The Role of Performance Plans in Mitigating Agency Problems: An Empirical Examination

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This paper examines the role of performance plans in mitigating managers' short-term decision orientation and risk-averse behavior. With capital expenditure levels as a proxy for long-term decision orientation, the study uses regression analysis to examine a period of eight years surrounding the adoption of a performance plan.

The results indicate a greater post-adoption increase in capital expenditures for adopting than for non-adopting firms. Two moderating factors, investment opportunity set and internally generated cash, are found to be important; performance plans appear to align capital expenditures with the availability of investment opportunities and internal cash. Performance plan adoption decreases total and systematic risk, however, indicating that managers of adopting firms may become more risk-averse.

Background

The separation of ownership from management creates agency problems in corporations, as managers may not always act in the best interests of the stockholders. Two specific agency problems are the horizon problem and the risk-aversion problem (Baiman, 1990). Because managers are not sure about their duration of employment with the corporation, they may be inclined to adopt a short-term decision horizon and maximize current period performance. Because shareholder wealth maximization is more closely linked to corporate long-term profitability than to short-term profitability, however, owners of the corporation would prefer that managers adopt a long-term decision horizon. The risk-aversion problem arises when managers are paid only a fixed salary and management performance is not tied to the performance of the company. Fixed salaries may motivate managers to prefer safe projects because they expect no incremental benefit from the success of risky projects but could lose their jobs if such projects fail. Owners of the corporation would

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prefer managers to be less risk-averse and to accept projects with greater risk, and correspondingly greater expected payoff, to increase shareholder wealth.

To alleviate the above agency problems and to better align the interests of owners and managers, corporations adopt a wide variety of executive compensation plans. Performance plans, which were introduced around 1972 (Kumar and Sopariwala, 1992), are designed to avoid many of the pitfalls inherent in bonus and stock option plans. Performance plans lengthen the managers' decision horizon by rewarding them on the achievement of certain accounting-based measures over a period ranging from three to six years rather than on current annual performance (Kumar and Sopariwala, 1992; Enis, 1993). Performance plans can be of two types: performance unit plan or performance share plan. Under a performance unit plan, executives are allocated a certain number of units of a fixed dollar value at the start of the award period. The executives compensation is determined at the end of the award period based on the number of units earned multiplied by the fixed dollar value per unit. The number of units earned depends on the extent to which the executive achieves the performance plan goal. Performance share plans differ from unit plans in that the executive is allocated a certain number of shares at the beginning of the award period. Executive compensation is determined at the end of the award period based on the value of the shares at the end of the award period. The fact that performance plan compensation usually is deferred until the end of the assessment period and forfeited if the manager leaves the organization during the period specified further serves to lengthen the manager's decision-making horizon.

Performance plans also have option-like characteristics because the participating manager's payoff has a lower bound of zero and increases as the performance measure exceeds some predetermined target. This may lessen the risk-aversion agency problem by reducing a risk-averse manager's motivation to reject variance-increasing projects.

While political, industrial, and economic factors beyond the manager's control influence stock prices, accounting-based corporate performance measures are less noisy indicators of managerial actions. Some researchers have favored the use of accounting measures such as earnings per share (EPS), return on assets (ROA), and return on equity (ROE) as they may be more accurate performance measures (Ely, 1991). This "makes an accounting-based performance plan an attractive alternative to a stock option plan ..."(Gaver, 1992, 140).[1]

Despite continuing research on executive compensation packages and their role in mitigating agency problems, designing an incentive compensation package that creates a complete commonality of interest between the principal (shareholder) and the agent (manager) remains an elusive goal. Because of the relative advantages and

[1] Performance plans have certain shortcomings, however. Kaplan and Atkinson (1989) note that managerial actions such as overproduction and switching depreciation methods could increase short-term accounting income but not be in the best interests of stockholders.

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disadvantages of any single executive compensation plan, corporations typically use more than one plan in their compensation packages. As research on the effects of performance plans is limited and has yielded conflicting results, further research is warranted.

Past Empirical Research

Several studies have examined the effect of performance plan adoption on management decision-making behavior, yielding conflicting results. Because adding performance plans to the existing executive compensation package increases the long-term component, they are expected to reduce management emphasis on short-term decisions and motivate management to explore new long-term investment opportunities.

One signal that management has changed their orientation toward long-term decisions is an increase in capital expenditure levels. In general, decreases in capital expenditure signal a short-term managerial orientation, while increases are positive signals of future earnings and cash flows (Lev and Thiagarajan, 1993). Prior studies have hypothesized that performance plan adoption should result in higher capital expenditures, as managers have an incentive to accept positive NPV projects with positive cash flows in the later years. (Larcker, 1983; Gaver and Gaver, 1993).

Results on the relationship between performance plan adoption and capital expenditure levels are inconclusive. Larcker (1983) and Jenkins and Seiler (1990) find a positive association between the adoption of performance plans and the level of capital expenditures. On the other hand, Sopariwala[2] (1985), Enis (1993), and Gaver and Gaver (1993) report no significant association.

The conflicting findings may result from small sample sizes, omitted variables, and imperfect matching. Arora and Alam (1999) use a sample size of 21 firms that adopted performance plans from 1988 to 1993. Larcker (1983) uses a matched pair sample of 25 adopting and 25 nonadopting corporations, while Sopariwala (1985) uses 47 matched-pairs. The omission of important variables, such as the investment opportunity set and the availability of internal cash, also may be a reason for the conflicting results, and matching of corporations may not successfully control for these variables.

