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What determines stock option contract design?

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Abstract

This paper analyzes factors driving the design of stock option plans for Finnish firms. We examine determinants of the scope of plans, exercise price, target group, and dividend protection. The scope is found to be negatively related to Tobin's Q and positively related to proxies for monitoring costs. The scope is also greater in broad-based plans, and in plans with dividend protection. Prior stock return is found to be negatively related to the size of the premium (out-of-the-moneyness), whereas dividend protection increases the premium. The results also suggest that investment intensity, cash flow, and monitoring costs are associated with the likelihood of granting premium (out-of-the-money) stock options. Furthermore, the likelihood of granting broad-based plans is increasing in institutional ownership and cash flow constraints, and decreasing in firm size. Broad-based plans are also more likely among firms in growth industries. We find support that the likelihood of dividend protection is decreasing in foreign ownership. In addition, firms paying zero-dividends are less likely to include dividend protection, whereas higher unsystematic risk is associated with a greater likelihood of including dividend protection.

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1. Introduction

Optimal contracting and especially executive stock options have received a great deal of attention in the financial economics literature during the past decades. A large part of the literature is involved in evaluating firms' contracting policies. Theory suggests that it is the principal's ability to observe the agent's actions that determines the form of compensation. If the appropriate actions are known and observable, the optimal incentive contract pays the agent (manager) a fixed salary and penalizes him for suboptimal behavior. However, if managerial actions are at least partly unobservable, tying managerial compensation to productive outcomes (such as firm value) is necessary to induce the manager to behave optimally (Holmström, 1979).

The ability of shareholders to observe and evaluate the actions undertaken by managers is affected by the complexity of managerial tasks. The more complex the decisions required from managers, the more difficult it is for shareholders to monitor these. Consequently, theory suggests that proxies for monitoring cost, such as firm size, asset complexity, and growth opportunities should be related to the amount of equity-based compensation used and to the power of the incentives provided by compensation (see, e.g., Demsetz and Lehn, 1985; Milgrom and Roberts, 1992). This prediction has gained strong support in empirical work.¹ More recently, however, the optimal contracting literature has been questioned by authors who suggest that managerial power and extraction of rents determine the form and design of executive compensation (Bebchuk et al., 2002). Hence, the question regarding the efficiency of executive compensation remains unsolved.

Most existing empirical studies concentrate on the incentive effects provided by equity-based compensation (see, e.g., Yermack, 1995). However, the variation in stock option contract design is rather limited for U.S. firms. For example, Murphy (1999) documents that 95% of the chief executive officer (CEO) stock options of 1000 large U.S. firms in 1992 were granted at-the-money. The fact that most stock options in the U.S. are granted at-the-money stems from tax and accounting considerations.² This excludes

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¹ For example, Baker and Hall (1998) and Himmelberg et al. (1999) document that the value of equity incentives increase at a decreasing rate with firm size. Furthermore, the findings of Smith and Watts (1992), Gaver and Gaver (1993), Mehran (1995), Guay (1999), Himmelberg et al. (1999), and Palia (2001) lend support to a positive relation between growth or investment opportunities and equity incentives.

² In the U.S., in-the-money stock options are not regarded as "performance-based compensation" under Section 162(m) of the Internal Revenue Code, and do not therefore constitute a tax deductible cost, if an executive's total non-performance-based compensation exceeds 1\$ million per year. In addition, stock options that are granted in-the-money have to be included in the income statement, whereas at-the-money and out-of-the-money need not. However, the fact that out-of-the-money stock options are not used remains a puzzle.

variation in the exercise price, and consequently also the possibilities to examine determinants of the exercise price. Theory, however, suggests that both the scope of stock option plans and optimal exercise prices will vary between firms. Finnish firms are not subject to the tax and accounting induced restrictions, and Finnish data thus, offers an excellent research laboratory for studying stock option contract design in greater detail than in prior studies.

This paper concentrates on the two main design attributes of stock options plans. First of all, the scope of the stock option plan, and furthermore, the setting of the exercise price.³ In practice, these two variables are the main considerations that shareholders need to decide on when evaluating and approving compensation proposals. In addition, we examine factors associated with the decision to grant broad-based stock option plans, a phenomenon that has become increasingly popular among firms. Finally, we analyze the determinants of another interesting contract design of stock options, namely, dividend protection. According to Murphy (1999), only 1% of CEO stock options in the U.S. offer dividend protection, an observation attributed to accounting considerations in the U.S. (see, e.g., Fenn and Liang, 2001). In Finland, however, dividend protection has become increasingly popular in the latter part of the 1990s, and hence, creates an excellent opportunity to study determinants of this feature.

We find that the stock option overhang (the fraction of equity obtained upon exercise of all granted stock options) is negatively related to Tobin's Q . Treating Tobin's Q as a measure of firm performance, this would suggest that poorly performing firms grant larger stock option plans. In addition, we find that the scope of stock option plans is increasing in proxies for monitoring costs, consistent with traditional principal-agent theory arguing that greater monitoring cost/difficulty should be positively related to the amount of equity-based compensation used (Holmström, 1979, Demsetz and Lehn, 1985; Milgrom and Roberts, 1992). We also find that the scope of the stock option plan is greater in broad-based stock options plans and in plans with dividend protection.

Furthermore, the results indicate that prior stock return is negatively related to the size of the stock option premium (out-of-the-moneyness). This is expected, since firms (shareholders) are likely to respond to poor prior stock price performance by requiring a higher corresponding stock price appreciation to reward managers. Alternatively, the

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³ Other important contract features of stock option plans are the design of vesting schedules and contract maturity. However, the determinants of stock option vesting schedules and contract maturity have been previously studied by Rosenberg (2002), based on a sample of Finnish firms. The study shows that highly levered firms employ shorter vesting schedules (and vest to maturity ratios), contract maturity is lower in focused firms, and that both vesting schedules and contract maturity tend to be higher in firms involving state ownership.

result suggests that managers have more negotiation power regarding the design of compensation in firms with greater prior stock price performance. The size of the premium is also found to be increasing in dividend protection. This result is plausible, since other things equal; dividend protection increases the expected value of the stock option, thus, reducing the negative effect of the higher premium. Moreover, the results indicate that investment intensity, cash flow, and monitoring costs are associated with the likelihood of granting premium (out-of-the-money) stock options.

The likelihood of granting broad-based stock option plans is found to be increasing in institutional ownership and cash flow constraints, and decreasing in firm size. Broad-based stock option plans are also more likely to be granted among firms in growth industries. Finally, we find support that the likelihood of including dividend protection is decreasing in the degree of foreign ownership. In addition, firms paying zero-dividends are less likely to include dividend protection, whereas higher unsystematic risk is associated with a greater likelihood of including dividend protection.

The paper is organized as follows. Section 2 presents the hypotheses and the research design used in the study. Sample selection and characteristics are discussed in Section 3. Section 4 reports the empirical results, and finally, Section 5 concludes the paper.

2. Hypothesis development and research design

This section discusses the hypothesized relations between firm characteristics and stock option contract design. First, we discuss the expected relations between firm attributes and the scope of stock option plans. Second, we explain the predicted relations between firm attributes and the exercise price of stock options. Finally, we discuss the priors regarding the relation between firm attributes and other stock option contract design features including the target group and dividend protection.

2.1. The scope of stock option plans

To examine determinants of the first of the two main design attributes of stock option plans we estimate the following empirical model:

$$\text{Scope of stock option plan} = f [\text{CEO ownership (+/-)}, \text{ownership concentration (-)}, \text{institutional ownership (+/-)}, \text{state ownership (-)}, \text{firm size (+)}, \text{Tobin's } Q \text{ (+/-)}, \text{investment (+)}, \text{leverage (-)}, \text{profitability (-)}, \text{capital to sales (-)}, \text{focus (-)}, \text{risk (+/-)}]$$

$$\text{prior plan in effect (-), broad-based plan (+), dividend protected plan (+/-), PV/indexed plan (+/-)].} \quad (1)$$

The dependent variable measures the relative size of the stock option plan. We use two different specifications for the scope. First, we use the stock option overhang, measured as the fraction of equity obtained upon exercise of all granted stock options, i.e., as the number of shares exercisable to the sum of shares exercisable and the number of outstanding shares at the date of the grant. Second, we measure the scope of the stock option plan as the total Black and Scholes value divided by the market value of equity at the grant date.⁴ See Appendix A for a detailed description regarding the calculation of the utilized variables.

Under the optimal contracting hypothesis, the firm (the board/compensation committee, and ultimately, shareholders) designs compensation arrangements exclusively for the purpose of alleviating the agency problem between shareholders and managers (see, e.g., Ross, 1973; Holmström, 1979; Grossman and Hart, 1983; Milgrom and Roberts, 1992). Hence, under this approach, we expect a negative relation between CEO ownership and the scope of stock option plans, since direct share ownership may be treated as a substitute for stock option compensation. In contrast, under the managerial rent extraction hypothesis of Bebchuk et al. (2002) a part of the agency problem is that executives use their compensation to provide themselves with rents.⁵ Since CEO ownership measures the direct voting power of the CEO, it is plausible to expect a positive relation between CEO ownership and the scope of stock option plans under the managerial rent extraction hypothesis. Ownership concentration is expected to be negatively related to the scope of stock option plans. This relation is expected based on two arguments. First, if concentrated ownership leads to more efficient monitoring of firm management, then other things equal, this reduces the need for equity-based compensation. Furthermore, ownership concentration is assumed to be inversely related to managerial power, and thus, the extent to which executives may extract benefits in the form of compensation. Institutional ownership is used as a proxy for the existence of professional shareholders. Professional shareholders are expected to have an articulated interest in developing corporate governance mechanisms of the firm, and hence, resulting in a positive relation with regard to the scope of the stock option plan. On the other hand,

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⁴ We calculate the value of stock options using the model of Merton (1973), i.e., modified for dividend payments, for stock options not protected against dividend payments. For stock option grants specifically protected against dividend payments, we employ standard Black and Scholes (1973) methodology.

managerial power is expected to be decreasing in institutional ownership, hence supporting a negative relation. An interesting institutional detail in Finland (unavailable for examination in the U.S.) is state ownership. Political interests causing public attention and pressure arising from state ownership is expected to reduce the degrees of freedom in the design of executive compensation. This also implies that the possibility of managerial rent extraction decreases. Hence, we expect a negative relation between state ownership and the scope of stock option plans.

Firm size is expected to be positively related to the scope of the stock option plan. Jensen and Meckling (1976) argue that large firms are more difficult (costly) to monitor, which would motivate greater equity incentives in large firms. Accordingly, Demsetz and Lehn (1985) hypothesize that the level of managerial equity holdings should be greater in larger firms. Theory and prior empirical evidence suggests that equity-based compensation is positively related to the growth opportunities of the firm. This would suggest a positive relation between the scope of stock option plans and both Tobin's Q and investment intensity. However, several prior studies (see, e.g., Morek et al., 1988) employ Tobin's Q as a measure of firm performance. Hence, one can assume that the expected marginal benefit of equity-based compensation is decreasing in firm performance, and thus, that shareholders of well performing firms are less willing to provide large equity incentives. This results in an expected negative relation for both Tobin's Q and profitability (measured as the ratio of cash flow to assets). We also include a variable measuring financial leverage, and expect a negative relation between financial leverage and the scope of stock option plans. The arguments of Jensen (1986, 1993) imply that the disciplinary role of debt may reduce agency costs, which in turn implies that firms with high financial leverage have a lower need for equity incentives as a control mechanism.⁶ We include the capital to sales ratio and firm focus to measure monitoring complexity, and expect negative relations between both variables and the scope of stock option plans.⁷ In addition, we further decompose the variable measuring

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⁵ Specifically, the amount of rents that an executive extracts is the excess of pay obtained by him over what he would have received under a contract that maximizes shareholder value (Bebchuk et al., 2002).

⁶ Furthermore, John and John (1993) analyze the relation between firms' compensation policies and capital structure, and predict that highly levered firms will provide less equity incentives to motivate optimal managerial risk choices. The intuition of this argument is straightforward, i.e., if managers have strong incentives to increase the value of equity, creditors will demand higher risk premia for providing capital (debt) for the fear that managers will pursue high-risk strategies transferring wealth from creditors to shareholders (asset substitution problem).

⁷ Empirical work has shown that firm diversification destroys value and results in the well-known diversification discount. The dominant part of the explanations for the diversification discount suggests that agency costs can be expected to be higher in diversified firms, which in turn could be explained by the fact that monitoring of the manager's effort is more costly in diversified firms compared to focused firms. See Lamont and Polk (2001) for a review of the causes and consequences of diversification.

firm focus into mature and growth industries, since we expect to find differences in the use of equity incentives between these groups. See Table 2 for details on these classifications.

Firm risk is included to measure monitoring difficulty as a result of noisiness in the firm's operating environment (Demsetz and Lehn, 1985), and the extent to which risk-averse managers can be incentivized via stock- and optionholdings (see, e.g., Himmelberg et al., 1999). Thus, the expected relation between firm risk and the scope of stock option plans is subject to ambiguity. In empirical work, Jin (2002) finds that executive pay becomes less sensitive to performance as unsystematic risk increases, but finds no relation between systematic risk and pay-for-performance. Hence, we also examine whether the type of risk affects the relation by decomposing total firm risk into systematic and unsystematic components.

