

The Association Between Executive Stock Option Plan Changes and Managerial Decision Making

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■ Numerous models of the firm have demonstrated that agency costs can be reduced by incentive compensation packages (e.g., Holmstrom [10], Jensen and Meckling [12], Beck and Zorn [3]). These plans tie the executive's compensation to measures of firm performance (e.g., earnings or stock price). In particular, many companies use executive stock options as part of the compensation package. These options allow managers to purchase the firm's shares at any time within a given period. In 1980, 83% of the 100 largest companies in the U.S. had option plans (Smith and

Watts [18]). There are a number of explanations for the use of executive stock option plans. Haugen and Senbet [8] have argued that stock options can be used to eliminate agency costs. Executive stock options can also lead to increased or even excessive risk taking. The use of stock options can also have favorable tax implications for both executives and the firm.

Empirical studies have shown that proposed changes in long-range managerial compensation plans (option, restricted stock, performance, stock appreciation rights, and phantom stock) are met with positive share price reactions (see Brickley, Bhagat and Lease [4], DeFusco, Johnson and Zorn [6], and Lembgruber [16]). Agrawal and Mandelker [2] find that variance increasing investments are more likely to be made by

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firms with managerial compensation contracts that have a large option component. There is also some evidence that the firm's bonds react negatively to changes in executive stock option plans (DeFusco, Johnson, and Zorn [6]).

Even if the impact on security holders is unambiguous at the time of plan announcement, it is unclear how specific managerial decisions are affected by executive stock options. In particular, the longer term effects of managerial compensation plans have only recently been examined. For a small sample of firms, Larcker [15] found that corporate capital investment increased subsequent to performance plan adoption. Lambert, Lanen, and Larcker [14] found that dividends are reduced relative to expected dividends subsequent to the initial adoption of executive stock options. DeFusco, Johnson and Zorn [6] found that the variance of the firm's equity increased subsequent to changes in executive stock option plans. Very little other empirical evidence exists concerning the effects of executive stock options.

In this study we examine variables that appear to have changed either as a consequence or incidental to executive stock option plan adoption. Stock market and accounting data are used to examine the long-term effects of executive stock options. We examine three general categories that would appear to be affected by the change in stock option plans — performance (stock market and accounting); financial (capital structure and dividend choice); and real (investment, R&D, advertising, and general expenses).

We find that cumulative abnormal stock market returns declined subsequent to plan adoption for approximately two-thirds of the firms in the sample. Return on assets declined both absolutely and adjusted for industry changes. Investments in growth opportunities, as measured by R&D intensity, declined significantly subsequent to plan adoption. Perquisite consumption — as measured by the ratio of selling, general and administrative expenses to total assets — significantly increased, a result that would appear to be opposite to that suggested by agency theory.

The present study cannot identify cause and effect and is subject to two caveats. First, the changes in option plans that we study are clustered in the five-year period 1978 to 1982. It is possible that the results are at least in part due to a bad draw from the population of outcomes. Second, it may be difficult to determine the impact of stock options with accounting data. Accounting data, for example, may indicate the level of

investment; however, it may not reveal much about its nature.

I. Stock Option Plans and Managerial Decisions

Executive stock option plans are explained typically as tax-reducing and incentive-improving devices. The use of stock options can also lead managers to select more risky projects. These explanations offer some predictions concerning managerial decisions subsequent to plan adoption. However, there is no comprehensive theory of the effects that executive stock option plans have on specific variables. For instance, managerial stock options might affect investment decisions. However, it is not clear which components of investment would be affected by executive stock option plans. We therefore hypothesize certain ratios that are likely to be affected by plan adoption according to tax, incentive and risk-taking explanations.

