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Earnings Persistence and Profit Sharing Plan Adoption

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A Thesis

in

The John Molson School of Business

Presented in Partial Fulfillment of the Requirements
For the Degree of Doctor of Philosophy at
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Abstract

Earnings Persistence and Profit Sharing Plan Adoption

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Concordia University, 2001

This paper argues that prior studies investigating the determinants of profit sharing plan adoption fail to consider the effect of current earnings changes on future expected compensation payments under profit sharing that underlie the success of profit sharing in motivating employees. When current earnings changes are caused by factors that make earnings too volatile then the payments under profit sharing are volatile and their predictability is reduced. In this situation, profit sharing is not expected to be successful in motivating employees and would not be a preferred means of compensation. In contrast, if earnings changes are caused by factors that produce more sustainable effects on earnings, rendering them more reliable and predictable, then compensation payments under profit sharing will be more predictable and representative of employees' efforts. In this case, profit sharing would be more successful in motivating employees and is more likely to be adopted as a preferred compensation scheme. Accordingly, it is hypothesized that a positive association exists between the level of permanence of current earnings changes and the adoption of profit sharing plans.

Permanence of earnings changes is measured by the level of earnings persistence which is computed using two alternative time-series models: IMA (1,1) and ARIMA (2,1,0). A Logit model is used to evaluate the effect of earnings persistence and control variables on the probability of adoption of employee profit sharing plans. Profit sharing data is extracted

from the U.S. IRS 5500 Form while financial data for the sample firms are retrieved from Compustat. The final sample includes 298 firms that are equally split between profit sharing and non-profit sharing firms.

The test results indicate that information about persistence of earnings innovations is a significant determinant of profit sharing plan adoption. Earnings persistence is positively associated with the probability of profit sharing plan adoption. This result is robust when the alternative measure of earnings persistence is used and the control variables are included. These results should lead to a richer model of employee profit sharing plan adoption and use.

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Table of Contents

	<u>Page</u>
Chapter 1: Thesis Overview and Organization	
1.1. Introduction.....	1
1.2. Purpose of the Research.....	2
1.3. Expected Contribution	7
1.4. Research Methodology	8
1.5. Summary of Results	10
Chapter 2: Earnings-based Employee Incentives and the Effect of Earnings Persistence	
2.1 Chapter Overview	12
2.2 Economic Contracts and Necessity of Monitoring Systems	12
2.3 Performance-based Compensation	15
2.4 Accounting Information and Incentive Compensation Plans	18
2.5 Limitations of Earnings-based Incentive Studies	21
2.6 Employee Profit Sharing	23
2.6.1 General Description	23
2.6.1.1 Establishment of a Profit Sharing Plan	24
2.6.1.2 Different Forms of Profit Sharing Plans in the United States	27
2.6.2 Motives for Profit Sharing Adoption: Theory and Determinants	29
2.6.2.1 Profitability/productivity Motive.....	31
2.6.2.2 Reduction of Monitoring Costs Motive.....	32
2.6.2.3 Wage Flexibility Motive.....	33
2.6.2.4 Social Perspective Motive.....	34
2.6.3 Moderating Factors	34
2.6.3.1 Firm Size	35
2.6.3.2 Firm Growth	35
2.6.3.3 Managerial Philosophy	36
2.6.3.4 Union Status	36
2.6.4 Limitations of Prior Studies	37
2.7 Earnings Properties and Profit Sharing Adoption	41
2.7.1 The Nature of Firm-Employees Contractual Relations	42
2.7.2 Firm-Employee Inherent Costs Under Profit Sharing	48
2.8 Role of Earnings Characteristics	50
2.9 Defining the Thesis' Main Hypothesis	52
Chapter 3: Methodology	
3.1 Chapter Overview	53
3.2 Sample: Selection Procedure and Attributes	53
3.2.1 Selection of Profit Sharing Firms	54
3.2.2 Matching Firms	55
3.3 Empirical Model	60
3.4 Variable Measurement	62

3.4.1 Profit Sharing Adoption	63
3.4.2 Earnings Persistence	63
3.4.3 Control Variables	65
Chapter 4: Empirical Results	
4.1 Chapter Review	71
4.2 Descriptive Statistics	72
4.3 The Effect of Earnings Persistence	73
4.3.1 Test Results	73
4.3.2 The Model's Efficiency	75
4.3.3 The Linearity Assumption	75
4.3.4 Interpretation of the Model's Coefficient	78
4.3.5 Influence of Earnings Persistence	79
4.4 Effect of Control Variables	81
4.4.1 Descriptive Statistics	79
4.4.2 Test Results	85
4.5 Effects of Contextual Variables	89
4.6 Alternative Measure of Earnings Persistence	92
4.6.1 ARIMA (2,1,0)	92
4.6.2 Present Value of Earnings Persistence Coefficient	94
4.6.3 Higher Order ARIMA Model and the Effect of Control Variables	98
4.6.4 Effect of Sample Selection	100
Chapter 5: Summary and Discussion	
5.1 Chapter Overview	102
5.2 Summary	102
5.3 Contribution and Implications	109
5.3.1 Contribution to Compensation Literature	109
5.3.2 Contribution to Accounting Literature	110
5.3.3 Implications for Compensation Professionals and Accountants	110
5.4 Limitations and Avenues for Future Research	111
References	113
Appendixes	
Appendix A - Practice of Profit Sharing in the United States	125
Appendix B - Practice of Profit Sharing Plans in Canada	132
Appendix C - The Nature of ARIMA Models	137
List of Figures	viii
List of Tables	ix