We also include indicator variables for prior stock option plans in effect and broad-based plans. We expect a smaller scope of stock option plans if a prior plan is in effect. Broad-based plans are expected to have a greater scope, since the target group of the plan is assumed to be larger. Furthermore, we include indicator variables for dividend protected plans and performance-vested/indexed plans to control for the effect of unconventional contract design features. Finally, year indicator variables are included to control for time effects.

2.2. *The exercise price of stock options*

Determinants of the second main design attribute of stock option plans, the setting of the exercise price, are investigated by a similar model as in the case of the scope of stock option plans. The empirical model is as follows:

$$\begin{aligned} \text{Stock option premium} = f [& \text{CEO ownership (-), ownership concentration (+), institutional} \\ & \text{ownership (+), state ownership (+), firm size (+/-), Tobin's } Q \text{ (-), investment (-),} \\ & \text{leverage (-), profitability (-), prior stock return (-), capital to sales (+), focus (+),} \\ & \text{risk (+/-), prior plan in effect (+/-), broad-based plan (+/-), dividend protected plan} \\ & \text{(+), PV/indexed plan (-)}]. \end{aligned} \quad (2)$$

The stock option premium (out-of-the-moneyness) is defined as $[(X-S)/S]$, where X corresponds to the exercise price of the option, and where S is the stock price at the grant date. We use two different specifications of the dependent variable, i.e., i) the first tranche premium, which is calculated as the out-of-the-moneyness of the stock options belonging

to the first tranche in the corresponding stock option plan, and ii) the weighted average stock option premium, which utilizes information of the characteristics of the total stock option plan. The weights used in the calculation correspond to the ratio of the number of shares obtainable upon exercise in each individual stock option tranche divided by the total number of shares obtainable upon exercise of all stock options. See Appendix A for a more detailed description of the procedure utilized to record and calculate the stock option premium.

The dependent variables are similar and have similar interpretations as in equation (1). However, the expected signs for the ownership characteristics based on the managerial rent extraction hypothesis are exactly the opposite from equation (1). Hence, we expect that higher managerial power (higher CEO ownership, and correspondingly, lower ownership concentration, and institutional- and state ownership) is negatively related to the stock option premium. The more power managers enjoy, the more potential benefits they are able to extract on the expense of shareholders.

The logarithm of assets controls for firm size, and has an ambiguous expected impact from a theoretical point of view. Tobin's Q and firm profitability have an expected negative relation with the stock option premium, since we expect that firms (shareholders) with lower profitability (reflected in the stock price) require a greater stock price appreciation to award managers. We expect investment intensity and leverage to be negatively related to the stock option premium. Choe (1999) shows, others things equal, that the optimal exercise price of stock options is decreasing in the riskiness of the firm's desired investment policy and in the degree of financial leverage. More specifically, Choe (1999) argues that higher financial leverage implies lower exercise value of stock options, which requires downward adjustments of the exercise price, if other components of executive compensation are held fixed.⁸ Prior stock return is expected to be negatively related to the stock option premium. Firms (shareholders) are expected to respond to poor prior stock price performance by requiring a higher corresponding stock price appreciation to reward managers. Alternatively, the ability of the manager under the managerial rent extraction hypothesis to negotiate favorable compensation arrangements is expected to be increased following greater stock price appreciation. As previously, the capital to sales ratio, firm focus, and firm risk are used to proxy monitoring difficulty/costs. Yermack (1997) argues that firms may want to award discount stock options with in-the-money exercise prices to achieve a larger pay-for-performance

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⁸ Put it differently, higher leverage encourages managers to take more risks (asset substitution), which needs to be mitigated through lower exercise prices of stock options.

sensitivity than is provided by at-the-money, fair market value stock options. On a share-for-share basis, discount stock options provide higher pay-for-performance sensitivities compared to fair market value stock options (Lambert et al., 1991). Furthermore, this result may be generalized regarding the exercise price of the stock options, i.e., the higher the out-of-the-moneyness of the stock option, the lower the pay-for-performance, other things equal. Consistent with principal-agent theory, we expect that firms with a higher degree of monitoring costs design compensation to provide greater pay-for-performance. Hence, the expected relation between the stock option premium and both the capital to sales ratio and firm focus is positive, whereas the relation between the premium and firm risk is negative. In a similar manner as for the scope of stock option plans in equation (1), we examine whether the premium differs for firms operating in mature and growth industries. As mentioned previously, Jin (2002) documented a negative relation between the level of unsystematic risk and pay-for-performance, but failed to find a significant relation between systematic risk and pay-for-performance. As for the scope of stock option plans in equation (1), we extend the analysis by decomposing total firm risk into systematic and unsystematic components.

Furthermore, we control for the existence of prior stock option plans in effect, broad-based plans, dividend protection, and performance-vested/indexed plans. The first two variables have ambiguous expected relations with the stock option premium. For dividend protected stock options we expect a higher premium, whereas for performance-vested/indexed stock options we expect a lower premium. This is due to the fact that the expected value of the stock option is higher in the case of dividend protection, and lower in the case of performance-vesting/indexing, other things equal. As for the scope of stock option plans, we control for time effects by including year indicator variables.

We extend the analysis of the dynamics of the stock option premium by estimating two categories of discrete decision models. Yermack (1997) argues that if firms really did give great thought to the optimal exercise prices of executive options, one would expect a nontrivial fraction of options to be awarded out-of-the-money. However, the literature shows that these premium options are extremely rare in the U.S., which remains a puzzle. In Finland, data shows that a nontrivial amount of stock options have been awarded with out-of-the-money exercise prices, and hence, the Finnish setting offers an interesting testing laboratory on factors associated with the granting of premium (out-of-the-money) stock options. Hence, in the first category, we construct dependent variables taking the value of one if, i) the first tranche premium is positive, and zero otherwise, and, ii) the weighted average premium is positive, and zero otherwise. Furthermore, to provide

additional insights on the factors driving the award of premium stock options, we include an additional restriction in the construction of the dependent variables. In the second category, we construct dependent variables taking the value of one if, i) the first tranche premium is positive and the stock option plan is targeted solely to the top management of the firm, and zero otherwise, and, ii) the weighted average premium is positive for stock options targeted to top management, and zero otherwise.

2.3. *The target group of stock option plans*

The granting of broad-based stock option plans has become increasingly popular in the recent years. Recent studies suggest that the determinants of stock option plans targeted to top-management differ from the determinants of plans targeted to non-executive employees. For example, Core and Guay (2001) argue that for non-executive employees the incentive alignment motivation for stock options is weaker, since lower-level employees have less influence on the stock price. They showed empirically that firms use greater stock option compensation targeted to non-executive employees when facing capital requirements and financing constraints, and that firms seem to use stock options to attract and retain certain types of employees as well as to create incentives to increase firm value. Furthermore, Ittner et al. (2002) examined the structure and performance consequences of equity grants to employees of new economy firms, and found that the relative importance of a number of factors influencing executive equity granting practices in new economy firms were substantially different from those in old economy firms. To investigate determinants of the target group of stock option plans, we estimate the following model:

$$\begin{aligned} \text{Broad-based plan [1/0]} = f [\text{CEO ownership (+/-), ownership concentration (+/-),} \\ \text{institutional ownership (+/-), state ownership (+/-), firm size (-), Tobin's } Q (+), \\ \text{wages per employee (+/-), leverage (-), zero-dividends (+), free cash flow (-), focus} \\ \text{(+) , risk (+/-), prior plan in effect (+/-), dividend protected plan (+/-), PV/indexed} \\ \text{plan (+/-)}]. \end{aligned} \quad (3)$$

The dependent variable in equation (3) takes the value of one if stock options are targeted to non-executive employees, and zero otherwise. In the majority of broad-based plans in our data, stock options are also granted to executives. Hence, the phenomenon under investigation in equation (3) is, in fact, the additional decision to grant stock options also to non-executive employees besides top management. In line with Core and Guay (2001)

we hypothesize that firms grant stock options to non-executive employees to provide incentives, to attract and retain certain types of employees, and as a substitute for cash compensation. In addition, we control for the variables measuring ownership structure as previously in equations (1) and (2).

We expect that the likelihood of granting broad-based stock option plans is decreasing in firm size, because lower-level employees in large firms are less likely to be able to influence the stock price through their individual actions (Core and Guay, 2001). The expected relation between Tobin's Q and the decision to grant broad-based stock option plans is positive, since the direct monitoring of employees is assumed to be more costly in firms with higher growth opportunities. Since employees, in general, are required to exercise their options at the time of departure from the firm (forcing suboptimal early exercise), firms use options to retain employees (Hale, 1998). Core and Guay (2001) predict that the importance of retaining employees is greatest in firms requiring higher-quality managers and in firms where human capital is a relatively more important factor of production. Furthermore, Core and Qian (2000) predict that lower-level employees receive more stock options at firms where growth opportunities are more strongly related to human capital. To proxy for the degree of human capital in the firm we use wages per employee, and predict that a higher ratio of wages per employee is associated with a greater likelihood of granting broad-based stock option plans. However, stock options may also be used as a substitute for cash compensation, which would imply a negative expected relation between wages per employee and the decision to grant broad-based stock option plans. The expected relation between financial leverage and broad-based stock option plans is negative. Capital structure theories suggest that firms with valuable growth opportunities should choose lower leverage. In empirical work, Smith and Watts (1992) found a negative relation between financial leverage and growth opportunities. We expect that broad-based equity incentives are most likely granted in firms possessing higher growth opportunities, and indirectly, in firms with a lower degree of financial leverage.

We measure the amount of cash available for compensation payments by including an indicator variable for zero-dividends. Yermack (1995) showed that firms with zero-dividends use greater stock option compensation, a result explained by the notion that firms with less cash flow use stock options as a substitute for a lower capacity to pay cash compensation. Furthermore, in line with Ittner et al. (2002) we include the ratio of free cash flow to assets. The expected relation between zero-dividends and the likelihood of granting broad-based stock option plans is positive, whereas the expected relation

between the level of free cash flow and broad-based plans is negative. We predict that the likelihood of granting broad-based stock option plans is greater in focused firms compared to diversified firms. Since equity incentives tie wealth to aggregate firm performance, it is straightforward to assume that the efficiency of tying a lower-level employee's wealth to firm performance is increasing in firm focus. As previously, we decompose the firm focus variable into mature and growth industry classifications, to study whether the tendency to grant broad-based stock option plans is affected by these classifications.

Firm risk is included to measure monitoring difficulty as a result of noisiness in the firm's operating environment (Demsetz and Lehn, 1985), and the extent to which risk-averse managers (and employees) can be incentivized via stock- and optionholdings (see, e.g., Himmelberg et al., 1999). The predicted relation between firm and the decision to grant broad-based stock option plans is ambiguous. As for the previous analyses, total firm risk is also decomposed into systematic and unsystematic components. Finally, we control for prior stock option plans in effect, and the influence of special contract design features, i.e., dividend protection and performance-vesting/indexing.

2.4. *Dividend protection*

Another interesting contract design feature is dividend protection. In dividend protected stock option plans, the exercise prices of stock options are reduced by the amount of the dividend payment per share on the ex-dividend date. According to Murphy (1999), only 1% of CEO stock options in the U.S. offer dividend protection.⁹ In Finland, however, dividend protection has become increasingly popular in the latter part of the 1990s, and hence, creates an excellent opportunity to study determinants of this feature. To accomplish this, we estimate the following model:

$$\begin{aligned} \text{Dividend protected plan [1/0]} = f [& \text{CEO ownership (+/-), ownership concentration (+/-),} \\ & \text{institutional ownership (+/-), state ownership (+/-), foreign ownership (-), firm size} \\ & \text{(+) , Tobin's } Q \text{ (-), leverage (+), zero-dividends (-), free cash flow (+), focus (-), risk} \\ & \text{(-), prior plan in effect (+/-), broad-based plan (+/-), PV/indexed plan (+)}]. \end{aligned} \quad (4)$$

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⁹ Fenn and Liang (2001) argue that the most compelling explanation for the almost complete lack of dividend protection in the U.S. stems from accounting considerations. Dividend protection of stock options is accomplished by adjusting the exercise price for paid dividends. Under current accounting standards in the U.S., such stock options are regarded as variable-plan stock options (performance-based compensation), due to the fact that the exercise price is contingent upon future events. Thus, the cost of these stock options must be recognized in the income statement as a compensation expense.

The dependent variable in equation (4) takes the value of one if the exercise price of stock options is protected against dividend payments, and zero otherwise. Other things equal, dividend payments reduce expected terminal stock prices, and thus, the value of call options that are not dividend protected (Johnson and Tian, 2000). Lambert et al. (1989) and Fenn and Liang (2001) have documented negative relations between dividends and executive stock options in the U.S. In Finland, however, Liljeblom and Pasternack (2002) found a positive relation between dividend distributions and the scope of stock option plans, when stock options are dividend protected. Furthermore, in Finland, dividends are effectively tax-free for domestic investors due to the imputation (*avoir-fiscal*) system.¹⁰ Foreign investors in Finland, however, do not benefit from the imputation system, and depending on the bilateral tax treaty, may have to pay withholding tax on dividend income from Finnish firms. Hence, foreign investors in Finland are expected to prefer capital gains due to share repurchases as opposed to dividends. Liljeblom and Pasternack (2002) find that foreign ownership in Finnish firms is the main determinant for share repurchases, and attribute this finding to tax factors. Furthermore, Karhunen (2002) finds that share repurchase programs in Finnish firms are used more extensively when the level of foreign ownership is high.

