b_D}{b_Y\theta_j}D_j - \ln C_j + \frac{\varpi_j}{b_Y\theta_j} - \frac{1}{\theta_j}\tilde{\varepsilon}_j \qquad (5)$$

The left-hand side of Equation (5) can be interpreted as a measure of earnings retention. The model predicts that dividend payout (earnings retention) is positively (negatively) associated with both D_j, dividends declared, and C_j, cash available.

The positive relationship between D_j and the payout ratio, D_j/C_j, is not surprising. The relationship between C_j and the payout ratio is more subtle. At first glance, it would appear that, by construction, an increase in C_j will result in a reduction in the payout ratio. This is not the case, however, because of the assumption regarding diminishing marginal returns to investment implicit in Equation (2). The manager will allocate available C_j between investment and dividends such that, *ex ante*, the marginal compensation from dividend payment is equal to the marginal compensation from production. Marginal compensation from dividend payment (b_D) is constant. Marginal compensation from production (b_Y) is also constant. However, from (2), expected marginal production increases with investment but at a diminishing rate. Therefore, as C_j increases, the manager will find it increasingly to his/her advantage to pay out proportionately more dividends. Hence, there is a positive relationship between C_j and the payout ratio.

Like all mathematically tractable economic models, the Bhattacharyya model is necessarily built upon a series of simplifying assumptions, e.g. a single period, managers affect firm productivity, managers and owners are motivated by purely extrinsic rewards, etc. Many of the factors that influence dividend policy (e.g. dividend "stickiness") and executive compensation (e.g. tax structure) have been left out. To be useful, the model must incorporate enough of the key factors that drive dividend payout and managerial compensation. Perhaps the best way to assess the usefulness of this model is to test the extent to which it explains empirically observable dividend and compensation behaviour. The next section of the paper presents the results of such empirical tests.

Empirical tests

Data

We obtained executive compensation data from footnotes to annual reports retrieved from the Canadian Compact Disclosure database, and collected firm-specific accounting variables from Compustat. Our sample began with a total of 707 firm-year observations. Firms in the financial service, professional service and government sectors were deleted (81 firm-years)[6], as well as firm-years with negative or missing shareholders' equity and negative share repurchases. In addition, we restrict our analysis to firms with payout ratios that are:

- non-negative because of difficulty in interpreting a negative payout ratio; and
- less than one, since ln(1 – Payout) is undefined for values of dividend payout greater than or equal to one.

A preliminary analysis of the data revealed the presence of some extreme values in many of the variables in our analysis. To mitigate the effect of these extreme values on our results, we deleted observations falling within the top and bottom one-half of 1 per cent of values of the following variables: Total CEO compensation, market-to-book

ratio, capital expenditures and beta. In addition, we deleted the top one-half of 1 per cent of the following variables: cash compensation, options and debt-equity ratio. We executed this deletion process in a different manner on variables that were "naturally" truncated. For example, cash compensation and options each had a significant number of zero values as the minimum. For these variables, we only deleted the top one-half of 1 per cent of values[7]. As well, the logarithmic transformation of income available to shareholders eliminated loss firm-years from our sample and reduced extreme positive values.

Descriptive statistics on the remaining sample are presented in Table I. The mean (median) firm-year in our sample has total assets of $1.887 billion ($660 million). The mean (median) total annual CEO compensation is $1.475 million ($926,050), while the mean (median) Black–Scholes value of annual stock options granted to CEOs in our sample is $1.213 million ($682,500). On average, the value of options granted accounts for more than 82 per cent of total compensation. The mean (median) annual CEO cash compensation, which includes salary and bonus, is $567,340 ($471,810). The mean (median) dividend payout ratio is 0.19 (0.08). The minimum and maximum values of the payout ratio (0 and 0.99, respectively), and the smaller number of valid cases, result from the restrictions imposed on the payout ratio as described above.