A. Tax Effects

Executive stock option plans affect the taxes of corporations and the executive. Miller and Scholes [17] show that a compensation package consisting of salary and stock options can provide more after-tax payoff to an executive than a pure salary contract.¹ Smith and Watts [18], however, argue that the tax effect can explain some, but not all, of the cross-sectional variation in the use of various compensation plans. The tax explanation offers no prediction about post-plan changes other than higher after-tax earnings for corporations and/or managers.²

B. Incentive Effects

The most obvious explanation for executive stock options is that they help align the interests of managers with those of shareholders. An improvement in incentives would imply an increase in earnings and/or market value of the firm's shares. The alignment of interests would also result in a reduction in perquisite consumption. Accounting data, however, may not fully capture reductions in managerial perquisite consumption. Sell-

¹Hite and Long [9] use tax arguments to explain the shift from qualified to nonqualified option plans in the early 1970s.

²Whether earnings or wages increase depends on how the increased rents are shared between the firm and the managers. In a competitive labor market only earnings will increase.

ing, general and administrative expenses might be one indicator of perquisite consumption.

The incentive explanation for executive stock options might also suggest that managers will allocate more effort into the search for new investment opportunities that will increase the long-term profitability of the firm. The increase in incentive compensation, however, could induce the payout of free cash flow for firms that have more cash flow than positive net present value investment opportunities (Jensen [11]). The impact on investment is ambiguous and therefore an empirical issue. How the various components of the investment mix might change is also an empirical issue. We examine changes that occur in investments in property, plant and equipment, research and development, and advertising.

C. Risk-Taking Effects

Standard option pricing theory indicates that the value of a stock option is an increasing function of the variance of the firm's stock price. This suggests that an executive stock option plan motivates the manager to increase the variability of the firm's equity returns by investing in more risky projects. This increase in risk-taking need not be excessive if managers were initially investing in projects that were too safe from the stockholders' point of view. Under this scenario, we would expect to observe an increase in the variability of earnings subsequent to plan adoption. An increase in firm variability could also be influenced by an increase in leverage (i.e., the debt to assets ratio).

Because executive stock options are not dividend protected, the payment of dividends will result in a decrease in the value of an executive's stock option (see Lambert, Lanen and Larcker [14]). As a result we would expect to see dividends decline subsequent to plan adoption. In this paper we measure the dividend decision with the dividend payout ratio and dividend yields. With an increase in performance and a decline in dividends we would expect to observe a decline in either payouts or yields subsequent to plan adoption.

II. Data and Methodology

A comprehensive list of New York Stock Exchange firms voting on executive stock option plans was obtained from the Exchange. The list, from 1978 to 1982, contained the name of each firm, the shareholder meeting date, and a brief description of the plans voted upon. The list contained 1442 firm events, representing 987 different firms.³ The majority of proxy statements,

1240 (86%), were available on the Q-File. In addition, 115 (8%) of the proxy statements were obtained from the SEC in Washington, D.C. We were unable to obtain copies of 87 (6%) of the proxy statements. Three events provided for the granting of "in the money" stock options and were eliminated from the sample.

According to Brickley, Bhagat and Lease [4], proposed executive compensation plan changes presented for shareholder approval are invariably ratified. A NYSE proxy specialist indicated that from 1979 through 1982 all proposed executive compensation plans were adopted. Plans are easily ratified, as they only require a majority vote of the outstanding shares to pass.

A review of the proxies revealed that not all proposed stock option plans solely involved executive stock options. Some of the plans contained performance unit, phantom stock, bonus and employee savings plan elements. Many of these plans are related to stock options. For instance, in a performance unit plan the executive earns specially valued units at no cost. These units are earned based on the achievement of predetermined performance goals. In a phantom stock plan, the executive receives units that are similar to company shares. At some point in the future, the executive receives the value of the stock appreciation plus dividends.⁴

Data on firm performance and financial/real decisions were collected from the COMPUSTAT annual industrial file. Because executive stock options are typically exercisable over a period of ten years, the impact of stock options on managerial decision making may not be immediately observable. As in Larcker [15], it is important to examine changes over a number of years. We compute firm and industry ratios for the five-year averages surrounding the adoption of executive stock option plans. The definition of industry membership is based on SIC codes and is presented in Appendix A. Firm five-year average ratios are stand-

³Many of the plans are extensions of existing plans and do not constitute first-time option plans for the firms.

