VOLUNTARY INCOME INCREASING ACCOUNTING CHANGES: THEORY AND FURTHER EMPIRICAL INVESTIGATION

By

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Abstract

This thesis presents a three step analysis of voluntary income increasing accounting changes. We first propose a theory as to why managers would elect to modify their reporting strategy. This theory builds on research on the economic factors motivating accounting choices, since it is assumed that accounting choices are a function of political costs, manager's compensation plans and debt constraints. Specifically, we claim that adversity motivates the manager to effect an income increasing accounting change.

Secondly, the thesis proposes a theoretical analysis of the potential market responses to a change announcement. The stock price effect of a change announcement is examined as a function of investors' rational anticipations of the manager's reporting actions and as a function of the level of information about adversity that investors may have prior to a change announcement.

An empirical analysis is presented in the third step of this thesis. Our empirical findings are that:

1- Change announcements, on average, have no significant impact on the market.

2- Relative to the Compustat population as a whole, firms that voluntarily adopt income increasing accounting changes exhibit symptoms of financial distress, suggesting that such

change announcements are associated with financial adversity.

3- Firms which voluntarily adopt income increasing accounting changes tend to exhibit symptoms of financial distress one or more years prior to the change year, suggesting that change announcements tend not to be a timely source of information conveying distress to the market.

4- There is a significant negative association between investors' proxies for prior information about adversity and the market impact of the change, especially for the subset of firms with above average leverage, suggesting that the information content of the accounting change signal is inversely related to investors prior information about adversity.

The empirical results thus support the view that investors, at the time a change occurs, have information about the prevailing state of the world, and that they have rational anticipations with respect to the manager's reporting behavior. In this respect, the accounting change is, on average, an inconsequential signal that adds little to what investors already knew before the change announcement.

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CHAPTER I

INTRODUCTION

Every firm uses a set of accounting methods in compiling accounting information and preparing financial statements. A firm's choice of methods is limited to a restricted set of accounting procedures called Generally Accepted Accounting Principles (GAAP). Some firms may elect to change their reporting methods from time to time. As a result of such change, the reported income may increase, decrease or it may remain unchanged.

Accounting literature has analyzed market responses to the announcement of voluntary income increasing accounting changes. Research on the issue has been mainly empirical. There is little current theory predicting the timing and magnitude of the capital market reaction to accounting changes, however, and there is no clear empirical evidence favoring any of the known capital market empirical hypotheses.

The purpose of this thesis is to further investigate market reaction to voluntary accounting changes. There are three steps in our methodology. First, a theory explaining why managers might change accounting methods is elaborated. This theory builds on the research on economic factors motivating the choice of accounting methods.

Second, we analyze potential market responses to the announcement of income increasing accounting changes. One

contribution of this thesis is that a link is made between the manager's motivation to effect the change and the market reaction to the change announcement. This is why we analyze market response as a function of investors' rational anticipations of the manager's reporting actions. We further demonstrate that investors' information about the prevailing state of the world, prior to the change announcement, is a key element in determining a stock price effect related to income increasing accounting changes.

Finally, this thesis performs some empirical tests of the potential market responses proposed in the second step of our analysis. Our empirical data describe a world in which investors have rational anticipations with respect to the manager's reporting actions, and in which investors have information about the prevailing state of the world prior to the change announcement. The existence of these two conditions implies that the accounting change has no incremental information content beyond what is already known to investors before the announcement.

Organization of the thesis

Chapter II reviews the relevant theories of accounting choices and subsequent changes. Attention is focused on the literature analyzing the economic motivations for selecting accounting methods, and on the literature that examines market response to the announcement of voluntary income increasing accounting changes.

The formal analytical model is presented in Chapter III. The manager's reporting decision problem is analyzed and the impact of adversity on the equilibrium reporting strategy is investigated. Finally, the conditions leading to different market reactions to accounting changes are discussed.

Chapter IV presents the empirical analysis designed to test the empirical implications of our model and Chapter V concludes the thesis.

CHAPTER II

OVERVIEW OF THE LITERATURE ON ACCOUNTING CHOICES AND SUBSEQUENT CHANGES

The literature dealing with the selection of accounting methods can be divided into two categories. There is literature on the economic factors motivating the manager to choose a particular accounting method, and there are studies analyzing the capital market reaction to the announcement of voluntary accounting changes. Section 1 of this Chapter reviews the research on the economic factors motivating accounting choices. Section 2 analyzes the theories of market reaction to voluntary accounting changes.

1 Economic factors motivating accounting choices

The literature on accounting choices has demonstrated that the selection of accounting methods is at least partially motivated by economic factors. Watts and Zimmerman (1978) postulated that some economic factors may motivate a manager to select particular accounting methods. As subsequent researchers took an interest in the subject, the list of factors was

expanded[1]. The major factors associated with voluntary choices of accounting methods thus far identified are taxation, political costs, management compensation plans, and debt constraints.

"Taxable income"[2] determines the amount of tax that a firm must pay in a given period. It is then hypothesized that firms would select income reducing methods to minimize their tax burden. That factor, however, is not of great importance to this study for we focus only on accounting changes that have no direct tax implication.

Political costs is the term Watts and Zimmerman (1978) use to describe the impact that different lobby groups may have on the political sector to effect transfers of wealth between various members of the economy, such as unions or competitors. They assert that a politically visible firm, which they define as a large firm[3], will be subject to such political wealth redistributions. The existence of these costs thus creates an incentive to lower reported income in order to minimize political visibility.

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1 Principal studies on the subject include Hagerman and Zmijewski (1979), Dhaliwal (1980), Bowen, Noreen and Lacey (1981), Zmijewski and Hagerman (1981), Dhaliwal, Salamon and Smith (1982), and Lilien and Pastena (1982).

2 Taxable income is determined by a different set of rules (i.e., the Internal Revenue Code and not GAAP). A firm's change in accounting methods usually affects reported income only, not taxable income.

3 A large firm is defined in the literature in terms of either assets or income.

A number of proxies were used to test this concept, the most important one being size. Hagerman and Zmijewski (1979) also believed that firms with higher systematic risk may be subject to higher accounting return, and are thus subject to negative wealth redistributions. The findings presented in Table 1[4] show that there is a significant degree of association between size and the selection of income decreasing accounting methods.

The next factor taken into consideration is lending agreements. Some debt restrictions are functions of accounting numbers. The most common restrictions include a maximum leverage ratio (total long term debt over total long term assets or equity), a minimum current ratio (current assets over current liabilities), and dividend constraints. There is obviously some incentive for the manager to avoid a violation of such constraints, for violation gives debt holders the opportunity to take over the firm. This incentive should be manifested by the choice of income increasing accounting methods if such constraints are present.

The variable most often used to proxy for the existence of debt covenants was leverage. Other measures such as interest coverage ratios and proxies for dividend constraints were also used. As Table 1 shows, leverage was found to be significantly related to the choice of income increasing accounting methods in

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[4] Table 1 presents some results of the studies of the economic motivation for accounting choices.

TABLE 1

Results of studies on the manager's motivation for accounting choices

FACTORS	POLITICAL COSTS		COMPENSATION PLAN		DEBT CONSTRAINTS
Proxy	Size	Risk	Man comp	Corp Control	Leverage
Expected association of factors with accounting choices, (-) factor favors income decreasing methods, (+) factor favors income increasing methods.	(-)	(-)	(+)	(+)	(+)
PAPERS					
Hagerman and Zmijewski (1979)					
Depreciation	(-#)	(-#)	(+@)		
Investment credit	(-@)	(-ns)	(+ns)		
Pension funds	(-ns)	(-ns)	(+#)		
Dhaliwal (1980)					
Succ effort vs Full costs					(+@)
Zmijewski and Hagerman (1981)					
Income strategy	(-!)	(-ns)	(+#)		(+#)
Bowen et al. (1981)					
Interest expense	(-)1 (+)2*				(+#)

TABLE 1 (continued)

Results of studies on the manager's motivation for accounting choices

FACTORS	POLITICAL COSTS		COMPENSATION PLAN		DEBT CONSTRAINTS
Proxy	Size	Risk	Man comp	Corp Control	Leverage
Expected association of factors with accounting choices, (-) factor favors income decreasing methods, (+) factor favors income increasing methods.	(-)	(-)	(+)	(+)	(+)
PAPERS					
Dhaliwal et al. (1982)					
Depreciation	(-&)			(+@)	(+@)
Lilien and Pastena (1982)					
Oil and Gas	(-#)				(+#)
Daley and Vigilend (1983)					
Research and Development costs	(-#)				(+#)

Notes:
1: For firms in the oil and gas industry
2: For firms not in the oil and gas industry
ns: Not significant
!: Significant below or equal to 1%
#: Significant between 1% and 5%
@: Significant between 5% and 10%
&: Significant between 10% and 15%
*: Results inconsistent with the theory

all occurrences, which stresses the importance of this economic factor in accounting choices.

Finally, the argument underlying the manager's compensation plans factor is that if his compensation is dependent upon accounting numbers (e.g., bonus plan), the manager will have an incentive to pick income increasing accounting methods. Healy, Kang and Palepu (1986) found evidence that managers may increase their remuneration by selecting income increasing accounting methods. Their analysis rejects the hypothesis that the compensation committee adjusts the bonus income base to undo the effect of the accounting change that has occurred.

In the literature, the proxy measures used for the manager's compensation were existing bonus plans and ownership control status. In the latter case, it is argued that managers of firms with diffuse ownership will maximize their monetary and non-monetary compensation by maximizing income. As Table 1 shows, there is some empirical evidence supporting the manager's compensation plan as a factor motivating accounting choices.

Analysis

Empirically, the objective of research on economic factors is to look for an association between these factors and the choice of income increasing or decreasing methods. The focus is usually on two methods of accounting for the same event, one of which is income increasing and the other, income decreasing.

There is a weakness in this procedure. Firms must make many accounting choices. It is the whole reporting strategy rather than a single method that is a function of the above mentioned economic factors. Consequently, focusing on one method only, as most of the above studies do, reduces the power of the empirical tests. The results of Table 1 nevertheless provide some evidence that economic factors motivate the manager's choice of accounting methods.

This thesis adopts a perspective that circumvents the problem of focusing on one particular accounting method: we have chosen to focus on the manager's motivation to change accounting methods. Our model assumes that accounting choices are motivated by the political costs, debt restrictions and manager's compensation mentioned above. It is then postulated that, in the event of adversity, the manager will effect an income increasing accounting change (see propositions 1 and 2 subsection 3.3, Chapter III). Our analysis, however, allows the manager to react by changing any accounting method.

The second objective of this research is to investigate potential market responses to the announcement of income increasing accounting changes. The following section reviews the previous literature on this subject.

2 Theories of capital market reactions

Since many reporting decisions have no income tax implications to a firm,[5] their impact on income was initially hypothesized to be cosmetic. This is why earlier studies such as Ball (1972), Archibald (1972) and Kaplan and Roll (1972) focused their analysis on testing whether investors would react positively to income increasing accounting changes.

This market conjecture is called the mechanistic hypothesis. It is aimed at testing whether investors are duped by a change in accounting methods that has no cash flow implications. In other words, investors are hypothesized to react "mechanistically" to the income effect of an accounting change. Stated in its null form, the hypothesis asserts that there should be no market reaction in the event of a voluntary income increasing accounting change that has no cash flow implications to the firm. Archibald (1972) refers to this null version as the "efficient market

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[5] By tax implications we mean the increase or decrease in tax payments for the firm which are caused by the change in accounting methods. Not all changes in accounting methods affect the calculation of taxable income, however.

hypothesis". But as Foster (1978) writes, one must be careful in interpreting this null hypothesis:

> Tests of the mechanistic hypothesis, via accounting change studies, have examined if positive earnings changes for change firms were associated with positive price changes and vice versa. To reject the hypothesis it was sufficient to find no such positive association.... The question of whether these studies are consistent with capital market efficiency is a much deeper issue, one would need to independently predict the "appropriate reaction".... The notion of an "appropriate" reaction is ill-defined and, as yet, poorly operationalized. For this reason, we choose to interpret the accounting change literature as tests of the mechanistic hypothesis rather than as tests of market efficiency. (p.357)

The results of the studies mentioned above provide no clear evidence supporting the mechanistic hypothesis. As Foster mentions, however, the results are not necessarily consistent with market efficiency.

More recent literature on accounting choices has focused on the analysis of economic factors that could motivate the choice of particular accounting techniques as demonstrated in section 1 above, namely debt restrictions, political costs and manager's compensation.

These potential economic impacts of accounting choices led Holthausen (1981) to develop a theory predicting a positive market reaction to an income increasing accounting change. He states that: "Recent evidence suggests that there are economic benefits associated with the choice of accounting procedures which have not been satisfactorily explored." [p 46]. The impact of the change

of different accounting methods on income has accordingly evolved from a cosmetic (mechanistic hypothesis) to an economic impact, for it is now believed that different accounting methods may have economic implications without having direct cash flow (income tax) implications.

Holthausen conjectures that the market should react positively to a voluntary accounting change from the accelerated to the straight line depreciation method, which is an income increasing accounting change. His theory predicts that shareholders' wealth would increase as a result of this income increasing accounting change. His argument is contingent on the conflict of interest between shareholders and bondholders. More precisely, he asserts that a manager faced with constraints on investment and financing decisions has an incentive to relax those constraints if the value of equity can be increased[6]. Equity holders would therefore benefit in terms of wealth transfer from relaxed constraints, which holding constant the value of the firm, would in turn reduce the debt holders' claim.