List of Figures

	<u>Page</u>
Figure 1 - Motives for and factors that affect the adoption of profit sharing plans	40
Figure 2 - Test of the Linearity Assumption	77
Figure 3 - The Relationship Between Earnings Persistence Level and the Probability of Profit Sharing Adoption	81

List of Tables

	<u>Page</u>
Table 1 - Sample Selection	57
Table 2 - Industry Classification of Sample Firms	58
Table 3 - Time Distribution of the Profit Sharing Adopters	59
Table 4 - Descriptive Statistics for the Earnings Persistence Coefficient	72
Table 5 - The Effect of Earnings Persistence	74
Table 6 - Estimations for the Linearity Assumption	77
Table 7 - Analysis of the Change in the Probability of Profit Sharing Adoption ...	80
Table 8 - Descriptive Statistics for the Control Variables and the Earnings Persistence Coefficient	83
Table 9 - Correlation (Pearson) Matrix of Variables Included in the Expanded Model	84
Table 10 - The Effect of the Earnings Persistence and Control Variables on the Probability of Profit Sharing Plan Adoption	86
Table 11 - Effects of the Contextual Variables	91
Table 12 - Descriptive Statistics for Different Measures of Earnings Persistence	95
Table 13 - The Effect of Earnings Persistence [Per EP _A]	96
Table 14 - The Effect of Earnings Persistence [Per EP _C]	97
Table 15 - Effects of the Earnings Persistence [Per EP _A] and Control Variables	99
Table 16 – Comparison of Earnings Persistence Coefficients	101

Chapter 1

Thesis Overview and Organization

1.1 Introduction

The use of employee profit sharing plans has increased significantly in the work place in the past few years and has attracted the attention of compensation analysts and researchers. Surveys show that the percentage of firms in the United States that have adopted profit sharing plans increased from 15% in 1945 to 30% in 1988 (Perry, 1988). Similarly, the percentage of firms that adopted profit sharing plans in the United Kingdom increased from 18% in 1984 to 43% in 1990 (Millward et al., 1992). In Canada, the percentage of adopting firms reached 25% in 1991 (Long, 1992). Also, a survey of more than 2000 U.S. firms showed that the percentage of firms with a variable compensation program (including employee profit sharing) rose from 47% in 1988 to 68% in 1993 (Tully, 1993).

Employee compensation studies have also documented a positive effect of profit sharing on employees in that it increases motivation and participation. Prior studies thus provide conceptual support for the usefulness of employee profit sharing, thereby concluding that the implementation of employee profit sharing improves the firm's performance by increasing the employees' motivation and job satisfaction (Gomez-Mejia and Balkin, 1989; Armstrong-Stassen, Wolfram, and D'souza, 1993; and Long, 1997). Also,

empirical studies present evidence of a positive association between the adoption of employee profit sharing and firm profitability, indicating that firms with employee profit sharing exhibit higher performance than firms without employee profit sharing (e.g., Bell and Neumark, 1993; Cable and Wilson, 1990; Fitzroy and Kraft, 1987; Kim, 1998; Kraft, 1991; Kruse 1991, 1993; and Bhargava, 1994).

However, prior research has not examined the reasons why only a fraction of firms adopt employee profit sharing despite the documented benefits. Hence, prior studies provide inadequate insight for understanding the factors that may influence the adoption of employee profit sharing and the conditions under which employee profit sharing is preferred. The answer to this question should lead to a better understanding of the use and adoption of profit sharing plans.

1.2 Purpose of the Research

Prior studies argue that firms adopt profit sharing plans for different purposes such as wage flexibility, reduction of monitoring costs, social perspective and that adoption of profit sharing plans is influenced by factors such as firm size, management style, future prospects, and union status. Achieving wage flexibility implies that profit sharing is preferred by firms that expect to have a higher level of instability in the future. In this case, profit sharing provides the firm with the opportunity to avoid making fixed

compensation payment commitments to employees when its financial situation is weak. This can be contrasted with increases in the base salary that are considered fixed payment commitments. It is also argued that successful firms may use profit sharing for wage flexibility purposes because it provides them an opportunity to share their success with their employees while avoiding the fixed compensation payment commitment.

To achieve a reduction of monitoring costs, firms with a higher level of job complexity and supervision prefer profit sharing to align their employees' interest with that of the firm. Therefore, the levels of supervision and job complexity are associated with the probability of profit sharing adoption. The social perspective suggests that employees show interest in profit sharing because it offers them the right to earnings similar to that of investors and executives.