Our primary hypothesis is that firms include dividend protection when the need to secure dividend payments is central. Furthermore, we control for the same variables measuring ownership structure as in equations (1) to (3). To examine whether tax incentives associated with foreign ownership in Finnish firms affects the design of stock option compensation, we include a measure of foreign ownership. We hypothesize that a higher level of foreign ownership is associated with a reduced likelihood of dividend protection, since we assume that the need of securing dividend payments is decreasing in the level of foreign ownership. Firms with relatively low marginal financing costs can distribute more cash to shareholders, due to the assumption that raising external funds in the future (due to temporary cash shortfalls) will be relatively inexpensive. Hence, large firms are expected to pay greater dividends than smaller firms, because large firms are expected to have more stable cash flows and posing less information asymmetries implying lower financing costs (Smith and Watts, 1992; Opler and Titman, 1993). As a result, firm size is expected to be positively related to dividend protection. Tobin's Q is expected to be negatively related to dividend protection, due to the well-established assumption that firms with greater growth opportunities will have lower payouts. The

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¹⁰ Specifically, shareholders may deduct taxes paid by the firm, and since the corporate tax rate is the same as the tax rate in personal capital income taxation, the net dividend paid out by the firm is tax-free (for details,

predicted relation between financial leverage and dividend protection is negative, due to the fact that greater financial leverage increases the risk of bankruptcy resulting in higher costs of external financing, and hence, that highly levered firms will optimally have lower payouts.

In line with Yermack (1995) we proxy for liquidity constraints by including an indicator variable for firms with zero-dividends. The predicted relation between zero-dividends and dividend protection is negative. According to Jensen (1986, 1993) agency costs related to overinvestment (empire-building) increase in the level of free cash flow available to the firm. Hence, the expected relation between the level of free cash flow and dividend protection is positive, since firms with a high level of free cash flow derive greater benefits from securing cash distributions to shareholders. We expect that the likelihood of dividend protection is decreasing in firm focus. Agency costs related to overinvestment are expected to be higher in diversified firms compared to focused firms (see, e.g., Lamont and Polk, 2001), and hence, the need of securing dividend payments is assumed to be greater in diversified firms. We also examine whether industry classification (mature or growth) affects the use of dividend protection.

Furthermore, we analyze whether firm risk affects the likelihood of including dividend protection. The expected relation between firm risk and dividend protection is negative. Greenwald and Stiglitz (1990) argue that increased uncertainty about future profitability increases the risk of bankruptcy. This implies that riskier firms may be constrained from external financing which reduces payouts, and hence, that the need of securing dividend payments is reduced. As in the previous analyses, we decompose total firm risk into systematic and unsystematic components. Finally, we control for prior stock option plans in effect, broad-based stock option plans, and performance-vested/indexed stock option plans. The expected relation between the former two variables and the decision to include dividend protection is subject to ambiguity, whereas the predicted relation between performance-vesting/indexing and dividend protection is positive. The positive relation is based on the assumption that since performance-vesting/indexing reduces the expected value of the stock option, other things equal, then firms may try to offset this reduction in expected value by including dividend protection.

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see, e.g., Liljeblom et al., 2001).

3. Sample characteristics

This section specifies the sources of the data used in the paper. Furthermore, sample selection issues are discussed. Finally, a descriptive analysis of the sample is presented.

3.1. Data sources and sample selection

Data on stock option plans are obtained from Alexander Corporate Finance Oy, consisting of complete information on all stock option plans for Finnish firms during the time period 1987 – 2001. The data contain information regarding the introduction date of stock option plans, the target group, vesting periods and contract maturities, exercise prices, number of shares obtainable upon exercise of stock options, and whether stock options are subject to dividend protection and/or performance-vesting/indexing. Firm accounting data are obtained from the Research Institute of the Finnish Economy (ETLA). Firm ownership data are obtained from *Pörssiyhtiöt* manuals and the Finnish Central Securities Depository (FCSD).¹¹ Stock returns, interest rates, and data regarding the number of shares outstanding are obtained from the Swedish School of Economics and Business Administration (SSEBA). Stock prices and dividends are collected from DataStream and the database of SSEBA.

The raw sample covers the time period 1987 – 2001 and consists of all stock option plans introduced in Finland (287 stock option plans).¹² The current study is restricted to firms trading on the main list of the Helsinki Stock Exchange (HEX), with banks and insurance companies excluded from the analysis. The initial sample is created by identifying stock option plans for firms that have appeared on the main list of HEX during the investigation period (the presence of a trading code in the database of SSEBA). Firms may have launched several stock option plans during the same year, and in these cases we include only the firstly launched stock option plan during the year in the analysis. To calculate the total Black and Scholes option value of stock option plans we require a minimum of 60 daily stock returns prior to the grant date, which excludes 47 stock option plans from the analysis. This is caused by the fact that firms may have launched stock option plans during prior listing on other lists than the main list of HEX, or directly in connection with their initial public offering (IPO) to the main list of HEX. Furthermore, to calculate explanatory risk variables we require a minimum of 60 daily

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¹¹ See, e.g., Grinblatt and Keloharju (2001) for details on these data sources.

¹² Lohja Corporation introduced the first public stock option plan in Finland at the end of year 1987.

stock returns prior to the last accounting period end preceding the year when stock option plans were launched, which excludes an additional 13 stock option plans from the analysis. This procedure results in a final sample of 141 stock option plans during the years 1987 – 2001, which represents approximately 49% of the total number of stock option plans introduced in Finland. Table 1 presents the sample selection procedure in the study.

[Insert Table 1 here]

Table 2 presents sample characteristics. Of the 141 stock option plans included in the sample, 106 (75%) were targeted to the top management of the firm, whereas 35 (25%) stock option plans were targeted in addition to the top management also to non-executive employees (broad-based stock option plans). Dividend protection is included in 71 (50%) out of the 141 stock option plans in the study, whereas 70 (50%) stock option plans are not subject to dividend protection. Finally, of the sample stock option plans, 12 (9%) involved performance-vesting/indexing, whereas 129 (91%) stock option plans were traditional plans. In Finland, performance-vesting implies in the majority of cases that exercise of stock options is conditional on whether some accounting-based measure of firm performance is fulfilled (e.g., net profit). Indexing of stock options refers to the policy that the exercise price of stock options is determined relative to, e.g., a peer-group benchmark.

[Insert Table 2 here]

Furthermore, Table 2 shows the timing of stock option plans in the sample (introductions and follow-up plans). As can be seen from Table 2, the majority of stock option plans have been granted in the latter part of the 1990s.¹³

Finally, Table 2 presents the distribution of stock option plans across industries. The industry classifications are obtained from the accounting data by ETLA. The industry is defined by ETLA as the area where at least 60% of annual sales are generated; otherwise the firm is classified as multi-business (diversified). Of the stock option plans in the sample, 30 (21%) were granted by diversified firms. In addition, we split the firms

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¹³ Anecdotic evidence suggests that this phenomenon is driven by factors such as the abolishment of restricting foreign ownership in Finnish publicly traded firms in 1993, joining the European Monetary Union (EMU), accompanied by the introduction of the euro in 1999, and the favorable development of stock market valuations in the late 1990s.

belonging to the focused category into mature and growth industries. The statistics in Table 2 reveal that 72 (51%) stock options plans in the sample were granted by firms in mature industries, whereas 39 (28%) stock options were launched by firms in growth industries.¹⁴

3.2. Descriptive statistics

Table 3 provides a descriptive analysis of the utilized data. Panel A displays descriptive statistics for the full sample (141 stock option plans), Panel B divides the sample into top management stock option plans (106) and broad-based stock option plans (35), whereas Panel C divides the sample into dividend protected stock options plans (71) and stock options plans without dividend protection (70).

[Insert Table 3 here]

In Panel A, the statistics for the scope of stock option plans indicate that the average value for the stock option overhang is 3.2%, and that the average value of the total Black and Scholes value divided by the market value of equity is 1.4%. As mentioned earlier, the stock option overhang measures the fraction of equity ownership that exercise of all stock options would result in. Furthermore, the values of the stock option premium (out-of-the-moneyness) indicate that the stock option plans in the sample have, on average, been granted out-of-the-money. The average value for the first tranche premium is 10.4%, whereas the weighted average premium is 11.2%, on average. The first tranche premium was positive (out-of-the-money) in 69% of the sample stock option plans, zero (at-the-money) in 11% of the sample stock option plans, and negative (in-the-money) in 20% of the sample stock option plans. The corresponding figures for the weighted average premium is 70% (out-of-the-money), 11% (at-the-money), and 19% (in-the-money).¹⁵

Not surprisingly, the figures in Panel B indicate that the scope of stock option plans have, on average, been significantly lower in top management plans compared to broad-based stock option plans. Equality in means is rejected at the 1% level, measured both as the stock option overhang, and the ratio of the total Black and Scholes value to the market value of equity. Furthermore, the average values of the stock option premium tend to be

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¹⁴ The median value of Tobin's Q for diversified firms, mature firms, and growth firms is 1.113, 1.099, and 2.678, respectively.

¹⁵ See Appendix A for details on how we specify the stock option premium.

lower in the case of top management plans compared to broad-based plans. However, these differences are not statistically significant on conventional levels.¹⁶

In Panel C, the statistics indicate that dividend protected stock option plans have on average been greater in scope than stock option plans without dividend protection. The average values of both the stock option overhang and the ratio of the total Black and Scholes value to the market value of equity are significantly (at the 1% level) higher for dividend protected stock option plans. In addition, the stock option premium has also, on average, been larger for dividend protected stock option plans. Equality in means is rejected for the first tranche premium and the weighted average premium at the 5% and 1% levels, respectively. The fact that dividend protected stock options seem to have a larger premium is plausible, since the effect of the larger premium (greater out-of-the-moneyness) is mitigated by dividend protection.

4. Empirical results

This section presents and discusses the empirical results. First, we report and discuss the results regarding the relations between firm characteristics and the scope of stock option plans. Second, we examine the relations between firm attributes and the exercise price of stock options. Finally, we analyze the relations between firm characteristics and contract design features including target group and dividend protection.

4.1. *Firm characteristics and the scope of stock option plans*

Table 4 presents regression results regarding the relations between firm attributes and the scope of stock option plans. Panel A presents regression results where the scope of stock option plans is measured as the stock option overhang, i.e., the fraction of equity obtained upon exercise of all granted stock options. Panel B displays regression results where the scope of the stock option plan is measured as the ratio of the total Black and Scholes value to the market value of the firm's equity. Furthermore, Panel A reports results from four different specifications, where specifications [I] and [II] employ a measure of total firm risk, whereas specifications [III] and [IV] decompose total firm risk into systematic and unsystematic components. Specifications [I] and [III] include an

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¹⁶ A positive relation between the scope of stock option plans and the corresponding premium (out-of-the-moneyness) is plausible, since other things equal, the probability of equity dilution (exercise of stock options) is decreasing in the stock option premium. Hence, firms (shareholders) may trade off a potentially higher degree of equity dilution by demanding a higher stock option premium.

indicator variable for firm focus, whereas specifications [II] and [IV] decompose this indicator variable to separate variables for mature and growth industries.

Panel B reports estimation results for two different specifications, where likewise, the first specification [I] includes a firm focus indicator variable, and where the second specification [II] includes separate variables for mature and growth industries. The specifications in Panel B are analyzed without variables measuring firm risk, since the dependent variable (BS value to MV of equity) incorporates the historical standard deviation of stock returns in its measurement. All estimations are conducted using ordinary least squares (OLS) regressions.

[Insert Table 4 here]

The results reported in Panel A reveal that variables measuring the ownership structure of the firm do not, in general, seem to be associated with the scope (stock option overhang) of stock option plans. The coefficients for Tobin's Q are negative and significant at the 1% level in all four specifications. As mentioned earlier, the predicted relation between Tobin's Q and the scope of stock option plans is ambiguous, dependent on whether one interprets Tobin's Q strictly as a proxy for the degree of growth opportunities, or firm performance. If Tobin's Q proxies firm performance the result is consistent with the argument that poorly performing firms introduce larger stock option plans to enforce incentive-alignment (motivate managers and employees to maximize shareholder value). The coefficient for the capital to sales ratio is negative and significant at the 1% level in specifications [I] through [IV]. Furthermore, the coefficients for total firm risk are positive and significant at the 5% level. These results are in line with predictions from optimal contracting theory, consistent with the argument that firms with a high degree of monitoring difficulty/costs (a low ratio of capital to sales and high variation in expected cash flows) use more equity incentives. Finally, the coefficients for broad-based stock option plans and dividend protection are positive and significant at the 1% level in all specifications.

Panel B of Table 4 reports regression results where the scope of stock option plans is measured as the ratio of the total Black and Scholes value to the market value of equity. In line with expectations, the coefficient for the capital to sales ratio is negative and significant at the 1% level in both specifications. The coefficient for the ratio of long-term debt to assets is positive and significant at the 10% level in specification [I] and at the 5% level in specification [II]. This is in contradiction with the argument that debt serves as a

substitute for equity incentives (Jensen, 1986, 1993), and with the prediction of John and John (1993) that highly levered firms will provide less equity incentives to motivate optimal managerial risk choices. The coefficients for broad-based stock option plans are positive and significant at the 1% level in specifications [I] and [II]. Finally, the coefficient of dividend protection is positive and significant at the 5% level in both specifications.