Wealth transfers, for example, could occur by paying higher dividends or by taking on riskier projects when constraints are relaxed. Holthausen hypothesizes that the stock market reaction should be positively associated with, among other things, leverage as a proxy for covenant tightness.

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6 In Holthausen's model, the manager maximizes equity value.

Holthausen's results are weak and inconsistent with his hypothesis. He could not provide evidence favorable to a wealth transfer hypothesis. Furthermore, and contrary to expectations, he finds a negative and significant association between leverage and the market impact on accounting changers.

Holthausen's theory does not consider the possibility that debt holders and shareholders may have had rational anticipations with respect to the manager's reporting actions at the time they entered into the original contracts. If that were the case, the act of changing accounting methods could convey to the market information about the firm's situation that led the manager to effect the change in the first place.

Harrison (1977) proposed a signaling role for accounting changes, but without the benefit of a model to demonstrate why such acts are credible as signals. As he states:

> Discretionary [accounting changes] can serve as signals regarding firm's production-investment decisions or expectations about future cash flows (e.g., tax payments). Alternatively, they may be made in order to conform to legal requirements, such as debt or other covenants, or they may be induced by the desire to smooth income in unusually profitable periods or to keep an earnings trend from tapering off.... Therefore, while [accounting changes], per se, may appear to have no substantive effect on the entity, the joint implication of the change and other events in the firm may have some substance. For this reason, predicting the market effects of most discretionary [accounting changes] is a very tenuous activity. [p 85]

Harrison's intent was to show that the discretionary characteristic could be one determinant of market reaction to an

accounting change. As we mentioned above, he does not set out a formal model clarifying his predictions and their genesis. His findings reveal a significant negative market reaction to income increasing accounting changers, although his results are subject to some methodological criticism[7].

Analysis

Up to present time, there have been two clear sign predictions with respect to market reaction to the announcement of income increasing accounting changes: these are a positive reaction and a zero reaction (see Table 2). The theoretical arguments underlying these predictions—the mechanistic hypothesis, the wealth transfer hypothesis and the no effect hypothesis—are incomplete since they ignore the manager's initial motivation to effect a change. They also ignore possible existence of investors' rational anticipations with respect to the manager's motivations to effect an income increasing accounting change.

This thesis differs from earlier research on capital market impact in two ways. First, we consider the potential investors' rational anticipations with respect to the manager's reporting behavior. If investors' rational anticipations exists, the stock price effect of the accounting change announcement is a function of the manager's motivation to effect the change. Second, we

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[7] We discuss Harrison's results in Chapter V.

TABLE 2

Previous hypotheses of market reaction to income increasing accounting changes and their sign prediction

HYPOTHESES	PREDICTIONS
Mechanistic	+
No effect	0
Wealth transfer (Holthausen (1981))	+

demonstrate that the level of information investors have about the state of the world is also a key element in determining market reaction to accounting changes.

Our theory is presented in Chapter III.

CHAPTER III

THEORY OF THE MANAGER'S MOTIVATION TO CHANGE ACCOUNTING METHODS AND OF THE MARKET REACTION TO SUCH CHANGE

This Chapter presents a model that analyzes the manager's reporting actions and evaluates investor reaction to the announcement of an income increasing accounting change. We postulate that adversity is an economic event that motivates the manager to effect an income increasing accounting change. We then analyze the market reaction to an income increasing accounting change as a function of investors' information about the prevailing state of the world before the announcement of the change, and as a function of investors' rational anticipations of the manager's reporting actions.

The Chapter is organized as follows. Section 1 provides an introduction documenting the motivation for our model. The model is presented in section 2. Section 3 analyzes the manager's reporting decision as adversity sets in. The market theory of investors' reactions to income increasing accounting changes follows in section 4.

1. INTRODUCTION

Earlier conjectures about the market impact of income increasing accounting changes were that investors are naive and

would react positively to the change announcement or that a change would not induce any reaction since it has no cash flow implications to the firm. More recently, Holthausen (1981) developed a market hypothesis based on research on economic motivations for selecting accounting methods, that predicts a positive market reaction to voluntary income increasing accounting changes.

The following quote from Foster (1986), however, criticizes the recent development of market theories of accounting changes:

> The subsequent literature (subsequent to the literature on the mechanistic hypothesis) has hypothesized that accounting changes are associated with factors that have cash flow consequences, for example, taxation payments, borrowing costs, management compensation costs, and political costs.... At present, there is little in the form of a developed theory to predict the magnitude and timing of the capital market reaction to the hypothesized cash flow consequences of accounting changes. (p396-397)

The contribution of the model in this thesis is that it provides some of the missing theory alluded to by Foster. The model generates new testable implications and also provides a theoretical framework from which to interpret existing empirical work.

The first objective of the model is to demonstrate that, under certain conditions, adversity will lead a manager to effect an income increasing accounting change, if the initial choice of reporting methods is a function of the economic factors discussed in Chapter II: the manager's compensation, political costs and debt restrictions.

Proposition 1 demonstrates that where there are no restrictive debt covenants, adversity will motivate the manager to change the reporting strategy by adopting an income increasing accounting change, provided that expected remuneration can be altered by the change. Proposition 2 shows that if adversity is accompanied by a strictly positive probability of technical default, the manager will adopt an income increasing accounting change that produces a reported income higher than otherwise (if adversity does not create a positive probability of default).

The second objective of the model is to analyze the market reaction to income increasing accounting changes. This study examines the idea that the market's reaction to an accounting change is linked to the manager's motivation for effecting the change[1]. We therefore evaluate potential market reaction as a function of investors' information about the state of the economy prior to the change announcement, and as a function of investors' rational anticipations of the manager's reporting behavior. Specifically, we claim that if investors have rational anticipations with respect to the manager's future reporting actions at the contracting time and if information asymmetry prevails, the accounting change will convey information about adversity to the market. Proposition 3 demonstrates that the

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[1] I am indebted to Professor Rex Thompson for early discussions about this idea, especially the notion that the market's predicted reaction to any voluntary policy change by management is confounded by market inferences about what new information led to a change in policy.

market reaction in such a case will be negative. Proposition 4 shows that the magnitude of the market impact will be an inverse function of investors' prior knowledge of adversity before the accounting change.

2 DESCRIPTION OF THE MODEL

We analyze the choice of reporting methods in an economy where there is only one firm and one manager. An overview of this economy follows in subsection 2.1. A description of the reporting action is presented in subsection 2.2. The economic motivations underlying the choice of accounting methods are presented in subsection 2.3.

2.1 Overview of the economy

This is a two period model[2]. At time t=0, the manager presents an investment project to investors (shareholders and debt holders) who supply funds to the manager. There is symmetry of information at the contracting time.

The outcomes are uncertain. There are two possible states of the world: either the economy is good (state "g") or adversity sets in and the economy is bad (state "b").

At time t=0 after contracting, the manager takes one productive action that is unobservable to investors and affects

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[2] The model can best be seen as a two period window of a multi-period model.

the outcome of both periods, and one reporting action that is observable to investors.

The manager learns which state of the world will prevail over the next two periods, shortly after choosing his productive act and initial reporting strategy. The manager is allowed to adjust his reporting strategy in response to his new private information on receiving this information. He is not allowed to further modify his reporting strategy and the revised selection will predominate until the end of period two.

Only the manager observes the real outcomes of the two periods. After learning the outcomes of each period, the manager, using his revised reporting strategy, computes the reported outcome that will be reported to shareholders and bondholders. It is assumed that the reported outcome will be independently verified by an external auditor to ensure that it is truthfully represented and consistent with the manager's announced reporting strategy.

Investors do not receive any information signal as to which state of the world prevails[3] and observe only the reported outcome prepared by the manager. It is assumed that investors cannot infer the real outcome from their observation of the reported

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[3] This assumption is relaxed in propositions 3 and 4.

outcome and of the manager's reporting strategy[4]. Consequently, there is information asymmetry after time t=0. The manager's modification to the reporting strategy, however, is observable by investors[5] who can then react by revising the value of their claim to the project outcome.

The project outcome for the first period is realized at time t=1. The manager computes the reported outcome and reports it to investors. He then receives his compensation as a function of that reported outcome. If there is technical default on bond covenants written on the reported outcome, the firm is taken over by the debt holders and the manager is dismissed, although he still receives his remuneration for period one. If default occurs at the end of period one, however, it is assumed that the manager cannot earn his opportunity wage elsewhere for the second period. Since he loses his second period remuneration, the manager's utility is adversely affected by bankruptcy[6]. If there is no default, the life of the firm continues. At the end of period two, the manager is remunerated as a function of the reported outcome of period two, and pays back his debt or renegotiates a

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[4] This assumption is based on the stylized empirical fact that a summary of the major accounting methods used by management is disclosed in the financial statements along with reported outcome. However, such information is not sufficient for one to infer the real outcome to the firm for the period.

[5] When an accounting change occurs, the firm reports both the news of the change and the effect that the change had on the reported outcome for the period.

[6] This could be interpreted as an adverse effect of bankruptcy on a manager's reputation.

new set of contracts for future periods. Figure 1 indicates the time path for the two periods of this model.

Notation

We will use the following notation throughout the analysis:

B = The amount invested by debt holders. (there is no interest in this model).

X_t = The end of period t cash flow to the firm which cannot be negative. It is assumed that X_1 and $X_2 \in [\alpha,\beta]$ where $\alpha,\beta > 0$.

$f(X_t)$ = The density function of the outcome X_t. It is assumed that X_1 and X_2 are independent[7].

r = The initial reporting strategy.

r' = The revised reporting strategy.

rX_t = The reported value of X_t.

Adversity

In this thesis, adversity is assumed to be a strict first order stochastic shift in the distribution of outcome as illustrated by Figure 2. The expected real outcome under the good state is

$$\mu_{tg} = \int_{\alpha}^{\beta} X_t f_g(X_t) dX_t,$$

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[7] The density function of the outcomes is assumed to satisfy the standard properties of a continuous density function. The cumulative distribution function is assumed to be differentiable with respect to outcome X.

FIGURE 1

Time path of the model

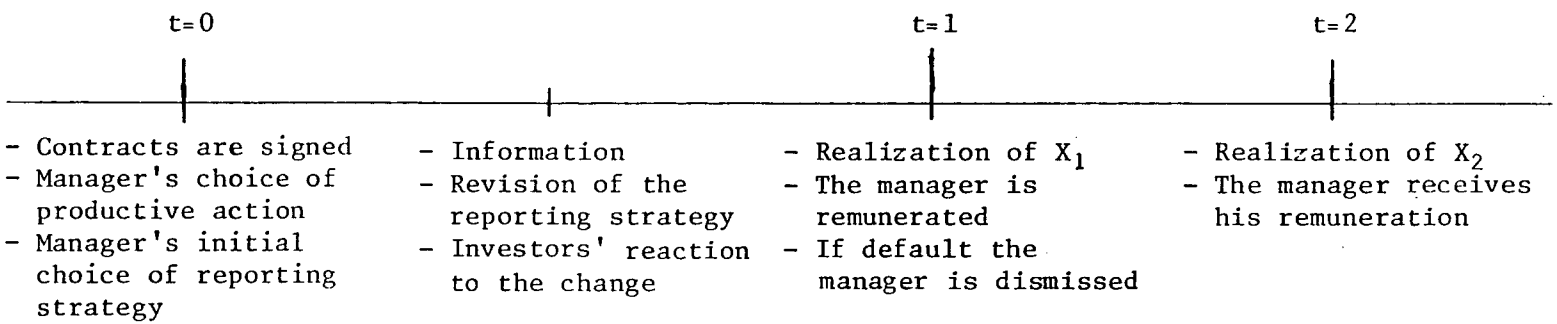
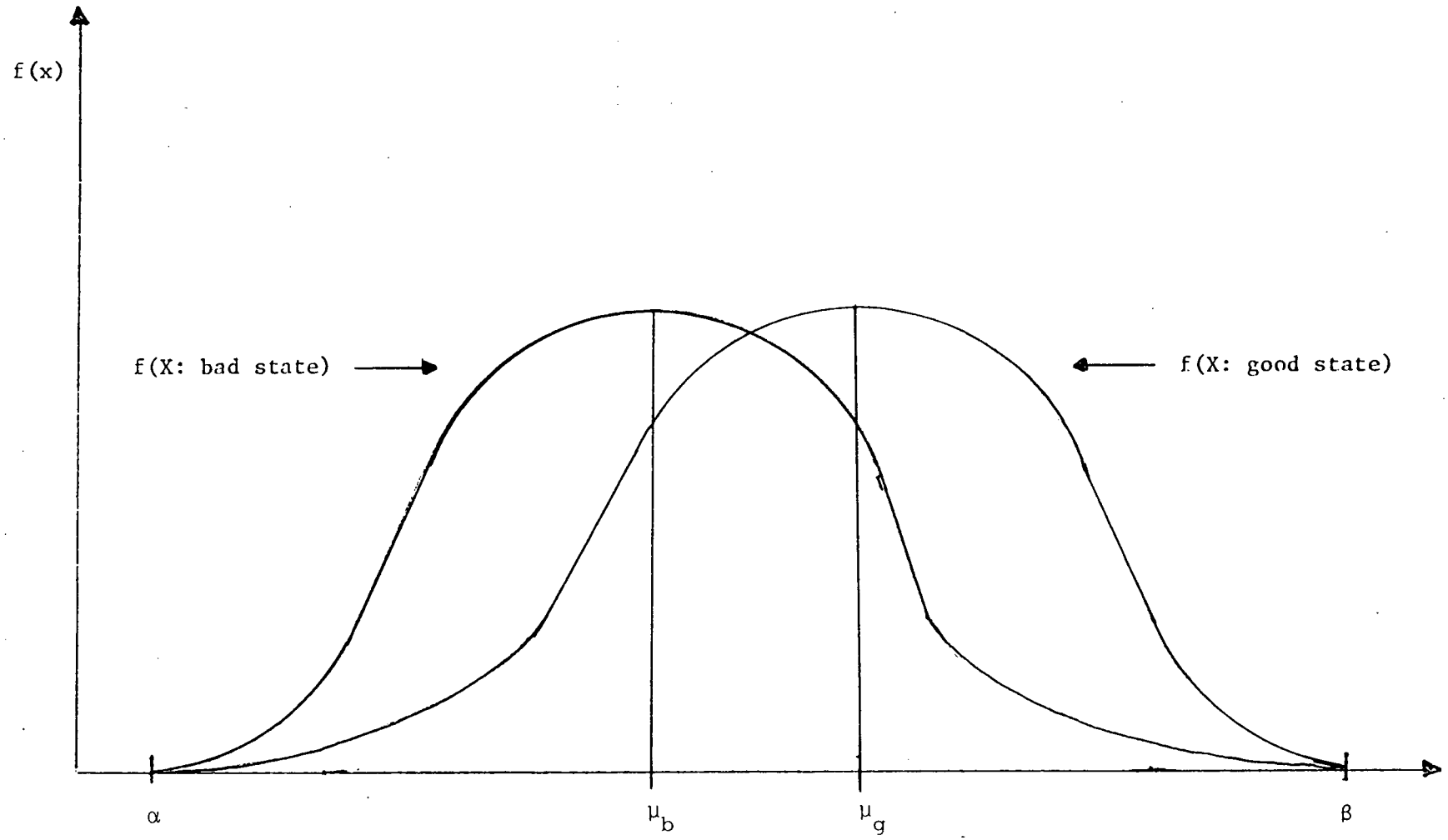