⁴As in Brickley, Bhagat, and Lease [4] we also classify each observation as clean or contaminated. An event is considered to be clean if the proxy statement contained no other board-sponsored agenda item except the proposed stock option plan, the election of directors, and the ratification of auditors. An event was considered contaminated if the proxy included any other board-sponsored agenda. We find that none of the subsequent tests are sensitive to the inclusion of contaminated stock option plan events. We therefore report results for the largest possible sample.

ardized by (i.e., divided by) their respective industry averages. Firms that made more than one increase in executive stock option plans over the sample period, 1978-1982, were eliminated to avoid problems of overlapping pre- and post-adoption intervals. This screen reduced the sample to 562 individual firm-events. To check for any potential selection bias, we also examine changes that take place for those firms that made more than one change in stock option plan over the sample period.

It may be difficult to determine the impact of stock options using accounting data. It is conceivable that executive stock options could have real effects that are impossible to detect with accounting data. Accounting data may, in a gross way, indicate the level of investment; however, it does not reveal much about its nature. Some investments, such as investments in employee training, are treated as expenditures. More daring marketing strategies will not be directly observed in our data. Accounting data, however, does permit us to examine effects on specific variables that are otherwise unobservable.

III. Results

We examine the changes that have occurred in risk-taking, investment, and capital structure by examining selected financial ratios. The ratios employed are five-year averages preceding and following the proposed change in executive stock option plans. Variable definitions are:

- (i) Return on Assets — Operating income after depreciation divided by the book value of total assets (ROA);
- (ii) Variance of ROA — Variability in ROA for the five-year period before and after plan adoption;
- (iii) Debt/Asset Ratio — (Book value of total debt)/(Book value of total debt + market value of equity);
- (iv) Dividend Payout (Yield) — Total dividends divided by earnings (market value of equity);⁵

⁵The dividend payout ratio is computed only if earnings are positive. In our sample, average five-year earnings were negative for approximately seventy firms.

- (v) Advertising (R&D) Intensity — Advertising (R&D) divided by the book value of total assets;
- (vi) Property, Plant & Equipment Ratio — Capital expenditures on property plant & equipment divided by book value of total assets;
- (vii) Selling, General and Administrative Expenses Ratio — Selling, general & administrative expenses divided by book value of total assets.

A. Industry Membership

Results for seventeen separate industry classifications for the 359 firms with data available on the COMPUTSTAT Industrial file are presented in Exhibit 1. Stock option plans adopted from 1978 to 1982 are spread broadly, but not uniformly, across industries. For instance, 66 adoptions occurred in business equipment, while 36 adoptions occurred in finance, and 18 in utilities. Other regularities are apparent. For example, finance companies and utilities have higher debt ratios. COMPUSTAT does not report outlays for research and development for these firms.

B. Performance

In this section the changes that occurred in firm accounting performance as measured by return on assets and its variability are reported. The median values for absolute performance and industry-adjusted (the ratio of firm to industry) performance before and after plan adoption are presented in Exhibit 2. In absolute terms, the average five-year return on assets declined from 12.45% to 8.63%. On an industry adjusted basis, firm profitability declined from an average of 102% of the industry average to 92% of the industry average.⁶ The decline in industry-adjusted profitability is highly significant (Wilcoxon $Z = -4.15$).^{7,8} In addition to the

⁶It is possible that the results could be attributed to the relative size of firms that announce option plans. The decline in relative profitability is also evident for two subsamples that contain firms larger and smaller than their respective industry average ranked by total assets.

⁷See Conover [5, p. 206] for a discussion of the Wilcoxon matched pairs sign rank test.