4.2. *Factors driving the exercise price of stock options*

Table 5 reports regression results for determinants of the stock option premium (out-of-the-moneyness). The table is divided into Panels A and B, where the dependent variable in Panel A is measured as the first tranche premium, and in Panel B as the weighted average premium. The table reports four different specifications in Panels A and B, i.e., the specifications include either a measure of total firm risk (specifications [I] and [II]) or measures of total firm risk decomposed into systematic and unsystematic components (specifications [III] and [IV]). Furthermore, the specifications utilize either an indicator variable for firm focus (specifications [I] and [III]) or decompose this measure into two separate variables for mature and growth industries (specifications [II] and [IV]). Data for prior stock return is missing in four observations. We apply the method utilized by Himmelberg et al. (1999) and Jin (2002) among others, i.e., set missing observations of prior stock return to zero, and include a separate indicator variable that takes the value of one for missing observations, and zero otherwise. All specifications are estimated using OLS regressions.

[Insert Table 5 here]

The results in Table 5 reveal a similar picture as in Table 4, i.e., ownership structure does not seem to be related to the design of stock option plans. In general, the results in Table 5 suggest that very few attributes seem to be related to the stock option premium in a systematic manner. The results suggest that prior stock return is negatively related to the stock option premium, with the coefficients of prior stock return being negative and significant at the 5% level in all specifications, with the exception of specifications [II] and [IV] in Panel A, where the coefficients are significant at the 10% level. This result suggests that firms with greater prior stock returns introduce stock options with less demanding features. We interpret this as a sign of firms using stock options as rewards for good performance, or managers having more negotiation power in firms with greater

prior stock price performance. The coefficients for the cash flow to assets ratio are negative and statistically significant in Panel B (at the 10% level in specifications [I] through [III]). Although not very robust, this result suggests that firms with higher performance set lower exercise prices for stock options. Furthermore, the coefficients for total firm risk are positive and significant at the 10% level in specifications [I] and [II] of Panel B. This relation is in contradiction with our expectations, since if firm risk proxies for monitoring difficulty we should observe that riskier firms introduce stock options with lower premiums, and hence tie compensation more closely to the stock price. Finally, the coefficients for dividend protection are positive and significant throughout the specifications in Panel B. These results are consistent with the priors, since other things equal, dividend protection increases the expected value of the stock option, and hence, reduces the negative effect of the higher premium.

To further elaborate on factors driving exercise prices, we estimate discrete (probit) decision models predicting the launch of premium (out-of-the-money) stock option plans. The results of these analyses are reported in Tables 6 and 7. The dependent variables are constructed on the basis of the (continuous) dependent variables in Table 5, i.e., the first tranche premium and the weighted average premium. Correspondingly, in Table 6 the dependent variable takes the value one if the plan is launched out-of-the-money, and otherwise zero. The dependent variable in Table 7 is constructed with an additional restriction, i.e., taking the value of one if the stock option plan is granted both out-of-the-money and is targeted to the top management of the firm, and zero otherwise. Panel A of Tables 6 and 7 report regression results where the dependent variable is based on the first tranche premium, whereas Panel B of Tables 6 and 7 reports corresponding results where the dependent variable is based on the weighted average premium. Furthermore, the regressions in Table 6 are estimated for a marginally reduced sample, since the dependent variable in four observations lacking data on prior stock return is equal to unity. The regressions are therefore estimated for the reduced sample (137 observations) including complete data on prior stock return. The regressions in Table 7 are estimated for the full sample (141 observations) utilizing the procedure of Himmelberg et al. (1999) and Jin (2002) among others, for dealing with missing data.

[Insert Table 6 here]

Inspection of the results regarding ownership structure in both Panels A and B of Table 6 supports the same conclusion as in the previous analyses (Tables 4 and 5), i.e., ownership

structure does not seem to be related to the design of stock option plans. On the contrary, the coefficients for the investment to capital ratio are negative and statistically significant throughout the specifications. Choe (1999) shows, others things equal, that the optimal exercise price of stock options is decreasing in the riskiness of the firm's desired investment policy. Hence, the obtained result seems to be consistent with this prediction, if one assumes that investment intensity is a proxy for the riskiness of the firm's investment policy. Furthermore, consistent with expectations, the results reveal that the likelihood of granting premium (out-of-the-money) stock options is decreasing in firm profitability (measured as the ratio of cash flow to assets). The coefficients of the cash flow to assets ratio are negative and statistically significant all specifications. Finally, the coefficients of the capital to sales ratio are positive and statistically significant in all specifications reported in Table 6. The capital to sales ratio is used to proxy for monitoring difficulty, and a higher capital to sales ratio is expected to be associated with lower monitoring costs. Hence, lower monitoring costs seem to be associated with a higher likelihood of granting premium stock options which is in line with our expectations, since on a share-for-share basis, the pay-for-performance sensitivity of out-of-the-money stock options is lower than that of corresponding in-the-money or at-the-money stock options (see, e.g., Lambert et al., 1991).

Regression results predicting the launch of premium stock options targeted to top management are reported in Table 7. The dependent variable in Table 7 takes the value of one if the stock option plan is launched out-of-the-money and is targeted to the top management, and zero otherwise.

[Insert Table 7 here]

The results in Table 7 are, in general, similar to the results reported in Table 6. First, the coefficients of the investment to capital ratio are negative and statistically significant throughout the specifications in Table 7, and hence, support the results reported in Table 6. The previously documented negative relation between the likelihood of granting premium stock options and firm profitability is further reassured by the results in Table 7, with all coefficients of cash flow to assets being negative and statistically significant in the reported specifications. Finally, in contradiction with the results presented in Table 6, the results in Table 7 suggest that a higher capital to sales ratio (lower monitoring costs) reduces the likelihood of granting premium stock options to top management.

4.3. *Firm characteristics and the target group of stock option plans*

Table 8 reports estimation results predicting the launch of broad-based stock option plans. The dependent variable in these models takes the value of one if stock options are in addition to top management also targeted to non-executive employees, and zero otherwise. The table reports four different specifications, i.e., the specifications include either a measure of total firm risk (specifications [I] and [II]) or measures of total firm risk decomposed into systematic and unsystematic components (specifications [III] and [IV]). Furthermore, the specifications utilize either a firm focus indicator variable (specifications [I] and [III]) or decompose this measure into two separate variables for mature and growth industries (specifications [II] and [IV]).

[Insert Table 8 here]

The results in Table 8 suggest that institutional ownership increases the likelihood of granting broad-based stock option plans, with the coefficients being positive and significant in all specifications. Although no specific expected relations between ownership structure and the likelihood of granting broad-based stock option plans were provided earlier, we interpret this result as supporting the notion that institutional owners may be more willing to accept (and promote) more sophisticated compensation arrangements in the firm, since institutional investors are expected to have an articulated interest in developing the firm's governance and compensation structure. Furthermore, the results suggest that smaller firms grant broad-based stock options plans, with the coefficients of firm size being negative and significant in all specifications.

The coefficients for Tobin's Q and wages per employee (in specifications [I] and [III]) suggest that the likelihood of granting broad-based stock option plans is greater in firms with high growth opportunities, and in firms with a higher degree of human capital. However, these effects disappear when indicator variables controlling for mature and growth industries are included in specifications [II] and [IV]. In this case, the coefficients of growth industries are positive and significant in both specifications. In line with expectations, the results in Table 8 suggest that the likelihood of granting broad-based stock option plans is increasing in cash flow constraints. The coefficients of the ratio of free cash flow to assets are negative and significant in all specifications.

4.4. *Factors driving the decision to include dividend protection*

Estimation results predicting the launch of stock option plans with dividend protection are reported in Table 9. In these models the dependent variable takes the value of one if stock options (exercise prices) are protected against dividend payments, and zero otherwise. Table 9 includes four different specifications, i.e., specifications utilize either a measure of total firm risk (specifications [I] and [II]) or measures of total firm risk decomposed into systematic and unsystematic components (specifications [III] and [IV]). Furthermore, the specifications include either an indicator variable for focused firms (specifications [I] and [III]) or two separate variables for mature and growth industries (specifications [II] and [IV]). Data on foreign ownership is available from the Finnish Central Securities Depository (FCSD) from October 1993 onwards. However, the dependent variable in 24 observations lacking data on foreign ownership is equal to zero. Hence, the regressions in Table 9 are estimated for the reduced sample (117 observations) including complete data on foreign ownership.

[Insert Table 9 here]

The results in Table 9 provide support to the notion that the degree of foreign ownership reduces the likelihood of including dividend protection in stock option plans. The coefficients for foreign ownership are negative and significant at the 10% level in all specifications. As discussed previously, a potential explanation for this relation is the fact that foreign investors in Finnish firms, in general, prefer share repurchases instead of dividend payments as a form of cash distribution, due to differential tax treatment (see, e.g., Liljeblom and Pasternack, 2002; Karhunen, 2002). Hence, this would suggest that the need of incentives for dividend payments would be reduced in firms characterized by a high degree of foreign ownership. In line with expectations, the coefficients for zero-dividends are negative and significant throughout the specifications. Finally, the coefficients of unsystematic risk are positive and significant in specifications [III] and [IV]. This result is in contradiction with our expectations, due to the assumption that riskier firms are expected to optimally have lower payouts, and hence, a reduced need of securing dividend payments.

5. Summary and conclusions

This paper examines the relations between firm characteristics and the design of stock option plans for Finnish firms. Most existing empirical studies concentrate on the incentive effects provided by equity-based compensation (see, e.g., Yermack, 1995). Nonetheless, the variation in contract design is rather limited for U.S. firms, especially in setting exercise prices, caused by tax and accounting considerations (Murphy, 1999). However, Finnish firms are not subject to the tax and accounting induced restrictions in the design of stock option plans, and hence, this paper extends the literature in the following ways. We examine determinants of the two main design attributes of stock option plans. First of all, the scope of stock option plans, and furthermore, the setting of exercise prices. In practice, these two variables are the main considerations that shareholders need to decide on when evaluating and approving compensation proposals. To our knowledge this paper is the first to provide a rigorous analysis of the factors determining the exercise price of stock options.

In addition, we study determinants of other contract features such as the target group of stock option plans and dividend protection. Only a few studies have to date been conducted on the increasingly popular policy of granting stock options also to non-executive employees (see, e.g., Core and Guay, 2001; Ittner et al., 2002). Furthermore, according to Murphy (1999), only 1% of CEO stock options in the U.S. offer dividend protection, an observation attributed to accounting considerations in the U.S. In Finland, however, dividend protection has become increasingly popular in the latter part of the 1990s, and hence, creates an excellent opportunity to study determinants of this feature. The empirical results of the paper reveal the following.

First, the stock option overhang (the fraction of equity obtained upon exercise of all granted stock options) is found to be inversely related to Tobin's Q . Several prior studies employ Tobin's Q as a measure of firm performance (see, e.g., Morck et al., 1988). If one treats Tobin's Q strictly as a measure of firm performance, then this result suggests that poorly performing firms grant larger stock option plans. Furthermore, we find that the scope of stock option plans is decreasing in the capital to sales ratio of the firm, and increasing in firm risk. These results are consistent with traditional principal-agent theory arguing that greater monitoring costs/difficulty should be positively related to the amount of equity-based compensation used (Holmström, 1979; Demsetz and Lehn, 1985; Milgrom and Roberts, 1992). We also find that the target group affects the scope of stock option plans, i.e., broad-based plans are found to be larger in scope than those targeted

solely to top management. In addition, dividend protected stock option plans tend to be greater in scope, compared to stock option plans without this feature.

Second, the results suggest that prior stock return is negatively related to the size of the stock option premium (out-of-the-moneyness). This result is consistent with expectations, since firms (shareholders) are expected to respond to poor prior stock price performance by requiring a higher corresponding stock price appreciation to reward managers. Alternatively, the result suggests that managers have more negotiation power regarding the design of compensation in firms with greater prior stock price performance. Moreover, dividend protection is found to be positively related to the size of the stock option premium. This result is expected, since other things equal, dividend protection increases the expected value of the stock option, and hence, mitigates the negative effect of the higher premium.

Third, the results indicate that the likelihood of granting premium (out-of-the-money) stock options is decreasing in the investment to capital ratio and the ratio of cash flow to assets. These results are robust to whether premium stock options are targeted to top management and non-executive employees, or solely to top management. The results also reveal that the likelihood of granting premium stock options is increasing in the capital to sales ratio. However, the relation turns from positive to negative when premium stock options are targeted solely to top management.

Regarding the target group of stock option plans, the results reveal that the likelihood of granting broad-based stock option plans is increasing in institutional ownership and cash flow constraints, and decreasing in firm size. Moreover, broad-based stock option plans are more likely to be granted among firms in growth industries. Finally, we find support that the likelihood of including dividend protection is decreasing in the degree of foreign ownership. In addition, firms paying zero-dividends are less likely to include dividend protection, whereas higher unsystematic risk is associated with a greater likelihood of including dividend protection.