Investment Opportunity Set

While adoption of a performance plan should result in greater capital expenditures, this may not hold for all corporations. The investment opportunity set available to a corporation may be a moderating factor in the association between plan adoption and subsequent capital expenditure levels. An increase in capital

[2] Although Sopariwala's main focus is research and development expenditures, he performed additional tests on capital expenditures and showed consistency.

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expenditure levels in the absence of positive investment opportunities may not enhance the accounting measures used to assess management performance. Only managers of corporations with large investment opportunity sets will be motivated to make substantial capital expenditures to improve accounting measures of performance. John and Mishra (1990) find that the effect of capital investment announcements is negative for corporations with small investment opportunity sets and positive for those with large sets.

Tobin's q has frequently been used as a proxy for the investment opportunities available to a firm (Jensen, 1986; Lang *et al.*, 1991; Akhigbe and Harikumar, 1995). Lindenberg and Ross (1981) introduce a more theoretically correct model for the computation of q. The calculation of q is costly, however, in terms of both data requirements and computational effort. Chung and Pruitt (1994) introduce the approximate q as an alternative to the Lindenberg and Ross's q, showing that it is highly correlated[3] with q and represents a good compromise between accuracy and computational effort.

Availability of Internal Cash

The availability of internal cash also may moderate the association between the adoption of performance plans and capital expenditure levels. The pecking order theory (Myers, 1984; Myers and Majluf, 1984; Griner and Gordon, 1995) suggests that because internal funds are the cheapest source of financing available to a corporation, corporations will use internal funds first, then debt, and finally stock issues. Thus, corporations that use the cost of internally generated funds as the discount rate in evaluating the profitability of projects will be more likely to accept projects that might be rejected based on a more expensive source of financing—and thus be more likely to have greater capital expenditure levels.

Changes in Managers' Risk Behavior

The option-like characteristics of performance plans may motivate participating managers to shift into higher risk investment projects, reducing the risk-aversion problem (Larcker, 1983). Lambert and Larcker (1985) and Lambert and Verrecchia (1991), however, argue that the option pricing model's assumption that executives can diversify the risk associated with the option's payoff may not always hold true. If managers cannot diversify their risk, and they perceive a high probability that performance will exceed the minimum level prescribed by the performance plan, then plan adoption actually may make them more risk-averse. Gaver and Gaver (1993)

[3] Chung and Pruitt (1994) conduct a ten-year cross-sectional comparison of Lindenberg and Ross's q and the approximate q. Their regression results indicate a minimum R^2 of 96.6 percent, indicating that the approximate q is a more than adequate substitute for Lindenberg and Ross's q.

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suggest that the relationship between performance plan adoption and managers' risk attitudes is ambiguous, and they make no directional predictions in their study. Using changes in asset betas as indicator, they conclude that adopting corporations tend subsequently to shift into less risky investment projects. Although they posit the explanation that managers might adopt "cautious investment strategies to protect what they view as virtually certain payoffs from the performance plan" (p. 154), they refute this argument by a comparison of the Value Line predictions of EPS, target EPS of the performance plan, and actual EPS. Thus, the impact of performance plan adoption on changes in risk attitudes of managers remains unclear and is an empirical issue.

Summary of Past Empirical Research

The research on the role of performance plans in mitigating the agency problems of horizon and risk-aversion has yielded mixed results. Previous studies of the impact of performance plans on managers' decision horizon (and subsequent capital investment) have controlled for size, industry classification, and fiscal year end, but have been limited by small sample sizes, omitted variables, and imperfect matching. In particular, the investment opportunity set of the corporation and the availability of internal cash flow, potential determinants of capital investment, should be included as control variables. With respect to effect of performance plan adoption and changes in risk attitudes of managers, research has been limited to one study that has produced mixed results (Gaver and Gaver, 1993).

Research Objective

Given the inconclusive results of earlier studies, we first reexamine the association between the adoption of performance plans and capital expenditure levels. We use a more recent and larger cross-section of data than do earlier studies, while controlling the investment opportunity set and the availability of internal cash. In addition, we use a regression approach in lieu of matching, which has been suggested as a possible reason for the conflicting results of earlier studies. Second, we examine the effect of performance plan adoption on the risk-averse behavior of managers. This behavior is reflected in both systematic and unsystematic risk of the firm.

Research Design

This study reexamines whether performance plan adoption results in managers' adopting a long-term decision horizon, followed by increased capital expenditure levels. To examine the consistency with the results obtained by Larcker (1983), Sopariwala (1985), and Jenkins and Seiler (1990), we begin by using a benchmark equation to examine whether performance plan adoption results in increased capital

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expenditure levels, controlling only for corporation size and capital intensity.[4] This leads to the following hypothesis:

H1: Corporations adopting performance plans experience higher capital expenditure levels in the period following plan adoption than do nonadopting corporations, controlling for corporation size and capital intensity.

Any finding of a positive association between performance plan adoption and capital expenditure levels will be explored further to see whether the association persists after controlling for other variables known to influence capital expenditure levels, i.e. investment opportunities and internal cash. Thus, the second and third hypotheses are as follows:

H2: Corporations adopting performance plans experience higher capital expenditure levels in the period following plan adoption than do nonadopting corporations, controlling for corporation size, capital intensity, and the investment opportunity set available to the corporation.