Prior studies also argue that the adoption of profit sharing plans is influenced by a numbers of factors including firm size, management style, future prospects, and union status. Some researchers argue that small firms may prefer profit sharing because the profit is distributed to fewer employees, while other researchers argue that profit sharing plans are more affordable and preferred by large firms because the cost of establishing and administrating a profit sharing plan is high. Management style has also been found to be an important factor as not all managers share the same view of the firm-employee relationship. While some managers value the inter-relationship between the firm and

employees, others stress merely the economic relationship. The firm's future prospects are also found to be significant, which implies that firms with a higher rate of business growth and expansion prefer profit sharing because their prospective plans require higher employee participation and motivation. Another significant determinant is union status, suggesting that unions generally oppose profit sharing because of their concern that profit sharing encourages employees to have a stronger commitment to the firm rather than to the union. Therefore, unionism is negatively related to the probability of profit sharing adoption.

The empirical results presented by prior studies are mixed. In addition, prior studies do not consider the effect of current earnings changes on the expected future payments under profit sharing that could underlie the motivational benefit (demotivational costs) of offering a successful compensation plan. This thesis argues that management considers those compensation schemes that are likely to have a positive effect on employee motivation. Further, profit sharing is considered an appropriate means of compensation and motivation if employees believe that compensation payments are achievable under profit sharing and that earnings reflect their efforts. This notion is supported by compensation theories such as agency and expectancy which imply that compensation schemes are successful in motivating employees by offering them achievable compensation based on their efforts.

Profit sharing plans, as well as payouts from such plans, are based on earnings. Therefore, earnings characteristics may influence the adoption of profit sharing plans. Accordingly, when earnings changes are caused by factors that make earnings more volatile and less predictable, then compensation payments under profit sharing are less predictable and may not be achievable. In this situation, profit sharing is less likely to be a preferred compensation scheme. On the other hand, when earnings changes are caused by factors that make future earnings more predictable (such as improvement in the firm's market share and business operations), then current earnings changes are expected to persist into the future and become more relevant to the prediction of future earnings changes. In this situation, profit sharing is more likely to be considered as a preferred compensation scheme. Accordingly, payments under profit sharing become more predictable and earnings are more likely to reflect the employees' efforts. Therefore, earnings characteristics can be an important determinant in examining the conditions under which profit sharing is preferred and adopted.

In general, changes in earnings consist of two components: a transitory change that will not last and is therefore unpredictable, and a permanent change caused by factors that are expected to persist in the future. When earnings changes are more permanent, the effect of a new input such as employee participation and effort is likely to be predictable. Extant literature suggests that performance measures that are too volatile are poor reflections of

employees' work and effort and that the employees' perception of the lack of control of these measures would undermine the effectiveness of any incentive scheme (Pfeffer et al., 1976; Ferris and Mitchell, 1987; Fandt and Ferris, 1990; and Amihud and Lev, 1981).

Miller and Rock (1985) used the term earnings persistence to denote the effect of current earnings changes on expected future earnings. A persistence coefficient can be estimated to measure the portion of earnings changes that is expected to persist into the future. Earnings changes could be completely persistent, completely transitory, or a mix of persistent and transitory components.

This thesis argues that earnings characteristics, as reflected in the time-series of earnings changes, can affect the perception of management and employees of the appropriateness of profit sharing as a method of compensation. It is argued that profit sharing would be more effective if the level of earnings persistence is relatively high, thus increasing the predictability of future earnings based upon current earnings changes. This would increase the firm's and employees' level of comfort with the adoption of profit sharing as a means of compensation because earnings changes are more predictable than if the earnings changes are noisy, consisting mainly of transitory components.

Prior empirical work that has investigated the adoption of profit sharing plans may have missed this important determinant, i.e., the earnings properties of profit sharing plan adopters prior to plan adoption. Therefore, the purpose of this thesis is to investigate if the

permanence of earnings innovations, as measured by earnings persistence, is associated with profit sharing plan adoption.

1.3 Expected contribution

There is extensive research on the use of accounting information in contracts, especially compensation contracts. However, most of that work has focused on executive compensation contracts, on debt contracts, and on political costs. Since profit sharing plans are used by thousands of firms and cover millions of employees, it is important to gain a better understanding of the reasons for adoption of such plans.

Most prior research on profit sharing plans examined the effects and impact of plan adoption. This thesis focuses, however, on the determinants of profit sharing plan adoption, thus providing insights regarding its use as an internal incentive mechanism. Specifically, this thesis assesses the role of earnings persistence as a new determinant of plan adoption. This should lead to a richer model of profit sharing plan adoption and should help us gain a better understanding of the conditions under which particular compensation strategies are adopted.