FIGURE 2

- The effect of adversity on the distribution of outcomes



and under the bad state is

$$\mu_{tb} = \int_{\alpha}^{\beta} X_t f_b(X_t) dX_t.$$

Clearly, by first order stochastic dominance, $\mu_{tg} > \mu_{tb}$.

2.2 Reporting choices

The manager of a firm must make a number of reporting choices. Some reporting methods are income increasing and others are income decreasing. The choice of accounting methods in any given period has repercussions on future periods, in that income can only be shifted back and forth through time with different accounting procedures. The selection of income increasing accounting procedures in the first period of a firm's life, for example, will lower the reported income in future periods.

We model the accounting choices in a two period model and we do not allow for the selection of methods in the first period to catch up in the second period for the following reasons:

1- To take the catching up effect into account, one would have to model accounting choices in a multi-period economy with more than one firm, since managers have short term appointments, and we do observe managers moving from firm to firm. If a manager leaves a firm, his replacement has to deal with the selection of methods left by the old manager. It

seems logical, therefore, to assume that managers make their choices of reporting methods over a limited time horizon. If such is the case, the catching up effect is unlikely to occur over the same time horizon.

2- The length of a firm's life is never known in advance. If a firm continues to expand, and therefore to capitalize assets, the catching up effect of early accounting choices can be postponed even further into the future.

Modeling accounting choices over a two period horizon has merit for the reasons cited above. Our model can then be seen as a two period window of a multi-period model our manager uses as the time horizon in his reporting decisions.

For analytical purposes, we have reduced the choice of accounting methods to the selection of one reporting strategy "r". The choice of using all methods that increase reported income will be called the most income increasing strategy[8]. The most income reducing strategy is the choice of all allowable methods that reduce the value of reported income. These reporting strategies will be represented as:

r^H = The most income increasing strategy

r_L = The most income reducing strategy

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[8] The reporting methods that a manager may choose are assumed to be restricted to the Generally Accepted Accounting Principles.

and $r^H > r_L$.

The manager is free to choose any reporting strategy between r^H and r_L.

2.3 Economic motivations for accounting choices

The basic motivation underlying the reporting decision is believed to be economic, in that the reporting strategy may affect future cash flows to the firm. Holthausen and Leftwich (1983) suggest three causal links between firms' cash flows and reported figures. They are[9]:

-political visibility,

-lending agreements, and

-management compensation plans.

Our analysis assumes that the manager's reporting behavior is motivated by these three economic factors.

Political visibility

Political visibility is the term used to describe the impact of reported accounting numbers on the way different lobby groups such as employees, consumers, unions or politicians react. These groups can induce politicians to effect adverse wealth redistributions. It is believed that politically visible firms have incentives to choose income reducing accounting methods to

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[9] A fourth link is also mentioned, but it primarily concerns utility companies. This fourth link, which is very close to political visibility, will be not be treated separately in this study.

avoid the probability of being adversely affected by wealth redistributions. Previous literature assumes that political visibility is a function of the reported income, for a high reported income could trigger high political costs.

In our model, the manager is assumed to take these potential transfers of resources into account in his selection of accounting methods, since political costs reduce cash flows to the firm thereby lowering the reported outcome for a given reporting strategy. This decrease in reported outcome will in turn reduce the manager's remuneration.

The firm in our model is assumed to be affected by political costs as a function of its political visibility. It seems reasonable to assume that a firm is politically visible if its past reported outcomes were high. We assume in this thesis that political costs are defined as

$$PC(X_1,X_2) = (arX_1)(rX_2), \qquad (1)$$

where "a" represents a firm specific factor.

The term (arX_1) represents the political visibility factor and is a function of the period one reported outcome. In other words, the political sector observes the reported outcome of period one, and from this observation decides how much to tax the firm in period two.

Actual political costs occur in period two. The reported outcome of period two, with the tax rate calculated from the

outcome of period one, determines the total political costs as defined in (1). Political costs have the following properties:

$\partial PC/\partial r > 0$

$\partial PC/\partial X_1 > 0$

$\partial PC/\partial X_2 > 0,$

The higher the reported outcome, the higher the political cost. It is also assumed that the political costs in period two cannot exceed the reported outcome for period two. That is,

$rX_2 - (arX_1)(rX_2) > 0$, or that $(arX_1) < 1.$ (2)

Lending agreements

Lending agreements often restrict the activities of the firm and many of these restrictions are expressed in terms of accounting numbers. The violation of a restriction places the firm in a position of technical default, which in turn gives bondholders the right to repossess the firm. The existence of such restrictions is believed to motivate the manager to select income increasing accounting methods.

In our two period model, we assume a debt constraint exists that requires the reported outcome at time one (rX_1) to be equal to or greater than debt value B. If default occurs, debt holders take over the firm. The manager's contract is terminated; he receives

his remuneration for period one but loses his remuneration for period two[10]. The following notation is then added:

δ = The lowest possible value of X_1 that would not trigger default for period one. In terms of the definition of debt covenant, we have:

$$B - r\delta = 0$$

so,

$$\delta = B/r \tag{3}$$

Hence, δ is a function of the selected reporting strategy as the debt restriction is a function of the reported outcome. Through these relationships, the manager, by his selection of reporting methods, can have some control over the variable δ. Specifically, the partial derivative of δ with respect to r is

$$\partial\delta/\partial r = -B/r^2 < 0. \tag{4}$$

Then, since (4) is negative, the manager reduces the debt constraint by increasing r.

The probability of default can now be defined as:

$$F(\delta) = \int_{\alpha}^{\delta} f(X_1)dX_1, \tag{5}$$

---

[10] As mentioned in footnote 4, the manager is assumed to be penalized in the event of technical default on debt covenants.

and its partial derivative with respect to r is

$$\partial F(\delta)/\partial r = f(\delta)\partial\delta/\partial r < 0. \qquad (6)$$

The manager can clearly reduce the probability of default by increasing his reporting strategy.

The management compensation plan

Management compensation plans often provide for the sharing of profits in excess of a target level. The bonus calculation is frequently based on reported accounting income. It is therefore hypothesized that the presence of a profit sharing plan induces the manager to select income increasing accounting methods.

In our model, the manager takes two actions, one productive action and one reporting action. Our manager is assumed to be risk averse. If he is to be motivated to select the optimal productive act for the firm under moral hazard[11], it is well known that his remuneration must be dependent upon the risky outcome. The manager's compensation, function Z in our model, is consequently assumed to be monotone increasing in reported outcome in order to solve the moral hazard problem on his productive action[12,13]. To simplify the mathematics in our model, it is

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11 His productive act is assumed to be unobservable by investors.

12 The manager's remuneration function Z is assumed to be the solution of a typical principal agent problem as studied, for example, by Harris and Raviv (1979) or Holmstrom (1979).

13 Conditions under which monotonic contracts are optimal can be found in Grossman and Hart (1982).

assumed that the manager has a linear remuneration function in the form

$$Z(rX_t) = ZrX_t$$

where $0 < Z < 1$.

It is further assumed that the reported outcome is subject to an independent audit, which eliminates the potential source of further information asymmetry, namely, a situation whereby the manager can misrepresent the reported outcome. The information asymmetry which now remains and cannot be eliminated is the manager's private knowledge of the state of the world[14]. The next section presents the manager's decision problem.

3 MANAGER'S DECISION PROBLEM

This section analyzes the manager's reporting decisions. The manager's problem is presented in subsection 3.1. The initial reporting strategy is analyzed in subsection 3.2. In subsection 3.3, we evaluate the manager's reporting strategy after he receives information about the state of the world.

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[14] To induce truthful revelation of this private information, the principal has to compensate the manager independently of the reported outcome. Unfortunately, such a contract would induce a minimum productive effort from the manager (see Ng and Stockenius (1979)).

3.1 The manager's reporting decision problem

Since the manager's compensation is a function of reported outcome only, he is assumed to maximize his remuneration in his choice of r and r'. The expected real outcome for periods one and two are μ_1 and μ_2. Political costs as indicated by equation (1) reduce the real outcome of period two. The manager's expected political costs at time t=0 are $ar\mu_1(r\mu_2)$.

The manager computes the reported outcome from the real outcome using the reporting function r. Hence, the expected reported outcome for the whole project is

$$r\mu_1 + r\mu_2 - ar\mu_1(r\mu_2). \qquad (7)$$

The manager derives no disutility for his reporting action r and r'. As the issues of moral hazard and information asymmetry with respect to the truthful and consistent reporting of rX_t have been eliminated, the manager's utility will increase as ZrX_t increases. The maximization of his expected utility is therefore equivalent to the maximization of his expected remuneration. His expected remuneration at time t=0 is then

$$Z[r\mu_1 + r\mu_2 - ar\mu_1(r\mu_2)]. \qquad (8)$$

Without loss of generality, the analysis of the manager's reporting decision will be carried out as if the manager were risk

neutral. The manager is assumed to solve the following problem when he selects his reporting strategy:

$$\underset{(r)}{\text{Maximize}} \quad E[Z] = Z[r\mu_1 + r\mu_2 - ar\mu_1(r\mu_2)], \tag{9}$$

subject to:

$$r_L \leq r \leq r^H.$$

3.2 The manager's initial reporting strategy

In our model, the initial choice of a reporting strategy is assumed to be a function of the various forces imposed on the firm by the three links discussed above. From one perspective, the manager may initially adopt income reducing reporting methods in order to minimize political costs. From another perspective, the manager may want to adopt income increasing reporting methods to counter other economic pressures such as the probability of technical default, or to maximize his remuneration.

For example, if the firm is not affected by a debt restriction or if the violation of such a constraint is unlikely, the manager will consider the remaining two forces, political costs and his remuneration, in his selection of a reporting strategy. If the firm is affected by political costs, the manager might choose to report lower than the maximum r^H in order to reduce the political costs burden.

If, in turn, the firm is affected by a positive probability of default, the initial reporting strategy that the manager

selects will be higher than the one selected when there is no such probability of default as from (6) above: the probability of default is shown to decrease as the reporting strategy increases.

Consequently, these economic pressures motivating the choice of accounting methods are firm specific and, depending on the trade-off between these pressures, some managers will initially select an income reducing reporting strategy while others will initially select an income increasing reporting strategy[15]. We assume that a reporting system is in place for the manager's initial selection of a reporting strategy, which is not a matter of choice in our model.