H3: Corporations adopting performance plans experience higher capital expenditure levels in the period following plan adoption than do nonadopting corporations, controlling for corporation size, capital intensity, the investment opportunity set, and the internal cash flow available to the corporation.

Because the *a priori* impact of performance plan adoption on managers' risk behavior is ambiguous, our hypothesis regarding the nature of risk shift in the post-adoption period is nondirectional.

H4: The average riskiness of the corporation as a result of investment projects undertaken changes in the period following plan adoption.

Data and Sample Selection

Fortune 1000 firms adopting performance plans during the period 1981 to 1991 are included in the sample. For a corporation to be retained in the sample, data on capital expenditures, sales, total debt, total assets, operating income, total income taxes, interest expense, and dividends had to be available for the nine-year period beginning four years prior to plan adoption and continuing four years after adoption.

[4] Gaver and Gaver (1993) report that industrial classifications influence the level of capital spending. Here, capital intensity is used to control for differences in capital investment levels as a result of industry classification.

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Following Gaver and Gaver (1993), we exclude financial institutions, which do not report capital expenditures.

During this time period, a total of 191 firms adopted performance plans. Sixty-five were eliminated for the following reasons: 39 were financial institutions and did not report capital expenditures, eight were not first-time adopters, and 18 had incomplete information available from Compustat for the eight-year period surrounding the performance plan adoption. From the population of the Fortune 1000 firms, we randomly selected an equal number of firms (126) that had not adopted a performance plan during the entire 11-year test period.

A total of 41 different industry groups appear in the sample, with the largest concentration being manufacturing. The many different industries represented and the fact that both adopting and nonadopting firms are spread fairly evenly across the different industry groups add confidence that the results are not driven by differences in industry representation. Consistent with Larcker (1983) and Gaver and Gaver (1993), the number of adopting firms shows an increasing trend over the 11-year period (Table 1).[5] Performance plan data were obtained from the compensation consulting agency Executive Compensation Reports.

Table 1—Number of Adopting Firms By Year

Year	Adopting Firms
1981	7
1982	9
1983	4
1984	9
1985	9
1986	9
1987	16
1988	14
1989	15
1990	19
1991	15
TOTAL	126

Measurement of Variables

Table 2 summarizes the independent and dependent variables, all of which except ADOPT were obtained from the Compustat database. Sales are used as a proxy for corporation size.[6] Capital intensity for the industry is the industry ratio of

[5] Only nine of the 191 firms that adopted performance plans during the 11-year period 1981-1991 subsequently discontinued these plans, which implies that the majority of the adopting firms were satisfied with the results achieved.

[6] Because most performance plan adopters are larger than nonadopting firms, size is employed as a control variable. Earlier studies have controlled for firm size by using asset-size (Gaver, Gaver, and Battistel, 1992) or the amount of sales (Sopariwala, 1985).

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Table 2—Definitions of Variables

Name	Code	Description
Panel A: Independent Variables:		
Sales	SALES	Net sales computed as gross sales reduced by cash discounts, trade discounts, and returned sales and allowances (Compustat data item number 12). Used as a proxy for corporation size.
Capital Intensity	CAPINT	Industry ratio of property, plant, and equipment to total assets. Used as a proxy to control for differences in the need for capital expenditures across industries.
Investment Opportunity Set	IOS	Approximate Tobin's q (see text) used as a proxy.
Internal Cash	INTCASH	Internally generated funds available to a corporation (see text).
Adoption Status	ADOPT	Dummy Variable: 1 if adopting a performance plan, 0 if not adopting.
Panel B: Dependent Variables		
Capital Expenditures	CAPEXP	Amount spent for the construction of property, plant, and equipment (Compustat data Item # 30), divided by sales as a control for corporation size.
Risk	RISK	Standard deviation (total risk) and beta estimates (systematic risk) used as proxies to measure shifts in riskiness of investment projects undertaken.

net property, plant, and equipment to total assets (Griner and Gordon, 1995). It is used to control for differences in the need for capital expenditures between industries.

The dependent variable is capital expenditures, deflated by (divided by) sales to control for corporation size, for each of the four years preceding and four years following plan adoption. Capital expenditures is the annual amount of expenditures for the construction and/or acquisition of property, plant, and equipment (Compustat annual data item number 30).

As a proxy for investment opportunity set, we use approximate q, measured as follows:

$$\text{Approximate } q = (MVE + PS + DEBT)/TA$$

where:

MVE = The market value of equity, computed as the product of a corporation's share price and the number of shares outstanding;

PS = The liquidating value of the corporation's outstanding preferred stock;

DEBT = The value of the corporation's short-term liabilities net of its short-term assets, plus the book value of the corporation's long-term debt;

TA = The book value of the total assets of the corporation.

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Our measure of the internal cash flow available to a corporation is the one used by Lehn and Poulsen (1989), Lang, Stulz, and Walking (1991), and Griner and Gordon (1995) and is computed as follows:[7]

$$INTCASH = INC - TAX - INTEXP - PFDIV - COMDIV$$

where:

INC = Operating income before depreciation (Compustat item 13);
TAX = Total income taxes (Compustat item 16 minus the change in the deferred taxes from the previous year to the current year [change in Compustat item 35]);
INTEXP = Gross interest expense on short and long-term debt (Compustat item # 15);
PFDIV = Total amount of preferred dividend requirement on cumulative preferred stock and dividends paid on noncumulative preferred stock (Compustat item # 19); and
COMDIV = Total dollar amount of dividends declared on common stock (Compustat item # 21).

