INCENTIVE EFFECTS AND MANAGERIAL COMPENSATION CONTRACTS: A STUDY OF PERFORMANCE PLAN ADOPTIONS.

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The University of Arizona   PH.D.   1987

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INCENTIVE EFFECTS AND MANAGERIAL COMPENSATION CONTRACTS:

A STUDY OF PERFORMANCE PLAN ADOPTIONS

by

Jennifer Jane Gaver

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A Dissertation Submitted to the

COMMITTEE ON BUSINESS ADMINISTRATION

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

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THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the Final Examination Committee, we certify that we have read

the dissertation prepared by ___Jennifer Jane Gaver_____

entitled ___Incentive Effects and Managerial Compensation Contracts: A_____

___Study of Performance Plan Adoptions_____

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and recommend that it be accepted as fulfilling the dissertation requirement

for the Degree of ___Doctor of Philosophy_____.

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ACKNOWLEDGMENTS

I am deeply indebted to Professor Dan Dhaliwal for having been my advisor and teacher during my course of study at the University of Arizona. He served as the chairman of my dissertation committee and patiently guided me through the preparation of this manuscript. I will always be grateful for his intellectual stimulation, encouragement and friendship.

Another advisor and friend also had a large role in this effort, and that is my husband Ken. A complete recounting of all of his contributions would require more space than that of the entire text. Suffice it to say that without his thoughtful comments, boundless programming expertise, econometric savvy and extreme patience, this dissertation may never have been completed. Ken's unselfish encouragement and support has been unwavering. He is and always will be my dearest friend and I dedicate this dissertation to him.

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ABSTRACT

This study provides evidence concerning the endogenous determination of managerial compensation contracts. To avoid the confounding effect of tax considerations, we limit our attention to the choice among long-term nonqualified incentive plans. Specifically, we consider a two-part decision faced by the firm: (1) whether to add an accounting-based "performance plan" to the existing portfolio of compensation contracts and (2) if the firm adopts a plan, the choice between a "relative" or an "absolute" performance measure.

Based on some behavioral implications of performance plans which distinguish them from alternative contracts, we develop hypotheses which relate the adoption and design of a performance plan to the firm's general incentive contracting environment. We test these hypotheses using a choice-based sample, evenly divided between performance plan adopters and nonadopters. For the purposes of parameter estimation, we use the multinomial logit model to reflect the qualitative, hierarchical nature of the decision setting. Our results indicate that variables which proxy for the incentive environment can explain which firms will adopt a performance plan, and also the type of performance measure used by the adopting firms.

CHAPTER 1

INTRODUCTION

1.1 Background and Problem Statement

The ability to attract and retain top professional managers is
crucial to the survival of all firms. To this end, the design of
managerial compensation contracts is of central importance. Recently,
there has been a great deal of interest in managerial compensation
issues, both in the popular press and in more scholarly arenas. Despite
burgeoning research efforts in this area, however, the forces underlying
the determination of managerial compensation contracts are still not
well understood.

To date, most empirical studies of executive compensation have
assumed that the contract is determined exogenously. These studies then
examine the effect of the contract on managerial behavior. Examples
include Healy (1985), who considers the relationship between parameters
of the bonus plan and the accounting choices made by managers, Larcker
(1983b), in which the effect of performance plan adoption on managerial
investment decisions is examined, and Larcker and Balkcom (1984), who
study the effects of the compensation contract on managerial selection
of mergers.

This "partial equilibrium" approach to the study of executive
compensation is justified on the grounds that a general theory of
contracting has not yet been developed. This general theory would

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assume that compensation contracts are endogenously determined; arising simultaneously with other major policy decisions of the firm. Although a fully articulated theory of contracting does not yet exist, two nonmutually exclusive hypotheses have evolved in the accounting literature which may provide some insight into the endogenous determination of compensation contracts. One hypothesis is that managerial pay packages are designed to provide incentives to managers to maximize the value of the firm. The other posits that tax considerations determine the structure of compensation contracts. According to this view, a compensation package is optimal if it minimizes the joint tax liability of the manager and the firm.

Distinguishing aspects of compensation agreements that are tax motivated from those that arise from incentive considerations, however, is complicated by what Miller and Scholes (1982) term the "identification problem." That is, the two hypotheses frequently make identical predictions concerning the structure of the contract in a given setting. The confounding interaction of tax and incentive effects is a major obstacle to understanding the process by which compensation contracts actually arise.

Unambiguous evidence concerning the explanatory power of either the "tax minimization hypothesis" or the "incentive alignment hypothesis" would be a useful first step in understanding the general determination of compensation contracts. A clear delineation of incentive effects, however, requires that tax considerations be held constant (and vice-versa). For example, Hite and Long (1982) provide evidence that compensation contracts are amended in response to changes

in the tax code. They document shifts between the use of qualified
options and nonqualified alternative plans after the Tax Reform Act of
1969 altered the tax treatment of options. This study highlights the
importance of controlling for changes in the tax environment when
testing implications of the incentive alignment hypothesis.

Most executive pay packages consist of multiple components,
including fixed salary, short-term bonuses, long-term incentive
compensation and deferred benefits. We argue that by restricting
attention to the long-term incentive portion of the contract, it is
possible to analyze incentive effects separately from tax influences.
This is because the choice among most long-term plans is a "tax neutral"
decision. From a tax perspective, all long-term plans are either
"qualified" (subject to capital gains treatment) or "nonqualified"
(taxed as ordinary income). The only long-term plan subject to capital
gains treatment is a qualified stock option plan. All other long-term
plans provide remuneration which is taxed as ordinary income. During
the Seventies, the tax environment uniformly favored the use of
nonqualified plans. Because these plans receive identical tax
treatment, the tax hypothesis makes no prediction concerning the
specific nonqualified plan that will be adopted by a firm in a given
setting.

Two alternative explanations for the cross-sectional diversity in
nonqualified long-term plans are possible. The first is suggested by
Miller (1977): the variation in plans represents "...neutral mutations
that serve no function, but do no harm." Alternatively, the cross-
sectional variation may be explained by the incentive alignment

hypothesis. That is, differences in underlying firm characteristics may lead to variations in the particular long-term contract perceived as optimal in providing incentives for managers to maximize firm value.

A simple dichotomous classification of long-term plans is based on the performance measure used: stock price or accounting numbers. (See Appendix A for a description of commonly used long-term plans.) Most long-term plans are based on market performance measures; an exception is a "performance plan" which has goals stated in terms of accounting results. Performance plans are a relatively new development in managerial compensation, with the first plans adopted in 1971. Larcker (1983b) reports a positive security market reaction to the announcement of a performance plan adoption. Yet in 1980, only 37% of the 200 largest U.S. industrial firms had adopted such a plan. (Kimball (1980).) Presumably, the nonadopting firms felt that modifying compensation contracts to include performance plans was either a zero or a negative net present value proposition. One possibility is that the plans did not convey the proper incentive effects in the contracting environment of these firms, or the incentive benefits were too small to justify the costs involved in renegotiating the contract.

This study seeks to address two related research questions. First, with tax influences held constant, can performance plan adoption be explained by incentive effects? That is, can variables used to proxy for the firm's incentive-contracting environment explain which firms will adopt performance plans? Second, given that a firm has adopted a performance plan, can incentive arguments explain the choice of a relative versus an absolute performance measure? With a relative

performance measure, individual firm results are compared to industry averages, rather than an absolute standard. Although firms use differing performance measures in their performance plans, all can be classified as either relative or absolute.

If we answer our research questions affirmatively, our study will provide evidence that compensation contracts are not simply neutral mutations, but do seem to address incentive problems faced by the firm. This would suggest that incentive effects have a significant role in our much sought after "theory of contracting." Clear evidence of this kind, unclouded by tax effects, has not been provided by earlier researchers and is the principal contribution that we hope for from the study.

1.2 Relevance to Accounting

Recently, a considerable amount of accounting research has been devoted to the study of the economic consequences of voluntary and mandatory changes in accounting techniques. (See Holthausen and Leftwich (1983) for a review of this literature.) Economic consequences theories rely on cross-sectional differences in contracting and monitoring costs to explain differential security market reactions to the announcement of an accounting change. As described by Holthausen and Leftwich, the existence of contracting and monitoring costs implies that changes in accounting rules have real wealth effects because they alter, not only the accounting numbers, but the distribution of the firm's expected cash flows and/or the claims of various parties to those cash flows.

In the economic consequences literature, the firm's contracts provide the causal link between the accounting system and firm value. Specifically, researchers have emphasized the importance of managerial compensation plans for understanding the relationship between executive decision making and security market performance. (See, for example, Larcker and Johnson (1981).) If mandatory changes in accounting methods reduce expected payments from compensation plans, managers may alter production, investment and financing decisions in an attempt to offset the effect of the rule change. These decisions may have a significant effect on the firm's cash flows.

In order to make valid predictions concerning the effect of mandatory changes in accounting techniques on managerial behavior and consequent changes in firm value, more must be learned about the incentive effects of compensation contracts. Knowledge of why firms voluntarily adopt specific plans may provide some insight into the potential impact of changes in the contracting environment. This should be of considerable interest to accounting regulators concerned about the economic consequences of their pronouncements.

The study of the endogenous determination of compensation contracts forces us to confront issues that extend beyond the realm of the "traditional" accounting model. Compensation policy is a strategy variable, which must be considered simultaneously with other major policy decisions made by the firm. However, the interdisciplinary flavor of our study has certain benefits. This is noted by Holthausen and Leftwich (1983) who write:

> Developing and testing economic consequence theories forces accounting researchers to confront unsolved issues in finance, political science and organization theory. Witness, for example, the current empirical investigations of management compensation contracts and lending agreements. Some of this research will prove useful to researchers in other areas. (p. 79)

We argue that any progress made towards a "theory of contracting" must involve this kind of interdisciplinary perspective. Given the role of accounting numbers in the contracting process, progress of this kind should be particularly important to accountants.

1.3 Organization of the Paper

The remainder of the paper is organized as follows. Chapter 2 provides an overview of our current state of knowledge concerning the incentive effects of compensation contracts and why firms voluntarily adopt certain types of contracts. In this chapter, we describe the incentive alignment hypothesis, outline the results of empirical tests of the hypothesis and suggest deficiencies in our knowledge that our study is designed to address. Chapter 3 describes four hypotheses which are testable implications of the incentive alignment hypothesis. These hypotheses relate performance plan adoption and design to variables which proxy for the firm's incentive-contracting environment. In Chapter 4, we provide operational definitions of our independent variables and identify our data sources. Chapter 5 describes our sample selection techniques and testing methodology. In Chapter 6 we summarize the results of the study. Finally, we offer some concluding comments in Chapter 7.

CHAPTER 2

PRIOR RESEARCH

We argue above that an understanding of the determination of
compensation contracts is crucial for accounting policy makers.
Specifically, in order to make valid predictions about the effect of
mandatory changes in accounting techniques on managerial behavior and
consequent changes in firm value, more must be learned about the
incentive effects of compensation contracts. This chapter provides an
overview of our current state of knowledge concerning these incentive
effects and why firms voluntarily adopt certain types of compensation
agreements. We describe the incentive alignment hypothesis, outline the
results of empirical tests of the hypothesis and suggest deficiencies in
our knowledge that our study is designed to address.

2.1 The Incentive Alignment Hypothesis

As described in the previous section, two nonmutually exclusive
hypotheses have been suggested by accounting researchers to explain the
cross-sectional diversity in managerial compensation contracts. Our
study focuses on the testable implications of the incentive alignment
hypothesis, which posits that compensation contracts are designed to
provide incentives to managers to maximize the value of the firm. In an
attempt to avoid confounding effects, the study is designed to hold tax
influences constant. Thus, the implications of the tax minimization
hypothesis are not directly considered.

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The incentive alignment hypothesis has its roots in agency theory. Two distinct formulations of the agency relationship have been proposed. Holmstrom (1979) and Shavell (1979), for example, describe the determination of optimal employment contracts between a risk-neutral capital supplier (the principal) and a risk and effort-averse provider of labor (the agent). The principal's problem is to design a compensation contract for the agent that will induce him or her to select the action that maximizes the principal's utility. It is assumed that the principal has perfect knowledge of the agent's preferences and beliefs. The agent's remuneration, specified by the compensation contract, may be based on any variables that are jointly observable by both principal and agent. These may include the outcome of the productive process (which depends on both the agent's action and the realization of a random state of nature), the agent's action, or any information available about the agent's action.

Demski and Feltham (1978) show that in situations in which the agent's action is costly to observe, efficient contracts will balance risk-sharing and incentive properties. That is, efficient contracts will impose some risk on the agent in order to provide the proper incentives for effort. The implication is that compensation will be at least partially based on "outcome." Outcome can be defined as stock price, or some accounting measure of performance. Further, equivalent incentives for effort at the lowest imposition of risk can be obtained by selecting performance measures which are relatively informative concerning the agent's action. This is desirable from the principal's perspective because risk averse agents will demand higher levels of

compensation as the uncertainty associated with their performance measure increases.

Compensation contracts which provide the proper incentives for effort at the lowest level of risk can take several forms. One means of reducing the riskiness of the contract is to include multiple compensation components based on a variety of performance measures. Holmstrom (1979) argues that contracting on multiple signals is beneficial if no one signal is a sufficient summary of all information available about the manager's action. In other words, multiple performance measures are more "informative" concerning the manager's action than any single measure considered individually. This may explain why most compensation contracts are actually packages of several kinds of remuneration. The riskiness of the entire package is reduced by combining a variety of compensation components into a portfolio.

A second method of risk reduction involves the use of "relative performance evaluation." Holmstrom (1982) shows that when other agents' outputs provide information about the actions of the agent under evaluation, their outputs will be used in his or her evaluation. This is a variation on the idea that there are gains from contracting on multiple signals. Instead of including multiple performance measures in the contract, however, relative performance evaluation considers information relating to multiple agents.

An alternative formulation of the agency relationship is provided by Jensen and Meckling (1976). Like Shavell and Holmstrom, they argue that a divergence of interests between principal and agent arises as a result of differing attitudes towards effort and risk. This leads to a

consideration of contracts which limit the agent's ability to take actions which differ from those preferred by the principal. Their analysis does not require the principal to have perfect knowledge of the agent's preferences. It does assume, however, that contracting takes place in capital and labor markets characterized by rational expectations.

In this setting, outside shareholders (the principals) anticipate the manager's (or agent's) self-serving behavior and reduce the amount that they will pay for shares accordingly. The shareholders are thus "price-protected," and the manager bears the full cost of his or her opportunistic behavior. This cost takes the form of the reduced market value of the manager's own equity shares, and/or a reduction in the wage rate he or she can command in external labor markets. Consequently, it is the manager who has an incentive to propose a contract to shareholders wherein the opportunistic behavior is limited. Thus, in Jensen and Meckling's analysis the compensation agreement is suggested by the agent, rather than the principal. Holmstrom and Shavell assume that the principal has sole responsibility for the selection of the employment contract.

Despite differing assumptions concerning the contracting process, both formulations of the agency problem suggest that some form of binding agreement between managers and shareholders is required to minimize the net costs of their divergent interests.[1] Smith and Watts

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1. Fama (1980) has argued that the conflict of interests between owners and managers is eliminated because efficient labor and capital

(1982) extend these ideas by making predictions concerning the structure of such contracts. One of their insights is that the use of fixed salary and deferred compensation may cause the manager to behave like a creditor of the firm, rejecting positive NPV projects that increase the volatility of the firm's cash flows. To reduce the manager's risk aversion, compensation components with positive incentives to increase variability will be offered. These involve plans with option characteristics, such as stock options or stock appreciation rights (SAR's). Compensation related to a stock option or SAR is an increasing function of the variability of the firm's stock price, which tends to overcome the manager's tendency to select low variance projects.

In summary, the incentive alignment hypothesis is based on agency theory, which describes the conflict of interest which may arise between the owners of the firm and its professional managers. The hypothesis predicts that some form of contracting between owners and managers will occur in order to minimize the net costs of these divergent interests. Specifically, compensation contracts will be designed to provide incentives to managers to take actions which maximize shareholder wealth. This suggests that firms facing varying degrees and kinds of incentive problems will select differing contracts. For example, the incentive-contracting environment of the firm may influence the type of performance measure perceived as optimal for determining executive

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markets discipline managers to pursue firm value maximization. If this argument is correct, costly contracts between owners and managers designed to mitigate conflicting interests would not be observed.

remuneration. Thus, the incentive alignment hypothesis may explain why some rirms adopt performance plans, while others choose to rely solely on market-based forms of compensation.

2.2 Empirical Tests of the Incentive Alignment Hypothesis

Empirical tests or the incentive alignment hypothesis have taken three rorms. In general, the empirical results have supported the hypothesis. One group or researchers has considered the relationship between levels of executive remuneration and corporate performance measures. They conclude that executives who pursue firm value maximization are rewarded with higher levels of total compensation. A second group considers the relationship between individual components of the contract and managerial decision making. They report that managerial behavior appears to be influenced by the incentives provided by compensation agreements. A third group tests the ability of the incentive alignment hypothesis to explain the structure of managerial compensation contracts. Their results indicate that contract design is related to underlying firm attributes. We now briefly review the findings of these three groups of studies.