3.3 Manager's reporting choice after the receipt of the information

Case A: no probability of default

The first objective of the model is to analyze how the manager varies his optimal reporting strategy as he learns that adversity is setting in. Let us assume that the initial solution

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[15] We believe that the existence of political costs as a motivation to report low is not critical for the analysis. Another line of reasoning is that the manager may retain flexibility, especially on income increasing accounting choices, in order to adjust for distress when it occurs. The choice of an income increasing reporting strategy before the period in which a bad state occurs might be suboptimal as it shifts income from future periods to the current period, reducing the possibility to face a bad state of the world in the future. Nevertheless, we pursue the analysis with political costs as we rely on prior research in the area for the existence of such costs.

to problem (9) is an interior solution. At the optimal initial choice r^*, we have

$$\partial E[Z]/\partial r\Big|_{r^*} = Z(\mu_1 + \mu_2) - 2Zar\mu_1\mu_2 = 0. \qquad (10)$$

The optimal reporting strategy as shown by equation (10) is the one for which the marginal gain in expected remuneration in period one and two, from higher reported profits, equals the marginal loss in remuneration from political costs. The manager's gain in remuneration comes from the increase in r multiplied by the expected real outcome for the whole project. The marginal loss from political costs arises because political visibility rises with r, thereby increasing the tax rate of period two. From (10), the optimal initial reporting strategy is[16]

$$r^* = 1/a\mu. \qquad (11)$$

The optimal reporting strategy is then a function of the expected real outcome to the firm. If the expected outcome is high, the reporting strategy r^* will be low, because of the greater exposure to political costs. If the expected outcome is low, r^* will be high as the burden of political costs is lower, and the manager wants to increase his remuneration. Equation (11) leads to the following proposition.

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[16] Equation (11) uses the equality $\mu_1 = \mu_2 = \mu$ (by assumption).

Proposition 1 Under the assumptions of the model[17], if the initial choice of reporting methods r^* is an interior solution, then the manager, in the event of adversity, will increase his reporting strategy.

Proof Let r^* be the optimal solution to (10) such that $r_L < r^* < r^H$. Adversity is defined as a downward shift in the mean of the distribution of outcomes, which we represent by μ-b. Equation (11) can then be rewritten as

$$r^* = 1/[a(\mu-b)]. \tag{12}$$

Thus, the partial derivative of (12) with respect to b yields

$$\partial r^*/\partial b = 1/[a(\mu-b)^2] > 0. \tag{13}$$

Consequently, as adversity increases, the optimal reporting strategy increases[18]. Hence, the revised reporting strategy will be higher than the initial choice: $r' > r^*$ [19]. ■

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[17] The assumptions of the model are assumed to hold for all of the remaining propositions as well.

[18] It is obvious that if the manager made his initial choice as if adversity prevailed, we would not observe a change in his reporting strategy after the receipt of his information.

[19] The result of this proposition is intuitive. The manager first selects an initial optimal reporting strategy r^* that equilibrates the marginal political costs with his marginal gain in remuneration. When adversity occurs, the first order stochastic shift decreases the marginal expected political costs. The manager can then increase the reporting strategy to reach a new equilibrium between the marginal expected political costs and his marginal gain in remuneration.

Case B: When adversity creates a positive probability of default

Proposition 1 is derived when there is no probability of default. Hence, the existence of debt is not necessary to motivate an income increasing accounting change. If, however, adversity creates a positive probability of default, $\delta > \alpha$, it should provide the manager with additional incentive to report a higher outcome, since he may lose his second period remuneration. We formalize this in a second proposition.

Proposition 2 Let r′ be the optimal revision of reporting strategy after adversity sets in with no probability of default (see Proposition 1 above). Supposing that $r_L < r' < r^H$, the manager will choose a higher revised reporting strategy r", where r" > r′, if adversity causes a positive probability of default.

Proof Let

$$E[Z|\delta] = Z\{r''\mu_{1b} + (1-F(\delta))(r''\mu_{2b} - ar''\mu_{1b}r''\mu_{2b})\} \qquad (14)$$

be the manager's expected remuneration under adversity with a strictly positive probability of default. The manager's problem at time zero, given adversity and a positive probability of default, is

$$\underset{\{r''\}}{\text{Maximize}} \quad E[Z|\delta]$$

Subject to:

$$r_L \leq r'' \leq r^H.$$

From equation (14)

$$\partial E[Z|\delta]/\partial r'' = Z(\mu_{1b} + \mu_{2b} - 2ar''\mu_{1b}\mu_{2b}) - Z(\partial F(\delta)/\partial r'')(r''\mu_{2b} - ar''\mu_{1b}r''\mu_{2b}) - ZF(\delta)(\mu_{2b} - 2ar''\mu_{1b}\mu_{2b}). \tag{15}$$

Expression (15) represents the rate of change of the manager's expected remuneration with respect to his choice of r" under adversity and a positive probability of default. Since the optimal manager's choice of reporting strategy in the event of adversity with no probability of default is r', which is the solution to

$$Z(\mu_{1b} + \mu_{2b}) - 2Zar'\mu_{1b}\mu_{2b} = 0, \tag{16}$$

evaluating (15) at r" = r', we obtain

$$\partial E[Z|\delta]/\partial r''\Big|_{r''=r'} = -Z\partial F(\delta)/\partial r'[r'\mu_{2b} - ar'\mu_{1b}r'\mu_{2b}] - ZF(\delta)[\mu_{2b} - 2ar'\mu_{1b}\mu_{2b}]. \tag{17}$$

We have

1- $\partial F(\delta)/\partial r' < 0$ from (6) above,

2- $r'\mu_{2b} - ar'\mu_{1b}r'\mu_{2b} > 0$ by assumption (2), and

3- $\mu_{2b} - 2ar'\mu_{1b}\mu_{2b} < 0$, since $\mu_{1b} + \mu_{2b} - 2ar'\mu_{1b}\mu_{2b} = 0$ in equation (16) and $\mu_{1b} > 0$.

Therefore, $\partial E[Z|\delta]/\partial r"\Big|_{r"=r'} > 0$.

Since (14) is a concave function with respect to r,[20] it implies that the manager will have incentive to choose an r" such that r" > r'. ■

Proposition 2 states that if the manager learns that adversity will prevail and that it may trigger technical default on the bond covenant, his revised reporting strategy will be r" so that r" > r^* and r" > r'. The reporting strategy r' would be his choice if adversity would not trigger technical default on the debt covenant. Hence, the manager is willing to increase the

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[20] The function (14) is concave if we have $\partial^2 F(\delta)/\partial r^2 > 0$.
$\partial^2 F(\delta)/\partial r^2 = -[\partial f(\delta)/\partial r](B/r^2) + 2f(\delta)(B/r^3)$.
Hence, $\partial f(\delta)/\partial r \leq 0$ is sufficient to have concavity of (14). This is equivalent to the assumption that the density function f(X) is monotone increasing at $X=\delta$; for example, if f(X) is normal, we would have concavity of (14) for any $\delta \leq \bar{X}$.

reported outcome and incur more political costs because of the default threat.

4 INVESTORS' REACTION TO ACCOUNTING CHANGES

The entire issue of market reaction to voluntary accounting changes can be analyzed in the perspective of investors' rational anticipations of the managers' reporting actions. The market reaction will vary depending on whether one assumes that investors have rational anticipations or not. Moreover, investors' prior information is also a key element in determining market reaction.

4.1 The analysis of potential market responses to the announcement of income increasing accounting changes as a function of investors' rational anticipations and investors' prior information

Consider our two period model with the following example. We demonstrate in propositions 1 and 2 that the manager would adopt an income increasing accounting change if the bad state occurs. To simplify our illustration, we temporarily assume that the manager under the bad state of the world will select reporting strategy r^H. We further assume that state b represents a first order stochastic shift to the left in the distribution of outcomes. Hence, if we let S be the value of the shareholders'

claim , we can say that $S_g > S_b$[21]. This means that the shareholders' claim is higher under the good state than under the bad state. Furthermore, Holthausen's wealth transfer argument states that an income increasing change relaxes debt constraints and thereby permits the manager to take actions favoring shareholders[22]. We illustrate this possibility by

$$S_b(r^H) > S_b(r) \quad \text{for} \quad r < r^H,$$

where:

$S_b(r)$ = is the shareholders' claim if reporting method r is used by the manager.

This means that the manager, in using r^H under the bad state of the world, and hence reporting a higher outcome, would make shareholders better off. We picture three probable outcomes of this example in Figure 3. The reporting method r represents the current method that is used and $r < r^H$.

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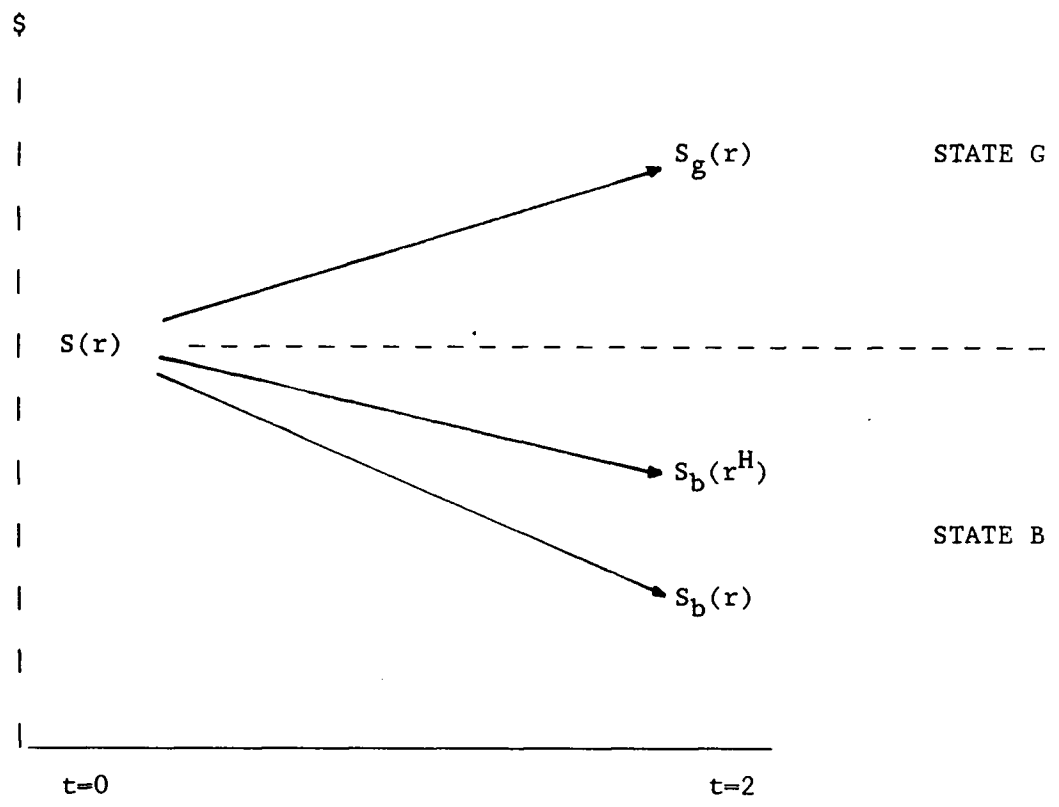
21 S_g= the shareholders' claim under the good state of the world
S_b= the shareholders' claim under the bad state of the world.

22 Example of such actions include substituting high for low variance projects, or paying extra dividends.

FIGURE 3

Shareholders' claim as a function of the state of the world and reporting actions



S(r) = Shareholders' expected claim at time=0, given the current reporting strategy r.

$S_b(r)$ = Shareholders' claim under state b if method r is used.

$S_b(r^H)$ = Shareholders' claim under state b if method r^h is used.

$S_g(r)$ = Shareholders' claim under state g if method r is used.

CASE A: Market reaction to an accounting change when investors have rational anticipations of the manager's actions.

If bondholders have rational anticipations (RA) with respect to the manager's reporting action, they know the manager will be interested in changing accounting methods in the event of adversity as Propositions 1 and 2 demonstrate. At the contracting time, they will calculate the expected costs of subsequent actions the manager might take that would not be in their advantage. They will then consider a lower claim value under a bad state as managers will transfer wealth to shareholders. The non-zero probability of wealth transfer is therefore anticipated at the contracting time.

The shareholders claim under the bad state of the world is similarly higher if the manager uses income increasing accounting methods which delay technical default and allow the manager to take actions favoring them[23]. At contracting time, they anticipate the manager's behavior and price their claim accordingly.

Case when investors have prior information (PI) about the bad state of the world

Suppose shareholders learn that state b will prevail before an accounting change occurs. As soon as they learn of state b,

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23 See Holthausen (1981) for more descriptions of wealth-transfers.

they will revise their claim value from S(r) to $S_b(r^H)$ (see Figure 3), even if the manager is still using method r. This is because shareholders know that the manager will eventually change to method r^H, as his contract motivates him to do so. The market reaction, at the time investors learn of adversity (the occurrence of state b), is negative, since $S(r) > S_b(r^H)$. When the manager actually adopts method r^H, there is no further reaction. Thus the predicted price response to the accounting change is zero, given these assumptions. See the upper left hand quadrant of Table 3.

Such a prediction is also consistent with the no effect hypothesis. There is no predicted market reaction, however, not because the change does not have any cash flow implications to the firm, but rather because the market has already reacted to what motivated the manager to effect the accounting change. The accounting change is then redundant information as the market already knows the state of the firm.

Case when investors have no prior information (NPI) about the bad state of the world

Suppose that investors have no knowledge of state b prior to observing the manager changing reporting methods to method r^H. As they know the manager's motivation to select method r^H in the event of state b, they will infer that state b predominates and revise their claim value from S(r) to $S_b(r^H)$. This revision is negative, as $S_b(r^H) < S(r)$ (see Figure 3), and occurs when the

TABLE 3

Market reactions as a function of investors' rational anticipations of the manager's reporting actions, and investors' prior information

		INVESTORS' PRIOR INFORMATION	
		YES	NO
INVESTORS' RATIONAL ANTICIPATIONS OF THE MANAGER'S REPORTING ACTIONS	YES	0	-
	NO	+	?

change is announced to the market for the first time. See the upper right hand quadrant of Table 3.