The change in riskiness of the investment decisions is computed as the changes in the standard deviation of monthly stock returns of the corporation (total risk) and the changes in movement of the corporation's monthly stock returns in relation to those of the market (systematic risk). Systematic risk is estimated using the market model. The risk measures are estimated for the four years before and after performance plan adoption.

Results

Because the three hypotheses about capital expenditures are related, we test them by stepwise regression. The full regression equation is as follows:

$$\begin{aligned}\log CAPEXP_{ij} = {} & \beta_0 + \beta_1 ADOPT + \beta_2 SALES_i + \beta_3 ADOPT*SALES_i \\ & + \beta_4 CAPINT_i + \beta_5 ADOPT*CAPINT_i + \beta_6 IOS_i \\ & + \beta_7 ADOPT*IOS_i + \beta_8 INTCASH_i \\ & + \beta_9 ADOPT*INTCASH_i + \varepsilon_{ij} \qquad (1)\end{aligned}$$

where:

i = The corporation, 1, … n, and;
j = The year, -4, … +4.

For an adopting corporation, where ADOPT = 1, equation (1) reduces to

$$\begin{aligned}\log CAPEXP_{ij} = {} & \beta_0 + \beta_1 + (\beta_2 + \beta_3) SALES_i + (\beta_4 + \beta_5) CAPINT \\ & + (\beta_6 + \beta_7) IOS_i + (\beta_8 + \beta_9) INTCASH_i + \varepsilon_{ij} \qquad \ldots (1a)\end{aligned}$$

For a nonadopting firm, where ADOPT = 0, equation (1) reduces to

[7] This measure is used, rather than the SFAS 95 cash flow, as it adjusts for imminent cash payments for dividends.

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$$\log (CAPEXP_{ij}) = \beta_0 + \beta_2 SALES_i + \beta_4 CAPINT_i + \beta_6 IOS_i + \beta_8 INTCASH_i + \varepsilon_{ij} \quad \ldots (1b)$$

Capital expenditures (CAPEXP) is deflated by sales as an additional control for size, following Larcker (1983) and Gaver and Gaver (1993). Then, the log of this ratio is taken to transform the data to a normal distribution, as indicated by the Kolmogorov-Smirnov test for normality.

Hypothesis 1 is tested by entering ADOPT, SALES, ADOPT*SALES, CAPINT, and ADOPT*CAPINT. Hypothesis 2 is tested by additionally entering IOS and ADOPT*IOS, and Hypothesis 3 is tested by further entering INTCASH and ADOPT*INTCASH.

Hypothesis 1 examines whether corporations adopting performance plans experience a greater capital expenditures in the period following performance plan adoption than do nonadopting corporations, controlling for corporation size and industry classification. The F-statistics indicate that the model is significant in all but the first of the eight years (Table 3). Adjusted-R^2 ranges from a low of 0.008 (year -4) to a high of 0.09 (year +4). In each of the eight years, the residuals are uncorrelated.[8]

The coefficient of ADOPT, β_1, is positive and significant in each of the eight years, indicating that adopting firms have a significantly greater capital expenditure level than do nonadopting firms. While the level already is greater among adopting firms before the adoption, the t-Statistics in the post-adoption period for this variable indicates an increasing level of significance. This provides limited evidence of a post-adoption increase in capital expenditures for adopting firms. These results are consistent with the findings of Gaver and Gaver (1993), but are less compelling than those of Larcker (1983).

The coefficient of CAPINT, β_4, is positive and significant in all years, indicating that capital expenditures are positively correlated to the industry's level of capital intensity. A negative coefficient β_5 means that the effect of capital intensity is moderated for adopting firms [because this negative coefficient is added to β_4 as shown in equation (1a)]. β_5 is negative and significant in the three years immediately preceding performance plan adoption, but not significant in three of the four years following adoption. This indicates that the adopting firms have capital expenditure levels that are less driven by the industry capital intensity level than do nonadopting firms in the pre-adoption period. After adoption however, they are similar to the nonadopting firms. This shift provides evidence that performance plans may be adopted to motivate managers to increase capital expenditure levels in line with the investment opportunities available to them and that these plans are successful in achieving this objective.

[8] The Durbin-Watson d statistic ranged from a low of 1.87 (year -3) to a high of 2.13 (Year +2). A Durbin-Watson d statistic ≈ 2 if the residuals are uncorrelated.