Variable	*N*	Mean	Median	SD	Skewness	Kurtosis	Minimum	Maximum
Dividends[a]	616	20.88	0.00	50.1	4.29	22.87	0	412.4
Income[a]	626	49.28	13.27	152.8	1.66	20.00	−1,171.8	1,142.9
Payout ratio[c]	442	0.19	0.08	0.2	3.47	31.32	0	0.99
Total compensation[b]	626	1,474.81	926.05	1,743.0	2.68	8.94	0	11,590.1
Cash compensation[b]	524	567.34	471.81	414.8	1.57	4.11	0	2,927.9
Options[b]	468	1,212.87	682.50	1,483.2	2.21	5.42	13.9	8,105.4
Assets[a]	626	1,887.12	660.30	3,735.5	5.50	42.75	1.3	38,697
Debt-equity ratio	624	0.46	0.25	0.6	4.18	29.04	0	5.8
Market-book ratio	613	2.43	1.66	2.9	6.50	57.14	0.4	35.3
Capital expenditures[a]	613	136.67	52.46	199.0	2.45	7.05	0	1,388.3
Beta	605	1.08	0.99	0.6	1.16	2.36	−0.5	4.2

Notes: [a]Indicates that amounts are in millions of Canadian dollars; [b]indicates that amounts are in thousands of Canadian dollars; [c]the number of cases with valid payout ratios is substantially less than cases with dividends and income due to restrictions on the payout ratio imposed by the model, i.e. cases with payout ratios less than zero, or greater than or equal to one, were eliminated from our sample. The 442 cases described here are only those for which the payout ratio is greater than or equal to zero and strictly less than one. Our sample includes firm-years from the period 1993-1995. Dividends is cash dividends declared to common shareholders during the year. Income is net income available to common shareholders. Payout ratio is dividends divided by net income available to common shareholders. Total compensation is total CEO compensation. Cash compensation is total CEO cash compensation, including salary and cash bonus. Options is the Black–Scholes value of stock options granted to the CEO. Assets is total assets as at year-end. Debt-equity ratio is long-term debt divided by common shareholders' equity as at year-end. Market-book ratio is the market value of firms' common shares divided by common shareholders' equity, both as at fiscal year-end. Capital expenditures is capital expenditures for the year as reported on the cash flow statement. Assets, debt-equity ratio and market-book ratio are as at fiscal year-end; all other items are for the fiscal year. Beta is the monthly fundamental beta, as reported by Compustat, calculated for a 60-month period ending in the month of the firm-year's fiscal year-end

Table I.
Descriptive statistics

A correlation matrix of the variables in the sample is presented in Table II. Almost all of the correlations are statistically significant at conventional levels. Dividend payout is negatively associated with BETA. Consistent with the descriptive statistics in Table I, the value of options granted is very highly correlated with total compensation (Pearson $r = 0.97$), much higher than the correlation between total compensation and cash compensation ($r = 0.36$).

Tobit regression results

Bhattacharyya (2003) models dividend payout as a function of dividends (D_j), cash (C_j) and managerial compensation (ϖ_j). In our empirical tests of this model, we use dividends declared as D_j and compensation figures from the firm annual reports as ϖ_j. We use earnings available to common shareholders as the empirical proxy for C_j for three reasons. First, the dividend payout ratio is traditionally defined as dividends divided by earnings available to common shareholders. Second, dividend payouts are often constrained by earnings-based covenants (e.g. times-dividends-earned). Finally, earnings are frequently used as a measure of the long run cash-generating potential of a firm.

We estimate two sets of tobit regression models[8]. The first is a direct test of Equation (5) and is operationalized as:

$$\ln(1 - \text{PAYOUT}) = \beta_0 + \beta_1 \text{COMPENSATION} + \beta_2 \text{DIVIDEND} + \beta_3 \text{LNINCOME} + \varepsilon \quad (6)$$

where PAYOUT is cash dividends declared to common shareholders divided by net income available to common shareholders (i.e. net income less preferred dividend