In this case we predict a negative market reaction, which occurs because the change conveys information to the market about the prevailing adversity. We name this hypothesis the information revealing hypothesis.

CASE B: Market reactions when investors have no rational anticipation (NRA) of the manager's actions

In the case of no rational anticipation (NRA), investors do not anticipate which actions the manager will use under either state of the world. The predicted market reaction then depends crucially on whether or not investors have prior information, as discussed below.

Case when investors have no prior information about the bad state of the world

In this case, it is hard to predict a market reaction. If one assumes that the accounting change will convey to the market information that adversity has set in, investors will then revise their claim from $S(r)$ to $S_b(r)$. Hence, there is a predicted negative market reaction. However, if one does not assume that the change conveys to the market information about the current state of the world, the market reaction is unpredictable. See the lower right hand quadrant of Table 3.

Case when investors have prior information about the bad state of the world

If investors learn that state b predominates prior to the accounting change, they will revise their claim downward from S(r) to $S_b(r)$ (see Figure 3). A subsequent accounting change from method r to r^H will induce shareholders to revise their claim value from $S_b(r)$ to $S_b(r^H)$. This revision is positive, as $S_b(r^H) > S_b(r)$ by definition of a wealth transfer. See the lower left quadrant of Table 3. In our setting, this is the case when we have an unambiguous positive reaction induced by the potential transfer of wealth from bondholders to shareholders, such as Holthausen (1981) hypothesized, that is, when NRA and PI prevail.

Such a positive reaction is also predicted by the mechanistic hypothesis. However, we consider the argument that investors are naive and would react mechanically to the income effect of an accounting change as somewhat unrealistic. The mechanistic argument is silent on how contracts based on accounting information affect prices.

The empirical objective of this study is to identify which of these possibilities best represents the actual phenomena of market reaction to the announcement of income increasing accounting changes.

The next subsection formalizes the information revealing hypothesis.

4.2 Information revealing hypothesis

In our model, the shareholders' expected claim at t=0, given the reporting strategy r, can be represented by[24]

$$S(r) = \int_{\delta}^{\beta}(1-Zr)X_1 f(X_1)dX_1 + [1-F(\delta)][(1-Z)(\mu_2 - ar\mu_1 r\mu_2)] - (1-F(\delta))B. \quad (18)$$

Equation (18) implies that if default occurs, shareholders lose their entire investment. Here we make the assumption that adversity reduces the expected outcome to the firm more than it reduces the political costs, hence

$$(\mu_{1g}+ \mu_{2g})-(\mu_{1b}+ \mu_{2b}) > ar^2(\mu_{1g}\mu_{2g} - \mu_{1b}\mu_{2b}) \text{ for } r_L \leq r \leq r^H. \quad (19)$$

Assumption (19) implies that for a given reporting strategy, the firm value decreases in the event of adversity[25]. Consequently, adversity implies that for any reporting strategy r,

$$S_b < S_g. \quad (20)$$

Our previous discussion then leads to the following propositions.

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[24] Equation (18) implies that if default does not occur, the outcomes to the firm will more than cover the debt repayment B at the end of period two.

[25] Without this assumption, it would be possible that shareholders be better off under the bad state of the world; this contradicts the definition of a bad state.

Proposition 3 If there is no prior information about the state of the world (NPI) and shareholders have rational anticipations (RA) with respect to the manager's reporting actions, the market reaction to an income increasing accounting change will be negative.

Proof Let ϕ_g and ϕ_b be the shareholders prior probabilities of the good and bad states respectively. Assume that information asymmetry is represented by

$$\phi_g > 0 \text{ and } \phi_b > 0.$$

Suppose the manager receives the signal that state b will predominate and effects an income increasing accounting change. As a result of this action and given their rational anticipations, investors revise their prior beliefs as to which state of the world prevails. The revised expectations are

ϕ'_g = the revised probability of the good state,

ϕ'_b = the revised probability of the bad state.

The shareholders' rational anticipations imply that

$$\phi'_g < \phi_g \quad \text{and} \quad \phi'_b > \phi_b \tag{21}$$

From (20) and (21) we have

$$\phi_g S_g + \phi_b S_b > \phi'_g S_g + \phi'_b S_b; \tag{22}$$

hence, the market reaction will be negative. ■

Proposition 4 The negative market reaction to an income increasing accounting change is inversely related to the amount of information investors have about adversity, prior to the accounting change.

Proof The shareholders' knowledge of adversity is represented by ϕ_b. From (22), the magnitude of the market reaction can be represented by

$$(1-\phi_b)S_g + \phi_b S_b - [\phi_g' S_g + \phi_b' S_b] = M > 0 \qquad (23)$$

From (23), we have

$$\partial M/\partial \phi_b = S_b - S_g \qquad (24)$$

which is smaller than zero by first order stochastic dominance. Hence, the magnitude of the market reaction decreases as investors' knowledge of adversity before the accounting change increases. ■

Proposition 3 demonstrates that, if investors have rational anticipations with respect to the manager's reporting actions and information asymmetry prevails, the market response to an income increasing accounting change motivated by adversity will be negative. Proposition 4 in turn states that the market response to the change announcement diminishes as shareholders' information

about adversity, before the accounting change, increases. The remainder of this thesis will test the empirical implications of our model.

CHAPTER IV

EMPIRICAL ANALYSIS

1. Empirical strategy and design

1.1 Empirical test involving the overall market reaction to change announcements

From our previous discussion of potential market reactions to the announcement of income increasing accounting changes, we have been able to clearly identify the sign of the market reaction in three cases. If we let λ_i represent firm i's market reaction to the announcement of an accounting change[1], our three possibilities are[2]:

1- If investors know that the bad state of the world prevails prior to the announcement of the accounting change (i.e., PI) and if they are aware of the manager's motivation to increase the reported outcome in the event of adversity (i.e., RA), then the announcement of the accounting change is predicted to have no impact on the market.

$$\lambda_i = 0$$

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1 "Accounting change" means "voluntary income increasing accounting change" in this thesis.

2 See Table 3 Chapter III.

2- If investors do not know that the bad state of the world prevails prior to the announcement of the accounting change (i.e., NPI) and if they are aware of the manager's motivation to increase the reported outcome in the event of adversity (i.e., RA), then the market reaction to the announcement of the accounting change is predicted to be negative.

$$\lambda_i < 0$$

3- If investors know that the bad state of the world prevails prior to the announcement of the accounting change (i.e., PI) but cannot predict that the manager will increase the reported income in the event of adversity (i.e., NRA), then the market reaction to the announcement of the accounting change is predicted to be positive.

$$\lambda_i > 0$$

Our empirical task is to identify which of these three possibilities best represents the actual phenomena of the market reaction to accounting change announcements. Our first empirical hypothesis is then formulated as

$$H_1^0 \quad \bar{\lambda} = 0,$$
$$H_1^A \quad \bar{\lambda} \neq 0, \tag{25}$$

where $\bar{\lambda}$ represents the average market impact for a sample of changers.

The formulation of the hypothesis in (25) above allows us to discriminate between the three possibilities. Empirically, we will attempt to reject a zero market reaction (the null hypothesis) in favor of either a positive or a negative market reaction. Hence, a significantly positive market response would provide evidence favoring NRA and PI. Similarly, a clearly negative response would favor RA and NPI.

A market reaction not statistically different from zero would only provide weak evidence consistent with RA and PI since it does not allow the rejection of the two alternate hypotheses. The reason is that although NRA-PI predicts a positive market response, it is silent on the magnitude of the market response. Hence a very small positive reaction could be consistent with both RA-PI, because the response is not statistically different from zero, and NRA-PI, because the response is positive. Similarly, RA-NPI predicts a negative market response reaction but it, too, is silent as to the magnitude of the market reaction. Consequently, a small negative number is evidence consistent with both RA-NPI, because the response is negative and RA-PI, because the response is not significantly different from zero. In an attempt to surmount this shortcoming, we supplement the tests on the average market impact with the cross-sectional tests of association discussed below.

The model does not make predictions for the case of no prior information (NPI) and no rational anticipations (NRA). Therefore, our empirical tests cannot be used to reject this fourth possibility. Nevertheless, we will argue (see section 5 below) that the evidence does not support this possibility.

1.2 Cross-sectional tests of association

When moving to cross-sectional analyses, the ideal would be to test and reject a null hypothesis that is implied by one of our theories in favor of an alternate hypothesis that is in turn an implication of a competing theory. In this way, the tests would be used to supplement the above test on overall change impact and to further discriminate between competing theories. Unfortunately, no such cross-sectional test is available. We therefore resort to a second-best strategy as described in the following paragraph.

For the case where rational anticipations prevail (RA), the model indicates an inverse relationship between the market reaction to an accounting change and the extent of prior information about adversity (PI). We therefore apply the following test of association using proxy measures for the extent of PI (variables selection is discussed in section 3 below). We will test for a negative association between the observed market

reaction to the change and the PI proxy[3]. This would only constitute weak evidence in favor of RA, because in our model NRA makes no prediction about the association between the observed market reaction to the change announcement and the PI proxy. As a result, this cross-sectional test does not offer the potential to discriminate between competing theories.

We posit the following linear relationship between the market impact to the announcement of an income increasing accounting change and investors' prior information:

$$\lambda_i = \gamma_0 + \gamma_1 UE_i + \gamma_2 PI_i + \mu_i, \qquad (26)$$

where:

λ_i = firm i's abnormal returns due to the change announcement,

UE_i = firm i's unexpected earnings variable (a control variable which we discuss in section 3 of the present chapter),

PI_i = the extent of prior information about adversity,

μ_i = an error term assumed to be independent across firms and normally distributed with mean zero.

---

[3] Proposition 4 predicts a negative relationship between the magnitude of the market reaction to change announcements and investors' level of information about adversity. What we test in this cross-sectional analysis is if investors reacted to adversity prior to the change announcement, their reaction to the announcement should be close to zero according to our theory. However, if investors did not react to adversity before the change announcement, their reaction to the announcement is predicted to be negative if RA prevails.

We then formulate our second empirical hypothesis as:

$$H_2^0 \quad \hat{\gamma}_2 \geq 0,$$
$$H_2^A \quad \hat{\gamma}_2 < 0, \tag{27}$$

1.3 Power of the empirical tests

Our theory, developed in Chapter III, states that adversity will induce an income increasing accounting change. Not all accounting changes are made because of adversity, however. There might be other reasons for changing accounting procedures although we believe that adversity is an important one. For example, within the context of our model, a change in the political costs structure could induce an accounting change. Furthermore, variables not treated specifically in our model, such as the auditor's preferences for accounting methods or a manager's attempt to avoid losing the benefits of a tax loss carry forward, are also potential motivations for a change in accounting procedures. Given our sampling criteria (see section 2 below), our sample of changers is likely to include some accounting changes that are not motivated by adversity.

The inclusion of other potential motives adds noise to our empirical tests. For our test on the overall market impact of the announcement of an accounting change (our first hypothesis), the bias of including changes not motivated by adversity is unpredictable. We do not have a theory that would indicate how

the market should react to the announcement of these accounting changes. However, for our cross-sectional tests involving prior information and the market response to the change announcement (our second hypothesis), including changes not motivated by adversity would bias the test results toward a failure to reject the null hypothesis[4].

To increase the power of our tests, we would like to be able to identify the firms in our sample for which adversity was the motive for the accounting change. Indeed, discerning the motivation for change at the time of the change is the investors' problem as well. There is, however, no systematic mechanism available either to investors at the time of the change, or to researchers ex-post, by which to unambiguously ascertain the change motivation. Nevertheless, we employ two partitioning strategies in an attempt to focus on the subset of firms for which adversity was likely to have been the motivation for the change.

We propose the following partitioning approaches:

1- A partitioning based on the stated reasons for changing methods.

2- A partitioning based on the extent of leverage.

The partitioning based on the stated reasons for changing methods allows us to eliminate accounting changes that were

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[4] For the firms with changes not motivated by adversity, there is a predicted zero association between the market impact of the change and the PI proxy.

supposedly made for obvious reasons other than potential distress reasons.

The partitioning based on the extent of leverage is motivated by our second theoretical proposition which demonstrates that when adversity occurs, the closeness of debt restrictions is a motivation to effect an income increasing accounting change. Hence, the probability that an accounting change is made in response to adversity should be higher for firms closer to their debt restrictions. This partitioning also implies that the market is more likely to interpret the accounting change as a signal of distress if the firm making the change is close to violating its debt restrictions; the accounting change is then interpreted as a joint signal of adversity. Consistent with prior empirical research, we use the extent of leverage to proxy for the closeness to debt restrictions[5].

Debt restrictions, however, might be specified in terms of (TAP) tailored accounting principles[6]. This means that debt restrictions are calculated in terms of specific accounting methods rather than GAAP which are used for reporting purposes. Consequently, if all debt restrictions are in terms of TAP, the manager cannot change accounting methods to relax debt constraints.