1. 4 Research Methodology

Earnings changes can be characterized as being transitory or permanent changes. Transitory changes, such as one-time sale contracts or sales of fixed assets, are not expected to persist into the future. On the other hand, permanent changes, such as the improvement in the firm's market share and its operating performance, are expected to persist into the future and to reflect the change in the firm's profitability. In general, the two components indicate whether earnings changes are more likely to persist into the future or consist of random shocks that are transitory in nature. Prior studies have found that investors in securities markets value the change in the permanent component of earnings and assign greater value to higher levels of persistence of earnings innovations (e.g., Collins and Kothari, 1989; Ali and Zarowin, 1992; and Kormandi and Lipe, 1987). Ali and Zarowin (1992), for example, documented that Earnings Response Coefficients (ERC) are higher on average when they are estimated using the persistent component of annual earnings than when ERCs are estimated based on contemporaneous earnings changes. Collins and Kothari (1989) argued that higher levels of earnings persistence will lead to higher revisions in dividend expectations and, subsequently, ERC will be higher.

Prior studies have used widely the time-series, Integrated Moving Average, IMA (1,1) model to measure earnings persistence (Collins and Kothari, 1989; Ali and Zarowin, 1992; and Baber et al., 1998). This model explores the association between current earnings

changes and past earnings shocks. The coefficient of this model indicates the extent of the relationship between current earnings and the shocks to recent earnings. However, other autoregressive integrated moving average (ARIMA) models have been used such as ARIMA (0,1,0) and ARIMA (0,0,1) by Miller and Rock (1985); ARIMA (1,0,0) by Easton and Zmijewski (1987); ARIMA (2,1,0) by Kormandi and Lipe (1987) and Baginski et al. (1999); and ARIMA (4,1,0) by Baginski et al (1999)¹. Baginski et al. (1999) argue that higher order ARIMA models are more effectively related to the characteristics of the firm's economic environment that are expected to influence earnings persistence.

This thesis uses IMA (1,1) primarily to compute earnings persistence to provide comparable results to the findings of prior studies. Also, researchers have agreed that the best model is a parsimonious model that provides the best results with the least number of parameters in the model. The IMA (1,1) model provides this opportunity as it provides a single coefficient for earnings persistence. In addition, this thesis uses ARIMA (2,1,0), a higher order model, as an alternative measure of earnings persistence following Kormandi and Lipe (1987) and Baginski et al. (1999).

A Logit model is used to investigate the association between the probability of adoption of employee profit sharing and earnings persistence. In addition to earnings persistence, relevant control variables, identified in prior studies are incorporated into the empirical model. Employee profit sharing data are extracted from the IRS 5500 Form while

¹ The general nature of ARIMA models is discussed in Appendix C.

the firm's financial data are extracted from Compustat (the U.S. active and research files, 1997). The test sample consists of the U.S. firms that adopted profit sharing plans between the years 1990 and 1997. A control sample of firms that did not adopt profit sharing plans during this period was selected based on the matching procedure suggested by Kumar and Supariwala (1992).

1.5 Summary of Results

Results indicate that earnings persistence is a significant determinant of adoption of employee profit sharing, as evidenced by a positive association between the probability of adoption of profit sharing and earnings persistence. This result is robust when an alternative measure of earnings persistence is used. In particular, the results show that the probability of profit sharing adoption increases by 14.5% when the earnings persistence coefficient increases from .25 to .50. The probability of adoption increases by another 8.5% when the earnings persistence coefficient increases from .50 to .75. Also, the results indicate that the probability of adoption is higher than 50% when the earnings persistence coefficient is higher than .75. These results are consistent with the argument that earnings persistence is indeed a significant determinant in the adoption of profit sharing plans even after including in the model control variables that have been found significant in prior studies. The results should lead to a richer model of employee profit sharing use and adoption.

The remainder of the thesis is organized as follows: Chapter Two discusses the role of earnings persistence in the firm-employee contracting and compensation arrangements. Chapter Three explains the methodology used in this study. Chapter Four presents the empirical test results. Chapter Five provides a discussion of the findings and presents concluding remarks.

Chapter 2

Earnings-based Employee Incentives and the Effect of Earnings Persistence

2.1 Chapter Overview

This chapter presents the main hypothesis of this thesis as to how earnings persistence can influence the decision to adopt employee profit sharing. In particular, it reviews the conceptual and empirical studies on the role of earnings in contracting and monitoring systems. It highlights the limitations of the accounting literature, which has mainly focused on executive compensation, thereby providing little insight into the role of earnings in contractual relationships between a firm and its employees, and more specifically in the determination of employee compensation contracts. This chapter describes the role of profit sharing in contracting by first explaining the nature of profit sharing and then illustrating how permanence of earnings changes can influence the adoption of profit sharing plans. This is followed by a presentation of the main hypothesis of this thesis.

2.2 Economic Contracts and Necessity of Monitoring Systems

Economic contracts are agreements among the firm's stakeholders (e.g. shareholders, executives, creditors, and employees) that specify the parties' responsibilities and rewards. Contracts delineate the property rights of parties to a firm's

resources (Jensen and Meckling, 1976; and Fama and Jensen, 1983a, 1983b). Contracts also establish the priorities and wealth distribution systems that affect the parties' welfare and encompass the salient features of their relationship. These include how the relationship is organized, governed, evaluated, and rewarded.