		1	2	3	4	5	6	7	8	9
1.	PAYOUT	1								
2.	TOTCOMP	0.04	1							
3.	CASHCOMP	0.22*	0.36*	1						
4.	OPTIONS	−0.05	0.97*	0.23*	1					
5.	DIVIDEND	0.55*	0.24*	0.41*	0.18*	1				
6.	LNINCOME	0.43*	0.29*	0.58*	0.19*	0.58*	1			
7.	DEBTEQ	0.10*	0.10*	0.17*	0.06	0.01	0.15*	1		
8.	MKTBOOK	−0.14*	−0.02	−0.12*	0.02	−0.09*	−0.14*	−0.15*	1	
9.	CAPEXP	0.31*	0.27*	0.40*	0.22*	0.59*	0.62*	0.19*	−0.11*	1
10.	BETA	−0.24*	0.06	−0.02	0.11*	−0.13*	−0.06	0.04	0.12*	−0.08

Notes: *Correlation is significantly different from zero at $p < 0.05$. PAYOUT is cash dividends declared to common shareholders divided by net income available to common shareholders. TOTCOMP is total CEO compensation for the (fiscal) year. CASHCOMP is total CEO cash compensation for the year, including salary and cash bonus. OPTIONS is the Black–Scholes value of stock options granted to CEO during the year. DIVIDEND is cash dividends to common shareholders declared during the year. LNINCOME is the log of income available to common shareholders for the year. DEBTEQ is long-term debt divided by common shareholders' equity as at year-end. MKTBOOK is the market value of the firm's common shares divided by common shareholders' equity as at year-end. CAPEXP is capital expenditures for the year. BETA is the monthly fundamental beta from Compustat, calculated for a 60-month period ending in the month of the firm-year's fiscal year-end

Table II.
Correlation matrix

requirement); COMPENSATION is the total of cash compensation and Black–Scholes value of options granted; DIVIDEND is cash dividends declared to common shareholders; and LNINCOME is the log of net income available to common shareholders[9]. We repeated all of our analyses with several alternate specifications of "dividends" and "cash", and all specifications yielded qualitatively consistent results. These alternate specifications are described later in this paper.

The results of estimating Equation (6) are presented in Table III. The pseudo R^2 for the four models ranges between 14 and 25 per cent, and the Wald test results allow us to reject the null hypothesis that all of the regression coefficients, except for the intercept term, are not significantly different from zero. As predicted by Bhattacharyya (2003), the coefficient is positive and strongly significant for total compensation, as well as for the value of options granted. However, the coefficient for cash compensation is not significant, contrary to the predictions of Bhattacharyya. The coefficients β_2 and β_3, on dividends and income, respectively, are both negative and significant as predicted by Bhattacharyya. The intercept coefficient, β_0, is theoretically indeterminate but consistently and significantly positive in all three models.

The results in Table III provide strong support for the Bhattacharyya model. However, some or all of these results could be due to excluded variables that other studies have found to be associated with dividend policy (e.g. White, 1996). In order to test this possibility, we estimate the following tobit regression model.

Independent variable	Expected sign	Coefficients (asymptotic t-statistics) Model I	Model II	Model III
CONSTANT	?	1.13 (7.25***)	0.99 (5.92***)	1.17 (6.13***)
TOTCOMP[a]	+	0.10 (2.97***)		
CASHCOMP[a]	+		0.01 (0.64)	
OPTIONS[a]	+			0.19 (3.82***)
DIVIDEND[b]	–	−0.49 (−4.39***)	−0.46 (−4.08***)	−0.91 (−5.00***)
LNINCOME	–	−0.32 (−7.06***)	−0.27 (−5.25***)	−0.32 (−5.52***)
Pseudo R^2		0.17	0.14	0.25
Wald χ^2 (3 df)		135.2***	103.1***	128.0***
N		467	397	342

Notes: *,**, and *** indicate that the statistic is statistically significant at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively. All p-values are one-tailed tests unless the expected sign of the coefficient is ambiguous (denoted by "?"), in which case the test is two-tailed; [a]indicates that the coefficient has been multiplied by 10^6; [b]indicates that the coefficient has been multiplied by 10^2

$$\ln(1 - \text{PAYOUT}) = \beta_0 + \beta_1 \text{COMPENSATION} + \beta_2 \text{DIVIDEND} + \beta_3 \text{LNINCOME} + \varepsilon$$