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[5] For example, Holthausen (1981), Dhaliwal et al. (1982), Bowen et al. (1981).

[6] For example, see Thornton and Bryant (1986).

It is not clear how our empirical results would be affected if our subsample of highly levered firms contained firms for which all debt restrictions are written in terms of TAP. The existence of TAP does not preclude adversity as a possible motivation for the accounting change, if the manager's remuneration is affected by the change. On the other hand, the inclusion of TAP firms could potentially reduce the power of the empirical tests for our subsample of highly levered firms if the motivation for the change is not adversity, since the leverage ratio might be a bad proxy for closeness to debt restrictions written in terms of TAP.

Previous evidence suggests that it is unlikely that all debt restrictions are written in terms of TAP. Leftwich (1983) claims that private lending agreements often include TAP measures, but he also mentions that there is no unanimity among lenders as to which measures to restrict. Leftwich's evidence on accounting methods used in debt agreements does not come from the debt agreements themselves, however, but from *commentaries*, a reference manual designed to provide advice to lenders who renegotiate restrictive covenants in lending agreements. Thornton and Bryant (1986), in turn, look at lending agreements of Canadian firms. They observe that 34 out of 71 firms have debt restrictions written in terms of TAP with respect to the method of accounting for leases. It is possible, however, that there are other debt restrictions written in terms of GAAP which would create an incentive for managers to

effect accounting changes (for example, maximum leverage, minimum working capital ratio, etc.)[7].

Still, the potential existence of TAP in debt agreements adds noise to the sample partitioning based on firm leverage, explained in section 1.3 of this Chapter. We will return to this issue when interpreting our cross-sectional results after partitioning.

2. Sample

The Compustat industrial (primary, supplementary and tertiary files) and the Compustat research file were used to identify firms that had made a change in accounting procedures. If a firm makes an accounting change in a particular year, Compustat reports a code identifying the item that is subject to the change. A total of six items can be noted: sales, cost of goods sold, depreciation, interest expense, income tax, and earnings before extraordinary items. These codes, however, do not specify whether the accounting change is mandatory or voluntary.

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[7] Most of the firms in our sample mentioned the existence of debt restrictions in their financial statements. We asked each firm in our sample to fill out a questionnaire requiring detailed information about the calculation of debt restrictions. However, only 10% of the firms in the sample answered the questionnaire. This obviously makes drawing inferences about debt restrictions difficult.

In order to be eligible for this study, a firm had to meet the following requirements:

-The firm had to have data available on the Compustat annual industrial primary, supplementary, tertiary, or research file[8] .

-The firm had to be listed on either the New York Stock Exchange (NYSE) or the American Stock Exchange (AMEX) (as identified by Compustat).

-The firm had to have a code identifying an accounting change for the period 1977 to 1984, on at least one of the following four items[9,10]:

cost of goods sold;

depreciation;

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[8] The Compustat research file contains firms that either went bankrupt or were liquidated, and are therefore no longer in the population regularly covered by Compustat. The sample includes 9 of these firms. Hence our sampling criteria do not preclude firms which eventually went bankrupt. Given the nature of the research task, excluding bankrupt firms would be an undesirable sampling restriction.

[9] We do not consider the remaining two items. The firms identified with a code on the interest expense item were deleted since most of the changes were due to the issuance of FASB # 34 which required the capitalization of interest during the construction phase of a project. Further, some of the firms with a note on the sale items were examined and very few turned out to have had voluntary accounting changes.

[10] Firms from the oil and gas industry were systematically deleted for the years 1977 to 1980. In that time period, the SEC and FASB released a number of pronouncements regarding the use of the full cost as opposed to the successful efforts method. Consequently, changes in accounting methods in that period for those firms were believed to be mandatory, and not suitable for this analysis.

income tax;

earnings before extraordinary items.

Firms meeting all these requirements were sorted from the Compustat tape. From this procedure, we identified 1488 potential accounting changers.

The financial statements for these firms were read to identify the changes that were voluntary as opposed to mandatory. Table 4 summarizes the result of this procedure; 651 firms were deleted because the accounting code reflected a mandatory accounting change. The financial statements of 192 firms were not available. Another 223 firms adopted LIFO and did not qualify for this analysis[11]. No accounting change could be identified for 173 firms. Finally, 125 firms were deleted because of missing daily returns and 15 because the accounting change decreased income and our theory is for income increasing accounting changes only. Hence, after investigation, 109 firms satisfied the requirements. Table 5 shows the final sample by type of change. The "other changes" category includes changes of accounting methods for oil and gas, pension plans, and capitalization of items that were previously expensed. Table 6 presents the various reasons given to motivate the accounting changes.

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[11] I am grateful to Professor William E. Ricks and Professor John S. Hughes for providing me with a list of LIFO changers for the years 1977 to 1979. The procedure identified 66 LIFO changers in that period.

TABLE 4

Sample firm elimination

TOTAL NUMBER OF FIRMS FROM COMPUSTAT		1488
FIRMS DELETED		
MANDATED CHANGES		
FASB #8	7	
FASB #13	29	
FASB #25	8	
FASB #34	6	
FASB #43	84	
FASB #52	358	
Oil & Gas (SEC)	22	
Other Mandatory	137	
TOTAL MANDATORY CHANGES		651
LIFO adopters		223
Firms for which no change was identified		173
Missing microfiches		192
Missing daily returns		125
Income decreasing changers		15
TOTAL DELETED		1379
FIRMS REMAINING IN THE SAMPLE		109

TABLE 5

Sample of firms by type of accounting changes

	NUMBER OF FIRMS
INVENTORY	23
ADOPTION OF FLOW THROUGH	26
DEPRECIATION	31
OTHER CHANGES	29
TOTAL	109

TABLE 6

Sample of firms by stated reasons for changing methods

	NUMBER OF FIRMS
No reason	27
Better matching of costs and revenues	35
Consistency with industry practices	38
Consistency with the firm's choices of methods for income tax purposes	4
Consistency of methods within the consolidated group	5
TOTAL	109

Relevant profile statistics concerning the sample of changers

We establish the profile of the changers in our sample for a period surrounding the accounting change using the following three ratios[12]:

1-Rate of return measure

(net income/net worth)

2-Financial leverage

(total debt/total assets)

3-Fixed payment coverage

(funds from operations/total debt)

Under adversity, the rate of return and fixed payment coverage ratios will be lower and the leverage ratio higher. For each firm in the sample, these three ratios were calculated for the period starting five years before the change and running to three years after. We computed the difference in the ratios between our sample firms and the average Compustat population for the corresponding years.

Table 7 presents the median of the differences between our sample firm ratios and the average Compustat population ratios,

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[12] Zmijewski (1983) measured the difference in 75 variables between a sample of bankrupt and non bankrupt firms. These three ratios showed consistent differences between bankrupt and non bankrupt firms.

TABLE 7

Median differences between the sample firm ratios and the average compustat population ratios

Ratios	Years relative of the accounting change year (year 0)								
	-5	-4	-3	-2	-1	0	+1	+2	+3
Rate of return (net income/net worth)	-.0024	.0129	.0105	.0215	-.017	-.0341	-.0086	.0173	.028
Number of observations	91	91	93	94	107	106	86	68	43
Wilcoxon Z Statistic (Prob > |Z|)	-.54 (.584)	1.77 (.07)	2.02 (.04)	2.42 (.015)	-2.27 (.02)	-3.04 (.002)	-1.68 (.09)	1.89 (.05)	2.17 (.02)
Financial leverage (total debt/total assets)	.0165	.00385	.0072	.0142	.0361	.0279	.0227	.0242	.0047
Number of observations	90	92	95	95	109	109	90	70	44
Wilcoxon Z Statistic (Prob > |Z|)	1.09 (.27)	.54 (.58)	.936 (.34)	1.74 (.08)	1.87 (.06)	1.62 (.10)	.82 (.40)	.62 (.53)	.38 (.69)
Fixed payment coverage (Funds from oper/tot debt)	-1.805	-1.79	-1.93	-1.87	-1.77	-1.85	-1.76	-1.73	-1.79
Number of observations	85	87	89	92	92	93	88	66	42
Wilcoxon Z Statistic (Prob > |Z|)	-11.18 (.0000)	-11.05 (.0000)	-11.48 (.0000)	-11.43 (.0000)	-11.43 (.0000)	-11.23 (.0000)	-10.85 (.0000)	-9.30 (.0000)	-7.22 (.0000)

along with a Wilcoxon Z statistic[13] . For the rate of return ratio, the median difference indicates that our sample of changers, on average, tends to perform significantly worse than the Compustat population for the years surrounding the change year (years -1 to +1). The results also show that our sample has, on average, a higher leverage ratio than the average Compustat population, and the median difference is significantly greater than zero for the years surrounding the accounting change year (year -2 to 0). Probably as a consequence of their high leverage ratio, our sample of changers has, on average, a significantly lower fixed payment coverage ratio than the average Compustat population.

Hence, the results of this analysis provide evidence favoring our theory that adversity induces income increasing accounting changes. They are also consistent with Bremser (1975) who reports that a sample of 80 firms reporting discretionary accounting changes exhibited a poorer pattern or trend of primary earnings per share (EPS) than a random sample of companies with no reported accounting changes during the same period. Similarly, Archibald (1976) reports that the majority of firms switching back from accelerated depreciation to straight line depreciation exhibited unfavorable net income performance vis à vis a benchmark net income measured for each firm's industry.

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[13] The Wilcoxon statistic tests if the differences in ratios are equal to zero.

We also analyze our sample market returns behavior for the period of approximately 3 years[14] prior to the change announcement (the period ends 3 days before the public announcement of the accounting change). To analyze prior returns, we compute the following market model for each firm in our sample:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}, \qquad (28)$$

where:

R_{it} = firm i's return for period t,

α_i = component of the firm i's returns unrelated to the market returns,

R_{mt} = the market return for period t,

ϵ_{it} = an error term assumed to be independent and normally distributed with mean zero.

The estimated intercept coefficients $\hat{\alpha}_i$ were averaged for all firms in our sample. The average is[15]:

$$\bar{\hat{\alpha}}_i = -.000672 \qquad t(\text{statistic}) = -5.33 \qquad Pr>|t| = .0001.$$

The negative average intercept coefficient indicates that, on average, our sample of changers performed worse than the market for the period preceding the accounting changes. This result also

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[14] The period consists of 600 trading days. The minimum estimation period is 300 trading days.

[15] $\bar{\hat{\alpha}}$ represents an average daily return component unrelated to the market returns.

suggests that investors had information about the potential adversity affecting the average firm (as demonstrated by Table 7) at the time of the accounting change announcement[16].

3. Variables measurement

3.1 Measures of adversity

In subsection 1.4, we proposed the following partitioning approaches to increase the power of our empirical tests:

1- A partitioning based on the stated reasons for changing accounting methods.

2- A partitioning based on the extent of leverage.

Partitioning based on the stated reasons for changing methods

Table 6 classifies the reasons given by management to motivate the accounting change. Among those, we retain the following two potential explanations as candidates for adversity:

1- No reason given

2- Better matching of costs and revenues

In the first case, the absence of motivation leaves unanswered the question of why management changed accounting methods. In the second case, changing accounting methods to

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[16] This result appears to be consistent with Ball (1972), who reports that his sample of 267 changers had experienced relative decline in security prices in the five year period prior to the accounting change.

achieve a better matching of costs and revenues is a general reason that can be used by managers to camouflage the true motive of their acts.

On the other hand, the three other reasons—consistency with industry practices, consistency with the firm's choices of methods for income tax purposes and consistency of methods within the consolidated group—appeal to a specific motive. As a result, it would be hard to justify these reasons if they were not true, since the auditor must concur with the change and the stated reasons.

Partitioning based on the extent of leverage

For the partitioning based on the extent of leverage, we use the average Compustat population leverage ratio as a benchmark. Specifically, if a firm has a leverage ratio for the year preceding the change year that is higher than the average Compustat population for the same year, the firm is classified in the high leverage group. There are 61 firms in this sample partition. Again, we select the leverage ratio at the end of year -1 because the market must know this information at the time of the change in order to interpret the joint signal.

3.2 Measurement of the market reaction to the announcement of the accounting change.

The model that is used to measure the abnormal returns for each firm is:

$$R_{it} = \alpha_i + \beta_i^{-1}R_{m_{t-1}} + \beta_i R_{m_t} + \beta^{+1}R_{m_{t+1}} + \lambda_i \delta_{it} + \epsilon_{it}, \qquad (29)$$

where:

R_{it} = firm i's return for period t,

R_{m_t} = the market return for period t,

δ_{it} = announcement variable (which takes the value of one in the announcement period and zero otherwise),

λ_i = the event parameter which measures the abnormal returns over the event period,

ϵ_{it} = an error term assumed to be independent and normally distributed with mean zero.

Thompson (1985) mentions that under weak stationary assumptions, all of the parameters of a residual analysis have the same asymptotic expectations as the parameters of (29)[17] .

To estimate (29), we use a post estimation period similar to the procedure followed by Richardson, Sefcik and Thompson (1986). The period of estimation ranges from 2 days before the announcement to 242 days after[18]. Hence, no prior data is used.