Although a firm exists legally, it has no practical existence without contracts between its parties. Therefore, the firm is “a nexus of contracts” (Jensen and Meckling, 1976) serving to bring different parties together in order to share resources and benefits. Each party's welfare is directly affected by the other parties' actions. To maximize their welfare, parties have to constantly balance two contracting phenomena: 1) establishing and maintaining contracts, and 2) minimizing harm from the other parties' self-interest attitudes. These two factors will be explained in turn.

The first phenomenon, establishing and maintaining contracts, refers to the parties' need for contracting, which constitutes the nature of a firm and is, in fact, the reason for its existence. Thus, a firm exists because the parties need each other's expertise and resources. According to Watts and Zimmerman (1986), a firm exists for three reasons: economies of scale, diversification, and specialization. Based on the economies of scale consideration, individuals need capital from other investors in order to sufficiently finance their projects and operations. The second reason, diversification, argues that risk management requires individuals to diversify their investment portfolio.

Therefore, in the absence of the necessity of economies of scale, individuals may still desire to diversify their investment to reduce the related risk and maximize their utilities. The third reason, specialization, is an obvious reason for contracting as no one can have all the necessary skills to carry out business activities. For instance, capital suppliers need managers' expertise while managers need employees' specialization.

The second phenomenon, minimizing harm from other parties' self-serving attitudes, is a very pertinent issue. Although a firm facilitates contracting and brings parties with different expertise and resources together, each party encounters the danger of self-serving attitudes by other parties. Self-serving attitudes encourage individuals to take actions that are not necessarily geared towards maximizing the firm's performance, but rather are simply to forward the individual's own interest. This phenomenon makes contracting difficult and increases uncertainty in the final outcome of the contractual relationship. Such a relationship is defined as an agency relationship under which a principal engages an agent (e.g., a manager) to perform some services that involve some degree of decision-making (Jensen and Meckling, 1976). Accordingly, agency costs are the reduction in the firm's optimal performance because of the agent's self-serving actions. Therefore, the main concern of a principal is how to reduce agency costs.

Two main options to reduce agency costs are bonding and monitoring. Bonding is the contractual condition that limits the agent's authority, while monitoring suggests the

establishment of a control and incentive system, which prevents the agent from pursuing his/her self-serving actions. Since the agent's actions cannot be observed at all times, and self-serving actions are unpredictable, then the establishment of an efficient bonding and monitoring system would be very costly, if not impossible.

Bonding and monitoring can be presented explicitly or implicitly in contracts (Jeon, 1996). The explicit contract approach is based on all contingencies that are verifiable by a third party and can therefore be enforced in a court of law. The implicit incentive approach relies on the stock market forces (in the case of executive compensation) to control moral hazard. Based on this notion, the market mechanism provides incentives by making wages contingent on the perceived management productivity (Gibbons and Murphy, 1992; Meyer and Vickers, 1994).

2.3 Performance-based Compensation

Although different types of contractual relations exist in a firm, such as contracts with suppliers and customers, only the case of employment contracts is considered for the purpose of this thesis. Specifically, the thesis discusses why and how performance-based compensation is used to reduce agency costs and also to motivate the agent to act in the best interest of the principal.

Performance-based compensation which is used to reduce agency costs, and to motivate the agent, can be classified into two groups: individual-based compensation and outcome-based compensation. Under the individual-based compensation, each agent is rewarded based on his/her performance regardless of the performance of other agents. The second type, the outcome-based compensation, emphasizes the firm's overall performance and also encourages agents to cooperate with each other to carry out the firm's activities. Although both types of compensation strategies aim to reduce agency costs and to increase cooperation, outcome-based compensation transfers more risk to the agent in exchange for higher expected compensation. Therefore, the agent's welfare is affected by the actions of other agents, which in turn affect the firm's overall performance. The expected compensation is higher for the agents if they cooperate efficiently, as it leads the firm to achieve higher performance.

Although outcome-based compensation can be helpful to increase cooperation among agents and to reduce agency costs, it has some limitations as well. The firm's overall performance is affected by macro-economic factors and inherent business risk that affect planning and forecasting. The effect of these factors makes it difficult for the principal to identify what actions the agent should take (Stiglitz, 1987; Stroh et al., 1996) and to identify what variations in the firm's performance are due to the agent's

performance and which ones are due to factors outside of the agent's control (Antle and Smith, 1985).