2.2.1 Studies or the Level of Managerial Compensation

Masson (1971), Murphy (1985) and Coughlan and Schmidt (1985) generally conclude that there is a significant positive relationship between total managerial compensation and firm performance, defined in terms or both snareholder return and sales growth. However, Masson observes that compensation packages often penalize executives who emphasize sales growth at the expense of stock price performance. That

is, in settings where sales maximization is inconsistent with firm value maximization, contracts are designed to encourage value maximization. This is contrary to the predictions of the once widely accepted "sales maximization hypothesis" proposed by Baumol (1967) and is consistent with the incentive alignment hypothesis. In each of these studies, the dependent variable is the present value of all forms of compensation awarded to the manager, with no attempt to distinguish between various components of the contract.

2.2.2 Studies of the Relationship Between Individual Contract Components and Managerial Behavior

The general conclusion of these studies is that managers respond to the incentives provided by their compensation contracts. This is reflected in their selection of discretionary accounting accruals (Healy (1985)), consumption of perquisites (Larcker (1983a)), capital investment decisions (Larcker (1983b)), and selection of mergers (Benston (1985)). Further, there is evidence that these managerial decisions directly affect shareholder wealth (Larcker (1983b)).

Healy (1985) considers the relationship between parameters of the bonus plan and the accounting choices made by managers. He reports that managers select discretionary accounting procedures and accruals to maximize their expected bonuses. Although this study is not intended as a direct test of the incentive alignment hypothesis, the implication is that annual bonuses by themselves may not induce managers to pursue firm value maximization.

More direct evidence concerning the incentive effects of bonus plans is provided by Larcker (1983a), who examines the relationship

between bonus plan adoptions and executive expenditure decisions for a group or commercial banks. Larcker finds that subsequent to the adoption of a bonus plan, bank managers tend to reduce discretionary expenditures. He argues that managers decrease discretionary expenditures ("perquisites") when they are given a bonus in addition to their fixed salary because the bonus increases the proportion of the cost which they must bear. This is consistent with the incentive alignment hypothesis because decreased consumption of perquisites is in the interest of the firm's shareholders.

In a subsequent study, Larcker (1983b) reports that the adoption of a performance plan is associated with increased capital investment and a positive security market reaction. He suggests two reasons for this. First, the performance plan may lengthen the decision making horizon of the manager, making him or her less sensitive to the short-term effects of investment projects. Second, the option nature of the plan[2] may induce risk averse managers to take on projects with more variable cash flows than would be acceptable in the absence of the plan. Shareholders seem to benefit from this increased investment, as evidenced by the positive security market reaction. The implication is that performance plans are adopted for their desirable incentive effects.

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2. In a later paper (Larcker and Balkcom (1984)), Larcker notes that "short-term bonus contracts frequently place an upper bound on the bonus...and performance plans typically have a maximum payout...This ceiling limits the ability of accounting contracts to operate as an option" (p. 40).

Benston (1985) takes a slightly different view of the components of executive compensation. Rather than restricting his attention to currently received remuneration, he considers the _cumulative_ effect of managerial equity holdings on merger decisions. Because managerial equity holdings are only one aspect of total compensation, this study is similar to others which analyze the effects of individual components of the contract on managerial behavior.

Some researchers have argued that managers of conglomerate firms select mergers that yield increased remuneration to themselves at the expense of shareholder wealth. (See, for example, Reid (1968).) Benston, however, finds that although managers may only hold a small percentage of total firm shares outstanding, these holdings often provide personal gains or losses that far exceed their alternative forms of remuneration. Similar findings are reported by Lewellen, Loderer and Rosenfeld (1985) and Agrawal and Mandelker (1985). Thus, when considering the incentive effects of the compensation contracts in force during a given year, it is important to control for the cumulative influence of managerial equity holdings.

2.2.3 Studies of the Ability of the Incentive Alignment Hypothesis to Explain Contract Structure

These studies relate the structure of the compensation contract to underlying firm attributes. Their results suggest that contract design is influenced by variables such as the investment opportunity set (Smith and Watts (1984, 1986)), the demands of external labor markets and concurrent changes in corporate strategy (Larcker and Johnson (1981)). In addition, there seems to be a distinction between firms

which use relative versus absolute performance measures in their
performance plans (Antle and Smith (1986)). In tests of associations
between contract design and firm variables, reported significance levels
are generally low. Despite this, these studies constitute commendable
first attempts to analyze the endogenous determination of compensation
contracts.

Smith and Watts (1984) argue that the characteristics of the
firm's investment opportunity set determine its choice of contracts.
Following Myers (1977), they assume that a firm's total assets consist
primarily of either "growth opportunities" or "assets in place." Firms
in regulated industries are assumed to have a large proportion of assets
in place; all others are classified as growth firms. They report that
growth firms offer higher levels of compensation and use greater
proportions of incentive compensation (such as stock options) than firms
in regulated industries. These results are consistent with the
incentive alignment hypothesis. That is, high levels of compensation
and compensation components with option characteristics are necessary to
induce risk averse managers to take on value increasing projects with
variable cash flows.[3]

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3. Similar results are reported by Larcker and Balkcom (1984),
who study the relationship between contract structure and the investment
decisions made by managers. Their results indicate that managers who
receive a large percentage of their total remuneration in the form of
long-term, market-based components tend to select mergers which increase
the variability of the firm's cash flows. This paper is similar to the
second group of studies discussed, however, in that contract structure
is assumed to be given. Thus, Larcker and Balkcom do not consider how
specific agreements come into being.

In a subsequent study, Smith and Watts (1986) refine their measures of the investment opportunity set. They assume that growth firms are characterized by (1) a low ratio of book value of assets to total firm value, (2) a low ratio of annual depreciation charges to total firm value and (3) a high ratio of research and development charges to total firm value. When regulated firms are excluded from their sample, the results are similar to the 1984 study. That is, growth firms tend to offer high levels of compensation and high proportions of incentive compensation.

Larcker and Johnson (1981) suggest that underlying firm attributes influence the decision to add a performance plan to the firm's existing portfolio of compensation agreements. Specifically, performance plan adoption may be explained by the relative magnitude of incentive problems faced by the firm and/or the demands of external labor markets. In addition, performance plan adoption may be indicative of major strategy realignments undertaken by the firm. Although the variables selected to proxy for incentive and labor market effects are not found to be significantly related to the adoption of a performance plan, the authors admit that the power of their statistical tests to find an effect is reduced by the use of a small sample of firms. Another limitation of the study is its focus on adoptions in a single year, with little control for the contracts already in existence.[4]

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4. Larcker and Johnson use a dummy variable to indicate the presence/absence of alternative forms of long-term compensation (other than performance plans) as a control variable for contract structure.

Further, the relationship between corporate strategy changes and performance plan adoption is not analyzed.

Antle and Smith (1986) provide evidence that executives are often compensated "as if" they are evaluated relative to their peers. They argue that the use of relative performance evaluation improves the efficiency of contracts by shielding agents from common uncertainty. Thus, "relative" contracts provide equivalent incentives for effort at a lower imposition of risk than their "absolute" counterparts. An interesting finding of the study is that not all firms seem to use relative performance evaluation, despite the theoretical gain in efficiency. Antle and Smith recommend further research into the association between relative performance evaluation and characteristics of executives, firms and industries.

2.3 Expected Contribution of Our Study

In general, the empirical research described above has yielded results which are consistent with the incentive alignment hypothesis. First, there is evidence that managers who pursue firm value maximization are rewarded with higher levels of compensation. Second, individual components of the contract appear to encourage managers to take actions which maximize shareholder wealth. For example, performance plans seem to lengthen the decision making horizon of the manager, resulting in investment decisions which maximize the value of the firm. Newly adopted bonus plans reduce managerial consumption of perquisites, which is also in the shareholders' interest. Third,

analysis of the structure of compensation agreements suggests underlying firm attributes which may influence contract design.

Despite these advances, our understanding of the influence of incentive effects on the endogenous determination of compensation contracts is still very incomplete. We argued earlier that an understanding of the determination of compensation contracts is crucial for accounting policy makers. Specifically, in order to make valid predictions about the effect of mandatory changes in accounting techniques on managerial behavior and consequent changes in firm value, more must be learned about the incentive effects of compensation contracts. To date, our principal accomplishment along these lines has been to document the managerial response to _given_ contracts. This means that (assuming that the contract itself is fixed) we can make predictions about the managerial behavior which will ensue when changes in accounting policy alter the terms of the contract. However, given that compensation contracts are voluntarily adopted and altered, a more realistic assumption is that the contracts themselves will be changed in response to changes in the contracting environment. Thus, it is not enough to predict the managerial response to a given contract. We must learn more about why firms adopt specific contracts in the first place-- i.e. more about the endogenous determination of compensation agreements.

Studies which relate contract design to underlying firm attributes represent initial attempts to unravel the complicated process of contract determination. Unfortunately, the empirical results from these studies have not been dramatic. This may be because observed contracts are "neutral mutations," unrelated in any systematic way to

the characteristics of adopting firms. Alternatively, the ability of these studies to find systematic relationships may be hindered by experimental design flaws. Until these flaws are corrected, we can say very little about the influence of incentive effects on the determination of compensation contracts.

The purpose of our study is to provide direct evidence on this issue by correcting some of the design problems that have plagued earlier work. First, we focus on a specific type of contract adoption which is not influenced by tax effects. Thus, we avoid the identification problem described by Miller and Scholes. Second, we use firm data, rather than data aggregated at the industry level. Because of its ready accessibility, industry data is commonly used in earlier studies. However, Smith and Watts (1986) (who use industry data) admit that the use of firm-level data may lead to more powerful tests of hypotheses. Third, the power of our tests is further increased by using a larger sample size than is typical in previous studies. We analyze data from 112 firms; sample sizes under 20 are not uncommon in this literature, particularly in studies which use industry-level data. Fourth, we control for compensation contracts already in place at the time of performance plan adoption. Previous studies often ignore, or inadequately control for existing agreements. Finally, we consider performance plan adoption in the context of the firm's other major policy decisions. Although the importance of this approach is discussed by Smith and Watts (1984, 1986) and Larcker and Johnson (1981), our study represents an initial attempt to operationalize strategy variables.

Recall our two research questions. First, with tax influences held constant, can performance plan adoption be explained by incentive effects? That is, can variables used to proxy for the firm's incentive-contracting environment explain which firms will adopt performance plans? Second, given that a firm has adopted a performance plan, can incentive arguments explain the choice of a relative versus an absolute performance measure? If we can answer our research questions affirmatively, our study will provide evidence that compensation contracts are not simply neutral mutations, but do seem to address incentive problems faced by the firm. This would suggest that incentive effects have a significant role in our much sought after "theory of contracting." Clear evidence of this kind, unclouded by tax effects or the other experimental design problems described above, has not been provided by earlier researchers and is the principal contribution hoped for from our study.

CHAPTER 3

TESTABLE HYPOTHESES

In this chapter we describe four hypotheses concerning: (1) which firms will adopt performance plans (H_1 through H_3) and (2) the type of performance measure used, given that a plan is adopted (H_4). All are testable implications of the general incentive alignment hypothesis, and relate performance plan adoption and design to variables which proxy for the firm's incentive-contracting environment. These variables, and their related hypotheses, are admittedly coarse indicators of the incentive problems faced by the firm. However, given that our understanding of the endogenous determination of compensation contracts is only in the rudimentary stages, we consider this level of precision appropriate. As we gain more insight into the problem, variables and testable propositions can be refined accordingly. To begin the discussion, we describe our assumptions concerning the contracting environment. Then, we state and discuss each hypothesis. Finally, we suggest firm and contract related variables which must be controlled for in order to observe effects related to our hypotheses.

3.1 The Contracting Environment

Actors in the contracting process include all major claimants to the firm's cash flows: stockholders, bondholders and managers. We assume that managers are risk and effort averse maximizers of wealth, responsible for making production, investment, financing and accounting

policy decisions. Through his or her decision making function, the manager provides the behavioral link between the adoption of a performance plan and potential changes in firm value. We assume that compensation agreements are amended only when expected benefits exceed expected costs. If the adoption of a performance plan involves nontrivial costs to the firm, corresponding incentive benefits can be inferred.

We assume that managerial wealth consists of three components: human capital, fixed claims on the firm's cash flows, and variable claims, dependent on firm performance. The riskiness of this portfolio is not completely diversifiable, because these claims are largely nonmarketable. Although (as noted by Smith and Zimmerman (1976)) some diversification opportunities exist, they relate primarily to managerial stock holdings. Antle and Smith (1986) point out that there is less opportunity to hedge the risk associated with accounting-based plans than there is with stock options. Diversification of the risk associated with human capital is even more difficult. The result is that managers are underdiversified relative to their shareholders. Thus, we assume that they are sensitive to the risk characteristics of their compensation packages.

Finally, we assume that the firm's accounting numbers are positively, but not perfectly correlated with cash flows. This means that if managers compensated by performance plans attempt to manipulate accounting results, their actions will have a similar effect on cash flows.

3.2 Hypotheses

We now state and discuss our four central hypotheses. The first three relate performance plan adoption to strategic decisions made by the firm concerning financing and investment policy. Hypothesis four relates the choice of a performance measure to the degree of uncertainty in the adopting firm's industry.

H_1: _Ceteris paribus_, the probability of performance plan adoption is positively associated with the firm's financial leverage.

In Appendix B we show that, relative to market-based options, performance plans provide less incentive to increase the variability of the underlying performance measure. We provide an example which demonstrates that in many settings, performance plans motivate managers to increase the level and _decrease_ the variability of accounting numbers. This type of behavior may increase the value of highly levered firms by reducing the agency costs associated with debt financing.

The conflict of interest between competing claimants to the firm's cash flows has been widely discussed in the accounting and finance literatures. (See, for example, Jensen and Meckling (1976) and Holthausen and Leftwich (1983).) Typically, researchers have assumed that managers of a levered firm have incentives to take actions which transfer wealth from bondholders to stockholders. Bondholders anticipate these actions, however, and "price protect" themselves by demanding higher rates of return. As an alternative to price protection, provisions may be included in the debt contract which limit possible wealth transfers. This is in the stockholders' interests if

the benefits of reduced borrowing costs exceed the direct and opportunity costs of complying with the covenants.

Typical provisions of bond covenants are described by Smith and Warner (1979). In general, covenants prohibit four types of managerial behavior: (1) raising dividends by reducing investment, (2) issuing additional debt of the same or higher priority, (3) rejecting positive NPV projects if benefits accrue to bondholders and (4) substituting high for low variance projects. Most covenants restrict dividend and financing policy because investment decisions are prohibitively expensive to monitor.

Smith and Warner note that as the proportion of fixed claims in the firm's capital structure increases, so does the conflict between shareholders and bondholders. Thus, they argue that bonding activities will increase with financial leverage. Bond covenants, however, are only one form of bonding activity. Alternatively, the manager can accept a compensation contract which signals to the bondholders that he or she will act in their interests. Managers/shareholders will prefer the set of bonding activities which results in the lowest monitoring costs. Thus, a compensation agreement which bonds the manager to a particular investment strategy may dominate costly debt covenants designed for the same purpose.

We argue that performance plan adoption is a least cost method of shielding bondholders from "asset substitution" risk. The value of an award under a performance plan is often inversely related to the variability of accounting results. Assuming that accounting numbers and cash flows are positively correlated, a manager who accepts a

performance plan warrants to bondholders that he or she will not attempt to affect wealth transfers by substituting high for low variance investment projects. Smith and Warner argue that asset substitution risk is an increasing function of the amount of debt in the capital structure. Thus, the level of bonding activities to reduce this risk should increase with financial leverage. If performance plan adoption is a least cost bonding arrangement, the probability of performance plan adoption should therefore be an increasing function of leverage.

We have argued that the performance plan is proposed to the bondholders by an owner-manager as an efficient bonding arrangement. We can also imagine a scenario in which shareholders offer the contract to managers in order to induce value maximizing behavior which does not explicitly depend on the reactions of the bondholders. Even in this case, the probability of performance plan adoption increases with financial leverage.

As discussed by Dhaliwal (1980) and Smith and Warner (1979), actions taken that increase the level and/or decrease the volatility of accounting numbers may decrease the probability of violating bond covenants, which are commonly based on accounting results. Holthausen (1981) reports that highly levered firms are typically close to all of their covenant constraints. Thus, these firms may run a distinct risk of covenant violation and technical default. As argued by Leftwich (1981), managers raced with technical default can either modify production, investment and financing decisions, renegotiate the contract, redeem the debt, or default. Although managers will

presumably select the least cost alternative, all courses of action are expected to impose some costs on the firm.

In Appendix B, we show that performance plans motivate managers to increase the level and decrease the variability of accounting numbers. Thus, the adoption of a performance plan may decrease the probability of violating bond covenants. To the extent that the associated costs or technical default are avoided, this will increase the value of the firm. Thus, our earlier conclusion is unchanged: highly levered firms are more likely to adopt performance plans than firms with relatively little debt in their capital structure.