⁸Our sample selection procedure eliminated firms that made more than one increase in stock option plans during the sample period. It is conceivable that firms which had only one stock option plan change performed poorly relative to those with multiple changes. We examined relative return on assets for those firms that made multiple changes and find results consistent with our sample.

Exhibit 1. Industry Membership and Selected Characteristics in the Five-Year Period Preceding the Change in Executive Stock Option Plans for a Sample of NYSE Firms, 1978–1982

Industry	Five-year averages					
	Number of firms	Sales ^a	Return on assets	Debt ratio	Dividends to earnings	R&D intensity
Food	17	1,722	0.16	0.47	0.17	0.01
Apparel	09	339	0.10	0.68	0.15	0.01
Drugs	17	1,496	0.17	0.37	0.22	0.03
Retail	17	2,212	0.13	0.54	0.13	0.01
Durables	23	1,164	0.15	0.45	0.15	0.03
Autos	10	7,609	0.11	0.59	0.23	0.03
Construction	14	708	0.10	0.58	0.17	0.02
Finance	36	948	0.07	0.83	0.15	n/a
Utilities	18	1,601	0.10	0.65	0.26	n/a
Transportation	19	2,027	0.11	0.59	0.15	0.03
Business equipment	66	1,010	0.15	0.39	0.15	0.03
Chemicals	12	1,777	0.14	0.45	0.18	0.02
Metal prod.	12	283	0.15	0.47	0.13	0.02
Metal ind.	15	1,679	0.10	0.59	0.22	0.01
Mining	07	474	0.13	0.46	0.23	0.01
Oil	15	1,549	0.14	0.38	0.16	0.01
Miscellaneous	37	648	0.14	0.47	0.17	0.02

^a Measured in millions of dollars

decline in profitability, we also find a significant increase in the variability of return on assets (Wilcoxon $Z = 4.43$) following the change in stock option plans. The increase in the variability of return on assets is consistent with other studies that find an increase in implicit share price variance following the change in option plans (see DeFusco, Johnson, and Zorn [6]). We also separately tested for changes in these performance measures for regulated firms (finance companies and utilities). For these two regulated industry groupings, return on assets declined significantly (Wilcoxon $Z = -2.09$) while its variability increased, but was only marginally significant (Wilcoxon $Z = 1.79$).

The decline in relative accounting profitability appears to contradict earlier study findings of a positive stock market reaction on the days surrounding plan announcement. A possible explanation is that the market has anticipated this decline but investors believe that the adoption of executive stock options will increase firm performance above prior expectations. If this is the case we should not expect to see any decline in abnormal firm performance subsequent to plan adoption.⁹ To examine this issue further, we collected excess return data from the CRSP Excess Returns file for the five-year period following the

change in option plan.¹⁰ Cumulative abnormal returns are computed for the one, two, three, four and five-year periods subsequent to the change in plan. On average, we find a decline in the cumulative abnormal performance for the complete sample of 359 firms. The one, two, three, four and five-year cumulative abnormal returns following the change in stock option plans are -6.66%, -14.17%, -18.58%, -25.89% and -29.41%. None of these measures are significant using standard t -tests. We also find that, relative to each firm's industry, cumulative abnormal returns over the five-year period subsequent to the change in the stock option plan also decline. The one, two, three, four and five-year industry-adjusted cumulative abnormal returns are -3.18%, -7.86%, -10.05%, -13.85% and -14.65%. Apparently some, but not all, of the decline in abnormal returns is accounted for by declines in industry performance. None of the industry-adjusted abnormal returns are significantly different from zero using standard t -tests.

Approximately two-thirds of the firms had negative cumulative abnormal returns (absolute and industry-

⁹We thank James Brickley for this suggestion.

¹⁰Daily excess returns are computed as the actual daily return minus the daily return on a control portfolio with a similar Scholes-Williams beta coefficient. CRSP updates betas annually. See Asquith and Mullins [1] for further discussion of the CRSP excess returns file.