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Table 3—Regression Results for Hypothesis 1

YEAR β_0	CONSTANT β_1	ADOPT β_2	SALES β_3	SALES*ADOPT β_4	CAPINT β_5	CAPINT*ADOPT	ADJ. R^2	F (p)
-4	-15.97	1.32	0.14	-0.29	2.09	-0.56	0.008	1.39
	(.00)**	(.09)*	(.45)	(.39)	(.02)**	(.29)		(.22)
-3	-16.61	1.92	0.43	-0.48	3.12	-1.25	0.025	2.31
	(.00)**	(.03)**	(.34)	(.32)	(.00)**	(.10)*		(.04)**
-2	-17.22	2.66	0.25	-0.24	4.07	-1.92	0.053	3.81
	(.00)**	(.00)**	(.40)	(.41)	(.00)**	(.03)**		(.00)**
-1	-17.88	1.71	-0.80	0.74	4.55	-1.43	0.070	4.79
	(.00)**	(.05)**	(.21)	(.23)	(.00)**	(.08)*		(.00)**
+1	-17.15	1.70	0.10	-0.20	3.87	-0.82	0.056	4.00
	(.00)**	(.05)**	(.46)	(.42)	(.00)**	(.21)		(.00)**
+2	-16.98	1.93	-0.08	-0.15	3.92	-0.98	0.059	4.13
	(.00)**	(.03)**	(.47)	(.44)	(.00)**	(.17)		(.00)**
+3	-17.67	2.20	0.08	-0.10	3.73	-0.96	0.065	4.48
	(.00)**	(.01)**	(.47)	(.46)	(.00)**	(.17)		(.00)**
+4	-19.12	2.88	-0.20	-0.45	4.70	-1.57	0.090	5.96
	(.00)**	(.00)**	(.43)	(.33)	(.00)**	(.06)*		(.00)**

Notes: The first line represents the t-statistic and the number in parentheses represents the one-tailed p-value
* Significant at a 0.10 level
** Significant at a 0.05 level

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Hypothesis 2 examines whether adopting corporations experience a greater capital expenditures in the period following adoption than do nonadopting corporations, controlling for corporation size, industry classification, and the investment opportunity set available to the firm. The F-statistics indicate that the model is highly significant in all but the first of the eight years (Table 4). Adjusted R^2 ranges from a low of 0.019 (year -4) to a high of 0.086 (year +4) and is higher than for the regressions to test Hypothesis 1 for every year except +1 and +4. Thus, the additional variable, investment opportunity set, contributes explanatory power. The residuals again are uncorrelated in each of the eight years. (Durbin-Watson statistics range from 1.91 to 2.16.)

Consistent with the test of Hypothesis 1, the results indicate that while a significantly greater capital expenditure level is evident among adopting firms before adoption of a performance plan, the increasing significance of the t-statistic for β_1 following adoption provides some evidence that adopting firms do increase the level of capital expenditures relative to level of capital expenditures of nonadopting firms in the post-adoption period. The coefficients of CAPINT and CAPINT*ADOPT are consistent with the pattern seen in the test of Hypothesis 1.

The IOS variable is not significant in seven of the eight years examined. The interaction of IOS with the status of the firm, however, is negative and significant in the two years immediately preceding performance plan adoption. This negative interaction indicates that firms adopting performance plans have *not* been raising capital expenditure levels consistent with the opportunities available to them, relative to the capital expenditure levels of nonadopting firms. In the post-adoption period, however, this interaction is not significant, indicating that plan adoption may have aligned capital expenditures levels with the investment opportunities.

Hypothesis 3 examines whether adopting corporations experience greater capital expenditures in the post-adoption period than do nonadopting corporations, controlling for corporation size, industry classification, the investment opportunity set available to the firm, and the internal cash available to the firm.

The F-statistics indicate that the model is highly significant in each year (Table 5). Adjusted R^2 ranges from a low of 0.055 (year -4) to a high of 0.127 (year +4) and is higher in each of the eight years than for the regressions to test Hypothesis 2, indicating that the internal cash variable contributes additional explanatory power. The Durbin-Watson d statistic ranges from a low of 1.95 to a high of 2.17, indicating that the residuals are uncorrelated in each of the eight years.

The coefficients again are consistent with the results for Hypotheses 1 and 2. INTCASH shows a significant positive coefficient in each of the eight years, indicating that the availability of internal cash is positively related to the level of capital expenditures. This is consistent with the findings of Griner and Gordon (1995) and indicates that earlier researchers' models that did not control for this variable may be misspecified. The interaction between the internal cash available to a firm and the

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Table 4—Regression Results for Hypothesis 2

YEAR	CONSTANT β_0	ADOPT β_1	SALES β_2	SALES *ADOPT β_3	CAPINT β_4	CAPINT *ADOPT β_5	IOS β_6	IOS*ADOPT β_7	ADJUSTED R^2	F (p)
-4	-15.62	1.32	0.16	-0.25	2.36	-0.80	-2.01	0.03	0.019	1.69
	(.00)**	(.09)*	(.43)	(.49)	(.01)**	(.21)	(.02)**	(.48)		(.11)
-3	-16.37	2.24	0.27	-0.38	3.24	-1.49	-1.03	-1.18	0.033	2.26
	(.00)**	(.01)**	(.39)	(.36)	(.00)**	(.07)*	(.16)	(.12)		(.03)**
-2	-17.05	3.10	0.13	-0.18	4.17	-2.20	-0.81	-1.66	0.066	3.53
	(.00)**	(.00)**	(.45)	(.43)	(.00)**	(.01)**	(.21)	(.05)**		(.00)**
-1	-17.74	2.15	-0.81	0.71	4.53	-1.61	-0.12	-1.63	0.075	3.93
	(.00)**	(.01)**	(.21)	(.24)	(.00)**	(.06)*	(.45)	(.05)**		(.00)**
+1	-16.88	1.87	0.01	-0.14	3.90	-0.96	-0.57	-0.72	0.054	3.05
	(.00)**	(.03)**	(.49)	(.44)	(.00)**	(.17)	(.29)	(.24)		(.00)**
+2	-16.67	2.08	-0.24	-0.15	4.04	-1.18	-1.13	-0.63	0.061	3.34
	(.00)**	(.02)**	(.41)	(.49)	(.00)**	(.12)	(.13)	(.27)		(.00)**
+3	-17.33	2.25	-0.11	0.06	3.86	-1.14	-1.25	-0.35	0.067	3.55
	(.00)**	(.01)**	(.46)	(.48)	(.00)**	(.13)	(.11)	(.36)		(.00)**
+4	-18.90	3.04	0.20	-0.47	4.64	-1.66	0.06	-0.97	0.086	4.39
	(.00)**	(.00)**	(.42)	(.32)	(.00)**	(.05)**	(.48)	(.17)		(.00)**