H_2 *Ceteris paribus*, the probability of performance plan adoption is positively related to concurrent strategy changes undertaken by the firm.

Larcker and Johnson (1981) suggest that a potential explanation of performance plan adoption is that the firm is undertaking a major strategy change and is concurrently restructuring its portfolio of compensation agreements. For example, they provide evidence that contract restructuring often occurs around the time of announcement of significant merger and acquisition activity. One reason that a performance plan *in particular* may be adopted when firms change strategy is suggested by Cook (1980). He argues that the popularity of performance plans stems from the "desire by companies to provide direct incentives for executives to achieve strategic business objectives" (p. 20). Thus, performance plans may be distinguished from alternative long-term contracts by their unique ability to explicitly tie compensation to "the key indicators of successful strategy change" (Larcker and Johnson, 1981, p. 13).

The implication of this is that through the choice of the performance measure, the corporation can maintain consistency between the goals of the strategy change and the incentives provided by the compensation contract. Firms contemplating a major strategy realignment may wish to focus executive attention on key strategy variables. If strategic goals can be stated in terms of accounting results, these firms are likely to adopt a performance plan.

Another reason why performance plans may be adopted by firms undergoing major strategy changes involves what Klein and Bawa (1976) call "estimation risk." When limited information is available about a security, investors may demand a premium for holding it. That is, the security will be priced to provide a return in excess of that implied by its systematic risk. Evidence of an estimation risk premium is provided by Barry and Brown (1984) who report that firms with short trading histories tend to experience excess (beta) risk adjusted rates of return on their common stock.

Estimation risk increases if investors become less certain of the firm's future cash flows. As noted by Collins, Roseff and Dhaliwal (1981), this can result if there is increased uncertainty concerning the investments available to the firm and/or which investments will be selected by managers. We argue that when firms announce major strategy changes, investor uncertainty concerning future investment decisions increases. Until more specific information becomes available concerning the impact of the change on production, investment and financing decisions, the price of the firm's stock may decline.

Managers of firms in this situation may prefer an accounting based
performance plan to compensation based on stock price.

H_3: Ceteris paribus, firms with diminishing investment
opportunities are more likely to adopt performance plans than
firms with an extensive investment opportunity set.

In H_2, we argue that performance plan adoption is related to
concurrent strategy changes undertaken by the firm. We do not specify
the kinds of strategies associated with adoption, only that a change in
strategy occurs. In H_3, we consider the compatibility of performance
plans with specific kinds of strategies pursued by the firm. "Strategy"
is a complex variable, involving production, investment, financing,
marketing and personnel decisions. We limit our attention to the
investment environment. Specifically, we argue that the characteristics
of the investment opportunity set influence the decision to adopt a
performance plan.

Management theorists (Buzzell, Gale and Sultan (1975),
Schoeffler, Buzzell and Heany (1974) and Hofer (1975)) suggest that
firms progress through distinct life-cycle phases. They argue that the
firm's optimal strategies depend on its current stage of development.
Thus, financing, production and investment policies that are optimal for
a start-up firm may differ considerably from those appropriate for a
mature firm. In order to motivate managers to pursue such distinct
strategies, it is reasonable to assume that compensation contracts would
vary according to the firm's developmental stage.

One indicator of the firm's stage of development may be the scope
or its investment opportunities. If this is true, optimal compensation
policies will vary according to the nature of the investment opportunity

set. (This is also argued by Smith and Watts (1984, 1986).) We
conjecture that newly emerging firms may face an extensive and untapped
menu of investment possibilities. It is likely that many of these
projects are based on new technologies and involve a high degree of
risk. In this setting, we argue that market-based options will be the
dominant form of compensation. At this stage in the firm's life-cycle,
continued growth is likely and market-based awards provide high expected
levels of compensation. Remuneration from market-based plans is also
relatively risky. However, it is possible that managers of these firms
are less sensitive to risk than their colleagues who elect to work for
more established companies. Also, as discussed in Appendix B, the
option nature of market-based plans encourages managers to focus on the
potential for upside gain, rather than the variability of the entire
distribution of possible outcomes.

As firms mature, their investment opportunity set may begin to
contract. The most profitable projects have probably already been
adopted, and those remaining may not be sufficient to maintain high
growth levels. In these firms, the prospect of continued stock price
appreciation (and expected levels of compensation from market-based
plans) is waning. In this case, the incremental benefit of adding more
stock options to the package is low. This is noted by Ellig (1983), who
writes

> [Although] options should be very attractive during the threshold
> phase ...Companies in these latter market stages should be
> seeking alternatives to stock options because investors are
> unlikely to push the market price of stock for such companies
> very aggressively. (p. 15)

We speculate that firms with declining investment opportunities will add

performance units rather than stock options to their compensation

agreements, because (1) the pay package will be more diversified, which

is attractive to risk averse managers and (2) the expected compensation

from the marginal performance unit exceeds the expected compensation

from the marginal stock option added to the package.

H_4: Ceteris paribus, firms operating in volatile industries will
use relative, rather than absolute performance measures in
their performance plans.

This hypothesis concerns the type of performance measure used,

given that a performance plan is adopted. As discussed previously,

although rirms use differing performance measures in their performance

plans, all can be classified as either relative or absolute. With a

relative performance measure, individual firm results are compared to

industry (or "peer company") averages, rather than an absolute standard.

An often cited reason for using relative performance measures

(see Bickford (1981)) is to remove uncertainty which is beyond the

manager's control. Defining firm performance in relation to industry

averages removes market and industry volatility; firm specific risk

remains. As argued by Demski and Feltham (1978), when the manager's

actions are costly to observe, some risk should be imposed on him or her

in order to provide the proper incentives for effort. However, risk

averse managers will require increasing levels of compensation in return

for bearing this risk. Holmstrom (1982) demonstrates that the

erficiency of a contract with an agent can be improved by incorporating

the performance of other agents exposed to similar risks. This gain in

erficiency results from the filtering of common uncertainty.

Performance plans which use relative performance measures reduce the

manager's exposure to systematic risk, while maintaining his or her
incentives for effort.

Following the development in Antle and Smith (1986), assume that
the outcome from the productive process for firm j is $x_j = a_j + S_j$,
where a_j is the agent's action and S_j represents the realization from a
random state of nature. When an absolute performance measure is used,
the award is conditioned on x_j and all of the risk associated with S_j is
imposed on the manager. We can decompose S_j into two parts: a common
component, I, and a firm-specific component, e_j. Thus, $S_j = b_j I + e_j$.

When random effects have a large influence on outcome, the use of
an absolute performance measure may impose more risk on the agent than
is necessary to achieve desired incentive results. In this setting, it
may be preferable to filter out the effects of common uncertainty by
using a relative performance measure. This means that the reward will
be based on the manager's action, a_j, and firm-specific risk, e_j. For
firms operating in "risky industries," factors beyond the manager's
control can significantly influence results. Thus, we argue that firms
in these industries will use relative, rather than absolute, performance
measures in their performance plans.

3.3 Control Variables

In this section, we describe firm and contract related variables
which must be controlled for in order to observe effects related to our
four main hypotheses. The expected relationship between each control
variable and performance plan adoption is stated in hypothesis form.

Hypotheses rive through seven relate adoption to variables intended to control ror the structure of the firm's existing portfolio of compensation agreements. We argue earlier in the paper that in order to obtain direct evidence concerning the relationship between contractual changes and the firm's incentive-contracting environment, this incremental approach is necessary. Hypothesis eight relates performance plan adoption to firm size.

H_5: *Ceteris paribus*, the probability of performance plan adoption at time (t) is negatively associated with the proportion of fixed claims in the compensation contract at time (t-1).

Smith and Watts (1982) argue that a manager compensated by fixed claims has an incentive to decrease the variability of the firm's cash flows. Although this increases the likelihood that cash flows will be sufficient to cover the manager's claim, it also results in a wealth transfer from shareholders to bondholders (and managers). Assuming that cash rlows and accounting numbers are positively correlated, this incentive may be reinforced by performance plans. Thus, we conjecture that any incremental change in a contract dominated by fixed claims is likely to involve market-based options, rather than performance units. Both performance units and market-based plans lengthen the manager's decision making horizon, thereby solving a major incentive problem associated with rixed claims. However, relative to performance units, stock options provide less incentive to decrease cash flow variability and thus will help to counteract--rather than reinforce--the dysfunctional incentive effects of fixed claim agreements.

H_6: *Ceteris paribus*, the probability of performance plan adoption at time (t) is positively associated with the proportion of market-based claims in the contract at time (t-1).

In certain settings, accounting and market-based plans provide competing incentives to the manager. Specifically, a market-based plan provides incentives to increase the variability of cash flows. Accounting-based plans often encourage the manager to decrease the variability of accounting numbers. Assuming that cash flows and accounting results are positively correlated, the incentives provided by each type of plan are in conflict. Thus, the addition of performance units to a compensation package already containing stock options will decrease the value of the options. However, we argue that as the proportion of market-based compensation increases, the marginal benefits of adding performance units will at some point exceed the marginal cost. The primary benefit of adding performance units to a contract dominated by stock options is that a more diversified pay package is created; the cost is the decreased value of the options. Thus, the likelihood of performance plan adoption increases with the proportion of market-based options already included in the contract.

A different perspective on this issue is taken by Larcker and Johnson. They argue that the addition of a performance plan may be unnecessary if incentive problems have already been controlled through other types of contractual relationships. In other words, a firm with an existing long-term compensation plan--stock options, for example--may have already solved its incentive problems with the existing contract and therefore has no need for a performance plan. This argument assumes, however, that (1) market-based plans and performance plans provide identical incentives to the manager and (2) the firm's incentive environment is static. As discussed above, performance plans and stock

options may not provide identical incentives. Further, it is likely
that the firm's incentive-contracting environment changes over time. As
the environment changes, new contractual forms may become optimal.
Thus, a firm with an existing stock option plan may at some point decide
that the addition of a performance plan to its executive compensation
package is necessary. As argued above, the likelihood of this event may
be an increasing function of the proportion of market-based options
already included in the contract.

> H_7: <u>Ceteris paribus</u>, the probability of performance plan adoption
> at time (t) is positively associated with managerial equity
> holdings at time (t-1).

This hypothesis is similar to H_6, but measures the <u>cumulative</u>
incentive effect of managerial equity holdings, rather than restricting
attention to current grants of market-based compensation. The results
of Benston (1985) indicate that it is important to control for
managerial equity holdings in their firms in order to obtain direct
evidence concerning the incentive effects of the compensation contract.

> H_8: <u>Ceteris paribus</u>, the probability of performance plan adoption
> is positively associated with firm size.

Surveys of the compensation practices of major U.S. firms (Fox
(1982), Mruk and Giardina (1977)) indicate that executives in large
firms tend to (1) receive higher levels of remuneration and (2) receive
a higher proportion of their total payment in the form of incentive
compensation. Further, Larcker and Balkcom (1984) report that large
firms are more likely to include performance plans in their compensation
contracts. One possible explanation of the observed relationship
between firm size and performance plan adoption is provided by Larcker

and Johnson (1981). That is, managerial actions may be difficult (and costly) to observe in large organizations. Compensation contracts in large firms will be designed to minimize this moral hazard problem, and may be more complex than those required by smaller firms with presumably lesser incentive problems. If the contractual agreements of large firms have a wider variety of provisions than those of smaller firms, they are more likely to include performance plans.

Irrespective of the validity of this argument, the empirical relationship between size and performance plan adoption suggests that at the very least an analysis of the decision to adopt a performance plan must control for firm size. Unlike Larcker and Johnson, we do not argue that the incentive alignment hypothesis implies a direct theoretical relationship between firm size and the decision to adopt a performance plan. However, we contend that in order to assess the direct effects of the variables described in H_1 through H_4, firm size must be held constant.

CHAPTER 4

DATA

In this chapter we provide operational definitions of our
independent variables and identify our data sources. Our four central
hypotheses specify three variables which relate to the adoption of a
performance plan (leverage, strategy changes and the investment
opportunity set) and a fourth which concerns the selection of a
performance measure, given that a plan is adopted (industry risk). To
observe these effects we control for firm size and characteristics of
existing compensation agreements. In this section, we discuss each of
these independent variables, specifying measurement techniques and data
sources.

4.1 Financial Leverage

We use two measures of the firm's financial leverage. Both are
calculated with data obtained from the Compustat annual industrial file.
The first leverage variable is the ratio of long term debt to total
assets. The second variable is the ratio of long term debt to
stockholders' equity. We use two proxies because we have no a priori
basis for specifying a unique functional form for the leverage variable.

4.2 Corporate Strategy Changes

Strategy change is a qualitative variable which takes on the
value of one if the firm is undergoing major strategy realignments, zero

otherwise. To code this variable, we apply "content analysis" to a three year time series of Value Line investment reports, centered on each sample year, for each of our sample firms. Content analysis, described by Holsti (1969), is a method of objectively recording the content of verbal messages. It is used by O'Keefe and Soloman (1985), for example, to assess managers' attitudes towards Statement No. 19 as reflected in their written comments to the FASB.

As discussed by O'Keefe and Soloman, content analysis involves defining a construct (which in our case is "strategy change") and then measuring the construct by systematically classifying references to it in a message (i.e. the Value Line reports). The most objective method of content analysis is to count the occurrence of specified references. Unfortunately, in many applications messages are sufficiently vague that shades of meaning must be incorporated into the coding scheme. This requires judgement on the part of the coder and lowers the objectivity of the measure. Value Line reports, however, do not greatly suffer from this kind of ambiguity. They are brief distillations of only the most essential facts concerning the firm. This allows us to objectively record the presence/absence of statements regarding strategic change.

In order to apply content analysis we first specify the types of verbal statements which, when included in a Value Line report, indicate strategic change. We begin by reading a random sample of 158 reports, published between 1971 and 1980. Firms from 55 industries are represented in this sample, with approximately three reports per industry. The purpose of this preliminary reading is to get a flavor for the type of information that is typically included the reports.

Thomas (1986) defines corporate strategy decisions as those which involve "the financial structure of the firm, allocation of capital among existing lines of business, diversification into new lines of business, and the acquisition or divestiture of business units" (p. 1). Based on this definition, and our familiarity with the typical content of Value Line reports, we list the following indicators of strategic change:

(1) entrance into new product markets

(2) announcement of a major acquisition program

(3) major divestitures of traditional lines of business

(4) industry reclassification by Value Line

(5) announcement of a major change in dividend or financing policies

(6) major changes in top management.

We assume that a firm is changing strategy if we find any occurrence of a statement on this list in its three year time series of Value Line reports.

4.3 The Investment Opportunity Set

Measurement of the firm's investment opportunity set is difficult because it is not directly observable. Further, there is no clear guidance from the accounting and finance literatures concerning appropriate proxy variables. Accordingly, we use a set of variables to measure the firm's investment opportunities, some qualitative and others more traditional quantitative measures. If the results from these variables converge, we will have increased confidence concerning the validity of our results. Churchill (1983) defines convergent validity

as "the confirmation of a relationship by independent measurement procedures" (p. 294). Given that we have an incomplete understanding of the elements of the investment opportunity set, we believe that this approach is necessary.

4.3.1 Qualitative Variables

We use content analysis to code two qualitative variables which represent the investment opportunity set. The first takes on the value of one if the firm's portfolio of profitable projects appears to be expanding. The second is coded one if the firm is beginning to exhaust its investment opportunity set. Our rules for classifying firms are based on our preliminary reading of Value Line investment reports (described above) and are listed in Table 1.

Evaluation of the investment opportunity set requires more judgment than the strategy change analysis described in the previous section. To code the strategy variable, we simply document the presence/absence of specific references to strategic change. Most Value Line reports, however, contain multiple references to information relevant to the firm's investment opportunities. We must judge whether these references, taken in their entirety, indicate growth or decline. For some firms, the information in the reports does not provide a strong signal in either direction. Our two dummy variables are designed, therefore, to capture "extreme" cases. When Value Line reports give no strong indication of the nature of the firm's investment opportunity set, the firm receives zero codings on both variables.

Our data includes the information used for the strategy analysis--a three year time series of _Value Line_ investment reports, centered on each sample year, for each of our sample firms. In addition to the investment reports, we also analyze _Value Line_ industry reports for the same time period. We include the industry reports in the analysis in order to provide a context for the firm-specific data in the investment reports.

4.3.2 Quantitative Variables

As quantitative measures of the investment opportunity set, we use variables suggested by Smith and Watts (1986). These variables are based on Myers' (1977) arguments that the firm's assets are primarily growth opportunities or assets in place, and are designed to measure the proportion of the firm's assets represented by intangible growth opportunities. We check the validity of these measures by examining the percentage change in investment outlays made by the firm in the following year. If these variables actually proxy for growth opportunities, they should be positively correlated with increased capital investment.

We use three ratios to measure the firm's growth opportunities: (1) book value of total assets to total firm value (2) depreciation charges to total firm value and (3) research and development charges to total firm value. Data for calculating these variables are obtained from the _Compustat_ annual industrial file. We define total firm value as the market value of equity plus the book value of current and long term debt. Total assets, depreciation charges and research and

TABLE 1

Content Analysis Rules for Coding the Investment Opportunity Set

I. Growth Indicators

1. Growth Industry.

   Value Line industry report indicates that demand is strong for products and is expected to increase in the future. Order backlogs, no excess capacity, stable or increasing prices.