PAYOUT is cash dividends declared to common shareholders divided by net income available to common shareholders. COMPENSATION is one of the following annual items, in Canadian dollars: TOTCOMP is total CEO compensation; CASHCOMP is CEO cash compensation, including salary and bonus; OPTIONS is the Black–Scholes value of stock options granted to the CEO. DIVIDEND is cash dividends declared during the year. LNINCOME is the log of income available to common shareholders for the year. Pseudo R^2 is the squared correlation between observed and expected values. The Wald χ^2 tests the null hypothesis that all of the tobit model parameters, other than the intercept term, are zero

Table III.
Tobit results for earnings retention (no control variables)

$$\ln(1 - \text{PAYOUT}) = \beta_0 + \beta_1 \text{COMPENSATION} + \beta_2 \text{DIVIDEND} + \beta_3 \text{LNINCOME} + \beta_4 \text{DEBTEQ} + \beta_5 \text{MKTBOOK} + \beta_6 \text{CAPEXP} + \beta_7 \text{BETA} + \eta_{1\ldots}\eta_7 + \varepsilon \quad (7)$$

where COMPENSATION, DIVIDEND and LNINCOME are as defined in Equation (6) above. DEBTEQ is long-term debt divided by common shareholders' equity, and is used here as a measure of firm leverage and a proxy for closeness to debt covenant restrictions. High leverage, with its associated financial risk and debt-servicing requirements, should be associated with lower dividend payout. MKTBOOK is the market value of the firm's common shares divided by the book value of common shareholders' equity, both at fiscal year-end. The market-to-book ratio is frequently used to proxy for investment opportunities available to the firm, regardless of the quality of the manager. We expect a higher market-to-book ratio to be associated with lower dividend payout. CAPEXP is capital expenditures for the year as reported on the cash flow statement, and controls for the possible effects of the firm's normal investment/capital asset replacement cycle. We expect capital expenditures to be negatively associated with dividend payout. BETA is the monthly fundamental beta, calculated for a 60-month period ending in the month of the firm-year's fiscal year-end. We expect riskier firms to be more reluctant to pay out dividends and, therefore, expect BETA to be negatively associated with dividend payout. η_1 through η_7 are dummy variables included to control for the effects of two years and five one-digit SIC industry groups in our sample.

Tobit regression results for Equation (7) are presented in Table IV (note that the coefficients for the year and industry dummy variables are not reported). The pseudo R^2 for the different versions of the model ranges from 28 to 36 per cent. In all three cases, the Wald statistic is significant, permitting rejection of the null hypothesis that all of the coefficients, aside from the intercept term, are zero. As in Table III, the total compensation and option compensation variables are significantly and positively (negatively) associated with earnings retention (dividend payout).

Dividends declared are negatively (positively) associated with earnings retention (dividend payout), consistent with the results in Table III. The coefficient on income is also negative, consistent with the results in Table III and the Bhattacharyya model.

Capital expenditures (CAPEXP) and firm beta (BETA) are positively associated with earnings retention, as expected, and are statistically significant in all three regressions. The coefficients on the market-to-book ratio (MKTBOOK) and debt-to-equity ratio (DEBTEQ) are positively associated with earnings retention in all three models, but are statistically significant in models I and II only.

The seven dummy variables are included in Equation (7) only to control for specific year and industry effects, and not to test any specific hypotheses. It is noteworthy, however, that the coefficients on two of the industries (utilities and retail/wholesale firms) were consistently negative and statistically significant, implying that firms in these industries tend to pay out relatively more of their earnings as dividends than do firms in other industries. As well, the coefficients for the 1994 and 1995 fiscal years were positive and significant, implying that firms tended to retain more earnings in these years relative to 1993.