Appendix A

This section describes the definitions and calculation of the employed variables. Stock option data are obtained from Alexander Corporate Finance Oy (ACF). Furthermore, we hand collect press releases regarding the decisions of stock option plans (in the majority of cases made at the firm's annual general meeting) to enable the exact specification of, e.g., the stock option premium at the date of grant. If press releases are not available, we double-check the details of stock option plans from information disclosed in firms' annual financial statements. Data regarding firm variables are obtained from the Research Institute of the Finnish Economy (ETLA). Ownership data are obtained from *Pörssitieto* manuals and the Finnish Central Securities Depository (FCSD). Stock returns, interest rates, and data regarding the number of shares outstanding are obtained from the Swedish School of Economics and Business Administration (SSEBA). Stock prices and dividends are collected from DataStream and the database of SSEBA.

A.1. Stock option contract design

Stock option overhang: measured as the fraction of equity obtained upon exercise of all granted stock options, i.e., as the number of shares exercisable to the sum of shares exercisable and the number of outstanding shares at the date of the grant.

Black and Scholes value of option plan to market value of equity: we calculate the total value of stock options using the model of Merton (1973), i.e., modified for dividend payments, for stock options not protected against dividend payments. For stock options specifically protected against dividend payments, we employ standard Black and Scholes (1973) methodology. For convenience, we describe the utilized methodology solely based on Merton (1973) dividend adjustment.

Call option value:

$$C = Se^{-dT} N(d_1) - Xe^{-rT} N(d_1 - \sigma\sqrt{T}), \quad (\text{A.1})$$

where $N(x)$ is the cumulative probability function for the normal distribution, and where d_1 is defined as:

$$d_1 = \frac{\ln(S/X) + (r - d + \sigma^2/2)T}{\sigma\sqrt{T}}, \quad (\text{A.2})$$

with the parameters:

S = stock price at the date of grant.

X = exercise price of the option.

r = $\ln(1 + \text{risk-free interest rate})$. We employ the 3-month Helsinki Interbank Offered Rate (HELIBOR)/European Interbank Offered Rate (EURIBOR) at the date of grant.

d = $\ln(1 + \text{expected dividend yield})$. We use the actual annual dividend yield as a proxy for the expected dividend yield over the life of the option.

σ = corresponds to the annualized standard deviation of daily stock returns calculated over the previous 250 trading days prior to the grant date. We require a minimum of 60 daily observations to calculate the annualized standard deviation.

T = remaining time to maturity of the option, measured in years, at the grant date.

The total value of stock options granted is calculated as the option value in individual stock option tranches (with corresponding parameters) multiplied by the number of shares obtainable upon exercise of the options in the tranche. The total value of stock options granted to the market value of equity is obtained by summing the total option values in all tranches comprising the stock option plan, and dividing this value by the market value of equity at the date of the grant. To calculate the market value of equity at the date of grant we utilize information regarding the number of shares outstanding and the stock price at the corresponding date (taking into account the existence of multiple stock series).

Stock option premium: to calculate the premium (out-of-the-moneyness) of stock options at the date of grant we apply the following procedure:

1. If the exact exercise price of stock options can be specified at the grant date, then this value is recorded. This is the case in the majority of stock option plans in the study.
2. If the exercise price is defined as a forward average exercise price, e.g., assuming that the grant date is April 1, 2000 and the exercise price is determined as the volume weighted average stock price (VWAP) during the time period March 15 – April 15, 2000, then the stock option is assumed to be granted at-the-money (ATM).

3. If the exercise price of the option cannot be determined with certainty at the date of grant (forward average exercise price), but a certain premium (fixed or percentage) is set, then the option is assumed to be granted with an exercise price equal to ATM + premium.
4. If the exercise price of the option cannot be determined with certainty at the date of grant, but a certain minimum exercise price is specified, then the option is assumed to be granted with the minimum exercise price. This is the case in a number of performance-vested/indexed stock options plans.

First tranche premium: calculated as $[(X-S)/S]$, where X is the exercise price of the stock options belonging to the first tranche of the stock option plan, and where S is the stock price at the date of grant.

Weighted average premium: calculated as the weighted average premium $[(X-S)/S]$, where X is the exercise price of the stock options belonging to an individual tranche of the stock option plan, and where S is the stock price at the date of grant. The weights used in the calculation correspond to the ratio of the number of shares obtainable upon exercise in each individual stock option tranche divided by the total number of shares obtainable upon exercise of all stock options.

A.2. Ownership variables

CEO ownership: measured as the fraction of shares held by the CEO of the firm. *Pörssitieto* only records the twenty largest shareholders of the firm, and hence, this variable takes the value of zero if the CEO is not among this group of shareholders.

Ownership concentration: calculated as the fraction of shares held by the three largest shareholders. To filter out the effect of state ownership, ownership concentration is calculated excluding state ownership. For example, if the Finnish State is the second largest shareholder of the firm, then ownership concentration is calculated as the fraction of shares held by the first, third, and fourth largest shareholder of the firm.

Institutional ownership: measured as an indicator variable taking the value of one if a financial institution is among the three largest shareholders, and zero otherwise.

State ownership: measured as an indicator variable taking the value of one if the Finnish State is among the three largest shareholders, and zero otherwise.

Foreign ownership: measured as the fraction of shares held by foreign investors at the end of the firm's accounting period. Data on firm-specific foreign ownership have been available on a monthly basis from the FCSO from October 1993 onwards.

A.3. Firm variables

Firm size: measured as the logarithm of the book value of assets.

Tobin's Q: calculated as the sum of market value of equity and book value of total debt, divided by the book value of assets. Market values of equity (annual) are obtained from *KOP Pörssiyhtiöt* manuals and *Kauppalähti* databases.

Investment to capital: measured as gross investment in fixed assets during the accounting period divided by fixed assets (book value of gross plant, property, and equipment).

Long-term debt to assets: measured as the book value of long-term debt divided by the book value of assets.

Cash flow to assets: measured as the ratio of EBITDA to book value of assets.

Free cash flow to assets: measured as the ratio of EBITDA less gross investment and total dividends to book value of assets.

Prior stock return: calculated as the 6-month (125 trading days) logarithmic stock return preceding the end of the accounting period during the year before the launch of stock option plans.

Capital to sales: measured as the ratio of fixed assets (book value of gross plant, property, and equipment) to sales.

Wages per employee: measured as the ratio of total labor costs during the firm's accounting period divided by the average number of employees during the corresponding period.

Firm focus: Firm-year observations are categorized as diversified or focused by analyzing the distribution of annual sales. The employed accounting data provided by ETLA specifies the firm's industry as the area where a minimum of 60% of sales is generated; otherwise the firm is categorized as multi-business. Hence, firm focus is measured as an indicator variable taking the value of one if at least 60% of its annual sales are generated in a single segment, and zero otherwise.

Total risk: calculated as the variance of daily stock returns during the firm's accounting period. The stock returns are total firm stock returns, and a minimum requirement of 60 daily stock returns is chosen as the restriction for inclusion of annual firm observations.

Systematic risk: estimated by a year-to-year market model regression based on daily stock returns, and calculated as the corresponding beta-squared multiplied by the variance of daily market index returns. The market index corresponds to the Helsinki Stock Exchange (HEX) Portfolio total return index. This index is a value-weighted index where all firms traded on the main list of HEX are represented. However, the weight of any individual firm is limited to 10%, thus eliminating the dominance of a few extremely large firms traded on HEX (e.g., Nokia). This index is, however, only available from 1991 onwards. The market index employed during the years 1986 – 1990 corresponds to the WI-index calculated at the Swedish School of Economics and Business Administration. Knif (1988) argues that the WI-index describes the Finnish market portfolio and is well suited for the estimation of beta coefficients. Furthermore, the dominating effect of a few abnormally large Finnish firms traded on the main of list of HEX has only been a problem in the latter part of the 1990s.

Unsystematic risk: calculated as the residual variance from a year-to-year market model regression based on daily stock returns.

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Table 1
Sample selection

The raw sample covers the time period 1987 – 2001 and consists of all stock option plans introduced in Finland (287 stock option plans). The current study is restricted to firms trading on the main list of the Helsinki Stock Exchange (HEX), with banks and insurance companies excluded from the analysis. Firms may have launched several stock option plans during the same year, and in these cases we include only the firstly launched stock option plan during the year in the analysis. The sample selection procedure results in a final sample of 141 stock option plans during the years 1987 – 2001, which represents approximately 49% of the total number of stock option plans introduced in Finland.

Sample selection	
Total number of stock option plans in Finland [1987 - 2001]	287
Firms appearing on HEX main list during the sample period [SSEBA-HEX code available]	226
Firms that have not appeared on HEX main list during the sample period [I- or NM-lists: no SSEBA-HEX code available]	61
Total	287
Initial sample 1	226
Banks or insurance companies [HEX main list]	17
Multiple grants during year [HEX main list]	8
Initial sample 2	201
Lack of stock return history [a minimum of 60 daily observations from grant date backwards] for Black and Scholes option valuation	47
- Firms may have launched stock option plans during listing on other lists than HEX main list (years before listing on HEX main list) or directly in connection with IPO to HEX main list	
Initial sample 3	154
Lack of stock return history [a minimum of 60 daily observations backwards from the last accounting period end before grant date] for explanatory risk variables	13
Final sample [number of stock option plans]	141
Percentage of all stock option plans in Finland [1987 - 2001]	49 %

Table 2
Sample characteristics

The sample covers the time period 1987 – 2001 and consists of stock option plans launched by firms traded on the main list of the Helsinki Stock Exchange (HEX). Panel A. [1] displays the distribution of the target group of stock option plans. Stock option plans are defined as targeted to top management, if stock options are targeted solely to the top management of the firm. If stock options are targeted also to non-executive employees, the stock option plan is defined as broad-based. Panel A. [2] presents the distribution of dividend protection in connection with stock option plans. In dividend protected stock option plans exercise prices are adjusted (reduced) on the ex-dividend date for the amount of dividend payments per share. Panel A. [3] shows the distribution of performance-vested/indexed stock option plans in the sample. A stock option plan is defined as performance-vested/indexed, if the exercise of stock options is conditional on whether some accounting-based measure of firm performance is fulfilled (e.g., net profit), and/or whether the exercise price is determined relative to, e.g., a peer-group benchmark.

Panel A. Plan characteristics					
A. [1] Target group		A. [2] Dividend protection		A. [3] Performance-vesting/indexing	
Top management plans	106 75 %	Included	71 50 %	Included	12 9 %
Broad-based plans	35 25 %	Not included	70 50 %	Not included	129 91 %
Total	141	Total	141	Total	141
Panel B. Timing of stock option plans					
B. [1] Introductions		B. [2] Follow-up contracts		B. [3] New stock option plans	
1987	1	1987	0	1987	1
1988	2	1988	0	1988	2
1989	3	1989	2	1989	5
1990	1	1990	1	1990	2
1991	0	1991	2	1991	2
1992	1	1992	0	1992	1
1993	4	1993	1	1993	5
1994	12	1994	2	1994	14
1995	2	1995	2	1995	4
1996	2	1996	4	1996	6
1997	5	1997	11	1997	16
1998	7	1998	15	1998	22
1999	3	1999	11	1999	14
2000	6	2000	21	2000	27
2001	1	2001	19	2001	20
Total	50		91		141
Panel C. Industry distribution					
Chemical and plastic [M]	9 6 %	Foods [M]	10 7 %	Retail [M]	3 2 %
Construction [M]	5 4 %	Forest [M]	8 6 %	Services [M]	1 1 %
Diversified [D]	30 21 %	Information technology [G]	13 9 %	Telecommunications [G]	3 2 %
Electricity and electronical equipment [G]	7 5 %	Investment [G]	5 4 %	Textile [M]	3 2 %
Electronical equipment [G]	7 5 %	Media [G]	4 3 %	Transportation [M]	6 4 %
Energy [M]	1 1 %	Metal [M]	20 14 %	Wholesale [M]	6 4 %
Diversified [D]	30	21 %			
Mature industry [M]	72	51 %			
Growth industry [G]	39	28 %			
Total	141	100 %			

Table 3
Descriptive statistics

The sample covers the time period 1987 – 2001, and consists of firms traded on the main list of the Helsinki Stock Exchange (HEX). Panel A presents summary statistics for the full sample, Panel B divides the sample into top management stock option plans and broad-based stock option plans, whereas Panel C divides that sample into dividend protected stock option plans and plans without dividend protection. Stock option overhang is calculated as the total number of shares exercisable induced by the stock option plan divided by the sum of the total number of shares exercisable and the number of shares outstanding at the grant date. Stock options are valued using the Black and Scholes (1973) methodology adjusted for dividend payments as in Merton (1973). Stock options specifically protected against dividend payments are valued using standard Black and Scholes methodology. The stock option premium (out-of-the-moneyness) is defined as $[(X-S)/S]$, where X corresponds to the exercise price of the option, and where S is the stock price at the grant date. The first tranche stock option premium is calculated as the out-of-the-moneyness of the stock options belonging to the first tranche in the stock option plan. The weighted average stock option premium utilizes information of the characteristics of the total stock option plan. The weights used in the calculation correspond to the ratio of the number of shares obtainable upon exercise in each individual stock option tranche divided by the total number of shares obtainable upon exercise of all stock options. Data on foreign ownership is available from the Finnish Central Securities Depository (FCSD) only from October 1993 onwards, due to this; data on foreign ownership is missing in 24 observations. Complete data on prior stock return is missing in four observations. A t -test (assuming unequal variances) is used to investigate equality in means in Panels B and C. The significance levels 1%, 5%, and 10% are denoted with ***, **, and *, respectively. All risk measures are multiplied by 100. See Appendix A for variable definitions.