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[17] In a residual analysis, we compute the market model (28) over a period outside the event window to estimate the parameters α_i and β_i. We then use the parameter estimates of this first pass, $\hat{\alpha}_i$ and $\hat{\beta}_i$, to compute the abnormal returns for the event period: $AR_i = \sum_t (R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt})$, for all t included in the event period (AR_i stands for firm i's period t abnormal return).

[18] The minimum estimation period is 100 days.

The announcement period runs from 2 days before the announcement to 2 days after (a 5 day period including the announcement day). This model is best suited for the analysis performed in this thesis for the following reasons:

-The use of a post estimation period minimizes the stability of the β's problem. The market model and our model (29) above assume the stability of the parameter β. However, the accounting change may be associated with a β shift as documented by Ball (1972), Sunder (1973) and Holthausen (1981). Focusing on post data only should help to correct this potential bias.

-According to the theory presented in Chapter III, the market impact is believed to vary depending on the investors' knowledge of adversity before the change. The use of post data in the estimation of (29) above allows the possibility of taking variables prior to the accounting change, and therefore, independent of the abnormal returns measured by (29) above, as proxies for investors' knowledge of adversity.

Finally, the equation (29) is intended to capture the lagged dependence between security returns and the market index when there is infrequent trading (see Scholes and Williams (1977) and

Dimson (1979)). A similar procedure is used by Holthausen (1981) and Richardson, Sefcik and Thompson (1986)[19].

Announcement dates and daily returns

In this thesis, special care is taken to identify the event dates as we test for the stock price effect of the announcement of a voluntary accounting change. The Wall Street Journal Index and the Wall Street Journal were used to identify the announcement dates for each firm in the sample. This procedure is important because the analysis is performed with daily data and abnormal returns are computed over a five day window.

Announcement dates were found for 86 firms. For the 23 firms with no announcement date, it is assumed that the announcement occurred at year end[20]. The empirical analysis is carried out with and without these 23 firms[21].

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19 We also measured the abnormal market reaction to change announcements without consideration for non-synchronous trading and our empirical results were not affected. This is consistent with the results of Brown and Warner (1985) who found no evidence suggesting that not accounting for non-synchronous trading would bias the results.

20 A similar procedure is used by Holthausen (1981).

21 The inclusion of the 23 firms did not significantly modify the results.

3.3 Measurement and control for unexpected earnings

Most of the accounting change announcements in our sample come at the same time as earnings announcements. The abnormal returns parameter as measured by (29) above contains (1) the market impact of the unexpected portion of earnings and (2) the market impact of the accounting change announcement. In this thesis, we use the following seasonal random walk measure of earnings expectations[22]:

$$E[R_{iq}] = R_{iq-4}$$

where

$E[R_{iq}]$ = expected value of firm i's earnings (primary earnings per share) for quarter q. The change announcement occurs concurrently to the earnings release of quarter q.

R_{iq-4} = firm i's earnings per share one year before quarter q (four quarters before the announcement quarter q).

Hence, the unexpected earnings variable UE is calculated as:

$$UE_i = [(R_{iq} - YI_i) - R_{iq-4}]/P_{iq}, \qquad (30)$$

where:

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[22] We also performed our test using analyst forecasts (Value line investment survey) as a measure of earnings expectations, but we present the results of our test using the seasonal random walk model. The reason is that the mechanical seasonal random walk shows a stronger association with the dependent variable in our model than the analyst forecast. This result is consistent with the study of Hughes and Ricks (1987) who could not demonstrate that an analyst forecast measure of unexpected earnings would perform better than a simple seasonal random walk model.

P_{iq} = the share price for firm i at the end of the quarter q.

YI_i = firm i's change impact on income for the year of the change[23].

3.4 Measurement of investors' prior information about adversity

We use the prior capital gain or loss in share prices for the period prior to the accounting change announcement to proxy for investors' prior information about adversity. The period considered starts at the end of three fiscal year prior to the change year (year T-3) and continues up to the change announcement (approximately a three year period). Specifically,

$$PI_i = [P_{iT} - P_{iT-3}]/P_{iT-3} \qquad (31)$$

where P_{iT} and P_{iT-3} stand for the share price at the announcement date and the share price at the end of three years prior to the change year (year T-3) respectively.

The choice of a time period over which to compute our PI proxy remains arbitrary, but as Foster (1986) reports, the financial ratios of bankrupt firms start to exhibit behavior different from that of non-bankrupt firms as early as three to

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[23] The accounting change modifies the results of the year in which it occurs. In order to have a better estimate of unexpected earnings, we subtract the effect of the accounting change on the income for the change year. However, the variable YI does not include the cumulative impact of accounting changes on prior years as this impact does not appear in the calculation of the primary earnings per share.

five years prior to bankruptcy. Furthermore, Westerfield (1970) shows that, in each of the 60 months prior to bankruptcy, the monthly cumulative abnormal returns of 20 bankrupt firms were negative suggesting that the capital market revises its valuation of these companies downward well before the bankruptcy announcement. It is then possible that the market learns of adversity for our sample of changers as early as three years before the change announcement. As a sensitivity analysis, however, we reperform our tests calculating the PI proxy on a two year and on a one year period before the change announcement. The results of these estimations are discussed in the next section.

Finally, our proxy PI does not include the dividend returns over the same period. We consider the share price (or the market value of the firm at one point in time) as the expected value of future cash flows to the firm. Hence a decrease in price would imply a decrease in expected future cash flows to the firm. However, we reperform our tests using a PI measure that includes dividends and we report the results of this estimation in the next section.

4 Empirical results

4.1 Results of the tests on the overall market reaction to the announcement of accounting changes.

Table 8 presents the sample average abnormal returns to the announcement of income increasing accounting changes. In panel A, our whole-sample results indicate an average abnormal return coefficient, as measured by equation (29), that is negative but not significantly different from zero. The same holds for the partitioning based on the stated reasons for the change in panel B, and for the firms reporting a leverage ratio higher than the average Compustat population in panel C where the average overall market response to the change announcement is not significantly different from zero. Table 9 displays some statistics of the overall market impact to the announcement of accounting changes.

Following Richardson, Sefcik and Thompson (1987), we first test whether each true coefficient equals zero. Assuming that the coefficient estimates $\hat{\lambda}_i$ are independent across firms with expected value of zero, the average t-statistic on $\hat{\lambda}_i$ is approximately normally distributed with standard deviation of $1/\sqrt{n}$, where n is the number of firms in each sample partition. The average t-statistic is less than one standard deviation away from zero in all sample partitions, as shown on Table 9. Consequently, we cannot reject the null hypothesis that the true λ_i are zero. We now test the less restrictive hypothesis

TABLE 8

Average sample market response to the announcement of income increasing accounting changes

The variable λ is the market impact coefficient measured by the equation (29) in the text for each firm:

$$R_{it} = \alpha_{it} + \beta_i^{-1} R_{mt-1} + \beta_i R_{mt} + \beta_i^{+1} R_{mt+1} + \lambda_i \delta_i + \epsilon_i;$$

where R_{it} and R_{mt} represent firm i's return and market return respectively for the period t, δ_{it} takes the value of 1 if t is in the event window (5 days) and 0 otherwise, λ_i measures the market reaction to the change announcement. We estimate this equation over a period of 245 days including a 5 day event period.

	Number of observations N	Average estimate λ (t-stat)	Average t-stat	Percent significant (at the α=.10 level) Positive	Negative
PANEL A					
Whole-sample	109	-.00018 (-.14)	.06912	10.09	5.50
PANEL B					
Partitioning based on the stated reasons for changing methods	62	-.00008 (-.04)	.05505	13.11	6.55
PANEL C					
Partitioning based on the extent of leverage	61	.00099 (.49)	.08808	9.67	6.45

TABLE 9

Frequency distribution of abnormal return coefficients.

The coefficients are taken from regression (29) in the text:

$$R_{it} = \alpha_i + \beta_i^{-1} R_{m_{t-1}} + \beta_i R_{m_t} + \beta^{+1} R_{m_{t+1}} + \lambda_i \delta_{it} + \epsilon_{it}.$$

	ALL FIRMS	PARTITIONING BASED ON THE STATED REASONS	PARTITIONING BASED ON THE EXTENT OF LEVERAGE
NUMBER OF FIRMS "n"	109	62	61
ANNOUNCEMENT COEFFICIENT λ_i			
Maximum	.0765	.0765	.0765
3rd Quartile	.00534	.00565	.00745
Median	-.0009	-.00065	-.001
1st Quartile	-.0074	-.00767	-.0062
Minimum	-.0608	-.0608	-.0332
Mean	-.00018	-.000088	.000997
F-statistic*	.018	.001	.28
(degrees of freedom)	(1,25425)	(1,14137)	(1,14124)
z-statistic**	.7217	.4334	.6873

*Under the null hypothesis of a zero mean, Richardson, Sefcik and Thompson (1987), report that the test statistic

$$F = \frac{(\Sigma \hat{\lambda}_i)^2}{(\Sigma \hat{\sigma}^2(\lambda_i))}$$

is distributed as F, where $\hat{\sigma}_i$ is the standard error of $\hat{\lambda}_i$ estimated from the time-series regressions (29) above.

**Assuming cross-sectional independence, under the null hypothesis that each coefficient is zero, the average t-statistic across the sample for a given coefficient is approximately normally distributed with mean zero and standard deviation of $1/\sqrt{n}$, where n is the number of firms.

that the sum of the true coefficients equals zero. Using an F-statistic reported on Table 9, for every sample partition, we cannot reject the hypothesis that the average λ_i is zero.

4.2 Empirical results of our cross-sectional tests of association

The overall market impact results above do not allow us to clearly identify which conditions presented in section 1 above best explain the phenomenon of the market reaction to accounting changes. We must acknowledge the fact that the unexpected earnings surprise is also included in the overall market impact response to change announcements as measured by model (29) in the text. In an attempt to account for unexpected earnings and better estimate which conditions prevail with respect to market responses to accounting change announcements, we compute the cross-sectional model (26).

The results of estimating our cross-sectional model (26) are shown in Table 10[24]. In panel A, the estimated coefficient $\hat{\gamma}_2$ has the predicted sign and is significantly negative at the α=.1 level (one-tailed test). In panel B, for the partitioning based on the stated reasons for changing methods, the coefficient is

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[24] The correlation coefficients among the independent variables are

PANEL A: .011
PANEL B: .087
PANEL C: -.048

TABLE 10

(Unadjusted for heteroscedasticity)

Fitted cross-sectional model of the relationship of investors' prior information with the market response to the accounting change announcement

The results are for regression (26) in text:

$\hat{\lambda}_i = \gamma_0 + \gamma_1 UE_i + \gamma_2 PI_i + \mu_i$, where :

$\hat{\lambda}_i$ = firm i's market response to the change announcement as measured by (29) in the text,

UE_i = unexpected earnings proxy as measured by equation (30) in the text,

PI_i = investors' prior information proxy as measured by equation (31) in the text,

γ_1 = linear contribution of the unexpected earnings proxy to the abnormal market reaction to the change announcement,

γ_2 = linear contribution of the proxy for investors' prior information to the abnormal market reaction to the change announcement,

μ_i = an error term assumed to be independent across firms and normally distributed with mean zero.

Panel A presents the results for the entire sample, panel B presents the results for the sample partitioning based on the stated reasons for the change and panel C presents the results for the sample partitioning based on the extent of leverage.

	$\hat{\gamma}_0$ (t stat)[a]	$\hat{\gamma}_1$ (t stat)[a]	$\hat{\gamma}_2$ (t stat)[a]	F	ADJ R^2	Number of cases
Predicted sign		(+)	(−)			
PANEL A	.0003 (.288)	.021 (2.56)*	-.0020 (-1.57)#	4.47*	.06	109
PANEL B	.0008 (.387)	.035 (2.66)*	-.0016 (-.766)	3.69@	.08	62
PANEL C	.0016 (.877)	.022 (2.37)@	-.0033 (-2.12)@	5.33*	.13	61

[a] One-tail test

* significant at the α=.01 level

@ significant at the α=.05 level

significant at the α=.10 level

negative but not statistically different from zero[25]. Finally, in panel C for the partitioning based on the extent of leverage, the PI coefficient is negative and statistically different from zero at the α=.05 level. We are therefore able to reject our second null hypothesis that there is a zero or a positive relationship between the extent of prior information and the market impact of the change for all firms and for the sample partitioning based on the extent of leverage. We also note that the coefficient for unexpected earnings $\hat{\gamma}_2$ is positive, as one would predict, and significant in all cases[26].

Test for standard assumptions involving residuals

The t-statistic shown on Table 10 assumes normality of the residuals. We test for and reject normality using a Kolmogorov-Smirnov test. We also perform an F-test for the equality of estimated variances of λ_i, and we reject the null hypothesis of equality of variances. Hence, heteroscedasticity is a potential

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[25] We acknowledge the fact that any of the reasons provided by management as explanations for the accounting change might be excuses. We therefore reperformed our cross-sectional empirical tests for all changers with the following reasons: no stated reason, better matching of costs and revenues, and consistency with the firm's choices of methods for tax purposes. The results are unchanged.