2. Strong (or strengthening) competitive position within industry.

   Large or increasing market share, ability to set price, increasing profit margins.

3. Entrance into new product markets with high growth potential. Expansion of geographic markets for existing products.

4. Extensive outlays for R&D, exploration. New product innovations.

5. Significant expansion of plant capacity – planned or ongoing.

6. Growth through acquisition program.

II. Decline/Retrenchment Indicators

1. Declining industry.

   Value Line industry report indicates shrinking demand, soft prices, rising costs and inventory levels, intense competition and firms leaving industry.

2. Erosion of market share within industry.

3. Withdrawal from major markets, corporate restructuring.

4. Stringent cost cutting measures, layoffs.

5. Reduction of capital spending, R&D programs.

development expense are taken directly from _Compustat_. These ratios are measured at the end of the performance plan adoption year and proxy for the level of the firm's intangible investment opportunities at the time of adoption.

To validate our ex ante proxies for growth opportunities, we examine ex post measures of investment activity. Specifically, we calculate the percentage change in capital expenditures in the year following adoption. If our ratios actually measure growth opportunities, they should be positively associated with increased capital spending in the following period. We obtain capital expenditure data from _Compustat_.

4.4 Industry Risk

In hypothesis four, we argue that the choice between an absolute and relative performance measure depends on the riskiness of the firm's operating environment. When an absolute performance measure is used, the manager's award is conditioned on some (absolute) measure of outcome, which depends on both the manager's action and the realization of a random state of nature. The greater the influence of the random element, the riskier the manager's award. We argue that in very risky industries, the use of an absolute performance measure may impose more risk on the manager than is necessary to achieve desired incentive effects. Thus, it may be preferable to filter out the effects of common uncertainty by using a relative performance measure.

How should we measure industry risk? From the manager's perspective, the riskiness of his or her award depends on the

variability of the performance measure. Bickford (1981) reports that the most frequently used performance measures involve target levels of EPS or growth in EPS. This suggests that an appropriate measure of industry risk is earnings variability at the industry level.

We use industry operating income per share as our industry earnings variable. (We choose this definition, rather than industry EPS, to avoid the confounding effects of financing decisions.) Industry risk is the standard deviation of industry operating income per share. We calculate the standard deviation in the following way. First, for a five year time period, centered on the sample year, we calculate average operating income per share for each sample firm's industry.[5] We then calculate industry risk as the standard deviation of this five year time series of industry averages. We obtain our data from the annual industrial Compustat file, which identifies industrial groupings based on four digit SIC codes.

4.5 Control Variables

We argue that in order to observe the effects related to our main hypotheses, we must control for firm size and the firm's existing portfolio of compensation agreements. We measure firm size as total assets, which we obtain from Compustat. Information concerning the managerial compensation contracts of publicly-held corporations is disclosed in the annual proxy statement. Most of our proxy statements are obtained through direct written requests to sample firms. In cases

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5. Because our Compustat file ends in 1981, we use a four year time series (1978-1981) for the 1980 sample firms.

where proxies are unavailable from the firm, they are obtained either from the University of Washington library or Disclosure, Inc.

In Chapter 3, we specify three compensation related control variables: (1) the proportion of the manager's total compensation represented by fixed claims, (2) the proportion of total compensation represented by market-based claims and (3) the manager's total equity ownership in the firm. Because we wish to control for contracts in place, these variables are measured during the year preceding the sample year. (Hereafter we refer to this as year (t-1).) Further, we average these variables over the firm's three top paid executives.[6] These averages proxy for the "typical" compensation contract offered by the firm.

We use the following definitions in constructing our compensation variables. Fixed claims are the sum of salary and pension benefits earned during the year. Market-based claims are the average value of unexercised stock options at the end of year (t-1). Equity ownership is the market value of common shares held at year end. Each of these variables is expressed as a proportion of total compensation.[7] Total

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6. To determine the three top paid employees, we use total compensation as disclosed in the remuneration table presented in the proxy statement.

7. Most previous researchers divide equity ownership by the total value of common shares outstanding, rather than total annual remuneration. However, Benston (1985) reports that although managers may own a very small proportion of total shares outstanding, their stock ownership often leads to gains and losses that far exceed their alternative forms of remuneration. With this in mind, we feel that the ratio of stock holdings to annual remuneration is a more relevant measure of ownership than the percentage of outstanding shares held by the manager.

compensation is the sum of all remuneration received during year (t-1),
including salary, currently received and deferred bonuses, employer
contributions to savings plans, current grants of stock options, SAR's,
restricted stock, phantom stock, dividend units and pension benefits
earned during the year. To conclude the chapter, we describe the
measurement of each of these elements.

Salary is taken from the remuneration table in the proxy
statement. In most cases, salary and bonus are aggregated in the table.
However, information about the amount of the bonus paid during the year
(or rive year averages of bonus awards) is usually provided, and we use
this information to estimate salary. In cases where bonus information
is not available, we use minimum salary levels guaranteed by employment
contracts as our salary estimate.

Estimated annual pension benefits, based on annual earnings and
years of service at retirement, are provided in the proxy statement. We
determine the average age and expected years of service for the firm's
top three executives from information provided in the proxy statement
and Who's Who in Finance and Industry. Given average age and using
standard mortality tables, we then determine the number of payments
expected after retirement, and the present value of these payments on
the retirement date. (For this and other computations involving
discounting, we follow the suggestion of Antle and Smith (1985) and use
the prevailing rate on twenty year Treasury bills as our discount rate.)
Finally, we calculate the annual annuity payment that must be made
during each year of service to provide the required amount at

retirement. This annual payment constitutes the amount of pension
benefits "earned" during the year.

We use the theoretical lower bound on rational option prices
described by Smith and Zimmerman (1976) to value unexercised stock
options. More precise estimates of option value may be provided by the
Black-Scholes option pricing model. However, the Black-Scholes model is
known to overstate the value of executive stock options because it
assumes that these claims are marketable. The lower bound approach
provides a conservative estimate of option value, and does not require
any additional assumptions concerning the distribution of future stock
prices, the payment of dividends, or the manner in which the option may
be exercised.

The theoretical lower bound is defined as max[S - (X + D)B, 0],
where

S = the market price of the stock on the day the option is
granted

X = the exercise price of the option (typically S = X)

T = the time until the option expires

$D = \sum_{t=1}^{T} d_t(1 + r)^t$ and d_t is the dividend payment in time t.

r = the risk-free rate

$B = (1 + r)^{-T}$.

To compute the theoretical lower bound, we make the following
assumptions. First, we assume that S = X = the average exercise price
for the shares under option. This price is disclosed in the proxy
statement. Second, we assume that T is five years for qualified options
and ten years for nonqualified options. During the early Seventies,

most firms in our sample have only qualified plans. By the late Seventies, almost all plans are nonqualified. During the interim, however, most sample firms have both types of plans in operation. In some cases, these firms provide a breakdown of qualified and nonqualified options outstanding. When this is available, we use a weighted average (based on number of qualified/nonqualified shares under option) for T. If no breakdown is given (as is usually the case) we assume that $T = 7.5$. Third, we use the annual dividend paid in year (t-1) for d_t, which we obtain from _Compustat_. Finally, we use the twenty year Treasury bill rate at the end of year (t-1) as the risk-free rate.

Equity ownership of the top three executives is the product of the average number of common shares "beneficially held" and the closing share price at the end of year (t-1). We obtain closing stock prices from _Compustat_ and information concerning share ownership from the proxy statement. Beneficial ownership includes shares held by members of the executive's immediate family and shares held in trusts in which the executive has an interest. We do not include shares under currently exercisable options in this definition.

The computation of total compensation depends on the types of plans the firm has in effect. We have described the measurement of salary, bonus and pension benefits earned during year (t-1). Compensation received in the form of stock options is defined as the number of options granted during the year, valued using the theoretical lower bound on rational option prices. Most proxy statements disclose aggregate grants of stock options during a five year period. To estimate the average annual grant, we divide the aggregated amount by

five. This has the effect of smoothing our estimated amount of market-based compensation in a given year, because most firms grant options in discontinuous "lumps," rather than on a yearly basis. However, Larcker and Balkcom (1984) note that the use of averages minimizes the potential for one year's data to distort the overall picture of the firm's compensation practices. Because we are interested in the "typical" contract offered by the firm, we believe that this technique is appropriate.

We conclude this discussion by briefly describing our measurement techniques for the remaining types of compensation plans. First, we obtain firm contributions to employee savings plans directly from the proxy statement. Second, we value dividend units as the aggregate number of units held by the executive multiplied by the current dividend. This amount is adjusted for any deferral provision.[8] Third, we ignore SAR grants. All of our sample firms which use SAR's grant them in tandem with stock options, with the exercise of one cancelling the other. To avoid double counting, we assume that the SAR provides zero incremental remuneration to the executive and value only the option. Finally, we measure restricted and phantom stock awards as the present value (at the prevailing Treasury bill rate) of the amount to be received at the end of the restriction period. We estimate this as the

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8. We would have preferred to value dividend unit awards as the number of units granted multiplied by the present value of the dividend stream relating to each unit. Unfortunately, most firms do not disclose the number of units granted during the year. Instead, they provide only aggregate information concerning the number of units granted since the plan's inception.

number of shares granted multiplied by the closing stock price at the
end of year (t-1).

CHAPTER 5

SAMPLE SELECTION AND TESTING METHODOLOGY

In this chapter we describe our sample selection technique, the composition of our final sample and our testing methodology. In order to increase the information content of the sample, we use a choice-based sampling plan. Our final sample consists of 112 firms, approximately evenly divided between performance plan adopters and nonadopters. Specification of a testing methodology depends on the structure of the decision problem. We discuss how relationships among the choice alternatives dictate the decision structure and suggest choice models appropriate for different structures. These models can then be used for parameter estimation and hypothesis testing. Finally, to assess the significance of our results, we conduct randomization tests. In our case, this approach is superior to the use of standard significance tables because it is does not rely on asymptotic distribution theory to test hypotheses and is not influenced by the nonrandom nature of our sample.

5.1 Sample Selection

The population studied consists of all firms that appear in the Fortune 500 between 1971 and 1980. The 1971-1980 time period is chosen because (1) performance plans were not used before 1971 and (2) a major shift in the tax environment occurred in 1981. (See Appendix C for details.) 687 distinct firm names are identified from the Fortune 500

lists. Of these, 14 firms are eliminated because mailing addresses could not be located. (Most of these firms are either privately held, or have been liquidated.) The remaining 673 firms constitute the population for the study. Since some firms engaged in merger activity, not all currently exist as separate entities. Larcker and Johnson (1981) note that compensation contracts are often amended immediately before or after a merger. Accordingly, we retain merged firms in the population because they may contribute important information to the study.

This population of firms has a wide variety of compensation contracts, some including performance plans. Because the proportion of firms that use performance plans is relatively small, a choice-based sampling plan is used.[9] Unlike random sampling, in which all firms have an equal likelihood of being included in the sample, the probability of selection in a choice-based sample depends on the choice the firm has made. As Cosslett (1981) points out, a choice-based sample is stratified on an endogenous variable, which in our case is the decision to adopt a performance plan.

Choice-based sampling increases the information content of the sample by making the proportions of performance plan users and nonusers

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9. Choice-based sampling has been used in the prediction of acquisition targets (Palepu (1986)) and the prediction of corporate bankruptcy (Zmijewski (1984)). Palepu suggests that this approach may be useful in any research setting that involves binary state prediction models with skewed distributions of the two states of interest in the population. Although we will be concerned with estimation, rather than prediction, it appears that a choice-based sampling design is appropriate for our study.

more evenly balanced. That is, a choice-based sample provides more
erficient parameter estimates than a random sample of the same size.
(See Manski and Lerman (1977) and Manski and McFadden (1981) for
details.) Cosslett shows that when sample sizes for each choice-based
subgroup are roughly equal, parameter estimates are obtained that have
near optimal efficiency. In our study, we analyze approximately equal
(total) numbers of adopter and nonadopter observations. Further, the
number from each group analyzed in each sample year is roughly the same.

We obtain preliminary classification of firms as adopters or
nonadopters from several sources. These are (1) annual surveys of long-
term incentive compensation conducted by Frederic W. Cook & Co. between
1971-1981, (2) a special report on performance plan adoption made
available to us by Frederic W. Cook, and (3) the sample of performance
plan adopters listed by Larcker (1983b).[10] Based on this information,
we tentatively classify 121 of our population firms as adopters.

An unusual feature of our sampling plan is that a single firm can
serve as both an adopter and a nonadopter in our sample. For example, a
performance plan adopter in 1979 is classified as a nonadopter in 1971
through 1978. Thus, the unit of observation for the study is firm-
years, rather than firms. This allows us to define a nonadopter "pool"

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10. The annual surveys of long-term incentive compensation
provided by Frederic W. Cook list the major categories of long-term
incentive compensation used by the Fortune 200. Examination of a time
series of these reports allows us to identify performance plan adopters
and year of adoption among the top 200. The second data source is a
detailed analysis of performance plan adoptions between 1978 and 1982,
also provided by Frederic W. Cook. This enables us to identify
additional non-Fortune 200 adoptions between 1978-1980. Finally,
Larcker lists 25 adoptions made between 1971 and 1977.

for each sample year. The 1971 nonadopter pool, for example, consists of the 673 population firms, less three firms which adopted in 1971. The pool for 1972 is comprised of the 673 population firms, less eight firms which adopted in either 1971 or 1972, and so on for the remaining sample years.

We use a random number generator to select firms from each nonadopter pool. Sampled nonadopters are deleted if they are selected in consecutive years, or if they adopt a performance plan in the year following the sample year. We do this to increase the independence of the observations and to reduce the potential for adoption classification errors. This results in the selection of 253 firm-years of nonadopter observations.[11]

To verify and update our preliminary classification, we survey each firm in the population to determine if a performance plan has been adopted and if so, the year of adoption. In addition, all 121 known adopters are requested to provide proxy statements for their adoption year and the 253 sampled nonadopters are requested to provide proxy statements for their sample year. Information about firms acquired by merger is requested from the acquiring firm.

We received responses from 319 firms, representing a response rate of 47%. Based on the proxy statements supplied by the responding firms, we are able to include approximately half of all known adopters in our analysis. Our final sample consists of 57 adopters and 55

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11. We select a large number of nonadopters relative to the number of adoptions in each year to allow for data unavailability and later identification of additional adopters.

nonadopters. The number of adopters and nonadopters analyzed in each sample year is presented in Table 2. A list of sample firms, including adoption date or year analyzed, is provided in Appendix D.

TABLE 2

Composition of Sample

Year	Number of Adopters	Number of Nonadopters	Total
1971	1	2	3
1972	3	3	6
1973	5	6	11
1974	5	5	10
1975	3	4	7
1976	3	4	7
1977	6	3	9
1978	7	6	13
1979	7	5	12
1980	17	17	34
Total	57	55	112

5.2   Testing Methodology

Selection of a testing methodology depends on the structure of the decision problem faced by the firm. This, in turn, is determined by

the relationships among the choice alternatives available. In this section, we outline a means of assessing these relationships and suggest choice models appropriate for different decision structures. We also discuss the implications of using a choice-based rather than a random sample for parameter estimation and hypothesis testing.

The firm's decision problem concerns the choice among three alternatives: not adopt, adopt a plan which uses a relative performance measure ("adopt-relative") or adopt a plan which uses an absolute performance measure ("adopt-absolute"). The issue is whether each alternative constitutes an independent option. It seems reasonable that not adopt is different from both adopt-relative and adopt-absolute, but how different are adopt-relative and adopt-absolute from each other? The answer to this question dictates the structure of the decision problem, which in turn indicates the type of model appropriate for parameter estimation and hypothesis testing.

Consider the extreme situations: (1) adopt-relative and adopt-absolute are perfect substitutes versus (2) adopt-relative and adopt-absolute are radically dissimilar. In the first case, there is no distinction between relative and absolute performance measures from the perspective of deciding to adopt a plan. Any difference between relative and absolute measures is only relevant once the decision to adopt has been made. The decision structure is a "tree" with two main branches: adopt, not adopt. The adopt branch has two subsidiary branches: relative, absolute. Given this structure, the appropriate estimation procedure is to apply logistic regression separately at each level of the model.

In the second case, relative and absolute performance measures are different. This means that all three options must be considered at the primary level of the adoption decision. The decision structure in this case is a tree with three branches—adopt-relative, adopt-absolute, not adopt—on a _single_ level. Given this structure, the appropriate estimation procedure is to apply multinomial logit with the dependent variable taking on one of three values: adopt-relative, adopt-absolute, not adopt.

Sequential application of separate logistic regressions when a single multinomial logit is required (or vice-versa) will result in biased and inconsistent parameter estimates. Accordingly, we must determine the degree of "similarity" between adopt-relative and adopt-absolute in order select to correct model. As described by Maddala (1983) we can assess the structure of the decision problem by applying a two-stage estimation procedure to a nested multinomial logit model. We describe this model below.