Variable	Mean	Median	Std. Dev.	1st Quart.	3rd Quart.	Minimum	Maximum
Panel A.							
Number of observations [141]							
Stock option plan characteristics							
Stock option overhang [shares exercisable/(shares exercisable+shares outstanding)]	0.032	0.026	0.023	0.017	0.045	0.001	0.108
Total Black and Scholes value of option plan [€]	45 389 440	3 024 407	278 188 950	1 346 701	8 726 311	3 315	2 958 373 675
Total Black and Scholes value of option plan to market value of equity	0.014	0.009	0.014	0.004	0.019	0.000	0.081
First tranche premium $[(X-S)/S]$	0.104	0.064	0.172	0.000	0.180	-0.251	0.869
Weighted average premium $[(X-S)/S]$	0.112	0.078	0.178	0.000	0.189	-0.251	0.869
Ownership variables							
CEO ownership	0.011	0.000	0.053	0.000	0.000	0.000	0.440
Ownership concentration	0.316	0.286	0.172	0.172	0.433	0.018	0.799
Institutional ownership [1/0]	0.887						
State ownership [1/0]	0.142						
Foreign ownership [117 observations]	0.272	0.207	0.235	0.069	0.448	0.001	0.960
Firm characteristics							
Total assets [€000]	1 725 771	586 471	3 526 308	135 559	1 396 000	20 014	21 322 865
Tobin's Q	2.335	1.202	3.679	0.997	1.973	0.715	30.928
Investment to capital	0.274	0.214	0.201	0.128	0.369	0.019	1.011
Long-term debt to assets	0.224	0.220	0.144	0.099	0.332	0.001	0.647
Wages per employee	0.207	0.204	0.069	0.161	0.248	0.053	0.446
Zero-dividends [1/0]	0.142						
Cash flow to assets	0.144	0.126	0.085	0.095	0.170	-0.059	0.462
Free cash flow to assets	0.002	0.017	0.127	-0.030	0.067	-0.804	0.300
Prior stock return [137 observations]	0.066	0.057	0.304	-0.120	0.266	-0.818	1.127
Capital to sales	0.877	0.433	2.017	0.252	0.682	0.057	13.577
Firm focus [1/0]	0.787						
Mature industry [1/0]	0.511						
Growth industry [1/0]	0.277						
Total risk	0.077	0.056	0.069	0.038	0.094	0.013	0.479
Systematic risk	0.014	0.006	0.025	0.002	0.015	0.000	0.157
Unsystematic risk	0.063	0.048	0.051	0.031	0.078	0.012	0.331
Number of firms	75						

(continues)

Table 3 (continued)

Variable	Mean	Median	Std. Dev.	Minimum	Maximum	Mean	Median	Std. Dev.	Minimum	Maximum	
Panel B.	Top management plans [106 observations]					Broad-based plans [35 observations]					<i>t</i> -value [equal means]
Stock option plan characteristics											
Stock option overhang [shares exercisable/(shares exercisable+shares outstanding)]	0.026	0.022	0.018	0.001	0.094	0.053	0.054	0.026	0.013	0.108	(-5.75)***
Total Black and Scholes value of option plan [€]	45 511 597	2 900 000	304 318 295	3 315	2 958 373 675	45 019 478	4 376 760	180 722 070	34 123	1 066 736 615	(0.01)
Total Black and Scholes value of option plan to market value of equity	0.010	0.007	0.011	0.000	0.081	0.026	0.027	0.015	0.001	0.060	(-5.59)***
First tranche premium [(<i>X</i> - <i>S</i>)/ <i>S</i>]	0.088	0.058	0.154	-0.251	0.569	0.152	0.120	0.214	-0.238	0.869	(-1.65)
Weighted average premium [(<i>X</i> - <i>S</i>)/ <i>S</i>]	0.096	0.065	0.157	-0.251	0.569	0.160	0.140	0.225	-0.238	0.869	(-1.56)
Ownership variables											
CEO ownership	0.008	0.000	0.042	0.000	0.341	0.021	0.000	0.077	0.000	0.440	(-0.90)
Ownership concentration	0.303	0.280	0.159	0.020	0.759	0.353	0.315	0.203	0.018	0.799	(-1.32)
Institutional ownership [1/0]	0.887					0.886					
State ownership [1/0]	0.160					0.086					
Foreign ownership [83/34 observations]	0.286	0.207	0.251	0.001	0.960	0.237	0.179	0.188	0.001	0.656	(1.15)
Firm characteristics											
Total assets [€000]	2 173 927	822 103	3 953 077	20 014	21 322 865	368 495	144 642	648 433	26 742	3 608 977	(4.52)***
Tobin's <i>Q</i>	1.613	1.135	1.586	0.715	11.855	4.519	1.853	6.438	0.823	30.928	(-2.64)**
Investment to capital	0.239	0.199	0.160	0.019	0.816	0.378	0.340	0.267	0.035	1.011	(-2.90)***
Long-term debt to assets	0.241	0.252	0.142	0.003	0.647	0.173	0.150	0.138	0.001	0.502	(2.51)**
Wages per employee	0.193	0.198	0.061	0.053	0.329	0.248	0.234	0.077	0.109	0.446	(-3.85)***
Zero-dividends [1/0]	0.132					0.171					
Cash flow to assets	0.137	0.124	0.075	-0.042	0.462	0.165	0.158	0.109	-0.059	0.458	(-1.42)
Free cash flow to assets	0.014	0.019	0.085	-0.354	0.211	-0.035	0.016	0.205	-0.804	0.300	(1.38)
Prior stock return [105/32 observations]	0.052	0.057	0.254	-0.778	0.548	0.111	0.057	0.432	-0.818	1.127	(-0.74)
Capital to sales	0.587	0.442	0.670	0.081	6.424	1.756	0.326	3.783	0.057	13.577	(-1.82)*
Firm focus [1/0]	0.736					0.943					
Mature industry [1/0]	0.585					0.286					
Growth industry [1/0]	0.151					0.657					
Total risk	0.068	0.052	0.059	0.013	0.391	0.104	0.088	0.088	0.023	0.479	(-2.26)**
Systematic risk	0.012	0.005	0.020	0.000	0.118	0.021	0.007	0.036	0.000	0.157	(-1.34)
Unsystematic risk	0.056	0.040	0.046	0.012	0.276	0.083	0.074	0.060	0.016	0.331	(-2.45)**
Number of firms	57					25					

(continues)

Table 3 (continued)

Variable	Mean	Median	Std. Dev.	Minimum	Maximum	Mean	Median	Std. Dev.	Minimum	Maximum	
Panel C.	Dividend protection [71 observations]					No dividend protection [70 observations]					<i>t</i> -value [equal means]
Stock option plan characteristics											
Stock option overhang [shares exercisable/(shares exercisable+shares outstanding)]	0.042	0.034	0.023	0.007	0.108	0.023	0.019	0.018	0.001	0.094	(5.35)***
Total Black and Scholes value of option plan [€]	51 839 309	4 474 276	350 376 208	600 624	2 958 373 675	38 847 430	2 036 485	179 979 035	3 315	1 076 885 399	(0.28)
Total Black and Scholes value of option plan to market value of equity	0.019	0.016	0.015	0.001	0.081	0.009	0.005	0.010	0.000	0.048	(5.18)***
First tranche premium [(<i>X</i> - <i>S</i>)/ <i>S</i>]	0.136	0.100	0.182	-0.238	0.869	0.071	0.046	0.156	-0.251	0.569	(2.30)**
Weighted average premium [(<i>X</i> - <i>S</i>)/ <i>S</i>]	0.151	0.124	0.195	-0.238	0.869	0.073	0.050	0.149	-0.251	0.569	(2.69)***
Ownership variables											
CEO ownership	0.015	0.000	0.066	0.000	0.440	0.008	0.000	0.035	0.000	0.264	(0.79)
Ownership concentration	0.303	0.272	0.166	0.020	0.752	0.329	0.324	0.178	0.018	0.799	(-0.91)
Institutional ownership [1/0]	0.817					0.957					
State ownership [1/0]	0.141					0.143					
Foreign ownership [71/46 observations]	0.232	0.158	0.213	0.010	0.960	0.333	0.295	0.255	0.001	0.819	(-2.23)**
Firm characteristics											
Total assets [€000]	1 393 157	613 213	3 174 319	20 014	19 890 072	2 063 136	568 055	3 844 279	22 958	21 322 865	(-1.13)
Tobin's <i>Q</i>	2.362	1.320	3.196	0.715	22.770	2.307	1.148	4.136	0.719	30.928	(0.09)
Investment to capital	0.269	0.203	0.192	0.019	0.873	0.279	0.218	0.210	0.035	1.011	(-0.29)
Long-term debt to assets	0.205	0.181	0.137	0.012	0.647	0.244	0.282	0.148	0.001	0.549	(-1.64)
Wages per employee	0.219	0.212	0.060	0.067	0.375	0.194	0.184	0.076	0.053	0.446	(2.19)**
Zero-dividends [1/0]	0.070					0.214					
Cash flow to assets	0.161	0.139	0.088	0.025	0.462	0.127	0.113	0.079	-0.059	0.458	(2.47)**
Free cash flow to assets	0.002	0.017	0.144	-0.804	0.232	0.001	0.019	0.108	-0.413	0.300	(0.02)
Prior stock return [68/69 observations]	-0.009	0.007	0.298	-0.818	0.751	0.139	0.194	0.295	-0.470	1.127	(-2.91)***
Capital to sales	0.927	0.433	2.255	0.057	13.577	0.826	0.435	1.758	0.134	11.227	(0.30)
Firm focus [1/0]	0.845					0.729					
Mature industry [1/0]	0.549					0.471					
Growth industry [1/0]	0.296					0.257					
Total risk	0.079	0.055	0.070	0.013	0.391	0.075	0.057	0.068	0.014	0.479	(0.42)
Systematic risk	0.013	0.005	0.023	0.000	0.118	0.016	0.008	0.027	0.000	0.157	(-0.59)
Unsystematic risk	0.066	0.050	0.054	0.013	0.276	0.059	0.042	0.048	0.012	0.331	(0.85)
Number of firms	54					40					

Table 4
Determinants of the scope of stock option plans

The stock option overhang in Panel A is measured as the fraction of equity obtained upon exercise of all granted stock options, i.e., as the number of shares exercisable to the sum of shares exercisable and the number of outstanding shares at the date of the grant. In Panel B the scope of the stock option plan is calculated as the total Black and Scholes value divided by the market value of equity at the grant date. The independent variables are measured at the end of the previous year. A full set of year dummies is included in all specifications (not reported). All risk measures are multiplied by 100. See Appendix A for variable definitions. Estimation is conducted utilizing OLS. The *t*-statistics (reported beneath each regression coefficient) are calculated using robust standard errors. The significance levels 1%, 5%, and 10% are denoted with ***, **, and *, respectively.

Independent variables	Dependent variable					
	Panel A. Stock option overhang				Panel B. BS value to MV of equity	
	[I]	[II]	[III]	[IV]	[I]	[II]
CEO ownership	0.025* (1.73)	0.025* (1.72)	0.022 (1.47)	0.022 (1.46)	0.004 (0.44)	0.006 (0.59)
Ownership concentration	0.003 (0.27)	0.003 (0.27)	0.003 (0.26)	0.003 (0.26)	-0.001 (-0.14)	-0.001 (-0.11)
Institutional ownership [1/0]	0.002 (0.36)	0.003 (0.35)	0.003 (0.42)	0.003 (0.42)	-0.004 (-0.83)	-0.003 (-0.63)
State ownership [1/0]	-0.007 (-1.35)	-0.007 (-1.36)	-0.007 (-1.37)	-0.007 (-1.38)	-0.004 (-1.56)	-0.004 (-1.53)
Firm size	-0.002* (-1.66)	-0.002 (-1.63)	-0.002* (-1.74)	-0.002* (-1.73)	-0.001 (-0.96)	-0.001 (-0.91)
Tobin's <i>Q</i>	-0.003*** (-3.82)	-0.003*** (-3.76)	-0.003*** (-3.72)	-0.003*** (-3.77)	-0.001 (-1.51)	-0.001 (-1.63)
Investment to capital	0.017 (1.36)	0.017 (1.37)	0.016 (1.26)	0.016 (1.27)	0.017* (1.67)	0.014 (1.52)
Long-term debt to assets	0.016 (1.17)	0.016 (1.11)	0.018 (1.25)	0.018 (1.21)	0.014* (1.82)	0.016** (2.13)
Cash flow to assets	0.030 (1.08)	0.029 (1.03)	0.026 (0.95)	0.026 (0.91)	-0.003 (-0.21)	-0.005 (-0.39)
Capital to sales	-0.003*** (-3.68)	-0.003*** (-3.37)	-0.003*** (-3.64)	-0.003*** (-3.35)	-0.002*** (-5.11)	-0.003*** (-4.81)
Firm focus [1/0]	-0.003 (-0.67)		-0.003 (-0.65)		-0.003 (-1.27)	
Mature industry [1/0]		-0.003 (-0.68)		-0.003 (-0.66)		-0.003 (-1.60)
Growth industry [1/0]		-0.002 (-0.33)		-0.002 (-0.30)		0.001 (0.36)
Total risk	0.081** (2.23)	0.081** (2.18)				
Systematic risk			0.155 (1.21)	0.155 (1.21)		
Unsystematic risk			0.054 (1.01)	0.053 (1.01)		
Prior plan in effect [1/0]	-0.002 (-0.47)	-0.002 (-0.46)	-0.001 (-0.39)	-0.001 (-0.39)	-0.002 (-1.27)	-0.002 (-1.23)
Broad-based plan [1/0]	0.025*** (5.37)	0.024*** (5.07)	0.025*** (5.45)	0.025*** (5.12)	0.014*** (5.27)	0.013*** (4.57)
Dividend protected plan [1/0]	0.011*** (2.86)	0.011*** (2.88)	0.012*** (2.87)	0.012*** (2.90)	0.005** (2.12)	0.005** (2.26)
PV/indexed plan [1/0]	-0.0004 (-0.09)	-0.0004 (-0.09)	-0.0004 (-0.08)	-0.0004 (-0.08)	-0.001 (-0.55)	-0.001 (-0.55)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.488	0.483	0.486	0.481	0.462	0.468
Number of observations	141	141	141	141	141	141