[26] We would expect to find such a positive association as the market should react positively if unexpected earnings are positive and vice-versa. We also reperformed our analysis using the Value Line Investment Survey earnings forecast to compute the unexpected earnings proxy variable. The results for the 78 firms with sufficient information are similar to those shown in Table 10 with the exception that the coefficient on unexpected earnings is positive but not statistically different from zero.

problem. We perform a transformation to correct for heteroscedasticity and reduce the excess kurtosis and skewness of the distribution of our error term. Following Richardson, Sefcik and Thompson (1987), both sides of (26) are divided by the estimated standard deviation of $\hat{\lambda}_i$, $\sigma_i(\lambda_i)$, computed with the time series regressions (29). The results of this estimation procedure are shown in Table 11. The results for the PI coefficient are similar to the results of Table 10. Hence, we conclude that our results for equation regression (26) are robust to alternative model specifications[27].

Results using different time period for calculating the PI proxy[28]

We reperform the analysis calculating the capital gain or loss on one and two year periods respectively. For the two year period, the coefficient $\hat{\gamma}_2$ is negative but only statistically different from zero for the sample partitioning based on the extent of leverage (but not statistically different from zero for the transformed models). For the one year period, the same parameter is negative but not significantly different from zero

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[27] We also reject the normality assumption for the transformed model. However, the departure from normality is not serious as the distribution of our residuals has thin tails, which produce a bias towards not rejecting the null hypothesis. Nevertheless we find significant results for our PI proxy coefficient.

[28] Proxy variables represent the true variable only up to a certain error. We must therefore bear in mind, when interpreting the results, the potential bias and inconsistency in the parameter estimates that this problem of error in variable problem might cause.

TABLE 11

(Adjusted for heteroscedasticity)

Fitted cross-sectional model of the relationship of investors' prior information with the market response to the accounting change announcement

The results are for regression (26) in text after dividing both sides of the model by the standard deviation of the parameter $\hat{\lambda}_i$ estimated by equation (29) in text. Equation (26) is:

$\hat{\lambda}_i = \gamma_0 + \gamma_1 UE_i + \gamma_2 PI_i + \mu_i$, where:

$\hat{\lambda}_i$ = firm i's market response to the change announcement as measured by (29) in the text,
UE_i = unexpected earnings proxy as measured by equation (30) in the text,
PI_i = investors' prior information proxy as measured by equation (31) in the text,
γ_1 = linear contribution of the unexpected earnings proxy to the abnormal market reaction to the change announcement,
γ_2 = linear contribution of the proxy for investors' prior information to the abnormal market reaction to the change announcement,
μ_i = an error term assumed to be independent across firms and normally distributed with mean zero.

Panel A presents the results for the entire sample, panel B presents the results for the sample partitioning based on the stated reasons for the change and panel C presents the results for the sample partitioning based on the extent of leverage.

	$\hat{\gamma}_0$ (t stat)[a]	$\hat{\gamma}_1$ (t stat)[a]	$\hat{\gamma}_2$ (t stat)[a]	F	ADJ R^2	Number of cases
Predicted sign		(+)	(−)			
PANEL A	.1038 (1.013)	.0147 (1.55)#	-.0009 (-.969)	1.733	.01	109
PANEL B	.0894 (.662)	.021 (1.47)#	-.0004 (-.345)	1.16	.003	62
PANEL C	.1416 (1.07)	.014 (1.46)#	-.0025 (-1.96)@	3.26@	.07	61

[a] One-tail test
* significant at the α=.01 level
@ significant at the α=.05 level
# significant at the α=.10 level

for any sample partitioning. The results are then sensitive to the time horizon choice for measuring PI in that the significance levels decrease with the time horizon. This result is consistent with the Westerfield (1970) results about the market's early detection of the potential effect of adversity affecting bankrupt firms. Although our sample does not include only bankrupt firms, we report in section 2 of this Chapter that, on average, our sample of firms shows signs of distress prior to the accounting change announcement.

Results of using PI proxy including dividends.

We also reperform the tests using the stock returns, including dividends, over a similar time horizon to compute the PI proxy. Specifically, we compute the average returns on the market for each firm over a three year period preceding the accounting change announcement. The results of the tests using such a measure for PI proxy do not differ from the results shown in Tables 10 and 11. We then conclude that our tests are robust to the definition of the PI proxy, with or without dividends.

5 Conclusion

The results of the tests on the overall market impact of the accounting change announcement do not allow us to reject a zero market reaction in favor of either a positive or a negative market impact. As we have already mentioned, such results provide only

weak evidence in favor of a world in which rational anticipations of the manager's reporting actions prevail and in which investors have prior information about the current state of the firm. The possibility of investors' prior information is further emphasized by our profile results demonstrating that, on average, our sample of changers performed worse in terms of market returns than the market population in the three year period prior to the change announcement.

Our cross-sectional analysis provides further evidence consistent with RA and PI. We are able to reject the null hypothesis of a zero or positive association between the market response and the investors' prior information proxy, for the sample as a whole and for the subset of sample firms with above average leverage. We still find a significant negative association for the sample partitioning based on the extent of leverage for the transformed model[29]. However, we must acknowledge the fact that the cross-sectional results rely heavily on the validity of selected proxy measures: the use of the unexpected earnings proxy to represent the investors' surprise due to the earnings announcement and the use of prior capital gain or loss in share price as a proxy for shareholders' prior information about the current state of the firm.

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[29] We must acknowledge the fact that the potential inclusion of TAP firms in this sample partitioning would bias the results towards the acceptance of the null hypothesis. However, we still find significant results for this subsample.

Finally, our model does not generate a prediction for the NPI-NRA case and we cannot formally reject this possibility with our empirical tests. However, our profile results in section 2 suggest that, on average, prior information about adversity is available for our sample of firms. Furthermore, our cross-sectional empirical results provide evidence consistent with rational anticipations. It is therefore less likely that this theoretical possibility could explain our sample results.

CHAPTER V

CONCLUSION

1 Overview of thesis objectives and results

In this thesis we present a three step analysis of voluntary income increasing accounting changes. We first propose a theory as to why managers would elect to increase the reported income through an accounting change. We demonstrate that if adversity sets in and if accounting choices are a function of political costs and the manager's compensation plans, it would be in the interest of a utility maximizing manager to effect an income increasing accounting change. Our finding is further strengthened when we add a third motivation, a debt restriction written on the reported outcome. The theoretical issue of why managers would change accounting methods has not been addressed by previous empirical work in the area.

In the second step of this thesis, a theoretical model is used to analyze potential market responses to the announcement of an income increasing accounting change is presented. In this part, we motivate the stock price effect of an accounting change by the theoretical conclusions of the first step analysis which states that adversity motivates the manager to effect an income increasing accounting change. Our analysis differs markedly from previous research in that a link is made between the manager's

motivation to change methods and the potential market reactions to the change announcement. We also consider the likely effect of investors' prior information about the state of the world on market response. The consideration of the investors' level of information was not present in prior empirical work.

In the theoretical model, we demonstrate that the change will convey information about adversity to the market if investors have rational anticipations of the manager's reporting behavior (RA). In such a case, the model predicts that the change will induce a negative market reaction. The model also demonstrates that the market response will vary as an inverse function of investors' information about adversity prior to the change announcement. For example, if investors had complete information about prevailing adversity prior to the change announcement, we predict that the change will not induce a market reaction, since the negative market reaction would have occurred at the time investors learned about the adversity.

If, on the other hand, investors have no rational anticipations of the manager's reporting behavior (NRA), the model and subsequent discussions indicate that the change would induce a positive market response, similar to that predicted by Holthausen (1981) (wealth transfer), provided that investors were aware of the prevailing adversity prior to the change announcement (PI).

In the third step of our analysis, we present an empirical analysis designed to test the conclusions derived in the theoretical market response analysis above.

Our empirical findings are that:

1- On average, the market response to the change announcement is not statistically different from zero.

2- Relative to the Compustat population as a whole, firms which voluntarily adopt income increasing accounting changes exhibit symptoms of financial distress, suggesting that such change announcements are associated with financial adversity.

3- Firms which voluntarily adopt income increasing accounting changes tend to exhibit symptoms of financial distress one or more years prior to the change year, suggesting that change announcements tend not to be a timely source of information conveying distress to the market.

4- Our cross-sectional tests of association, as predicted, find a significant inverse association between the market reaction to the change announcement and investors' prior information proxy, especially for firms with a leverage ratio that is higher than the Compustat population average.

These results lead us to conclude that our data, on average, best describe a world in which investors have rational anticipations with respect to the managers' reporting actions and in which, on average, prior information about adversity prevailed before the change announcement. Our analysis also suggests that,

while a voluntary income increasing accounting change appears to be associated with financial distress, such changes are not a timely source of information conveying distress to the market.

2 Comparison of our empirical results with prior studies

2.1 Mechanistic hypothesis

Archibald (1972) and Ball (1972), who evaluated abnormal returns to change announcements with monthly data and who used a wide event window (4 and 12 years respectively), concluded that the announcement of the change had no apparent effect on market prices. Kaplan and Roll (1972) used weekly data and found a 31 week cumulative abnormal return, ending with the announcement week, which was not statistically different from zero.

Our first empirical result is consistent with the results of the three studies above. We also find no apparent market reaction to the announcement of accounting changes, even with methodological refinements including the use of daily data and a substantially smaller estimation period. Unlike previous studies, we can conclude that the change announcement has no apparent market impact as we measure the market reaction over a five day event window[1].

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[1] Previous studies cumulated abnormal returns over a large period making any conclusion about the change announcement per se difficult.

2.2 Holthausen (1981)

Our initial result is comparable to the result of Holthausen (1981), who found an average abnormal market response to accounting change announcements that was not significantly different from zero over an event period similar to ours. We are, like Holthausen, unable to reject the null hypothesis of a zero market response to the change announcement. We consequently replicate Holthausen's result as to the overall market impact of the change.

A zero market impact, however, is explained by our theoretical arguments when RA and PI prevail. Our cross-sectional analysis then complements this first result by testing an implication of RA, namely, the predicted negative association between investors' prior information and market response to the change announcement. As mentioned above, we observe such a negative association.

In conclusion, our study complements Holthausen's study in presenting theoretical arguments as to why the market reaction to a change announcement would be zero, and by providing empirical tests for these arguments.

2.3 Harrison (1977)

Harrison (1977), using a non-changers control group, found a significant negative difference in returns for voluntary income increasing changers. He averaged the return differences over a

thirteen month period, however, as opposed to the five day period in this study[2]. Such a measure is unrefined in the light of recent evidence of less than two day assimilation of information contained in earnings announcements (i.e., Morse (1981)).

Harrison's significant negative finding might be explained by the fact that his use of a control sample to measure market reaction to voluntary accounting changes creates a self-selection bias problem in that firms themselves select the group to which they belong (i.e., changers or non-changers). Harrison used no clear theory to identify potential dissimilarities between changers and non-changers[3]. The control variables in his study are therefore unlikely to account for all differences, and as Ricks and Biddle (1985) point out, it is difficult to predict how the differences not accounted for will affect the variations in stock returns.

If our theory that adversity induces accounting changes is valid, the proportion of firms affected by adversity should in fact be greater in Harrison's sample of changers than in his

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[2] He used monthly returns and computed an average abnormal monthly return for the thirteen month period surrounding the second month after year end, which was assumed to be the announcement month.

[3] His control variables were relative risk, industry and fiscal year end.

control group[4]. His results capture what we consider to be investors' prior information in this study, namely the investors' reaction to other information about adversity released in the period prior to the change announcement, as well as the marginal signal of the announcement of an accounting change, which would explain his significant negative result.

3 General conclusion

This thesis adopts a different perspective on examining market reaction to accounting changes, namely, focusing on the information transmission potential of an income increasing accounting change. This possibility has been considered to some extent in prior research, but never in depth. We must, however, pay tribute to Harrison (1977) for his insight into the issue.

Our analysis responds to a need in the accounting literature by providing a theory as to why information can be transmitted through an accounting change. The first element in this theory is an investigation of the manager's motivation to effect an income increasing revision in his reporting strategy. The second element is the presentation of sufficient conditions for information to be transmitted with the change announcement, that is investors'

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[4] Ball (1972), Archibald (1972) and Kaplan and Roll (1972) found that their sample of changers, on average, performed poorly in the period prior to the accounting change. We also provide statistics suggesting adverse conditions affecting our sample of changers prior to the change announcement in section 2 of Chapter IV.

rational anticipations of the manager's reporting actions and investors not having prior information about the prevailing state of the world. Our theoretical setting also specifies the conditions under which a wealth transfer such as that presented by Holthausen (1981) would occur.

Our empirical analysis is designed to eliminate one set of conditions in favor of another set of conditions. Our empirical findings favor an interpretation of investors' rational anticipations of the manager's reporting actions and investors' prior information about the state of the world.

Finally, the result of our cross-sectional analysis provides further, although weak, evidence consistent with investors' rationality with respect to the manager's reporting actions. Our sample statistics on stock returns prior to the change announcement also provide additional support for the view that, on average, information about adversity was available to investors at the time of the change.

One interpretation of our results is that the accounting change is a manifestation of the manager's reaction to a situation that is already known to investors. In this respect, the accounting change is, on average, an inconsequential signal that adds little to what investors already knew before the change announcement.

We must, however, acknowledge the fact that our research suffers from the methodological limitations of using proxy variables and our inability to find a cross-sectional test that

would discriminate between our different theories. Nevertheless, we believe that this thesis contributes to accounting literature in that its analysis of accounting changes proposes answers to some current questions that previous literature had left unanswered.

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