Despite these difficulties, outcome-based compensation is widely used in the practice. Researchers have provided different hypotheses to explain their widespread adoption. These include the incentive hypothesis, the tax saving hypothesis, the good performance signalling hypothesis, and the screening hypothesis. The incentive hypothesis implies that outcome-based compensation can be used to motivate the agents toward maximization of the firm's value. It discusses the fact that the agent's compensation is contingent on the firm's performance. Thus, the agent is encouraged to take actions that improve the firm's performance. The tax saving hypothesis implies that outcome-based compensation may be used to reduce the agent's (manager's) taxes (Miller and Scholes, 1982). Managers may desire to maximize their compensation after tax over a long period such as five years. This provides managers with the opportunity to even out the firm's performance in order to defer some performance driving activities from a very good performance period to a weak performance period. Such an action will benefit the managers by resulting in a lower marginal tax rate.

The good performance signalling hypothesis implies that adoption of outcome-based compensation policy signals the possibility of a future good performance. According to this hypothesis, managers use their internal information in negotiation for

their compensation. They show interest in an outcome-based compensation when they predict good future performance periods for the firm. Inversely, they may reject outcome-based compensation when weak performance periods are expected. The screening hypothesis explains that only particular agents seek outcome-based compensation (Raviv, 1985). According to this hypothesis, outcome-based compensation can be used to classify agents based on their levels of risk seeking and their confidence to make positive changes in the firm's performance.

Focusing on the incentive role of outcome-based compensation in monitoring and motivation, the next section explains how earnings numbers are potentially useful for this purpose.

2.4 Accounting Information and Incentive Compensation Plans

Explaining how accounting information can be useful in compensation setting requires a consideration of the wealth generation process and the firm's performance evaluation. Change in the principal's welfare is measured by the change in the firm's value. However, the real value of the firm is not observable until the firm is liquidated. Therefore, some measures are needed to approximate the firm's value periodically and to compute periodic performance. Stock prices and earnings are the two major measures used for this purpose. Stock prices are available for publicly traded firms. Therefore, the

change in the stock price can be used as a performance measure. However, stock prices are affected by many factors, such as macroeconomic factors and market trends that are not under the firm's control. Thus, stock price is not completely an appropriate measure of the agent's efforts.

As an alternative, the firm's value can be approximated by discounting its future earnings, assuming that earnings are a representative measure of the firm's performance and cash flow. Therefore, changes in the firm's periodical earnings can be used as a measure of performance. However, managerial discretion in the selection of accounting methods and some restrictive methods for accounting measurement make earnings a noisy measure as well (Watts and Zimmerman, 1986; Sloan, 1993; and Lambert, 1993). It is clear, therefore, that stock prices and earnings are imperfect measures for evaluating the firm's performance. Because of this imperfection, many performance evaluation plans (mainly management compensation plans) tend to include both measures, stock prices and earnings, to reduce the noise in the estimation of the firm's performance. However, the weight for each measure differs across firms. While there is no absolute argument in defence of the superiority of one measure over the other, the various arguments for the usefulness of earnings as a base for compensation are reviewed below.

Watts and Zimmerman (1986) argue that there are at least three possible factors motivating the use of earnings-based compensation measures: inability to observe the

firm's market value, disaggregation of performance, and taxes. The first factor stresses the complementary role of earnings. It was noted earlier that the firm's value is unobservable and that stock prices are a noisy measure of the firm's value. Nevertheless, it is well documented that stock price changes are associated with earnings changes. Therefore, earnings could be potentially useful in the determination of the firm's value. Second, it is not possible to compute the effects of the performance of the different levels of management on the firm's value when stock prices are used for performance measurement. Therefore, even if the total market value of the firm is observable, the market values of the subunits are unobservable. However, earnings can be computed for subunits separately and performance can be disaggregated. Third, earnings-based compensation can be used to defer some of the agent's compensation to future years, and this may offer some tax advantages.

The complementary role of accounting numbers has received significant attention in research, especially in the analysis of executive compensation. It is argued that earnings are used to reduce the noise in stock prices for the purpose of performance measurement. According to this argument, earnings-based performance measures can be helpful in protecting managers from the effects of uncontrollable factors that affect a firm's value. Therefore, earnings are widely used for executive compensation even when

stock prices are readily available (Lambert, 1993; Kim and Suh, 1993; Bushman and Indjejikian, 1993; and Sloan 1993).

2.5 Limitations of Earnings-based Incentive Studies

Although the accounting literature explaining the use and nature of earnings-based compensation is expanding, it is mainly limited to the case of executive compensation. For example, researchers have devoted significant effort to illustrate and test the incremental usefulness of earnings information (especially over stock-based measures) in executive performance measurement and compensation (e.g., Sloan, 1993; Lambert and Larcker, 1987; Jensen and Murphy, 1990; and Baber et al., 1998). These studies document that compensation committees use earnings-based measures in setting up executives' compensation to mitigate the effect of noise in stock prices. However, these studies provide little evidence about the use of earnings-based contracts for other internal stakeholders such as employees, who are potential users of accounting information. There is even less evidence as to whether and how employers or employee compensation committees use accounting information.

The internal incentive structure that includes employee performance measurement and compensation is one of the most important but least analyzed factors that affect organizational behaviour and performance. The extant research on the economics of

contracting offers little guidance in understanding actual compensation arrangements in large organizations (Baker et al., 1988) and further research is required to reveal the facts related to the selection of different types of internal incentive structures such as employee compensation.