Let P_{adopt} denote the probability that a firm randomly selected from the population will adopt a performance plan. Also, let $P_{rel|adopt}$ denote the conditional probability that a relative performance measure will be chosen, given that a performance plan is adopted. Following the development in Maddala, we can write

$$P_{rel|adopt} = \frac{1}{(1 + e^{-Y'a})} \tag{1}$$

and

$$P_{adopt} = \frac{1}{(1 + e^{-X'b - I'\gamma})} \qquad (2)$$

where X is a vector of explanatory variables that relate to the decision to adopt a performance plan, Y is a vector of explanatory variables related to the choice of a performance measure and I, the so-called inclusive value, is defined as $\log(1 + e^{-Y'a})$.

The unknown parameters in the model are a, b and γ with γ allowed to vary between zero and one. The value of γ indicates the similarity between adopt-relative and adopt-absolute. When γ is close to zero, the two alternatives are very similar; when γ approaches one adopt-relative and adopt-absolute are very distinct.

Thus, to determine the structure of the decision problem we must estimate γ. This is achieved through a two-stage application of logistic regression. First, a is estimated using Equation 1 and used to calculate I. (Recall that $I = \log(1 + e^{-Y'a})$.) Then, b and γ are estimated using Equation 2 and the computed values of I. If γ is close to zero, I drops out of the model and each level of the decision process can be separately estimated. A value of γ close to one calls for the use of multinomial logit with three values of the dependent variable: adopt-relative, adopt-absolute and not adopt. If γ is between zero and one, parameter estimation is complete with the estimation of Equation 2.

One additional wrinkle in our problem is that we have a choice-based, rather than a random sample. This means that application of standard maximum likelihood estimation procedures will lead to biased and inconsistent estimates. Fortunately, this bias is reflected solely

in the intercept term of Equation 2. To show this, we use the conditional maximum likelihood estimator (CMLE) described by Manski and McFadden (1981) which is also employed by Palepu (1985).

Recall that P_{adopt} represents the probability that a firm randomly selected from the population will adopt a performance plan. Denote the probability that a firm in the sample will adopt a performance plan as P'_{adopt}. If the sample is random, the probability of being selected does not depend on the firm's adoption decision. In other words, $P_{adopt} = P'_{adopt}$. This is not true with choice-based sampling. Using Bayes' formula, the sample adoption probability, P'_{adopt}, is

$$\frac{(P_{adopt})Pr(sampled|adopt)}{(P_{adopt})Pr(sampled|adopt) + (1 - P_{adopt})Pr(sampled|not\ adopt)} .$$

Because the probability of being sampled depends on the firm's adoption decision, $P_{adopt} \neq P'_{adopt}$. This means that the population adoption probability cannot be used to compute the sample likelihood function. Instead, the sample adoption probability must be used. This can be determined using Bayes' formula. For example, suppose that: (1) 150 firms in the population are identified as adopters, (2) 500 firms are classified as nonadopters and (3) all adopters and an equal number of nonadopters are included in the sample. Thus, the probability that a firm in the population is in the sample is 1 if it adopted a performance plan and .30 (150/500) if it is a nonadopter. We can compute P'_{adopt} as

$$P'_{adopt} = \frac{(P_{adopt})(1)}{(P_{adopt})(1) + (1 - P_{adopt})(.30)} \quad .$$

A convenient feature of the logistic probability model is that the only difference that results from substituting P'_{adopt} for P_{adopt} is in the constant term. Specifically, Equation 2 can be rewritten as

$$P'_{adopt} = \frac{1}{1 + e^{\ln(.30) - X'b - I'\gamma}} \quad .$$

Thus, with the exception of the intercept term, the regression coefficients in the logit model are unaffected by the use of a choice-based sample. This means that no special adjustment is necessary for the purposes of estimating the regression coefficients and testing hypotheses about the variables in the model.

5.3 Randomization Tests

As described by Edgington (1980), randomization tests are "procedures for determining statistical significance directly from experimental data without recourse to significance tables" (p. 1). In a randomization test, the data are repeatedly permuted between treatments and a test statistic is calculated after each permutation. The percentage of test statistics as large as that associated with the experimental results constitutes the significance level for the test.

Edgington notes that a randomization test is valid for any kind of sample, while parametric statistical tables assume that the sample is random. Further, determining significance through randomization tests

is a distribution-free procedure and thus any statistical test which is interpreted in this way does not rely on distributional assumptions. In fact, Bradley (1968) points out that "eminent statisticians have stated that the randomization test is the truly correct one and that the corresponding parametric test is valid only to the extent that it results in the same statistical decision" (p. 85). Randomization tests have been used in accounting research by Noreen and Sepe (1981) and Foster, Olsen and Shevlin (1984).

Randomization tests are not alternatives to statistical tests, but rather an alternative to conventional significance tables as a means of interpreting the experimental results. Thus, to test our hypotheses concerning performance plan adoption and design, we use multinomial logit for parameter estimation and then conduct randomization tests to assess significance. Our randomization tests consist of repeatedly permuting the assignment of observations to treatments and calculating coefficients and associated t-statistics and chi-squared statistics after each permutation. We report significance levels as the proportion of calculated values in excess of those derived from our experimental results.

CHAPTER 6

RESULTS

In this chapter we present the results of our study. In Section 6.1, we provide descriptive statistics of the explanatory variables derined in Chapter 4. We also analyze the convergent validity of our proxy variables for the investment opportunity set. Next, in Section 6.2 we use the two-step estimation prccedure described in Chapter 5 to determine the structure of the decision problem. We find that the distinction between relative and absolute performance measures does not influence the basic adoption decision. This means that logistic regression can be applied separately at each level of the decision hierarchy. In Section 6.3 we use stepwise logistic regression to determine which of our variables are significantly related to performance plan adoption. Based on these results, we add a qualitative measure of market-based compensation to the model, which has significant incremental explanatory power over our original definition of this variable. After specifying the first level of the model, we again apply logistic regression to examine the role of industry risk in the use of relative performance measures. Finally, in Section 6.4 we present the results of randomization tests designed to assess the significance of the relationships at each level of the model.

6.1 Descriptive Statistics

In this section we present (1) descriptive statistics for each of our independent variables, (2) a correlation matrix for the independent variables and (3) the results of an analysis of the convergent validity of alternative measures of the firm's investment opportunity set. We begin by presenting descriptive statistics in Table 3; the correlation matrix follows in Table 4.

With few exceptions, the correlations between the independent variables presented in Table 4 are not extreme. The only cases where relatively high correlations exist are between the leverage variables, DEBTASS and DEBTEQ (0.883) and between two measures of the investment opportunity set, BOOKMKT and DEPRMKT (0.518). Also, as expected, we observe moderately negative correlations between FIXED and MKTCOMP (-0.330) and also between GROWTH and DECLINE (-0.356). An interesting outcome is the relationship among BOOKMKT, GROWTH and DECLINE. Recall that high values of BOOKMKT are associated with a declining investment opportunity set. As anticipated, BOOKMKT is negatively correlated with GROWTH (-0.358) and positively correlated with DECLINE (0.419). A similar pattern emerges when DEPRMKT is used as the proxy for the investment opportunity set. DEPRMKT is negatively related to GROWTH (-0.238) and positively related to DECLINE (0.521). The remaining correlations among the explanatory variables are inconsequential. Thus, it appears that multicollinearity will not be a problem is model estimation and hypothesis testing.

TABLE 3
Descriptive Statistics for Explanatory Variables

Variable	Mean	Median	Std. Dev.	Min	Max
DEBTASS	0.1802	0.1873	0.1005	0.0000	0.4455
DEBTEQ	0.4192	0.3724	0.3449	0.0000	1.9322
ASSETS	$2,812	$1,167	$5,310	$121	$41,531
BOOKMKT	1.0861	0.9745	0.5780	0.1570	3.4113
DEPRMKT	0.0390	0.0340	0.0334	0.0001	0.1736
RDMKT	0.0227	0.0163	0.0257	0.0000	0.1749
%CHCAP	0.2206	0.1392	0.5706	-0.6051	3.2485
STDEVOI	0.7297	0.5800	0.6772	0.0000	3.1405
OWNSHRS	44.9	2.9	302.8	0.0000	3,155.2
MKTCOMP	0.3412	0.1362	0.5330	0.0000	2.8949
FIXED	0.6490	0.6402	0.2030	0.0146	1.0000
GROWTH	0.2946	0.0000	0.4579	0.0000	1.0000
DECLINE	0.2232	0.0000	0.4183	0.0000	1.0000
STRATEGY	0.3750	0.0000	0.4863	0.0000	1.0000

DEBTASS = the debt to assets ratio.
DEBTEQ = the debt to equity ratio.
ASSETS = total assets, measured in millions of dollars.
BOOKMKT = the book value of assets to the total value of the firm.
DEPRMKT = depreciation charges to the total value of the firm.
RDMKT = R & D charges to the total value of the firm.
%CHCAP = the percentage change in capital expenditures between year (t) and year (t+1), where year (t) is the year of adoption.
STDEVOI = the standard deviation of industry operating income per share, measured in dollars.
OWNSHRS = managerial equity holdings to total compensation.
MKTCOMP = the value of outstanding options to total compensation.
FIXED = salary and pension benefits to total compensation.
GROWTH = qualitative measure of growing investment opportunities.
DECLINE = qualitative measure of declining investment opportunities.
STRATEGY = qualitative measure of strategy change.

TABLE 4
Correlation Matrix of Explanatory Variables

	DEBTASS	DEBTEQ	ASSETS	BOOKMKT	DEPRMKT	RDMKT	%CHCAP
DEBTASS	1.000						
DEBTEQ	0.883	1.000					
ASSETS	-0.141	-0.090	1.000				
BOOKMKT	0.280	0.265	-0.061	1.000			
DEPRMKT	0.141	0.073	0.084	0.518	1.000		
RDMKT	-0.194	-0.147	-0.011	0.293	0.202	1.000	
%CHCAP	-0.015	-0.021	0.033	0.088	-0.049	-0.054	1.000
STDEVOI	-0.020	-0.037	0.342	0.103	0.091	-0.015	0.041
OWNSHRS	-0.191	-0.136	-0.050	-0.153	-0.094	0.093	-0.044
MKTCOMP	-0.223	-0.165	-0.040	-0.243	0.073	0.111	-0.027
FIXED	0.192	0.225	-0.105	0.192	-0.013	-0.087	0.121
GROWTH	-0.281	-0.190	-0.098	-0.358	-0.238	0.051	-0.109
DECLINE	0.193	0.101	-0.007	0.419	0.521	0.085	-0.005
STRATEGY	0.104	0.108	-0.045	0.080	-0.011	-0.009	-0.022

	STDEVOI	OWNSHRS	MKTCOMP	FIXED	GROWTH	DECLINE	STRATEGY
STDEVOI	1.000						
OWNSHRS	-0.114	1.000					
MKTCOMP	-0.075	-0.056	1.000				
FIXED	-0.016	0.139	-0.330	1.000			
GROWTH	-0.097	0.146	0.257	-0.074	1.000		
DECLINE	0.046	-0.060	-0.056	0.057	-0.346	1.000	
STRATEGY	0.079	-0.095	-0.011	0.014	-0.096	0.028	1.000

The correlations among BOOKMKT, DEPRMKT, GROWTH and DECLINE provide preliminary evidence on the convergent validity of our measures of the investment opportunity set.[12] To test the significance of these relationships, we regress BOOKMKT on GROWTH and DECLINE. The regression equation (with t-ratios in parentheses) is

$$\text{BOOKMKT} = 1.07 - 0.306 \text{ GROWTH} + 0.463 \text{ DECLINE}.$$
$$\qquad\qquad\quad (-2.70) \qquad\qquad (3.73)$$

The coefficients on GROWTH and DECLINE have the expected signs and are each significant at the 0.01 level. The adjusted R-squared on the model is 0.213. We then replace BOOKMKT with DEPRMKT as the dependent variable. The ensuing regression equation is

$$\text{DEPRMKT} = 0.0315 - 0.00476 \text{ GROWTH} + 0.0398 \text{ DECLINE}.$$
$$\qquad\qquad\quad (-0.75) \qquad\qquad\quad (5.73)$$

Again, the coefficients on GROWTH and DECLINE have the expected signs. However, only DECLINE is statistically significant. The adjusted R-squared is 0.261. No significant relationship is found by regressing RDMKT on GROWTH and DECLINE.

It appears that BOOKMKT, and to a lesser extent DEPRMKT, are significantly related to qualitative measures of the investment opportunity set. Specifically, both variables seem to capture the degree to which the firm's investment opportunities are declining. These results provide evidence on the convergent validity of our

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12. %CHCAP, our ex post measure of investment opportunities, is not significantly related to any other measure of the investment opportunity set and is not analyzed further. The poor showing made by this variable may result from misspecification of the time period in which changes in capital investment actually take place.

measures of the investment opportunity set, lending credibility to our measurement of this construct.

6.2 Model Structure

In this section, we use the two-stage procedure described in Chapter 5 to determine the structure of our decision problem. Recall that the issue concerns the degree of "similarity" between adopt-relative and adopt-absolute. If these two choice alternatives are very similar, the decision structure is two-tiered and an appropriate estimation procedure is to apply logistic regression at each level of the model. On the other hand, if adopt-relative and adopt-absolute are distinct alternatives, the decision structure is a single level involving three choice alternatives: not adopt, adopt-relative and adopt-absolute. Parameter estimation in this case is achieved using multinomial logit.

We begin by applying logistic regression to the model: RELATIVE = f(STDEVOI). (This corresponds to Equation 1 in Chapter 5.) RELATIVE takes on the value of one if a relative performance measure is used and zero otherwise. (Thus, a zero coding indicates the use of an absolute measure.) This relationship is evaluated based on data for our 57 adopting firms. The resulting logistic regression equation is

$$\text{Log } \frac{P(RELATIVE)}{P(ABSOLUTE)} = -2.776 + 1.082 \text{ STDEVOI.}$$

Next, we calculate I (the "inclusive value") using the relationship

$$I = (1 + e^{-2.776 + 1.082 \text{ STDEVOI}}).$$

We then use the computed value of I to estimate Equation 2 from Chapter 5:

$$P_{adopt} = \frac{1}{(1 + e^{-X'b - I'\gamma})}$$

where X is the vector of explanatory variables that relate to the decision to adopt a performance plan.

Upon estimating Equation 2, we find that the estimated γ has a p-value of 0.6433. The insignificance of γ indicates that adopt-relative and adopt-absolute are very similar alternatives from the perspective of the adoption decision. This means that we can separately apply logistic regression at each level of the model for the purposes of parameter estimation and hypothesis testing.

6.3 Model Specification

The analysis in Section 6.2 indicates that our decision problem has two distinct levels. To determine which variables are significantly related to performance plan adoption, we begin by applying logistic regression to the first level of the model, with all variables included. Then, we use backwards elimination to delete insignificant variables. Variables are deleted if computed p-values are greater than 0.15. The first level of the model, with all variables included is

ADOPT = f(DEBTASS, DEBTEQ, ASSETS, BOOKMKT, DEPRMKT, RDMKT, FIXED, MKTCOMP, OWNSHRS, GROWTH, DECLINE, STRATEGY).

Backwards elimination results in deletion of DEBTEQ, ASSETS, BOOKMKT, DEPRMKT, RDMKT, FIXED and MKTCOMP. The resulting logistic regression equation (p-values in parentheses) is

$$\text{Log} \frac{P(ADOPT)}{P(NOT\ ADOPT)} = -1.0076 + 3.423\ DEBTASS + 0.0027\ OWNSHRS - 0.432\ GROWTH$$
$$(0.114) \qquad\qquad (0.063) \qquad\qquad (0.071)$$

$$-0.535\ DECLINE + 0.455\ STRATEGY.$$
$$(0.037) \qquad\qquad (0.029)$$

Note that all variables except DECLINE have the predicted sign. Highly levered firms (measured by DEBTASS), those undergoing strategy changes and firms where managers have a large equity interest are likely to be performance plan adopters; firms in which the investment opportunity set is undergoing some kind of transition (GROWTH or DECLINE) are _unlikely_ to adopt plans. This last result is a surprise--recall that H_3 predicts that firms with declining investment opportunities will adopt performance plans. Our results suggest, however, that firms with relatively static investment opportunity sets are adopters. This may explain why the quantitative measures of investment opportunities (BOOKMKT, DEPRMKT and RDMKT) are not included in the model. These variables measure the investment opportunity set at a point in time. The important factor, however, seems to be how investment opportunities are changing around the time of performance plan adoption. By incorporating information from a series of _Value Line_ reports, the qualitative variables are better able to capture the changing nature of this variable over time.

Another unexpected outcome is the insignificance of variables which measure the characteristics of the compensation contract prior to adoption: FIXED and MKTCOMP. Recall that MKTCOMP is defined as the average value of outstanding options divided by average total compensation. In H_6, we argue that when the value of MKTCOMP is small, there may be benefits from additional grants of stock options because

the contract has not yet been "saturated" with market-based compensation. As the value of MKTCOMP gets large, however, performance plans may become more attractive as a means of diversifying the compensation package. Thus, we hypothesize a positive relationship between MKTCOMP and the likelihood of performance plan adoption.