Sensitivity analysis

Cash dividends are not the only means available to managers of distributing income to shareholders. Many firms frequently engage in share repurchases as a way of

Independent variable	Expected sign	Coefficients (asymptotic t-statistics) Model I	Model II	Model III
CONSTANT	?	0.81 (3.41***)	0.74 (2.95***)	0.76 (2.67***)
TOTCOMP[a]	+	0.06 (1.68**)		
CASHCOMP[a]	+		−0.07 (−0.42)	
OPTIONS[a]	+			0.13 (2.44***)
DIVIDEND[b]	−	−0.47 (−3.75***)	−0.45 (−3.54***)	−0.95 (−4.47***)
LNINCOME	−	−0.36 (−6.28***)	−0.32 (−5.11***)	−0.36 (−5.08***)
DEBTEQ	+	0.23 (1.72**)	0.31 (2.23**)	0.13 (0.85)
MKTBOOK	+	0.06 (1.37*)	0.07 (1.46*)	0.05 (0.96)
CAPEXP[b]	+	0.06 (1.70**)	0.07 (2.08**)	0.08 (1.85**)
BETA	+	0.27 (2.27**)	0.25 (1.88**)	0.40 (2.73***)
Pseudo R^2		0.30	0.28	0.36
Wald χ^2 (14 df)		189.4***	163.5***	162.8***
N		447	386	327

Notes: *, **, and *** indicate that the statistic is statistically significant at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively. All p-values are one-tailed tests unless the expected sign of the coefficient is ambiguous (denoted by "?"), in which case the p-value is two-tailed; [a]indicates that the coefficient has been multiplied by 10^6; bindicates that the coefficient has been multiplied by 10^2

$$\ln(1 - \text{PAYOUT}) = \beta_0 + \beta_1 \text{COMPENSATION} + \beta_2 \text{DIVIDEND} + \beta_3 \text{LNINCOME} + \beta_4 \text{DEBTEQ} + \beta_5 \text{MKTBOOK} + \beta_6 \text{CAPEXP} + \beta_7 BETA + \eta_{1\ldots}\eta_7 + \varepsilon$$

PAYOUT is cash dividends declared to common shareholders divided by net income available to common shareholders. COMPENSATION is one of the following annual items, in Canadian dollars: TOTCOMP is total CEO compensation; CASHCOMP is CEO cash compensation, including salary and bonus; OPTIONS is the Black–Scholes value of stock options granted to CEO. DIVIDEND is cash dividends declared during the year. LNINCOME is the log of income available to common shareholders for the year. DEBTEQ is long-term debt divided by common shareholders' equity as at year-end. MKTBOOK is the market value of firms' common shares divided by common shareholders' equity as at year-end. CAPEXP is capital expenditures for the year. η_i are coefficients (not reported) for dummy variables indicating one of five one-digit SIC industry classifications or one of two fiscal years. BETA is the monthly fundamental beta as reported by Compustat. Pseudo R^2 is the squared correlation between observed and expected values. The Wald χ^2 tests the null hypothesis that all of the tobit model parameters, other than the intercept term, are zero

Table IV.
Tobit results for earnings retention (control variables included)

distributing excess cash to shareholders while avoiding the "stickiness" associated with increased dividends (see, for example, Jolls, 1998; Kahle, 2002; and Weisbenner, 2000). Grullon and Michaely (2002) find evidence that firms have gradually substituted repurchases for dividends. Ignoring share repurchases, therefore, risks misspecifying the cash distribution parameter in Bhattacharyya (2003).

To address this issue, we compute a new payout variable based on the approach used by Grullon and Michaely (2002). DIVPURCH is defined as the sum of cash dividends on common stock declared and total expenditure on repurchase of common and preferred stock, minus any reduction in the redemption value of the net number of preferred shares outstanding[10]. The payout ratio associated with DIVPURCH is DPPAYOUT, defined as DIVPURCH divided by net income available to common shareholders. We redo the analyses presented in Tables III and

IV, using DIVPURCH and DPPAYOUT in place of DIVIDEND and PAYOUT, respectively.

The results of these supplementary analyses are presented in Tables V and VI. The results in Table V (without control variables) are qualitatively similar to those reported in Table III, i.e. total compensation and options are positive and statistically significant, as predicted, but cash compensation is not significant. In Table VI (regressions with control variables), total compensation is no longer significant (although still positive), while the value of options granted continues to be significantly and positively associated with earnings retention. The capital expenditure variable is no longer statistically significant (although still positive) in models I and III, while the debt-to-equity ratio is now significant and positive in all three models. These results provide additional support for the Bhattacharyya model.