The firm-employee contractual relationship is different from the firm-executive contractual relationship for various reasons. On the one hand, executives have a specific labour market that enables them to negotiate for different compensation packages that optimize their total compensation. In addition, executives have control over project selection and the firm's resources, which provide them with the possibility of opportunistic behavior. On the other hand, employees have fewer options to diversify their employment risk. Their labour market is more limited than the labour market for executives because executives are, on average, more educated. Deere (1987) and Royalty (1998) have found that the level of job opportunities increases with the level of education and skills.

Employees have less control over firm-level decisions. Yet, they behave according to their contractual relationship with the firm and are encouraged to adjust their input based on their compensation. Also, their opportunistic behaviour appears in different forms such as shirking and withholding of information (Baker et al., 1988). Because of these differences, new research is required (1) to investigate whether the findings about the usefulness of earnings in security valuation and executive performance measurement are

valid in the firm-employee relationship context, and (2) to examine specific issues such as the causes of withholding information and shirking which are related to the firm-employee contractual relationship.

Focusing on employee profit sharing, the most popular earnings-based employee compensation, the next section explains the nature of profit sharing and the use of earnings information in the adoption of profit sharing plans.

2.6 Employee Profit Sharing

2.6.1 General Description

A general description of profit sharing plans is provided in this section. A more detailed description is found in Appendix A.

The use of employee profit sharing is increasing in the work place. The percentage of firms in the United States that adopted profit sharing plans increased from 15% in 1945 to 30% in 1988 (Perry, 1988). In Canada, this percentage reached 25% in 1991 (Long, 1992), and in the United Kingdom, it increased from 18% in 1984 to 43% in 1990 (Millward et al., 1992).

Employee profit sharing is an outcome-based compensation plan that is offered to all or a group of employees in a firm. It links the employee's compensation to the firm's earnings and requires distribution of a percentage of the annual earnings to the plan

members. Payments under profit sharing are computed based on a profit sharing percentage and distributed to employees based on a distribution formula. The profit sharing percentage is a fraction of the firm's earnings that will be distributed to employees if a certain level of performance is met. The percentage can be applied to total earnings or to earnings in excess of a certain amount.

2.6.1.1 Establishment of a Profit Sharing Plan

Profit sharing plans aim to motivate employees towards higher participation and productivity. To reach these objectives, the plan's objectives, administration, and reward distribution policies must be clearly communicated to employees. Employees' participation can be increased by allowing them to take part in the plan's selection and administration. Therefore, employee communication requires employee involvement in the various steps of establishing and administering a profit sharing plan. The establishment of a plan includes selection and implementation, while its administration includes maintaining the plan in terms of its day-to-day activities. Of the different steps in the establishment of a profit sharing plan, the following are considered important:

- Setting the plan's objectives
- Organizing a profit sharing committee
- Selecting the type of profit sharing

- Announcing of the plan to employees.

Setting the Plan's Objectives: The main goal of employee profit sharing is promoting employee participation and productivity. There are two issues in setting up an employee profit sharing plan. First, attention should be directed to the plan's specific goals (i.e., to reduce monitoring costs) instead of focusing on the general goal of following industry practice. This issue affects the plan design and administration. Second, the participation of employees in the plan's administration is essential to encourage mutual benefits between the firm and its employees. To achieve this objective, firms organize an employee profit sharing committee.

Organizing a Profit Sharing Committee: The management of a firm that offers a profit sharing plan should not dictate to employees the terms of the plan since employee involvement is essential in achieving the plan's goal. Therefore, employers establish a profit sharing committee, through appointment or election, that is responsible for analyzing different aspects of the proposed profit sharing arrangement taking into consideration both the employees' and the firm's concerns. The profit sharing committee may have full authority to make any decision about any aspect of profit sharing, or it may

have a limited authority where it provides management with recommendations. Tyson (1996) outlines the characteristics of the committee members who should be:

- Representative of all sections, levels, departments, and divisions of the organization
- Representative of a cross-section of the demographic profile of the company in term of age, seniority, gender, education, ethnicity, etc.
- Considered “opinion leaders” by their respective colleagues and sufficiently well respected by their peers.

Selecting the Type of Profit Sharing Plan: To attract the employees' participation and attention, employees should be allowed to have input in the selection of the type of plan. The plan can be a cash plan, a deferred plan, or a combination of the two. Employees may prefer cash plans in general. However, employers may educate employees about the benefits of deferred plans and the possibilities of tax saving and investment. In any case, the decision process will have more credibility with employees if they are given the opportunity to express their opinion on the issue.

Announcing of the Plan to Employees: A proper announcement of the plan to employees is crucial in achieving the plan's goals. The plan is normally announced to employees by

the firm's Chief Executive Officer to stress its importance and to indicate the support of top management for the plan. The objectives of the plan are clearly stated, indicating how the plan will affect employee compensation and how employees can make the plan a success. Also, it is indicated whether the same committee members who were in charge of establishing the plan will be in charge of maintaining it. A contact person is introduced and employees are encouraged to provide the committee with their comments and questions.