We suspect that the insignificance of MKTCOMP may relate to our method of valuing outstanding options. We use the theoretical lower bound on rational option prices described by Smith and Zimmerman (1976). This means that MKTCOMP takes on the value of zero when (1) no options are outstanding (usually because the firm let its option plan lapse) or (2) the outstanding options have a negative value. In either case, a zero value indicates that a stock option plan is not an attractive contracting alternative for the firm. Thus, firms with large values of MKTCOMP or zero values of MKTCOMP may be most likely to adopt a performance plan. If this is true, the tendency to issue additional options will not be an everywhere decreasing function of MKTCOMP—it will only be a decreasing function where MKTCOMP is positive.

With this in mind, we add an additional variable to the model. This variable takes on the value one if MKTCOMP is zero, and is zero otherwise. We refer to this variable as NOOPTION because it indicates the special case where no options are outstanding, or their value is negative. (Of the 22 NOOPTION firms, 16 did not have options outstanding and 6 had negative values.) We then reestimate the model with NOOPTION included. The resulting logistic regression equation (p-values in parentheses) is

$$\text{Log } \frac{P(ADOPT)}{P(NOT\ ADOPT)} = -0.9570 + \underset{(0.134)}{3.362}\ DEBTASS + \underset{(0.039)}{0.0024}\ OWNSHRS - \underset{(0.018)}{0.613}\ GROWTH$$

$$-\underset{(0.018)}{0.634}\ DECLINE + \underset{(0.012)}{0.556}\ STRATEGY + \underset{(0.074)}{0.780}\ MKTCOMP$$

$$+\underset{(0.024)}{0.661}\ NOOPTION.$$

The chi-squared statistic for this model is 22.023 with 7 degrees of freedom, which is significant at the 0.0025 level. With the inclusion of NOOPTION, MKTCOMP enters the model with the expected sign. It appears that (1) firms with a large proportion of market-based claims or (2) firms with no market-based claims in their compensation contracts are likely to adopt performance plans.

We also reestimate the model using alternative specifications of FIXED (changing our definition from salary plus pension benefits to salary alone). This variable does not enter the model under either specification. Likewise, ASSETS does not enter the model, despite the empirical relationship between size and performance plan adoption noted by earlier researchers. This result is surprising because ASSETS is not deflated for price level changes and more adoptions take place in the later years of our sample period. Whatever the cause of these results, they suggest that FIXED and ASSETS do not add much to the model and should be excluded. Similarly, DEBTEQ is deleted in favor of DEBTASS as our leverage variable.

Thus, we use the model stated above to describe the decision to adopt a performance plan. This, however, is only the first tier of the decision process. Given that the firm adopts, it must then select either a relative or absolute performance measure. We hypothesize that

relative performance evaluation will be used more often by firms operating in risky industries. Our next step is to estimate the relationship between relative performance evaluation and industry risk, measured by the standard deviation of industry operating income per share (STDEVOI).

Of the 57 adoptions analyzed, we find only eight cases where firms explicitly state that relative performance evaluation is used. These firms and their adoption years are presented in Table 5. For our sample, relative performance evaluation is uncommon prior to 1978. Similar findings are reported by Bickford (1984). He identifies a sample of 27 firms which used relative performance measures in their performance plans in 1984. Of these firms, only one initiated relative performance evaluation prior to 1978.

In the words of Cook (1980) "most of the long-term incentive arrangements that have emerged in recent years have been developed in response to problems with previous plans" (p. 23). An obvious problem with the use of absolute performance measures is the difficulty associated with specifying an appropriate performance goal—especially in a very uncertain industry or economic climate. One way of dealing with this problem is to define performance relative to peer companies. It appears that recognition of this problem, and development of a response to it (relative performance evaluation) did not evolve immediately. Our sample period ends in 1980—just after plans based on relative performance measures were beginning to emerge. As a result, few of our adopting firms are classified users of relative performance measures.

TABLE 5

Firms Using Relative Performance Evaluation

Firm	Adoption Year
Rohm & Haas	1974
Atlantic Richfield	1976
Champion International	1978
Phillips Petroleum	1978
Hanna Mining	1979
Celanese	1980
Chevron	1980
Firestone	1980

To estimate the role of industry risk in the use of relative performance measures, we apply logistic regression to the second level of the model:

$$RELATIVE = f(STDEVOI).$$

This relationship is evaluated based on data for our 57 adopting firms. The resulting logistic regression equation (p-values in parentheses) is

$$Log \frac{P(RELATIVE)}{P(ABSOLUTE)} = -2.776 + 1.082\ STDEVOI.$$
$$(0.059)$$

As expected, the use of a relative performance measure is more likely for firms which operate is risky industries. This result must be interpreted with some caution, however, due to the limited number of firms included in the analysis and the fact that only 14% (8 of 57) of these firms use relative measures.

6.4 Randomization Tests

Section 6.3 describes our model specification process and presents the estimated logistic regression equation for each level of the decision hierarchy. We now present the results of a randomization procedure designed to assess the significance of these results. Our principal finding is that the p-values computed via randomization are very close to those based on the chi-squared statistics computed for our coefficients in the logit model. This close agreement indicates that the large sample distribution theory underlying the asymptotic chi-squared test statistics for the logit model holds in this application.

As described in section 5.3, randomization tests are alternatives to conventional significance tables as a means of interpreting the experimental results. In a randomization test, the data are repeatedly permuted between treatments and a test statistic is calculated after each permutation. The percentage of test statistics as large as that associated with the experimental results constitutes the significance level for the test. Randomization tests have two advantages over conventional statistical tables for assessing significance: they do not rely on either a random sample or underlying distributional assumptions about the data.

For our randomization tests, we permute the assignment of observations to treatments 500 times and calculate coefficients and associated t-statistics and chi-squared statistics after each permutation. This is done for both levels of the model. Reported significance levels are the proportion of calculated values in excess of those derived from our experimental results. In Table 6, we present the

beta coefficients, t-ratios and chi-squared statistics obtained from our
experimental data and described in section 6.3. These results represent
the "benchmarks" against which the permuted data are compared. In Table
7, we present average beta coefficients, t-statistics and chi-squared
statistics from our 500 permuted runs. Then, in Table 8, we report the
proportion of permuted results which exceed our experimental results.
Thus, Table 8 contains the p-values obtained via randomization.

Under the null hypotheses (no variables significant), we should
observe beta coefficients and t-ratios close to zero and chi-squared
statistics close to one. Examination of Table 7 reveals average
coefficients, t-ratios and chi-squared statistics of approximately these
magnitudes, suggesting that the randomization test closely simulates
effects under the null hypothesis. Thus, it appears that no systematic
biases are being introduced by our randomization procedure.

Table 8 presents p-values based on beta coefficients, t-ratios
and chi-squared statistics for each variable in the model. In most
applications of randomization tests, researchers have focused solely on
computed test statistics to determine p-values. However, it is not
clear to us that test statistics based on parametric assumptions provide
any greater insight than the beta coefficients themselves. (In fact,
the most appropriate measure may be based on the coefficients precisely
because no parametric assumptions are required.) Thus, we report three
p-values for each variable. Those based on the coefficients and
t-ratios are roughly equivalent; p-values based on the chi-squared
statistic are approximately twice that magnitude. This is because the

TABLE 6

Experimental Results

First Level of Model

Variable	Coefficient	Std. Error	T-Ratio	Chi-Square
DEBTASS	3.3617	2.2823	1.473	2.244
OWNSHRS	0.0024	0.0034	0.696	4.252
MRTCOMP	0.7795	0.4506	1.730	3.197
GROWTH	-0.6128	0.2655	-2.308	5.603
DECLINE	-0.6338	0.2765	-2.292	5.571
STRATEGY	0.5556	0.2259	2.460	6.377
NOOPTION	0.6610	0.3030	2.182	5.100

Overall Chi-Squared Statistic for First Level of Model: 22.0228

Likelihood Ratio Index[a]: 0.1419

Second Level of Model

Variable	Coefficient	Std. Error	T-Ratio	Chi-Square
STDEVOI	1.0817	0.5729	1.888	3.572

Overall Chi-Squared Statistic for Second Level of Model: 3.5721

Likelihood Ratio Index: 0.0773

    a. The likelihood ratio index is a "pseudo R^2." McFadden (1979) states that a likelihood ratio index in excess of 0.20 indicates an excellent fit.

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TABLE 7

Average Coefficients, T-Ratios and Chi-Squared Statistics
Based on 500 Permutations of Data

First Level of Model

Variable	Coefficient	T-Ratio	Chi-Square
DEBTASS	-0.0442	-0.020	1.055
OWNSHRS	-0.0224	-0.039	1.783
MKTCOMP	-0.0190	-0.051	1.088
GROWTH	0.0027	0.009	1.021
DECLINE	0.0133	0.050	1.136
STRATEGY	-0.0058	-0.029	1.009
NOOPTION	0.0049	0.016	1.038

Average Overall Chi-Squared Statistic: 7.947

Average Likelihood Ratio Index: 0.051

Second Level of Model

Variable	Coefficient	T-Ratio	Chi-Square
STDEVOI	-0.0741	0.037	1.162

Average Overall Chi-Squared Statistic: 1.162

Average Likelihood Ratio Index: 0.025

TABLE 8

P-Values Based on Proportion of Permuted Results
That Exceed Experimental Results

First Level of Model

| | P-Values Based on: | | |
Variable	Coefficient	T-Ratio	Chi-Square
DEBTASS	0.064	0.072	0.144
OWNSHRS	0.196	0.262	0.070
MKTCOMP	0.042	0.034	0.084
GROWTH	0.006	0.006	0.020
DECLINE	0.010	0.014	0.022
STRATEGY	0.002	0.004	0.008
NOOPTION	0.006	0.010	0.024

P-value Based on Overall Chi-Squared Statistic: 0.002

P-value Based on Likelihood Ratio Index: 0.002

Second Level of Model

| | P-Values Based on: | | |
Variable	Coefficient	T-Ratio	Chi-Square
STDEVOI	0.032	0.032	0.072

P-value Based on Overall Chi-Squared Statistic: 0.072

P-value Based on Likelihood Ratio Index: 0.072

chi-squared p-values are based on a two-tailed test and p-values based on coefficients and t-ratios assume a one-tailed test.

One striking result is the close agreement between the p-values based on the chi-squared statistics derived from our logit results and those obtained through the randomization test. We summarize these results in Table 9.

The only puzzling result from Table 8 concerns the variable OWNSHRS. P-values based on beta coefficients and t-ratios indicate that this variable is insignificant (p-values approximately 0.20), while the chi-squared p-value indicates significance at the 0.07 level. Because the chi-squared statistic is based on a two-tailed test, we would expect p-values around 0.40, or twice the magnitude of those based on the coefficients and t-ratios. This pattern is observed for all of the other variables in the model. We can only conclude that OWNSHRS exhibits some degree of instability, and that its significance is not established.

With the exception of OWNSHRS, the randomization tests provide strong evidence that the variables specified in Section 6.3 are significant, at approximately the levels indicated by our logit results. If we adjust for the fact that the coefficients and t-ratio p-values are based on one-tailed tests, while the chi-squared p-values are based on a two-tailed test, we observe close agreement between the three sets of p-values obtained from randomization and those derived from the chi-squared statistics of our logit model. The implication is that the large sample distribution theory underlying the asymptotic chi-squared test statistics for the logit model holds in this application. In

TABLE 9

Comparison of P-Values based on Chi-Squared Statistics
Obtained from Logit and Randomization

First Level of Model

	P-Values Based on:	
Variable	Logit	Randomization
DEBTASS	0.134	0.144
OWNSHRS	0.039	0.070
MKTCOMP	0.074	0.084
GROWTH	0.018	0.020
DECLINE	0.018	0.022
STRATEGY	0.012	0.008
NOOPTION	0.024	0.024
Overall significance:	0.002	0.002

Second Level of Model

	P-Values Based on:	
Variable	Logit	Randomization
STDEVOI	0.059	0.072
Overall significance:	0.059	0.072

Chapter 7, we discuss the implications of these results for testing our hypotheses concerning performance plan adoption and the choice of a performance measure.

CHAPTER 7

DISCUSSION OF RESULTS AND FUTURE RESEARCH

In this final chapter, we discuss the results of the study, point out some of its limitations and comment on certain unanswered questions that merit future research. We begin by restating each of our hypotheses and commenting on the degree to which they are supported by our results. Our general conclusion is that performance plan adoption and design is significantly related to variables which proxy for the firm's incentive-contracting environment. This suggests that performance plans are not simply "neutral mutations," but instead are adopted for their incentive effects. Of course, the performance plan adoption decision is only a small piece of the entire compensation puzzle. However, by focusing on this problem, we are able to analyze incentive effects independently of tax considerations. Thus, at least for this issue, we have evidence in support of the incentive hypothesis which is not clouded by tax effects. This kind of evidence has not been provided by earlier researchers and represents an initial step in understanding more complicated contracting phenomena.

7.1 Discussion of Research Hypotheses

H_1 states that the probability of performance plan adoption is positively related to the firm's financial leverage. We argue that performance plans will increase the value of highly levered firms by

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reducing the agency costs of debt financing. This results from an incentive property of performance plans which distinguishes them from market-based plans. In Appendix B we show that, relative to stock options, performance plans provide less incentive to managers to increase the variability of the firm's accounting numbers and cash flows. As a result, performance plans may represent a least cost bonding arrangement between owner/managers and bondholders. Further, the probability of violating bond covenants may decrease in the presence of a performance plan. To the extent that the associated costs of technical default are thereby avoided, performance plan adoption will increase the value of the firm.

We find that financial leverage—measured by the firm's debt to assets ratio—is positively related to performance plan adoption. This relationship is significant at the 0.06 level.[13] Thus, our results support H_1.

H_2 states that the probability of performance plan adoption is positively related to concurrent strategy changes undertaken by the firm. We argue that contract restructuring in general is likely around the time of a major strategy change. Performance plans in particular may be adopted for two reasons. First, to the extent that strategic goals can be stated in terms of accounting results, performance plans

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13. For convenience, we focus on one set of p-values throughout Chapter 7. We choose the p-values based on beta coefficients and derived from our randomization tests because they are not based on any parametric assumptions. Keep in mind, however, that these p-values are based on one-tailed tests, and must be doubled if we desire a two-tailed equivalent measure.

offer a unique opportunity to explicitly tie compensation to key strategy variables. Second, the stock price of firms undergoing major strategy changes may be temporarily dampened as a result of increased "estimation risk." Managers of these firms may therefore prefer an accounting-based performance plan to compensation based on stock price.

Our qualitative measure of strategy change--based on "content analysis" of a time series of _Value Line_ reports--is positively related to performance plan adoption. This relationship is significant at the 0.002 level. Thus, our results also support H_2.

H_3 states that firms with diminishing investment opportunities are more likely to adopt performance plans than firms with an extensive opportunity set. Market-based plans are most valuable in settings where stock price appreciation is likely. We argue that the potential for price appreciation is high for newly emerging firms with untapped investment opportunities. Thus, firms with an extensive investment opportunity set are _not_ likely to offer performance plans. Instead, their compensation packages will be dominated by stock options. As firms mature and begin to exhaust their investment opportunities, continued stock price appreciation is less assured. These firms may begin to add performance plans to their portfolio of compensation agreements (1) to diversify the package and (2) because expected compensation from the performance plan exceeds the expected reward from stock options.

We use two qualitative variables to reflect the extreme cases where the firm's investment opportunities are either rapidly expanding or declining. This leaves a third category of firms with fairly stable

investment opportunity sets. We find that firms in the extreme categories are _unlikely_ to adopt a performance plan. (The coefficients on both GROWTH and DECLINE are negative and significant at approximately the 0.01 level.) This is not entirely consistent with H_3, which predicts that only growth firms will be unlikely to adopt a plan. Firms with declining investment opportunities are expected to be performance plan adopters.

These results seem reasonable, however, when we recall our original premise: market-based plans are most valuable in settings where stock price appreciation is likely. Price appreciation may be most likely for firms in the extreme categories because changes in the investment opportunity set are _cyclical_. Instead of a linear progression beginning with growth and ending with decline, firms may experience periodic cycles where they resume growth after a decline stage. This would be the case if firms have the opportunity to exit mature product markets and enter more promising areas. In this scenario, firms which have hit "rock bottom" (our DECLINE firms) may actually be about to turn the corner and reenter a growth phase. The implication is that DECLINE firms are really "pre-GROWTH" firms. Accordingly, firms in _either_ of the extreme categories will be more likely to use market based plans and less likely to adopt performance plans. This suggests that performance plans are adopted by firms with investment opportunity sets which are relatively stable—not in a transition phase. These firms may also be more likely to report moderate earnings growth, which would increase the attractiveness of a performance plan.