Notes: The first line represents the t-statistic and the number in parentheses represents the one-tailed p-value

* Significant at a 0.10 level

** Significant at a 0.05 level

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Table 5—Regression Results for Hypothesis 3

Year	CONSTANT β_0	ADOPT β_1	SALES β_2	SALES* ADOPT β_3	CAPINT β_4	CAPINT* ADOPT β_5	IOS β_6	IOS* ADOPT β_7	INTCASH β_8	INTCASH* ADOPT β_9	ADJ. R^2	F (p)
-4	-16.09	1.05	-1.59	0.48	2.38	-0.22	-1.96	0.01	2.42-	1.33	0.055	2.63
	(.00)**	(.15)	(.06)*	(.32)	(.01)**	(.42)	(.03)**	(.49)	(.01)**	(.09)*		(.01)**
-3	-16.84	2.05	-1.31	0.41	3.28	-0.99	-0.96	-1.22	2.55	-1.59	0.066	2.97
	(.00)**	(.02)**	(.09)*	(.34)	(.00)**	(.16)	(.17)	(.11)	(.00)**	(.06)*		(.00)**
-2	-17.61	3.07	-1.73	1.04	4.22	-1.83	-0.72-	1.72	3.04	-2.28	0.100	4.08
	(.00)**	(.00)**	(.04)**	(.15)	(.00)**	(.03)**	(.24)	(.04)**	(.00)**	(.01)**		(.00)**
-1	-18.33	2.01	-2.43	1.48	4.61	-1.13	-0.03	-1.69	2.94	-1.98	0.113	4.54
	(.00)**	(.02)**	(.01)**	(.07)*	(.00)**	(.13)	(.49)	(.05)**	(.00)**	(.03)**		(.00)**
+1	-17.58	1.82	-2.02	1.14	3.98	-0.54	-0.47-	0.77	3.37	-2.46	0.099	4.06
	(.00)**	(.04)**	(.02)**	(.13)	(.00)**	(.30)	(.32)	(.22)	(.00)**	(.00)**		(.00)**
+2	-17.22	1.95	-1.93	0.93	4.10	-0.72	-1.05	-0.67	2.88	-1.96	0.096	3.98
	(.00)**	(.03)**	(.03)**	(.18)	(.00)**	(.24)	(.15)	(.25)	(.00)**	(.03)**		(.00)**
+3	-17.85	2.19	-1.80	1.10	3.91	-0.77	-1.18	-0.39	2.86	-2.09	0.097	3.99
	(.00)**	(.02)**	(.04)**	(.13)	(.00)**	(.22)	(.12)	(.35)	(.02)**	(.02)**		(.00)**
+4	-19.54	2.84	-1.57	0.44	4.72	-1.11	-0.16-	1.01	2.89	-1.83	0.127	5.02
	(.00)**	(.00)**	(.06)*	(.33)	(.00)**	(.14)	(.44)	(.16)	(.00)**	(.04)**		(.00)**

Notes: The first line represents the t-statistic and the number in parentheses represents the one-tailed p-value
* Significant at a 0.10 level
** Significant at a 0.05 level

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status of the firm (INTCASH*ADOPT) is negative and significant in the two years immediately preceding performance plan adoption. Thus, adopting firms were not increasing capital expenditures proportionate to the internal cash available to them. This condition may have been an additional incentive, combined with the misalignment between investment opportunities and capital expenditures, for the adoption of a performance plan. While this interaction variable continues to be significant and negative in the post-adoption period, the t-statistic does indicate a decreasing trend, providing some evidence that performance plans motivate managers to increase capital expenditure levels in line with internal cash availability.

Hypothesis 4 states that the riskiness of the firm changes as a result of investment projects undertaken following performance plan adoption and is tested in two ways: by the changes in the standard deviation of monthly stock returns of the corporation (total risk) and by the changes in movement of the corporation's monthly stock returns in relation to those of the market (systematic risk, beta, estimated using the market model).

Because the risk variables examined (standard deviation and beta) do not meet the distributional assumptions of parametric tests, we present median values and apply the nonparametric Mann-Whitney U test and the Wilcoxon signed rank test. The tests of Hypothesis 4 appear in Table 6 (standard deviation) and Table 7 (beta).