Table 5
Determinants of the stock option premium

The stock option premium (out-of-the-moneyness) is defined as $[(X-S)/S]$, where X corresponds to the exercise price of the option, and where S is the stock price at the grant date. In Panel A, the first tranche premium is calculated as the out-of-the-moneyness of the stock options belonging to the first tranche in the stock option plan. In Panel B, the weighted average stock option premium utilizes information of the characteristics of the total stock option plan. The weights used in the calculation correspond to the ratio of the number of shares obtainable upon exercise in each individual stock option tranche divided by the total number of shares obtainable upon exercise of all stock options. The independent variables are measured at the end of the previous year. A full set of year dummies is included in all specifications (not reported). All risk measures are multiplied by 100. Data for prior stock return is missing in four observations. We apply the method utilized by Himmelberg et al. (1999) and Jin (2002), among others, i.e., set missing observations of prior stock return to zero, and include a separate indicator variable that takes the value of one for missing observations, and zero otherwise. See Appendix A for variable definitions. Estimation is conducted utilizing OLS. The t -statistics (reported beneath each regression coefficient) are calculated using robust standard errors. The significance levels 1%, 5%, and 10% are denoted with ***, **, and *, respectively.

Independent variables	Dependent variable							
	Panel A. First tranche premium				Panel B. Weighted average premium			
	[I]	[II]	[III]	[IV]	[I]	[II]	[III]	[IV]
CEO ownership	0.008 (0.03)	-0.006 (-0.02)	0.028 (0.10)	0.015 (0.05)	-0.007 (-0.03)	-0.011 (-0.04)	-0.010 (-0.04)	-0.014 (-0.05)
Ownership concentration	-0.052 (-0.47)	-0.051 (-0.46)	-0.054 (-0.49)	-0.053 (-0.48)	-0.046 (-0.41)	-0.046 (-0.40)	-0.046 (-0.40)	-0.045 (-0.40)
Institutional ownership [1/0]	0.018 (0.38)	0.011 (0.24)	0.014 (0.29)	0.007 (0.15)	0.030 (0.64)	0.028 (0.57)	0.030 (0.66)	0.028 (0.59)
State ownership [1/0]	-0.018 (-0.35)	-0.020 (-0.38)	-0.018 (-0.36)	-0.020 (-0.39)	-0.028 (-0.52)	-0.029 (-0.53)	-0.028 (-0.52)	-0.029 (-0.53)
Firm size	-0.002 (-0.20)	-0.002 (-0.23)	0.001 (0.09)	0.001 (0.07)	0.004 (0.35)	0.004 (0.34)	0.004 (0.26)	0.004 (0.25)
Tobin's Q	-0.005 (-0.80)	-0.005 (-0.69)	-0.004 (-0.54)	-0.004 (-0.44)	-0.005 (-0.77)	-0.005 (-0.71)	-0.005 (-0.70)	-0.005 (-0.63)
Investment to capital	0.114 (1.01)	0.134 (1.13)	0.120 (1.02)	0.140 (1.13)	0.063 (0.63)	0.070 (0.65)	0.062 (0.59)	0.069 (0.61)
Long-term debt to assets	0.016 (0.11)	0.0003 (0.01)	0.009 (0.06)	-0.007 (-0.05)	0.010 (0.07)	0.005 (0.03)	0.011 (0.08)	0.006 (0.04)
Cash flow to assets	-0.374 (-1.48)	-0.350 (-1.38)	-0.344 (-1.32)	-0.319 (-1.21)	-0.363* (-1.76)	-0.355* (-1.71)	-0.367* (-1.73)	-0.359 (-1.65)
Prior stock return	-0.144** (-2.06)	-0.135* (-1.80)	-0.154** (-2.11)	-0.146* (-1.90)	-0.182** (-2.26)	-0.179** (-2.08)	-0.181** (-2.24)	-0.178** (-2.09)
Prior stock return missing [1/0]	-0.104 (-1.57)	-0.101 (-1.39)	-0.101 (-1.58)	-0.098 (-1.40)	-0.070 (-0.97)	-0.069 (-0.91)	-0.070 (-0.96)	-0.069 (-0.90)
Capital to sales	0.015 (1.37)	0.018 (1.52)	0.015 (1.42)	0.018 (1.57)	0.018* (1.71)	0.019 (1.66)	0.018* (1.69)	0.019 (1.64)
Firm focus [1/0]	0.009 (0.27)		0.009 (0.26)		0.020 (0.54)		0.020 (0.53)	
Mature industry [1/0]		0.015 (0.42)		0.015 (0.41)		0.022 (0.58)		0.022 (0.58)
Growth industry [1/0]		-0.024 (-0.46)		-0.025 (-0.46)		0.009 (0.15)		0.009 (0.15)
Total risk	0.481 (1.28)	0.508 (1.38)			0.599* (1.68)	0.608* (1.73)		
Systematic risk			0.021 (0.02)	0.044 (0.04)			0.661 (0.55)	0.668 (0.57)
Unsystematic risk			0.649 (1.23)	0.678 (1.30)			0.576 (1.10)	0.586 (1.11)
Prior plan in effect [1/0]	0.004 (0.13)	0.005 (0.14)	0.002 (0.07)	0.003 (0.08)	0.001 (0.02)	0.001 (0.02)	0.001 (0.02)	0.001 (0.03)
Broad-based plan [1/0]	0.027 (0.61)	0.035 (0.77)	0.027 (0.59)	0.034 (0.75)	0.037 (0.79)	0.039 (0.86)	0.037 (0.79)	0.039 (0.86)
Dividend protected plan [1/0]	0.051 (1.28)	0.050 (1.27)	0.046 (1.21)	0.045 (1.21)	0.074** (2.12)	0.074** (2.12)	0.075** (2.28)	0.075** (2.27)
PV/indexed plan [1/0]	-0.073 (-1.52)	-0.073 (-1.54)	-0.073 (-1.53)	-0.074 (-1.54)	-0.082 (-1.55)	-0.082 (-1.55)	-0.082 (-1.54)	-0.082 (-1.54)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.218	0.216	0.213	0.211	0.262	0.256	0.255	0.249
Number of observations	141	141	141	141	141	141	141	141

Table 6

Probit estimation results predicting the launch of premium stock option plans

The stock option premium (out-of-the-moneyness) is defined as $[(X-S)/S]$, where X corresponds to the exercise price of the option, and where S is the stock price at the grant date. The first tranche premium is calculated as the out-of-the-moneyness of the stock options belonging to the first tranche in the stock option plan. In Panel A, the dependent variable takes the value of one, if the first tranche premium is positive, and zero otherwise. The weighted average stock option premium utilizes information of the characteristics of the total stock option plan. The weights used in the calculation correspond to the ratio of the number of shares obtainable upon exercise in each individual stock option tranche divided by the total number of shares obtainable upon exercise of all stock options. In Panel B, the dependent variable takes the value of one if the weighted average premium is positive, and zero otherwise. The independent variables are measured at the end of the previous year. All risk measures are multiplied by 100. The dependent variable in four observations lacking data on prior stock return is equal to unity. The regressions are therefore estimated for the reduced sample (137 observations) including complete data on prior stock return. See Appendix A for variable definitions. The t -statistics (reported beneath each regression coefficient) are calculated using robust standard errors. The significance levels 1%, 5%, and 10% are denoted with ***, **, and *, respectively.

Independent variables	Dependent variable							
	Panel A. First tranche premium OTM [1/0]				Panel B. Weighted average premium OTM [1/0]			
	[I]	[II]	[III]	[IV]	[I]	[II]	[III]	[IV]
CEO ownership	-0.924 (-0.43)	-0.997 (-0.46)	-1.432 (-0.65)	-1.501 (-0.68)	-1.123 (-0.51)	-1.210 (-0.55)	-1.753 (-0.80)	-1.841 (-0.84)
Ownership concentration	-0.942 (-1.09)	-0.952 (-1.11)	-0.840 (-0.95)	-0.854 (-0.97)	-1.100 (-1.26)	-1.115 (-1.29)	-0.993 (-1.10)	-1.012 (-1.13)
Institutional ownership [1/0]	-0.090 (-0.21)	-0.131 (-0.31)	0.010 (0.02)	-0.032 (-0.07)	-0.054 (-0.13)	-0.101 (-0.24)	0.072 (0.17)	0.022 (0.05)
State ownership [1/0]	-0.170 (-0.40)	-0.183 (-0.43)	-0.190 (-0.44)	-0.203 (-0.47)	-0.271 (-0.63)	-0.287 (-0.67)	-0.297 (-0.67)	-0.315 (-0.72)
Firm size	-0.032 (-0.30)	-0.032 (-0.31)	-0.114 (-0.97)	-0.114 (-0.97)	-0.046 (-0.44)	-0.047 (-0.44)	-0.145 (-1.22)	-0.146 (-1.22)
Tobin's Q	0.027 (0.55)	0.029 (0.59)	-0.008 (-0.16)	-0.007 (-0.12)	0.030 (0.60)	0.032 (0.65)	-0.011 (-0.20)	-0.009 (-0.17)
Investment to capital	-1.539** (-2.27)	-1.364* (-1.84)	-1.627** (-2.45)	-1.457** (-2.00)	-1.673** (-2.42)	-1.474* (-1.95)	-1.785*** (-2.66)	-1.588** (-2.15)
Long-term debt to assets	-0.390 (-0.40)	-0.521 (-0.53)	-0.342 (-0.35)	-0.462 (-0.47)	-0.193 (-0.19)	-0.346 (-0.34)	-0.121 (-0.12)	-0.262 (-0.26)
Cash flow to assets	-3.553* (-1.87)	-3.435* (-1.80)	-4.479** (-2.41)	-4.363** (-2.33)	-3.993** (-2.08)	-3.861** (-2.01)	-5.137*** (-2.79)	-5.010*** (-2.71)
Prior stock return	-0.538 (-1.12)	-0.481 (-1.00)	-0.328 (-0.65)	-0.273 (-0.54)	-0.426 (-0.87)	-0.358 (-0.74)	-0.169 (-0.33)	-0.100 (-0.20)
Capital to sales	0.146** (2.58)	0.161** (2.55)	0.163** (2.39)	0.175** (2.48)	0.147** (2.59)	0.164*** (2.62)	0.169** (2.33)	0.182** (2.48)
Firm focus [1/0]	-0.031 (-0.09)		0.0002 (0.01)		0.045 (0.14)		0.085 (0.25)	
Mature industry [1/0]		0.007 (0.02)		0.037 (0.11)		0.090 (0.27)		0.130 (0.38)
Growth industry [1/0]		-0.237 (-0.48)		-0.202 (-0.40)		-0.194 (-0.39)		-0.154 (-0.31)
Total risk	-0.494 (-0.22)	-0.228 (-0.10)			-0.088 (-0.04)	0.230 (0.10)		
Systematic risk			10.967 (1.21)	11.198 (1.23)			13.469 (1.47)	13.812 (1.50)
Unsystematic risk			-3.952 (-1.16)	-3.675 (-1.07)			-4.189 (-1.20)	-3.864 (-1.10)
Prior plan in effect [1/0]	-0.221 (-0.76)	-0.213 (-0.74)	-0.125 (-0.43)	-0.119 (-0.41)	-0.263 (-0.90)	-0.255 (-0.87)	-0.153 (-0.52)	-0.145 (-0.49)
Broad-based plan [1/0]	0.063 (0.18)	0.119 (0.33)	0.098 (0.28)	0.155 (0.42)	0.014 (0.04)	0.082 (0.22)	0.057 (0.16)	0.127 (0.35)
Dividend protected plan [1/0]	0.367 (1.23)	0.353 (1.18)	0.419 (1.39)	0.407 (1.35)	0.355 (1.17)	0.339 (1.11)	0.420 (1.38)	0.406 (1.33)
PV/indexed plan [1/0]	-0.535 (-1.13)	-0.531 (-1.13)	-0.511 (-1.04)	-0.508 (-1.05)	-0.509 (-1.08)	-0.504 (-1.08)	-0.485 (-0.98)	-0.482 (-0.99)
Log likelihood	-75.518	-75.356	-74.645	-74.494	-73.999	-73.782	-72.803	-72.594
Pseudo R-squared	0.122	0.124	0.132	0.134	0.132	0.134	0.146	0.148
Dependent variable [at 1 in %]	0.679	0.679	0.679	0.679	0.686	0.686	0.686	0.686
Number of observations	137	137	137	137	137	137	137	137

Table 7

Probit estimation results predicting the launch of premium stock option plans targeted to top management

The stock option premium (out-of-the-moneyness) is defined as $[(X-S)/S]$, where X corresponds to the exercise price of the option, and where S is the stock price at the grant date. The first tranche premium is calculated as the out-of-the-moneyness of the stock options belonging to the first tranche in the stock option plan. In Panel A, the dependent variable takes the value of one, if the first tranche premium is positive and the plan is targeted solely to top management, and zero otherwise. The weighted average stock option premium utilizes information of the characteristics of the total stock option plan. The weights used in the calculation correspond to the ratio of the number of shares obtainable upon exercise in each individual stock option tranche divided by the total number of shares obtainable upon exercise of all stock options. In Panel B, the dependent variable takes the value of one if the weighted average premium is positive and the plan is targeted solely to top management, and zero otherwise. The independent variables are measured at the end of the previous year. All risk measures are multiplied by 100. Data for prior stock return is missing in four observations. We apply the method utilized by Himmelberg et al. (1999) and Jin (2002), among others, i.e., set missing observations of prior stock return to zero, and include a separate indicator variable that takes the value of one for missing observations, and zero otherwise. See Appendix A for variable definitions. The t -statistics (reported beneath each regression coefficient) are calculated using robust standard errors. The significance levels 1%, 5%, and 10% are denoted with ***, **, and *, respectively.