H_4 states that firms operating in risky industries will use relative (rather than absolute) performance measures in their performance plans. When the manager's action is costly to observe, some risk should be imposed on him or her to provide the proper incentives for effort. However, managers will demand increasing levels of compensation in return for bearing this risk. In settings where influences beyond the manager's control have a large influence on outcome, the efficiency of the contract is improved by incorporating information about the performance of other agents exposed to similar risk. We argue that influences beyond the manager's control have a large influence on outcome in risky industries. Thus, filtering the effect of common uncertainty by using a relative performance measure will be most common in these industries.

We measure industry risk as the standard deviation of industry operating income per share (STDEVOI). Our results indicate that firms which adopt performance plans are more likely to use relative performance measures when STDEVOI is high. The positive relationship between RELATIVE and STDEVOI is significant at the 0.03 level. Thus, H_4 is supported. This is subject to the caveat, however, that our results are based on a small number of firms: relative measures are used by only 8 of the 57 performance plan adopters included in the study.

H_5 states that the probability of performance plan adoption is negatively related to the proportion of fixed claims in the firm's existing compensation agreements. We argue that the incentives of managers compensated by fixed claims to decrease the variability of cash flows is reinforced by performance plans. This behavior results in a

wealth transfer from stockholders to bondholders (and managers). The implication is that any incremental change in a contract dominated by fixed claims is likely to involve the addition of stock options rather than a performance plan. This is because stock options provide less incentive to decrease cash flow variability and thus will help to counteract--rather than reinforce--the dysfunctional incentive effects of fixed claim agreements.

We find that the proportion of fixed claims in existing compensation agreements is not significantly related to the probability that the firm will adopt a performance plan. Thus, our results do not support H_5. One reason for this may be measurement error in our variable FIXED. Recall that FIXED is defined as salary plus pension benefits earned in the current period divided by total remuneration. Most firms report the sum of salary and bonus payments, rather than disclosing salary separately. We estimate salary in one of two ways, depending on the information available: (1) by subtracting bonus payments or (2) by using minimum salary levels guaranteed by employment contracts. In cases where we use information from employment contracts, we probably underestimate the actual salary paid. Subtraction of bonuses to estimate salary, on the other hand, most likely produces a biased upward estimate. This is because most firms disclose aggregate bonus payments for the preceding five year period. The average of these payments probably understates the current bonus and produces an overstated salary estimate. Because salary is the major determinant of the value of FIXED, measurement errors in salary may account for our

inability to detect a significant relationship between the proportion of fixed claims and the probability of performance plan adoption.

H_6 states that the probability of performance plan adoption is positively related to the proportion of market-based claims in the firm's existing compensation agreements. We argue that when the value of MKTCOMP is small, there may be benefits from additional grants of stock options because the contract has not yet been "saturated" with market-based compensation. As the value of MKTCOMP gets large, however, performance plans may become more attractive as a means of diversifying the compensation package.

As described in section 6.3, on our initial attempt to estimate the first level of the model, MKTCOMP is eliminated as insignificant. Suspecting that this is a result of the lower bound of zero on MKTCOMP, we add an additional variable to the model which takes on the value one if MKTCOMP is zero, and is zero otherwise. We refer to this variable as NOOPTION because it indicates the special case where no options are outstanding, or their value is negative. Upon reestimating the model with NOOPTION included, we find that both MKTCOMP and NOOPTION are positively related to the probability of performance plan adoption, and these relationships are significant at the 0.04 and 0.006 levels, respectively. Thus, it appears that (1) firms with a large proportion of market-based claims or (2) firms with no market-based claims in their compensation contracts are likely to adopt performance plans.

H_7 states that the probability of performance plan adoption is positively related to the level of existing managerial equity holdings. This hypothesis is similar to H_6, but measures the cumulative incentive

effect of managerial equity holdings, rather than restricting attention to current grants of market-based compensation. The results of earlier studies indicate that it is important to control for managerial equity holdings in their firms in order to obtain direct evidence concerning the incentive effects of the compensation contract.

As discussed in section 6.4, our measure of managerial equity holding--OWNSHRS--produces some anomalous results. OWNSHRS is positively related to the probability of performance plan adoption, as expected. However, the significance of the relationship is unclear. P-values based on beta coefficients and t-ratios indicate that this variable is insignificant (p-values approximately 0.20), while the chi-squared p-value indicates significance at the 0.07 level. It appears that OWNSHRS exhibits some degree of instability, and its significance is not established. Thus, our results are inconclusive with respect to H_7.

Finally, H_8 states that the probability of performance plan adoption is positively related to firm size. Based on the empirical relationship between size and performance plan adoption observed by earlier researchers, we argue that firm size must be included in our analysis as a control variable. However, we find that size, measured by total assets (ASSETS), is deleted from our model as insignificant. We find this to be especially puzzling because ASSETS is not deflated for price level changes and more adoptions take place in the later years of our sample period. Whatever the cause of these results, we conclude that firm size is not related to performance plan adoption. Thus, H_8 is not supported.

7.2 _Limitations_ _of_ _the_ _Current_ _Study_ _and_ _Issues_ _for_ _Future_ _Research_

Our results are consistent with the proposition that performance plans are adopted for their incentive effects. By focusing on a narrowly defined compensation issue, during a time period when the tax environment is relatively stable, we are able to avoid the identification problem which has plagued earlier investigations of the determination of compensation contracts. Our study is one of the first successful attempts to provide evidence on the validity of the incentive hypothesis which is unclouded by tax effects.

Despite this success, some limitations of the study should be noted. First, as mentioned above, the scope is necessarily limited to a narrowly defined compensation issue. The decision to adopt a performance plan is only one aspect of the more general choice among long-term incentive plans. We simplify the problem by assuming that all long-term plans can be dichotomized according to the nature of their performance measure: stock price or accounting numbers. The study concerns the case of a firm deciding whether to add an accounting-based performance plan to an existing portfolio of market-based, long-term contracts. We do not consider how the firm allocates compensation between accounting-based and market-based contracts, or the proportion of compensation derived from alternative market-based plans (restricted or phantom stock, for example). Further, long-term incentive contracts are only one component of the entire compensation package, which also includes fixed current remuneration (salary and currently paid employee benefits), annual bonuses and deferred compensation (pensions, deferred bonus payments, etc.). We do not consider the more global decision of

how the firm allocates remuneration across all of these alternative compensation vehicles.

Thus, our study represents only an initial attempt to unravel the complicated process of the endogenous determination of managerial compensation contracts. Further research should be aimed at extending the scope of this study from consideration of a single compensation decision (adoption of a performance plan) to more general issues concerning the determination of the compensation package. The principal difficulty with this, of course, is that as the scope of the problem is broadened, tax influences and the general identification problem reasserts itself. But, tax effects—however complicated—can be controlled for. Thus, the identification problem should not be an insurmountable barrier to continued research into the influence of incentive effects on the determination of compensation contracts.

One implication of our study is that compensation policy is related to other strategic decisions made by the firm. Our most significant variables are those which measure qualitative aspects of corporate strategy. These are STRATEGY, which measures strategic change in general, and GROWTH and DECLINE which measure changes in the firm's strategic investment opportunities. Variables based on content analysis, although relatively subjective, seem to be superior to accounting-based proxies for the same constructs. We feel that additional research into the interaction of strategic variables is indicated. Using content analysis or some comparable method, measures of strategic variables should be refined and expanded to encompass additional aspects of corporate policy beyond the investment decision.

This study concerns two research questions. First, with tax influences held constant, can performance plan adoption be explained by incentive effects? Our results suggest that this question can be answered affirmatively. However, we also ask a second question: given that a firm adopts a performance plan, can incentive arguments explain the choice of a relative versus an absolute performance measure? Our results indicate a significant, positive relationship between industry risk and the use of relative performance measures. These results must be viewed as preliminary, however, due to the small number of firms included in the analysis. To gather additional evidence on the relative versus absolute decision, we could extend the sample period past 1980. Changes in the tax code should have no influence on the choice of a performance measure and we suspect that by extending our sample period into the Eighties we would find greater numbers of plans involving relative measures. An expanded sample of adopters, more evenly balanced between users of relative and absolute plans would provide a more powerful test of our second research question.

Finally, the question of the endogenous determination of managerial compensation contracts is embedded in the larger issue of the firm's general contracting process. Our results indicate that agency theory provides a useful framework for viewing compensation issues. This suggests that incentive effects have may have a significant role in developing a more general theory of contracting. We view our study as one building block towards the achievement of this goal.

APPENDIX A

LONG-TERM INCENTIVE PLANS

Managerial compensation contracts are typically comprised of
multiple components. These include fixed current remuneration (salary
and currently paid employee benefits), annual bonuses, long-term
incentive plans and deferred compensation (pensions, deferred bonus
payments, etc.). A variety of compensation arrangements qualify as
long-term incentive plans, including stock options, stock appreciation
rights, restricted stock, phantom stock, performance units and
performance shares. In this appendix we describe the principal features
of each of these long-term plans.

A.1 Stock Options

Stock options entitle participating executives to purchase shares
of their company's stock at a fixed price (typically market value when
the option is granted) during a fixed exercise period. In most cases,
the option is forfeited if the executive voluntarily leaves the firm or
is fired. Termination of unexercised options also typically occurs a
short time after the executive's death. As noted by Smith and Watts
(1982), the award of options is made by the compensation committee (of
the board of directors) according to the terms of the option plan. The
plan usually specifies both the total number of options that can be
granted and the maximum number that can be awarded to any individual
during the life of the plan.

A.2 Stock Appreciation Rights (SAR's)

SAR's entitle the manager to receive an amount of cash equal to the increase in the market price of a fixed number of the employer's shares over some predetermined price. SAR's are most often granted in tandem with stock options, with the exercise of the SAR cancelling the related option. Tandem plans (which offer a choice between SAR's and options) are effective in reducing transactions costs when the executive has a preference ror either cash or shares.

A.3 Restricted Stock

Restricted stock involves the grant to executives of nontransferable and forfeitable company shares which are earned through continued company employment. These awards typically take the form of either actual shares of dividend-bearing, voting company stock, or "restricted stock units," which are nonvoting, but are converted into actual company shares at the time of vesting. Unlike most other long-term incentive plans, restricted stock grants are not tied to any explicit company performance measure.

A.4 Phantom Stock

An executive granted "phantom stock" is credited for a number of restricted shares. Rather than actually receiving the shares when the restrictions lapse, however, he or she is paid an amount of cash equal to their market value. Thus (as pointed out by Smith and Watts) phantom stock is to restricted stock as SAR's are to stock options. The award

of phantom stock reduces transactions costs in situations where the executive prefers cash rather than shares.

A.5 Performance Attainment Plans

Performance attainment plans entitle participating executives to future payments if the company attains certain predetermined performance goals over a multi-year period. There are two major types of future value performance grants (see Larcker (1983b)): performance shares and performance units. In both cases, firm performance goals are established in terms of accounting numbers at the beginning of the award period. Common performance measures include earnings per share, growth in earnings per share, return on assets and return on equity. These may be defined as absolute levels of firm achievement, or relative measures of performance, as compared to peer companies. The award period usually ranges from three to five years.

Under a performance unit plan, the executive is granted a stated number of performance units of fixed dollar value at the beginning of the award period. Compensation is determined at the end of the award period as the number of units "earned out" times the dollar value per unit. The number earned out depends on the extent to which performance goals have been attained during the award period.

Under a performance share plan, the executive is allocated a number of shares at the beginning of the award period. Similar to a performance unit plan, the number of shares earned out is determined by the extent to which performance goals are achieved. Compensation is

based on the number of shares earned times the market value of the
company's stock at the end of the award period.

Performance unit and performance share plans differ from stock
options and SAR's in that accounting numbers, rather than stock price,
are used to define firm performance. Compensation is entirely based on
accounting results under a performance unit plan; performance share
plans are "hybrids" in the sense that compensation is jointly determined
by accounting performance and stock price. A performance share, in
fact, is equivalent to a combination performance unit/phantom stock
grant. Bickford (1981) reports that performance units are a more
frequently encountered compensation device than performance shares.

An appreciation for the frequency with which various long-term
incentive plans are included in actual compensation contracts is
provided by Kimball (1980). His analysis of the compensation contracts
used by the 200 largest U.S. industrial firms in 1980 is reflected in
Table A-1.

TABLE A-1

Prevalence of Long-Term Plans Used in 1980
by the 200 Largest Industrials

Type of Plan	Number in Use in 1980	Percentage of Firms Offering this Plan
Stock Options	164	82%
SAR's	128	64
Performance Shares/Units	74	37
Restricted Stock	32	16
Phantom Stock	20	10

Source: Kimball, 1980, p. 33.

APPENDIX B

THE DIFFERENTIAL EFFECTS OF ACCOUNTING-BASED VERSUS MARKET-BASED PLANS ON MANAGERIAL RISK AVERSION

Smith and Watts (1982) identify several "incentive problems" that compensation contracts may be designed to control. In particular, contracts may be effective in lengthening the manager's planning horizon and/or reducing his or her risk aversion. All long-term plans, whether accounting or market-based, are expected to reduce the horizon problem. Market-based plans equate the manager's horizon to that of the stockholders by basing remuneration on stock price. Multi-year performance plans can achieve the same result by providing for overlapping grant periods. The two types of plans may not, however, provide the same incentives regarding managerial risk aversion. If performance plans motivate managers to decrease the volatility of accounting results and if accounting numbers and cash flows are positively correlated, then the adoption of a performance plan may encourage managers to be more risk averse in their selection of projects than they would be in the absence of the plan.

As discussed by Smith and Watts (1982), market-based plans are all options, either on the firm's stock (as in the case of stock options or SAR's) or on the firm's assets (as in restricted or phantom stock). Using the Black and Scholes (1973) options pricing model, most accounting researchers have concluded that the value of awards under these plans increases with both the level and the volatility of the

underlying asset. Thus, a manager who is awarded a stock option is assumed to have an incentive to increase both the mean and the variance of the distribution of the firm's stock price. Even though increased variability increases the chances that the option will expire "out of the money," the manager holding an option is concerned primarily with the potential gain. He or she loses nothing if the option expires unexercised, and may receive a considerable windfall if the actual price realization is in the upper tail of the distribution.

The assumption that the value of executive stock is a strictly increasing function of stock price variability is challenged by Lambert and Larcker (1985). They point out that a critical assumption of the Black-Scholes model is that the holder of the option can create a riskless hedge using the option, the firm's stock and riskless bonds. If such a hedge is unavailable, then the holder (i.e. the executive) is subject to the risk associated with increased price variability. Assuming executives are risk averse, their expected utility from a stock option award will not be a strictly increasing function of variability. At some point, the benefit of increasea variance is offset by the riskiness associated with the award. The implication is that managers holding stock options do not have incentives to always increase stock price variance. Lambert and Larcker show analytically that incentives to decrease variance are positively related to (1) the executive's risk aversion and (2) the probability that the option will expire in the money.

The analysis of Lambert and Larcker suggests that executive stock options may not reduce managerial risk aversion to the extent that is

typically assumed.   Given this, we wish to demonstrate that, _relative_ _to stock options,_ performance plans encourage more risk averse behavior. "Risk averse behavior" is defined as any action which leads to decreased variability of cash flows.   Throughout the discussion, we assume that cash flows and accounting numbers are positively correlated.   Thus, actions which decrease the variability of accounting results also reflect risk aversion.

One reason why performance plans encourage more risk averse behavior than stock options is that the risk associated with performance plans is more difficult to diversify.   A given manager will have the same innate utility function, irrespective of whether he or she receives a stock option or a performance unit.   The relevant question is the degree to which diversification opportunities are available under each type of plan.   Even if a perfect hedge cannot be created for an executive stock option, some diversification is still possible.[14] Antle and Smith (1986) point out that there is less opportunity to hedge the risk associated with accounting-based plans than there is with stock options.   The implication is that--even if stock options encourage managers to decrease stock price variability in certain settings-- performance plans will have a similar, _but more pronounced effect._

The conclusion that managers awarded stock options may prefer to decrease stock price variability depends entirely on the assumption that

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14. For example, Smith and Zimmerman (1976) point out that the executive can diversify by (1) borrowing and investing in other assets or (2) short-selling his or her firm's stock.   However, the first alternative will result in a higher risk-return relationship implied by a more levered portfolio and the second may be in violation of insider trading rules.

managerial risk exposure cannot be reduced to zero through diversification. However, we can show that even risk neutral managers may have incentives to decrease the variability of accounting numbers under a performance plan. This is because, unlike stock options, performance plans specify a maximum number of units or shares which can be earned. This ceiling limits their ability to operate as a traditional option. This is noted by Larcker and Balkcom (1984), who write:

> It should be noted that short-term bonus contracts frequently place an upper bound on the bonus (Healy, 1982) and performance plans typically have a maximum payout (Larcker, 1983). This limits the ability of accounting contracts to operate as an option. (p. 40)

For the remainder of the appendix, we will focus on the case of a risk neutral manager who is awarded performance units or shares. This manager's utility is a linear function of his or her compensation. Compensation is an increasing function of the number of units or shares "earned out." Thus, we define expected payoff (EP) as the expected number of units or shares earned. We will show that EP is a strictly increasing function of the level of accounting results, but not their variability.