Table 6—Test of Hypothesis 4, Standard Deviation (Total Risk)

Comparison	Z-Statistic	p-Value (two-tailed)
Panel A: Adopting vs. Nonadopting (Mann-Whitney U-Test)		
Pre-Adoption Period	-1.592	0.111
Post-Adoption Period	-1.768	0.077*
Panel B: Pre-Adoption to Post-Adoption (Wilcoxon Signed Rank Test)		
Adopting Firms	3.380	0.001**
Nonadopting Firms	3.100	0.002**

* Significant at a 0.10 level
** Significant at a 0.05 level

In the pre-adoption period no significant difference in either risk metric appears between adopting and nonadopting corporations. Nonadopting firms, however, show significantly greater post-adoption risk in both categories than do adopting firms. Both adopting and nonadopting firms experienced significant reductions in total risk from the pre-adoption to the post-adoption period. Only adopting firms experienced a significant reduction in systematic risk from the pre-adoption period to the post-adoption period.[9]

[9] The decrease in total risk for both adopting and nonadopting firms is difficult to explain. The shift in systematic risk is a more valid and reliable measure of risk than total risk, as it is firm specific.

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Table 7—Test of Hypothesis 4, Beta (Systematic) Risk

Comparison	Z-Statistic	p-Value (2-tailed)
Panel A: Adopting vs. Nonadopting (Mann-Whitney U-Test)		
Pre-Adoption Period	-0.092	0.927
Post-Adoption Period	-2.121	0.034**
Panel B: Pre-Adoption to Post-Adoption Period (Wilcoxon Signed Rank Test)		
Adopting Firms	1.728	0.084*
Nonadopting Firms	0.874	0.382

* Significant at a 0.10 level
** Significant at a 0.05 level

These findings may indicate that firms tend to shift into less risky investment projects following performance plan adoption. These results are consistent with the Gaver and Gaver (1993) and Lewellen *et al.* (1988) findings, but are contrary to Larcker's (1983) speculation that managers of firms adopting performance plans may shift into higher risk investment projects due to the option-like characteristics of performance plans. Larcker does, however, also suggest that a post-adoption *reduction* in risk may occur if managers perceive performance targets as easy to achieve and thus adopt a cautious investment strategy to protect virtually certain payoffs.

Summary

The purpose of this study was to examine the role of performance plans in mitigating the agency problems of managers' short-term decision orientation and risk-averse behavior. Earlier research on these topics has yielded mixed results. This may have been due to one or a combination of several factors, including small sample sizes, omission of certain important variables, and imperfect matching.

This study uses a substantially larger sample of 126 adopting and 126 nonadopting firms compared to the relatively smaller samples used by some earlier studies. It also controls for the effect of the investment opportunity set and the availability of internal cash, two important variables that have been shown to have an effect on capital expenditure spending by firms. In addition, this study uses a regression approach to obviate the matching problem.

The results provide limited evidence of an increase in post-adoption capital expenditures for firms adopting performance plans relative to nonadopting firms; they are consistent with those of Gaver and Gaver (1993) but are not as strong as those of Larcker (1983).

Capital intensity, a proxy for differences in the need for capital expenditure among different industries, is positive and significant in all years, indicating that capital expenditure levels are positively correlated to the industry's level of capital intensity. The interaction between capital intensity and plan adoption in the pre-adoption period provides evidence that adopting firms have capital expenditure levels less consistent with the industry needs than do nonadopting firms. This interaction is not significant in the post-adoption period, indicating that adopting

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firms have increased capital expenditure levels in line with those of nonadopting firms. Thus, performance plans may be adopted, with some success, to prompt managers to adopt a long-term decision horizon.

Similarly, the significant interaction of the investment opportunity set with plan adoption in the two years immediately preceding performance plan adoption indicates that firms adopting performance plans had not been raising capital expenditure levels consistent with the investment opportunities available to them, relative to nonadopting firms. In the post-adoption period, this interaction is not significant, indicating that performance plan adoption may have been successful in aligning capital expenditure levels with the investment opportunities. Recognition of a failure to increase capital expenditures may have been an incentive for these firms to adopt performance plans and motivate managers.

The results also identify availability of internal cash as an important determinant of capital expenditure levels, indicating that misspecified models may have affected the results of earlier research that did not control for this variable. The interaction of internal cash with plan adoption was negative and significant in the two years immediately preceding performance plan adoption, indicating that adopting firms had not been increasing capital expenditures proportionately with an increase in the internal cash available to them. Recognition of this failure, combined with the misalignment between investment opportunities and capital expenditures, may have been an additional incentive for the adoption of a performance plan. While this interaction variable continues to be significant and negative in the post-adoption period, the declining statistical significance provides some evidence that the performance plans were successful.

In the pre-adoption period, adopting and nonadopting firms do not differ on either of the risk measures employed, total risk and systematic risk. Adopting firms, however, have a significantly *lower* post-adoption level of both risk measures than do non-adopting firms, indicating that managers of adopting firms may become more risk-averse in the post-adoption period. This is contrary to Larcker's (1983) speculation that performance plans, because of their option-like characteristics, should motivate managers to undertake riskier investments. Larcker does note, however, that managers may grow more risk-averse if they perceive performance targets as easy and attempt to protect virtually certain payoffs. Gaver and Gaver (1993) achieve similar results using a different measure, asset beta.

Contributions

Considerable evidence in the literature indicates that executive compensation plans help to reduce agency costs. On a practical level, the findings of this study are of interest to both corporate managers, who design and implement executive compensation plans, and shareholders, who are interested in maximizing firm value.