Exhibit 2. Changes in Firm Characteristics Before and After Executive Stock Option Plan Changes for the Sample of NYSE Firms, 1978-1982

Ratio	N ^a	Unadjusted Median		Industry Adjusted Median		Wilcoxon Z ^b
		Before	After	Before	After	
Return on assets	324	12.45	8.63	1.02	0.92	-4.15*
Variance of ROA	324	0.006	0.009	3.76	4.63	4.43*
Debt/asset ratio ^c	324	52.21	51.80	0.44	0.46	3.64*
Dividend payout	252	14.60	20.95	0.86	0.98	4.44*
Dividend yield	321	3.50	3.01	0.71	0.79	3.37*
Advertising intensity	136	2.04	2.06	1.14	1.04	-0.67
R&D intensity	181	4.13	3.72	1.04	0.80	-4.38*
Property, plant & equipment expend. ratio	324	8.01	7.22	0.89	0.87	-1.34
Selling, general & admin. expenses ratio	317	23.02	23.72	0.23	0.24	4.01*

^aSample sizes vary due to availability of data on COMPUSTAT.

^bNonparametric Wilcoxon matched-pairs sign rank test of whether industry adjusted average changed following change in executive stock option plan.

^cThe debt ratio remains unchanged if book value of equity is used in place of market value of equity. For this ratio, the medians, prior to and following plan change (industry in parentheses) are 19.87 (0.98) and 18.87 (0.98). The changes are insignificantly different from zero.

*Significant at the 5% level.

adjusted) for each yearly period. The Wilcoxon non-parametric sign test can be used to test whether or not these firms could have had negative abnormal cumulative returns by chance. We find that the decline in absolute and industry-adjusted cumulative abnormal returns are significantly different from zero at the 5% level. The persistent decline in cumulative abnormal returns over the five-year period following plan adoption is paradoxical given the positive stock market reaction to changes in stock option plans. It is puzzling that those firms that change managerial stock option plans on average perform poorly. The observed decline in profitability could be attributed to a bad draw from the earnings distribution. For instance, firms that invested in high variance projects tended to do poorly in the 1980s. The documented increase in earnings and stock market volatility is consistent with this notion.

C. Financial

In this section we examine changes that have occurred in the debt ratio, dividend payout ratio and dividend yield. For the full sample, a significant increase in the debt to asset, dividend payout ratio and dividend yield is reported in Exhibit 2. For regulated firms, the debt to asset ratio significantly increases ($Z = 2.31$) while both dividend measures rise slightly (both Z s < 1.50). For the full sample and the set of

regulated firms the debt ratio remains unchanged if the book value of assets is used in place of its market value counterpart.

The increase in the debt ratio (with market value of assets) is consistent with the previously documented increase in risk. The increase in dividend payout and yield is surprising given that the value of long-term stock options are likely to be maximized with a low payout ratio. If managers attempt to maintain a stable dividend policy in the face of falling profits or declining stock prices, an increase in the payout ratio and yield would result.

D. Real

In this section the changes that have occurred in ratios that capture real asset decisions made by the firm are examined. The ratios examined are expenditures on property, plant and equipment to total assets (book value), R&D and advertising intensity, and the ratio of selling, general and administrative expenses to total assets (book value). The property, plant and equipment expenditure ratio is an indicator of the firm's investment policy. R&D and advertising intensity are indicators of long-term investment in growth opportunities and marketing strategies. The selling, general and administrative expenses ratio is employed as a weak indicator for perquisite consumption. Because

these ratios are computed relative to the book value of assets we do not expect them to be sensitive to the behavior of earnings.

One of the striking findings of changes in real firm decisions, reported in Exhibit 2, is the relative decline in research and development intensity and the increase in selling, general and administrative expenses. In Exhibit 2, we observe that R&D intensity declined by approximately 24% (1.04 versus 0.80) below pre-option change levels, while selling, general and administrative expenses increased approximately 1% (0.23 versus 0.24). Expenditures on property, plant and equipment as well as advertising intensity declined slightly (both $Z_s < -1.40$). We do not find any significant changes in advertising intensity, expenditures for property, plant and equipment, and selling, general and administrative expenses for regulated firms.