As a supplementary check, we identified and deleted from our sample all firm-years reporting share repurchase activity on the cash flow statement. The tobit results obtained from this reduced sample (not reported here) are qualitatively the same as those reported in Table IV, i.e. total compensation and options granted are significantly and positively associated with earnings retention of non-repurchasing firms.

We used earnings available to common shareholders as the empirical measure of the Bhattacharyya cash parameter since earnings can be interpreted as a long-term average measure of cash generated by the firm's operations, and because earnings

Independent variable	Expected sign	Coefficients (asymptotic t-statistics) Model I	Model II	Model III
CONSTANT	?	1.15 (7.72***)	1.13 (6.77***)	1.10 (6.29***)
TOTCOMP[a]	+	0.08 (2.25**)		
CASHCOMP[a]	+		−0.01 (−0.06)	
OPTIONS[a]	+			0.16 (3.47***)
DIVPURCH[b]	−	−0.19 (−2.04**)	−0.14 (−1.48*)	−0.59 (−4.15***)
LNINCOME	−	−0.35 (−8.02***)	−0.32 (−6.32***)	−0.33 (−6.22***)
Pseudo R^2		0.13	0.11	0.23
Wald χ^2 (3 df)		113.2***	86.4***	117.2***
N		467	397	342

Notes: *, **, and *** indicate that the statistic is statistically significant at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively. All p-values are one-tailed tests unless the expected sign of the coefficient is ambiguous (denoted by "?"), in which case the test is two-tailed; [a]indicates that the coefficient has been multiplied by 10^6; [b]indicates that the coefficient has been multiplied by 10^3

$$\ln(1 - \text{DPPAYOUT}) = \beta_0 + \beta_1 \text{COMPENSATION} + \beta_2 \text{DIVPURCH} + \beta_3 \text{LNINCOME} + \varepsilon$$

DPPAYOUT is cash dividends declared to common shareholders, plus total expenditure for repurchase of common shares, divided by net income available to common shareholders. COMPENSATION is one of the following annual items, in Canadian dollars: TOTCOMP is total CEO compensation; CASHCOMP is total CEO cash compensation, including salary and bonus; OPTIONS is the Black–Scholes value of stock options granted to the CEO. DIVPURCH is cash dividends declared, plus total expenditure for repurchase of common shares, during the year. LNINCOME is the log of income available to common shareholders for the year. Pseudo R^2 is the squared correlation between observed and expected values. The Wald χ^2 tests the null hypothesis that all of the tobit model parameters, other than the intercept term, are zero

Table V.
Tobit results for earnings retention (no control variables): payout is cash dividends plus common share repurchases

Independent variable	Expected sign	Coefficients (asymptotic t-statistics) Model I	Model II	Model III
CONSTANT	?	0.79 (3.52***)	0.83 (3.40***)	0.69 (2.63***)
TOTCOMP[a]	+	0.03 (0.92)		
CASHCOMP[a]	+		−0.18 (−1.10)	
OPTIONS[a]	+			0.11 (2.09**)
DIVPURCH[b]	−	−1.42 (−1.39*)	−0.90 (−0.87)	−6.00 (−3.78***)
LNINCOME	−	−0.37 (−6.76***)	−0.37 (−5.87***)	−0.35 (−5.36***)
DEBTEQ	+	0.29 (2.17**)	0.36 (2.59***)	0.20 (1.34*)
MKTBOOK	+	0.06 (1.31*)	0.07 (1.54*)	0.03 (0.73)
CAPEXP[b]	+	0.27 (0.78)	0.45 (1.28*)	0.46 (1.09)
BETA	+	0.22 (1.91**)	0.22 (1.68**)	0.29 (2.18**)
Pseudo R^2		0.25	0.23	0.37
Wald χ^2 (14 df)		161.2***	137.5***	159.9***
N		447	386	327