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The association between executive compensation plans and management behavior has long been of concern to accounting researchers. If the use of accounting-based measures as a basis of performance evaluation affects a manager's decision-making, obtaining empirical evidence of this association is an issue that warrants further investigation. Studies investigating the role of performance plans in mitigating agency problems have yielded mixed results. This study reexamines the effects of performance plan adoption on the decision-making behavior of managers, attempting to eliminate some of the weaknesses of the earlier, inconclusive studies.

While this study does not look at the direct impact of performance plan adoption on the value of the corporation, it does find that the adoption of performance plans results in increased levels of capital expenditures. McConnell and Muscarella (1985) find that increases in capital expenditure levels are associated with significant positive excess stock returns, while decreases are associated with significant negative excess stock returns. They interpret their results as evidence that managers seek to maximize the value of the corporation when making capital expenditure decisions. If increases in capital expenditure levels are related to the value of a corporation, then empirically examining the determinants of capital investment levels is an issue of considerable interest to accountants and managers.

Limitations

One of the limitations of this study is that the use of a binary dummy variable for the status of a firm, adopting or nonadopting, ignores the *amount* of potential reward available from the achievement of performance plan measures. Taking into consideration the proportion of compensation derived from performance plans to total compensation might lead to improved construct validity and greater statistical power. Most firms adopting performance plans already have existing stock-option plans and short-term bonus plans. If the compensation of a manager derived from a bonus plan is sufficiently larger than that from the performance plan, the manager may have an insufficient incentive to adopt a long-term decision horizon. On the other hand, if much of the manager's total compensation is derived from a stock-option plan and managers already have adopted a long-term decision-horizon, the addition of a performance plan may add little incentive.

A second limitation, inherent in all empirical studies of this nature, is the self-selection bias. The adopting and nonadopting firms self-select into the two groups, perhaps as a result of different characteristics between the two groups.

A third limitation is that the study ignores tax considerations. Because the money paid to managers for performance plan achievement is tax-deductible, some authors have argued that performance plans are adopted strictly for tax advantages rather than to reduce the misalignment of interests between managers and shareholders. To the extent that this is true, it is difficult to attribute the benefits stemming form the adoption of a performance plan to the incentives of the plan. Smith and

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Watts (1982), however, argue that similar tax advantages can be obtained by using less complex compensation contracts. Moreover, Larcker (1983) states that the tax advantage is likely to be small and unlikely to be the sole reason why firms adopt these plans.

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Appendix A
Descriptive Statistics of Variables for Adopting Firms

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
SALES[a]	6143.38	2321.8	12830.17	209.84	79557
CAPINT[b]	0.0687	0.0639	0.0289	0.0001	0.1790
APP.Q[c]	3.057	1.7887	4.1186	0.0871	30.652
INTCASH[d]	329.945	128.515	775.01	-1710.85	6054
CAPEXP -4[e]	0.1018	0.0757	0.0943	0.0131	0.6330
CAPEXP -3	0.1008	0.0758	0.0889	0.0092	0.5769
CAPEXP -2	0.1065	0.0750	0.0954	0.0099	0.5369
CAPEXP -1	0.0937	0.0714	0.0763	0.0084	0.5463
CAPEXP +1	0.1166	0.0626	0.2069	0.0067	2.1065
CAPEXP +2	0.1016	0.0626	0.1001	0.0079	0.5477
CAPEXP +3	0.1035	0.0665	0.1196	0.0082	1.0228
CAPEXP +4	0.0945	0.0585	0.0838	0.0064	0.5319

[a] Sales during event year reported in millions
[b] Capital intensity during event year computed as the industry ratio of PP&E divided by total assets
[c] Approximate q ratio used as a proxy for the investment opportunity set available to the firm during event year
[d] Internal cash available to a firm during event year, reported in millions
[e] Capital expenditure represents the amount spent on property, plant, and equipment divided by sales. -4 represents the fourth year before adoption

Appendix B
Descriptive Statistics of Variables for Nonadopting Firms

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
SALES[a]	3325.58	2126.26	3873.62	26.377	27496
CAPINT[b]	0.0836	0.0772	0.0392	0.0048	0.2744
APP. Q[c]	4.691	2.0631	9.249	0.0592	64.332
INTCASH[d]	169.368	86.695	216.716	-167.086	1122
CAPEXP -4[e]	0.1028	0.0566	0.1150	0.0107	0.5298
CAPEXP -3	0.1031	0.0657	0.1094	0.0069	0.4933
CAPEXP -2	0.1071	0.0629	0.1204	0.0045	0.7227
CAPEXP -1	0.1016	0.0641	0.1019	0.0056	0.4194
CAPEXP +1	0.0966	0.0636	0.1100	0.0058	0.6935
CAPEXP +2	0.1062	0.0562	0.1681	0.0042	1.5157
CAPEXP +3	0.0879	0.0612	0.0933	0.0027	0.5147
CAPEXP +4	0.0896	0.0566	0.1300	0.0024	1.1508

[a] Sales during event year reported in millions
[b] Capital intensity during event year computed as the industry ratio of PP&E divided by total assets
[c] Approximate q ratio used as a proxy for the investment opportunity set available to the firm during event year
[d] Internal cash available to a firm during event year, reported in millions
[e] Capital expenditure represents the amount spent on property, plant, and equipment divided by sales. -4 represents the fourth year before adoption

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