For simplicity, assume that the accounting performance measure specified by the performance plan (denoted as x) is distributed according to the uniform distribution on the interval (a,b). Let B_1 be the lower bound on the performance measure, below which no units are awarded. B_2 represents the upper bound, which determines the maximum number of units which can be obtained. The expected number of units earned (EP) from the plan is therefore given by

$$EP = \int_{B_1}^{B_2} x \ \frac{1}{(b-a)} \ dx + B_2 \int_{B_2}^{b} \frac{1}{(b-a)} \ dx \quad .$$

Given that the mean (μ) of the distribution is $(a+b)/2$ and the variance (σ^2) is $(b-a)^2/12$, EP can be rewritten as

$$EP = \int_{B_1}^{B_2} x \ \frac{1}{2\sqrt{3}\ \sigma} \ dx \ + B_2 \int_{B_2}^{\mu + \sqrt{3}\ \sigma} \frac{1}{2\sqrt{3}\ \sigma} \ dx$$

$$= \frac{B_2^2 - B_1^2}{4\sqrt{3}\ \sigma} \ + \ B_2 \left[\frac{\mu + \sqrt{3}\ \sigma - B_2}{2\sqrt{3}\ \sigma} \right] \quad .$$

The change in expected pay-off as the mean of the performance measure increases is:

$$\frac{\partial EP}{\partial \mu} = \frac{B_2}{2\sqrt{3}\ \sigma} \quad . \tag{B-1}$$

Finally, the change in expected pay-off as the standard deviation of the performance measure increases is:

$$\frac{\partial EP}{\partial \sigma} = \frac{B_2^2 - 2B_2\ \mu - B_1^2}{4\sqrt{3}\ \sigma^2} \quad . \tag{B-2}$$

Equation B-1 is positive as long as B_2 (the upper bound) is positive, which seems like a reasonable assumption. This implies that the manager can increase the expected pay-off from the performance plan

by increasing the level of the performance measure. This result also holds for executive stock options.

Equation B-2 indicates that the manager's attitude towards the variability of the accounting performance measure depends on the location of the upper bound. Specifically, if μ is less than $(B_2^2 - B_1^2)/2B_2$, the expected pay-off from the performance plan is an increasing function of variability. Conversely, if μ is greater than $(B_2^2 - B_1^2)/2B_2$, the expected pay-off decreases as the variability in the performance measure increases. This implies that in plans with readily attainable performance goals (B_2 "close" to the expected level of performance), managers can increase the expected number of units awarded by _decreasing_ the variability of accounting numbers. (This is similar to Lambert and Larcker's result that there is an incentive to decrease stock price variance when (1) the probability of expiration in the money is high and (2) executives are sufficiently risk averse. However, the incentive to decrease variability under a performance plan does not depend on the second condition.)

Bickford (1981) reports that most performance plans are tied to growth in EPS, with the target level of growth often set at or below the general rate of inflation. Thus, most performance plans set fairly "easy" goals. This suggests that in many situations, performance plans may provide incentives to decrease the variability of accounting results. Unless we introduce the added assumption of risk aversion, the value of market-based options is a strictly increasing function of the volatility of stock price. Thus, relative to market-based options,

performance plans provide less incentive to increase volatility of the relevant performance measure.

Empirical evidence which supports this conclusion is provided by Healy (1985) who studies the effect of bonus plans on the discretionary accounting choices made by managers. Similar to performance plans, bonus plans often specify an accounting defined floor and ceiling on allowable transfers to the bonus pool. Healy reports that managers appear to select the level of net accruals that maximizes their expected bonus award. Thus, (1) if earnings before discretionary accruals are between the upper and lower bounds specified by the plan, managers will select income-increasing accruals, (2) if earnings before accruals are above the upper bound, income-decreasing accruals will be chosen and (3) if earnings before accruals are below the lower bound, income-decreasing accruals will be selected (the "big bath" phenomenon).

With the exception of (3), this behavior results in decreasing the variability of accounting numbers. In contrast, the incentive to take a bath when earnings are below the required threshold increases the variability of accounting results. This incentive may not exist, however, when compensation contracts include multi-year performance units and the results from consecutive years are not independent. In this case, managers may be less likely to take a bath in one year, because future years will also be affected. The implication is that performance plans may induce managers to decrease the variability of accounting results.

Does this mean that performance plans motivate managers to decrease _cash flow_ variability? The answer depends on several factors.

Recall that we assume that accounting numbers and cash flows are positively correlated. In addition, let us assume that performance goals are readily attainable. Under these conditions, compensation (not just units) from performance unit plans will increase when managers take actions to increase the level and decrease the variability of accounting numbers. By assumption, performance unit plans will therefore motivate managers to decrease cash flow variability.

The manager awarded performance shares faces conflicting incentives. The expected number of shares obtained increases when accounting number variability is decreased. The manager's per share compensation, however, depends on stock price. As an option on the firm's assets, the price of the stock increases with the variability of the firm's cash flows. Because accounting numbers and cash flows are positively correlated, the manager has a dilemma. If he or she increases variability (of either cash flows or accounting numbers), the per share award goes up, but the expected number of shares goes down (and vice-versa). Thus, we cannot predict whether the manager will prefer to increase or decrease cash flow variability.

Our original point, however, is that relative to pure market based options, performance plans are less effective in reducing managerial risk aversion. Stock options (assuming risk neutrality) provide a clear incentive to increase the variance of stock price, and (indirectly) cash flows. Performance plans--either units or shares--do not provide this kind of unambiguous signal. In fact, in many cases performance plans may encourage managers to decrease variability.

In summary, we argue that both accounting and market-based
compensation plans motivate managers to increase the level of their
performance measure. However, relative to market-based plans,
performance plans provide less incentive to increase the variability of
the measure. When performance goals are readily attainable, the award
from performance plans increases as the variability in accounting
results is lowered. Analogously, when the probability of expiration in
the money is high, the manager's utility from stock options increases
when stock price variance is lowered and the executive is sufficiently
risk averse. Risk aversion encourages managers to decrease the
variability of their performance measure whether they are given stock
options or performance units/shares. However, the same manager will be
even more risk averse under a performance plan because the risk
associated with the plan is more difficult to diversify. Thus,
performance plans lead to more risk averse behavior than stock options
because (1) they expose the manager to more risk and (2) they impose a
ceiling on the maximum achievable award.

APPENDIX C

TAX IMPLICATIONS OF LONG-TERM PLANS: 1969-1981

In this appendix we show that the choice between accounting and
market-based long-term incentive plans is not driven by tax effects. We
provide a chronology of changes in the marginal tax rates on earned
income, tax preference items, capital gains, and corporate income
between 1969 and 1981 and discuss the impact of these changes on the
choice between qualified and nonqualified plans. We show that between
1969 and 1980, the tax environment uniformly favored nonqualified long-
term plans. In 1981, however, the passage of new tax legislation
altered the environment so that qualified options became tax
advantageous.

According to the tax minimization hypothesis, compensation
contracts are designed to minimize the joint tax burden of the manager
and the firm. Explanation of contractual changes in terms of concurrent
changes in the tax code, therefore, requires specification of: (1) the
after-tax payoffs resulting from alternative plans and (2) the tax-
induced changes in these payoffs over time.

To compare the after-tax payoffs of qualified and nonqualified
plans, the following notation (from Hite and Long (1982)) is used
throughout this appendix:

S_t = the stock price at time t,

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X = the exercise price,

t_g = the effective marginal rate on capital gains,

t_e = the marginal tax rate on earned income,

t_p = the marginal tax rate on tax preference income and,

t_c = the marginal tax rate on corporate income.

The after-tax pay-off to the executive of a _qualified_ stock option is

$$(1 - t_g - t_p) \max[(S_t - X), 0]. \tag{C-1}$$

When the option is in the money, (i.e. S_t greater than X), the cash flow to the executive is the spread between S_t and X, less the sum of capital gains and preference item taxes.[15] As pointed out by Hite and Long, no capital gains taxes are actually paid on the exercise date, but there is an accrued liability. Thus, the effective rate, t_g, is nonnegative. No tax deduction for the firm is allowed.[16]

Pursuant to the Tax Reform Act of 1976, options granted after May 20, 1976 are eligible for capital gains treatment only if they are granted under a previously adopted qualified plan. The Act also states that qualified options must be exercised prior to May 21, 1981. Options not meeting these deadlines are treated as _nonqualified options_. The spread between the stock price and the exercise price of a nonqualified option is taxable as ordinary income on the exercise date. The corporation receives a similar tax deduction. The "bargain element"

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15. This only applies to tax years ending after December 31, 1969.

16. Source: Sections 421 and 422 of the Internal Revenue Code.

(spread between market and exercise price) related to nonqualified options is not a tax preference item.

As argued by Hite and Long, the corporate tax deduction related to nonqualified plans allows the firm to provide $1/(1-t_c)$ nonqualified options to replace each qualified option without changing its total after-tax compensation cost. The after-tax cash flow to the executive receiving $1/(1-t_c)$ nonqualified options is

$$[(1 - t_e)/(1 - t_o)] \max[(S_t - X), 0]. \qquad (C-2)$$

When the option is in the money, the cash flow is the spread related to $1/(1-t_c)$ shares, less earned income taxes. This tax treatment is extended to SAR's, restricted and phantom stock and performance plans, in addition to nonqualified stock options.

The Economic Recovery Tax Act of 1981 (ERTA) reestablished capital gains treatment for stock options by creating "incentive stock options" (ISO's). The incentive stock option rules are effective for qualifying options granted after December 31, 1975 and exercised or outstanding after December 31, 1980. A summary of the major legislative changes regarding long-term incentive plans between 1969 and 1981 is presented in Figure C-1.

Equations C-1 and C-2 describe the after-tax payoffs to the executive relating to one qualified option and $1/(1-t_c)$ nonqualified options, respectively. Because the firm incurs the same costs in either case, nonqualified options dominate qualified plans if they provide greater after-tax compensation to the executive. Hite and Long show that this is equivalent to requiring that:

ISO's

Qualified Options | No New Qualified Plans

| | | | | | | | | | | | | | |
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

Tax Reform Act of 1969

Bargain element of
qualified options
treated as tax
preference item
after 12/31/69.

Tax Reform Act of 1976

No new qualified
plans may be   adopted
after 5/20/76.

Economic Recovery Act of 1981

Options may qualify for ISO
treatment if granted after
12/21/75 and exercised
after 12/31/80.

By 5/21/81, all qualified
options must be exercised.

Figure   C-1
Major   Tax   Code   Changes   Affecting   Stock   Options
1969   -   1981

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$$(t_g + t_p) > \frac{t_e}{1 - t_c} - \frac{t_c}{1 - t_c} \quad . \tag{C-3}$$

The left hand side of the inequality represents the tax liability of the executive (which is also the joint liability of executive and firm) per dollar of income derived from a qualified option. The right hand side represents the joint liability, resulting from converting a qualified option to $1/(1-t_c)$ nonqualified options. The executive's tax liability per dollar of spread is $t_e/(1-t_c)$. This is reduced by the corporate tax savings: $t_c/(1-t_c)$. In short, nonqualified plans will be preferred if the corporate tax savings exceed the additional tax imposed on the executive.

Inequality C-3 indicates that a favorable tax climate for nonqualified plans results from: (1) low or decreasing marginal rates on earned income, (2) high or increasing marginal rates on capital gains and tax preference items and (3) high or increasing rates on corporate income. Thus, the explanation of shifts between qualified and nonqualified plans over time requires specification of changing marginal tax rates on capital gains, earned income, tax preference income, and corporate income. A summary of tax rates between 1969 and 1981 is provided in Table C-1.

Examination of Table C-1 reveals that between 1969 and 1977: (1) marginal rates on earned income were stable or decreasing and (2) marginal rates on capital gains and tax preference items were stable or increasing. These conditions favor the use of nonqualified plans. In 1978, however, rates on both corporate income and capital gains were

TABLE C-1

Maximum Tax Rates: 1969-1981

Year	Earned Income	Capital Gains[a]	Tax Preference Income	Corporate Income
1969	.70[b]	.25	0	.48[b]
1970	.70	.35	.10[c]	.48
1971	.60	.35	.10	.48
1972	.50	.35	.10	.48
1973	.50	.35	.10	.48
1974	.50	.35	.10	.48
1975	.50	.35	.10	.48
1976	.50	.35	.15[d]	.48
1977	.50[e]	.35	.15	.48
1978	.50	.28	.15	.46
1979	.50	.28	.15	.46
1980	.50	.28	.15	.46
1981	.50	.28	.15	.46

Source: Internal Revenue Code (1969-1981)

NOTES TO TABLE C-1

a. The capital gains rates represent the maximum rate applicable to net long-term capital gains as defined in Section 1201. For tax years ending after 1969 and before 10-31-78, the maximum rate on capital gains below $50,000 is 25%; 35% for gains in excess of $50,000. After 10-31-78, the maximum rate is 28%.

b. Individuals and firms were also required to pay a temporary surcharge of 10% in 1969 and 2.5% in 1970 in addition to their regular taxes.

c. 10% is the minimum tax on preference items exceeding the sum of $30,000 and regular taxes for the year. In addition, tax preference items in excess of $30,000 result in a dollar for dollar reclassification of earned income to ordinary income.

d. For tax years starting after 1975, the minimum tax on individuals is a flat 15%, reduced by the greater of $10,000 or 1/2 of the regular income tax imposed for the tax year.

e. After 1976, the maximum 50% rate applies to "personal service income," rather than earned income. Personal service income includes distributions from pensions, annuities and deferred compensation, wages and professional fees.

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decreased. The tax hypothesis predicts that this environmental change will be associated with an increased use of qualified options. However, the creation of new qualified plans was prohibited between 1976 and 1980 by the Tax Reform Act of 1976. It was not until the passage of ERTA in 1981 that new qualified option (ISO's) plans could again be established.

This analysis of the tax environment indicates that nonqualified plans will be the dominant form of long-term incentive compensation between 1969 and 1980. Cook (1980) reports that during this time, firms which initially switched from qualified to nonqualified stock options also introduced a variety of alternative nonqualified plans, including SAR's, restricted stock, phantom stock and performance plans. (Prior to

1969, qualified stock options were virtually the only long-term
incentive plan used.) Because all nonqualified plans receive the same
tax treatment, the tax minimization hypothesis cannot explain the cross-
sectional variation in plan adoption. In the words of Hite and Long
(1982):

> The tax hypothesis offers little insight into the...wide
> variation in the alternative plans. With each of these plans the
> tax implications are the same: the pay-off to the executive is
> treated as compensation income and the corporation receives a
> corresponding deduction. Thus, the tax hypothesis is capable of
> explaining why firms switched from qualified to nonqualified
> plans in the early Seventies but it offers no insights that would
> allow one to predict which of the various nonqualified plans any
> particular firm might adopt. (p. 13)

Hite and Long suggest that the incentive alignment hypothesis may
be successful in explaining the diversity in observed contracts:

> ...it may be possible to identify incentive effects of the
> various plans that might explain why some firms merely switched
> from qualified to nonqualified stock options while other firms
> shifted to plans based not on market values but on accounting
> measures. (p. 13)

Based on our analysis and that of Hite and Long, we conclude that
the choice between accounting and market-based plans is not motivated by
tax considerations. Following their suggestion, our study is designed
to test whether incentive effects can explain contract design.

APPENDIX D

SAMPLE FIRMS

Year	Adopters	Nonadopters
1971	CBS	Borg Warner Ford Motor
1972	GTE International Paper Sun Company	Bemis Copperweld Eli Lilly
1973	FMC Polaroid Vulcan Materials Weyerhauser Boise Cascade	Armstrong Cork Cessna Aircraft Kimberly Clark Norton Company Raytheon Texaco
1974	Bemis Borden Pillsbury Rohm & Haas Westpoint Pepperell	Archer Daniels Midland General Dynamics General Signal Interco Whirlpool
1975	Eli Lilly Owens Illinois PPG	Burlington Industries Ethyl Corp. Lubrizol Upjohn
1976	Atlantic Richfield CPC International Xerox	Fleetwood Enterprises General Motors Lear Siegler Square D
1977	Allegheny Ludlum Bell & Howell Colt Industries Emerson Electric Nalco Chemical Rockwell International	Chicago Bridge & Iron Gifford-Hill International Multifoods

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Year	Adopters	Nonadopters
1978	Brunswick Corp. Champion International Corning Glass General Electric NL Industries Phillips Petroleum Seagrams	A. O. Smith Control Data Exxon Goodyear Tire Lockheed Wean United
1979	Esmark Hanna Mining Honeywell Koppers Texas Instruments United Technologies Westinghouse	Archer Daniels Midland General Signal Georgia Pacific Merck Time
1980	Allied Corp. Campbell Soup Celanese Chevron Control Data Diamond Shamrock Federal Paper Board Firestone Tire GATX Levi Strauss McDermott McGraw Edison Owens Corning Pfizer Scovill Southwest Forest Products U. S. Gypsum	AMAX Anderson Clayton Avnet Bethlehem Steel Carpenter Technology Colgate Palmolive Dana Corp. Eagle-Picher Federal Mogul Genesco Harris Corp. Hercules Johnson & Johnson Lear Siegler Rohr Talley Industries Tosco

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