Notes: *, **, and *** indicate that the statistic is statistically significant at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively. All p-values are one-tailed tests unless the expected sign of the coefficient is ambiguous (denoted by "?"), in which case the p-value is two-tailed; [a]indicates that the coefficient has been multiplied by 10^6; [b]indicates that the coefficient has been multiplied by 10^3

$$\ln(1 - \text{DPPAYOUT}) = \beta_0 + \beta_1 \text{COMPENSATION} + \beta_2 \text{DIVPURCH} + \beta_3 \text{LNINCOME} + \beta_4 \text{DEBTEQ} + \beta_5 \text{MKTBOOK} + \beta_6 \text{CAPEXP} + \beta_7 \text{BETA} + \eta_{1\ldots}\eta_7 + \varepsilon$$

DPPAYOUT is cash dividends declared to common shareholders, plus total expenditure for repurchase of common stock, divided by net income available to common shareholders. COMPENSATION is one of the following annual items, in Canadian dollars: TOTCOMP is total CEO compensation; CASHCOMP is total CEO cash compensation, including salary and bonus; OPTIONS is the Black–Scholes value of stock options granted to CEO. DIVPURCH is cash dividends declared, plus total expenditure for repurchase of common stock, during the year. LNINCOME is the log of income available to common shareholders for the year. DEBTEQ is long-term debt divided by common shareholders' equity as at year-end. MKTBOOK is the market value of firms' common shares divided by common shareholders' equity as at year-end. CAPEXP is capital expenditures for the year. η_i are coefficients (not reported) for dummy variables indicating one of five one-digit SIC industry classifications or one of two fiscal years. BETA is the monthly fundamental beta as reported by Compustat. Pseudo R^2 is the squared correlation between observed and expected values. The Wald χ^2 tests the null hypothesis that all of the tobit model parameters, other than the intercept term, are zero

Table VI.
Tobit results for earnings retention (control variables included): payout is cash dividends plus share repurchases

available to common shareholders is probably the most widely used denominator term in the payout ratio. We also conducted our analyses using

- cash flow from operations (from the cash flow statement); and
- free cash flow, as defined by Lehn and Poulsen (1989), *in lieu* of income available to common shareholders.

In a further analysis, we used dividend yield in lieu of dividend payout, and market value of shareholders' equity *in lieu* of earnings, in our tobit regressions. In all cases, the results are qualitatively similar to those reported in Table IV.

Because it is a one-period model, Bhattacharyya (2003) assumes that the compensation effects of dividend and investment decisions are realized in the same period that those

decisions are made. It is possible, however, that current managerial performance is rewarded (or punished) in subsequent periods through lagged adjustments to compensation (Fama, 1980). To test for this possibility, we ran our regressions using next year's (i.e. year $t+1$) compensation variables in place of this year's (year t) compensation. The results are qualitatively similar to those reported in Table III (without control variables). The compensation variables were not significant in replications of the regression models with control variables, as reported in Table IV. This could be due to reduced power in these regressions because of substantially smaller sample sizes available for these regressions.

Also related to the one-period model issue is the possibility that managers behave in a manner predicted by Bhattacharyya, but use prior periods' income and dividends in setting the current period's dividend policy. To test this possibility, we ran our tobit regressions using cash dividends and income available to common shareholders from year $t-1$ as independent variables instead of year t. The regression results were similar to those reported in Tables III and IV (and are not reported here), but the total compensation coefficients were only significant at the 10 per cent level. As in the tests described immediately above, the sample size was much smaller for this specification and is likely at least partly responsible for the weaker statistical results.

The model specifies that dividends be included in our regressions without any adjustment for size. To ensure that heteroscedasticity or outliers do not affect our results, we divided all variables in Equation (7) by total assets and performed the tobit procedure on the deflated variables. The results are qualitatively similar to those reported in Table IV.

Conclusion

Understanding dividend policy has been one of the most significant challenges in finance for many years. A number of studies have documented an empirical association between managerial compensation and dividend policy although, until recently, no formal theoretical model has been advanced to explain this link. Bhattacharyya (2003) offers a model of dividend payout that incorporates managerial compensation and demonstrates that compensation affects the level of cash dividends, conditional upon the level of cash available for distribution.