The documented decline in R&D intensity and the slight increase in selling, general and administrative expenses seems puzzling. Lambert [13] shows that the conflict of interest between managers and shareholders can lead to either an underinvestment or overinvestment in risky projects. Intuitively it would appear that selling, general and administrative expenses should decrease following an increase in incentive stock options. There does not appear to be any obvious tax or change in accounting techniques that would account for the observed changes in selling expenses. The predicted change in selling expenses may not be observable because we cannot directly measure components of the accounting numbers. The increase in selling, general and administrative expenses might represent the increased efforts by management to control costs. However, these explanations are problematic given the previously cited decline in stock market performance following plan adoption.

IV. Conclusions

In this paper, changes in managerial decisions associated with increases in executive stock option plans were examined. The sample consists of all firms on the NYSE (with data available on COMPUSTAT) proposing changes in incentive stock options plans between 1978 and 1982. Accounting ratios were grouped into three categories: performance, financial and real. Performance variables included return on assets and the variance of return on assets. The financial ratios were the debt to asset ratio, the dividend payout ratio and dividend yield. Real variables were defined to be advertising and research and development intensity, proper-

ty, plant and equipment expenditure ratio, and the selling, general and administrative expenses ratio.

Previous studies have documented a positive stock market reaction to changes in incentive compensation plans. The specific changes that such plans induce remain unclear. There is weak evidence, supported in this study, that these plan changes induce increased risk taking. The variance of earnings increases subsequent to the adoption of such plans. Other results are puzzling.

The dividend payout ratio increased while the debt ratio decreased. These results appear to be driven by a decline in profitability that, on average, occurred in the five-year period following the change in option plan. It is somewhat surprising that the sample of firms that increased incentive stock option plans should experience earnings declines relative to their industries. They also, on average, experienced long-term declines in cumulative abnormal returns.

Firms proposing changes in managerial stock options experienced a statistically significant decline in expenditures on R&D, and an increase in selling, general and administrative expenses. These changes appear to be contrary to what would be implied by agency theory and cannot be explained by the decline in earnings. The limitations of the study preclude a causal link between plan changes and the observed changes in accounting numbers. Executive stock options could have real effects that are impossible to detect utilizing accounting information. Accounting data may indicate the level of investment but it may not reveal much about its nature. The results, however, are intriguing and warrant further research.

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Appendix A

We use the following industry definitions employed by Fama and French [7].

Industry	SIC Codes
Food	100-299, 2000-2099, 5140-5159, 5191
Apparel	2200-2399, 3140-3149, 5130-5139
Drugs	2100-2199, 2830-2849, 5122, 5194
Retail	5230-5999
Durables	2500-2599, 3000-3099, 3172, 3630-3669, 3860-3949, 3960-3969, 5020-5029, 5040-5049, 5064, 5094-5099
Autos	3710-3719, 3792, 5010-5019
Construction	500-1799, 2400-2499, 2850-2859, 2952, 3200-3299, 3420-3439, 5030-5039, 5070-5075, 5198, 5211
Finance	6000-6999
Utilities	4900-4999
Transportation	3720-3789, 3790, 3799, 4000-4799
Business equipment	3500-3629, 3670-3699, 3800-3859, 3950-3959, 5060-5069, 5078-5089
Chemicals	2800-2829, 2860-2899, 5160-5169
Metal products	3410-3419, 3440-3449, 5080-5089
Metal industries	3300-3399
Mining	1000-1299, 1400-1499, 5050-5059
Oil	1300-1399, 2910-2919, 5170-5179
Miscellaneous	600-2799, 2990-2999, 3110-3119, 3190-3199, 3980-3999, 4800-4899, 5090, 5093, 5110-5119, 5199, 7000-8999, 9910, 9999

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