Independent variables	Dependent variable							
	Panel A. First tranche premium OTM in plans targeted to top management [1/0]				Panel B. Weighted average premium OTM in plans targeted to top management [1/0]			
	[I]	[II]	[III]	[IV]	[I]	[II]	[III]	[IV]
CEO ownership	-2.090 (-1.02)	-2.088 (-1.01)	-2.069 (-1.00)	-2.068 (-0.99)	-2.300 (-1.13)	-2.305 (-1.12)	-2.318 (-1.13)	-2.322 (-1.12)
Ownership concentration	-1.311* (-1.66)	-1.312 (-1.63)	-1.319* (-1.66)	-1.319 (-1.63)	-1.478* (-1.85)	-1.474* (-1.82)	-1.472* (-1.83)	-1.468* (-1.80)
Institutional ownership [1/0]	-0.348 (-0.88)	-0.348 (-0.88)	-0.352 (-0.89)	-0.352 (-0.89)	-0.309 (-0.78)	-0.311 (-0.78)	-0.306 (-0.77)	-0.307 (-0.77)
State ownership [1/0]	-0.265 (-0.63)	-0.265 (-0.63)	-0.265 (-0.63)	-0.265 (-0.63)	-0.369 (-0.87)	-0.369 (-0.87)	-0.370 (-0.87)	-0.369 (-0.87)
Firm size	0.082 (0.83)	0.082 (0.82)	0.086 (0.77)	0.086 (0.76)	0.074 (0.74)	0.074 (0.73)	0.071 (0.63)	0.071 (0.63)
Tobin's Q	-0.079 (-1.19)	-0.080 (-1.06)	-0.078 (-1.13)	-0.078 (-1.00)	-0.085 (-1.29)	-0.084 (-1.14)	-0.087 (-1.26)	-0.086 (-1.10)
Investment to capital	-1.415** (-2.17)	-1.418* (-1.90)	-1.406** (-2.12)	-1.407* (-1.85)	-1.541** (-2.32)	-1.530** (-2.02)	-1.549** (-2.29)	-1.539** (-1.99)
Long-term debt to assets	0.137 (0.15)	0.138 (0.15)	0.132 (0.15)	0.133 (0.15)	0.310 (0.34)	0.304 (0.33)	0.314 (0.35)	0.309 (0.34)
Cash flow to assets	-3.494* (-1.89)	-3.495* (-1.87)	-3.460* (-1.84)	-3.460* (-1.82)	-3.925** (-2.09)	-3.919** (-2.07)	-3.955** (-2.08)	-3.949** (-2.05)
Prior stock return	-0.216 (-0.46)	-0.216 (-0.46)	-0.224 (-0.48)	-0.224 (-0.47)	-0.075 (-0.16)	-0.073 (-0.16)	-0.068 (-0.15)	-0.067 (-0.14)
Prior stock return missing [1/0]	-0.396 (-0.47)	-0.397 (-0.47)	-0.392 (-0.46)	-0.392 (-0.46)	-0.411 (-0.48)	-0.409 (-0.48)	-0.416 (-0.48)	-0.414 (-0.48)
Capital to sales	-0.143** (-2.34)	-0.144** (-2.02)	-0.143** (-2.32)	-0.143** (-2.00)	-0.145** (-2.39)	-0.144** (-2.04)	-0.146** (-2.38)	-0.145** (-2.02)
Firm focus [1/0]	-0.126 (-0.40)		-0.128 (-0.41)		-0.058 (-0.19)		-0.057 (-0.18)	
Mature industry [1/0]		-0.127 (-0.40)		-0.128 (-0.40)		-0.056 (-0.18)		-0.055 (-0.17)
Growth industry [1/0]		-0.124 (-0.25)		-0.127 (-0.25)		-0.071 (-0.14)		-0.068 (-0.13)
Total risk	-1.422 (-0.66)	-1.423 (-0.66)			-1.138 (-0.53)	-1.132 (-0.52)		
Systematic risk			-2.012 (-0.26)	-2.011 (-0.26)			-0.632 (-0.08)	-0.646 (-0.08)
Unsystematic risk			-1.236 (-0.36)	-1.237 (-0.36)			-1.298 (-0.38)	-1.286 (-0.37)
Prior plan in effect [1/0]	0.244 (0.91)	0.244 (0.91)	0.240 (0.89)	0.240 (0.89)	0.219 (0.81)	0.218 (0.80)	0.222 (0.81)	0.221 (0.81)
Dividend protected plan [1/0]	0.027 (0.10)	0.027 (0.10)	0.025 (0.09)	0.025 (0.09)	0.021 (0.07)	0.021 (0.07)	0.023 (0.08)	0.023 (0.08)
PV/indexed plan [1/0]	-0.164 (-0.34)	-0.164 (-0.34)	-0.165 (-0.34)	-0.165 (-0.34)	-0.132 (-0.27)	-0.132 (-0.28)	-0.131 (-0.27)	-0.131 (-0.27)
Log likelihood	-80.938	-80.938	-80.935	-80.935	-80.044	-80.044	-80.042	-80.042
Pseudo R-squared	0.171	0.171	0.171	0.171	0.180	0.180	0.180	0.180
Dependent variable [at 1 in %]	0.518	0.518	0.518	0.518	0.525	0.525	0.525	0.525
Number of observations	141	141	141	141	141	141	141	141

Table 8

Probit estimation results predicting the launch of broad-based stock option plans

The dependent variable takes the value of one if the stock option plan is (in addition to top management) also targeted to non-executive employees, and zero otherwise. The independent variables are measured at the end of the previous year. All risk measures are multiplied by 100. See Appendix A for variable definitions. The *t*-statistics (reported beneath each regression coefficient) are calculated using robust standard errors. The significance levels 1%, 5%, and 10% are denoted with ***, **, and *, respectively.

Independent variables	Dependent variable: Broad-based plan [1/0]			
	[I]	[II]	[III]	[IV]
CEO ownership	1.321 (0.59)	1.763 (0.79)	1.255 (0.55)	1.691 (0.75)
Ownership concentration	0.796 (0.87)	0.539 (0.57)	0.832 (0.89)	0.577 (0.60)
Institutional ownership [1/0]	1.144** (1.99)	1.252** (2.24)	1.151** (2.03)	1.259** (2.28)
State ownership [1/0]	0.155 (0.40)	0.149 (0.40)	0.166 (0.43)	0.160 (0.43)
Firm size	-0.329*** (-2.95)	-0.299*** (-2.63)	-0.345*** (-3.04)	-0.316*** (-2.71)
Tobin's <i>Q</i>	0.174** (2.12)	0.116 (1.45)	0.167* (1.87)	0.109 (1.27)
Wages per employee	4.094** (2.05)	3.241 (1.57)	4.153** (2.10)	3.289 (1.60)
Long-term debt to assets	-1.818* (-1.66)	-1.608 (-1.45)	-1.788 (-1.62)	-1.575 (-1.41)
Zero-dividends [1/0]	0.161 (0.25)	0.325 (0.52)	0.164 (0.26)	0.331 (0.53)
Free cash flow to assets	-3.067*** (-2.75)	-2.420** (-2.14)	-3.062*** (-2.77)	-2.431** (-2.18)
Firm focus [1/0]	0.576 (1.33)		0.582 (1.33)	
Mature industry [1/0]		0.426 (0.99)		0.431 (0.99)
Growth industry [1/0]		1.083** (2.07)		1.088** (2.06)
Total risk	-0.208 (-0.07)	-0.558 (-0.20)		
Systematic risk			2.399 (0.28)	2.139 (0.26)
Unsystematic risk			-1.133 (-0.26)	-1.537 (-0.34)
Prior plan in effect [1/0]	-0.534 (-1.61)	-0.426 (-1.33)	-0.521 (-1.55)	-0.410 (-1.26)
Dividend protected plan [1/0]	0.340 (1.06)	0.412 (1.30)	0.343 (1.08)	0.417 (1.32)
PV/indexed plan [1/0]	-0.549 (-1.29)	-0.437 (-1.06)	-0.543 (-1.28)	-0.432 (-1.05)
Log likelihood	-48.834	-47.721	-48.791	-47.676
Pseudo R-squared	0.382	0.396	0.383	0.397
Dependent variable [at 1 in %]	0.248	0.248	0.248	0.248
Number of observations	141	141	141	141

Table 9

Probit estimation results predicting the launch of dividend protected stock option plans

The dependent variable takes the value of one if the stock option plan includes dividend protection, and zero otherwise. The independent variables are measured at the end of the previous year. All risk measures are multiplied by 100. Data on foreign ownership is available from the Finnish Central Securities Depository (FCSD) from October 1993 onwards. The dependent variable in 24 observations lacking data on foreign ownership is equal to zero. The regressions are therefore estimated for the reduced sample (117 observations) including data on foreign ownership. See Appendix A for variable definitions. The *t*-statistics (reported beneath each regression coefficient) are calculated using robust standard errors. The significance levels 1%, 5%, and 10% are denoted with ***, **, and *, respectively.

Independent variables	Dependent variable: Dividend protected plan [1/0]			
	[I]	[II]	[III]	[IV]
CEO ownership	2.993 (1.35)	2.919 (1.32)	2.464 (1.29)	2.409 (1.25)
Ownership concentration	-0.965 (-1.05)	-0.931 (-1.02)	-1.137 (-1.25)	-1.099 (-1.22)
Institutional ownership [1/0]	-0.390 (-0.88)	-0.445 (-0.96)	-0.457 (-0.91)	-0.503 (-0.98)
State ownership [1/0]	-0.441 (-0.92)	-0.437 (-0.91)	-0.519 (-1.08)	-0.512 (-1.06)
Foreign ownership	-1.095* (-1.83)	-1.068* (-1.77)	-1.180* (-1.91)	-1.159* (-1.87)
Firm size	-0.158 (-1.43)	-0.159 (-1.42)	-0.055 (-0.45)	-0.057 (-0.46)
Tobin's <i>Q</i>	-0.068 (-1.55)	-0.060 (-1.35)	-0.024 (-0.55)	-0.017 (-0.38)
Long-term debt to assets	0.567 (0.54)	0.465 (0.43)	0.504 (0.50)	0.414 (0.40)
Zero-dividends [1/0]	-1.049** (-2.35)	-1.075** (-2.42)	-1.276*** (-2.63)	-1.295*** (-2.69)
Free cash flow to assets	-0.051 (-0.04)	-0.211 (-0.17)	0.301 (0.28)	0.163 (0.14)
Firm focus [1/0]	0.183 (0.48)		0.199 (0.52)	
Mature industry [1/0]		0.211 (0.55)		0.221 (0.57)
Growth industry [1/0]		0.015 (0.03)		0.056 (0.11)
Total risk	3.069 (0.95)	3.167 (0.97)		
Systematic risk			-13.016 (-1.34)	-12.803 (-1.32)
Unsystematic risk			9.772** (2.27)	9.778** (2.27)
Prior plan in effect [1/0]	0.496 (1.57)	0.476 (1.49)	0.439 (1.33)	0.423 (1.27)
Broad-based plan [1/0]	-0.076 (-0.21)	-0.015 (-0.04)	-0.075 (-0.21)	-0.025 (-0.07)
PV/indexed plan [1/0]	0.975* (1.79)	0.961* (1.76)	0.930 (1.57)	0.918 (1.55)
Log likelihood	-63.672	-63.573	-61.545	-61.477
Pseudo R-squared	0.188	0.189	0.215	0.216
Dependent variable [at 1 in %]	0.607	0.607	0.607	0.607
Number of observations	117	117	117	117

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