The central premise underlying the model is that shareholders use the compensation contract to induce managers with lower productivity (i.e. managers with less access to positive NPV projects) to distribute more of their available earnings or cash as dividends. In contrast, managers with high productivity have access to more positive NPV projects. These managers are, therefore, offered incentives to invest more of their available earnings or cash in productive ventures, leaving less for distribution as dividends. Consequently, dividend payout is negatively associated with managerial productivity. In equilibrium, higher productivity managers are paid more and, therefore, it follows that dividend payouts will be negatively associated with managerial compensation.

The results of tobit analyses of dividend payouts of Canadian firms over the period 1993-1995 are consistent with the predictions of the Bhattacharyya model, even after controlling for leverage, market-to-book value, capital expenditures, systematic risk, and year and industry effects. While our results support the existence of a link between dividend payout and total compensation, and between dividend payout and options compensation, we were unable to document a significant association between dividend payout and cash compensation. This suggests that stock options is the primary

instrument of compensation that is associated with dividend payout, a result that is consistent with the previous studies of levels of stock options and dividend policy using US data. Since stock options account for, on average, 82 per cent of total CEO compensation in our sample, stock options are, for many firms, the principal component of CEO compensation. Given the significant association between option compensation and dividend payout, it is not surprising that we also find a significant association between total compensation and dividend payout.

The absence of a significant association between cash compensation, which is composed of salary and cash bonus, and dividend payout is consistent with the notion that salary is relatively insensitive to corporate performance and, therefore, is not directly linked to investing or dividend policy decisions. This result is partly consistent with Antle and Smith (1985), who found that, for many companies in their US sample, non-bonus components of compensation seemed to counter the effect of earnings-based bonuses such that there was no statistically significant association between total compensation and firm performance (as measured by earnings). We would expect that cash bonus would be more sensitive to corporate performance, but, as noted earlier, there is no way to investigate this prediction with this data, and no way to assess the importance of bonus relative to salary in cash compensation. Future studies might investigate more specifically the link between cash bonus compensation, independent of salary, and dividend payout.

Notes

1. The compensation contract is assumed to be structured in such a way that the manager finds it in her self-interest to pay out dividends rather than invest in negative NPV projects, since the latter reduces firm value in an efficient market.
2. Managers often hold substantial stock in the corporation as well, but the association between stock ownership and dividend policy is at least somewhat ambiguous as managers might have different preferences for dividend income vs capital gains.
3. The linear compensation function is assumed for reasons of tractability.
4. As a check on the robustness of his model, Bhattacharyya developed an alternative version in which output was a function of both managerial quality and effort. He showed that the equilibrium results are determined by managerial quality and not by effort. In accordance with the principle of Occam's Razor, the simplest model, involving agent quality alone, is considered here.
5. b_0 refers to the fixed component of total compensation, but is not equivalent to "salary" as that term is normally used. Salary itself can, and often does, have a variable component in that it is frequently adjusted as a function of managerial performance.
6. The remaining sample of 247 firms were from the following industry groups: 93 firms in Minerals and Petroleum Extraction (SIC codes 1000-1499); 94 in Manufacturing (SIC codes 2000-3999); 34 in Transportation, Communications and Utilities (SIC codes 4000-4991); 17 in Wholesale/Retail (SIC codes 5000-5999); and nine in Hospitality/Services (SIC codes 7000-7999).
7. Performing our analyses without these deletions had no effect on the statistical results presented here.
8. Tobit is appropriate here because this is a "censored sample", i.e. firms that pay no dividends can only have a zero value for ln(1-PAYOUT). In the presence of independent and normally distributed error terms, least squares estimators of the regression coefficients are biased and inconsistent. Tobit overcomes these difficulties (Judge *et al.*, 1985, pp. 779-81) and is commonly used in studies of dividend behaviour (Huang, 2001).

9. LNINCOME also serves as a proxy for size, as it is highly correlated (0.81) with Ln of Total Assets (LTOTASST). The results are qualitatively similar when both LNINCOME and LTOTASST are included as independent variables.

10. These data come from Compustat, which reports funds used to repurchase common and preferred shares as a single item (Compustat data item A115). To isolate repurchases of common shares, the decline in the redemption value of preferred shares (item A56) is used to approximate the cash paid to repurchase preferred shares and is subtracted from the total share repurchases item.

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