2.6.1.2 Different Forms of Profit Sharing Plans in the United States

Basically, there are three different types of profit sharing plans in the United States: cash, deferred, and a combination of both types of plans.

Cash Form: Under this form, employees receive their share of the firm's profit through regular cash payments. The frequency of these payments depends on the firm's policy and it can vary from monthly to yearly. There are no tax advantages for employees under the cash form. The cash form is not subject to any regulations and the payment policies are solely determined by an agreement between the employees and the firm (usually through an employee compensation committee). The main advantage of the cash form is its instant effect on employees' motivation. The disadvantages are the lack of long-term

effects on employees' motivation and inefficient use of tax advantages provided by income tax regulations.

Deferred Profit Sharing: Under this form, the employees' shares of profit are deposited in a trust account. The money is usually invested in a portfolio. Normally, employees receive their share at retirement time although they can withdraw their money at any time. The employee's share of profit is tax exempted until the money is withdrawn from the trust account. In some aspects, a deferred profit sharing plan is similar to a defined contribution pension plan where the employer's commitment is determined at the time of contribution, not at the time of payment (Kruse, 1993). However, deferred profit sharing plans are substantially different from pension plans as the employer's contribution depends upon the firm's profit as determined under the profit sharing plan.

A popular pension plan which can be viewed as a deferred profit sharing plan (but which is not a profit sharing plan by itself) is the 401(K)². Under 401(K), the employer matches a percentage of the employee's contribution to an employee retirement plan up to a certain level (e.g., a percentage of 40% of total employment pay). Thus, the employer's contribution is not linked to the firm's profit, but rather to the employee's contribution to the retirement plan. However, the employer's contributions to the plan are often based on the firm's profitability. Employees can get loans from a 401(K) plan and

an owner of a business is considered as an employee for the purpose of 401(K) plans. Deferred profit sharing plans are subject to regulations and employers must file an appropriate form with the U.S. Department of Labor.

Combination Form: A third form of profit sharing is the combination form. Under this form, profit sharing may include a cash portion plus a deferred portion. In this case, the benefits of both cash and deferred plans are attained.

Other characteristics of profit sharing plans are presented in Appendices A and B.

2.6.2 Motivation for Profit Sharing Adoption: Theory and Determinants

Prior researchers have argued that profit sharing can influence employee performance by providing financial incentives and aligning the firm's and employees' goals, thus leading to higher performance (e.g., Hanson and Bell, 1987). Consequently, additional effort on the part of employees that leads to increased profit is rewarded by higher remuneration. Such motivation is likely to help build a more cooperative, team-oriented atmosphere in the organization. Aligning the employees' and the firm's goals can also lead to an increase in job satisfaction as greater efforts will result in higher reward and compensation. Job satisfaction is likely to increase employees' loyalty to their

² The alpha-numeric designation refers to the relevant section of the Internal Revenue Code.

workplace, encourage cooperation and participation, and reduce workplace conflict (Armstrong-Stassen et al., 1993; Gomez-Mejia and Balkin, 1989; and Long, 1997).

Prior studies in this area are mainly conceptual (e.g., Weitzman, 1984, 1985; and Gomez-Mejia and Balkin, 1989). However, recent empirical studies have provided some support as well. In a survey of 600 Canadian CEOs, Long (1997) reports that more than 44% of the surveyed CEOs indicated that profit sharing improves employee motivation and 34% pointed out that it rewards loyal employees. Kruse (1996) reported that profit sharing was observed more in firms with recent adoption of job enrichment programs to enforce their incentive programs.

Conceptually, profit sharing is posited to decrease agency costs and increase cooperation by aligning the employees' interest with the firm's interest. However, there are three main issues concerning the success of profit sharing. The first issue is whether the empirical evidence supports the hypothesized positive effect of profit sharing on firm performance. This issue has been widely investigated. The second issue, which follows from the first, is why profit sharing has a positive impact on firm performance. Existing studies on the second issue are in their early stages. The third issue is the identification of factors that influence the adoption of profit sharing. This is the focus of this thesis. Extant research on the first issue, profitability/productivity studies, is reviewed in the next section, followed by a discussion of other motives for profit sharing adoption and review of factors

influencing the adoption of profit sharing. Then, the limitations of prior research in this area are discussed.

2.6.2.1 Profitability/Productivity Motive: There is a considerable body of research investigating whether profit sharing is associated with changes in firm performance. Firm performance has been defined as the change in the firm's productivity or profitability. Productivity relates to a value-added measure such as sales less the amounts paid to suppliers for goods and services or sales per employee, while profitability is measured as the change in the firm's net income.

Overall, prior studies provide empirical support for a positive relationship between profit sharing and productivity (Bell and Neumark, 1993; Cable and Wilson, 1990; Conte and Svejnar, 1988; Defourney et al., 1985; Fitzroy and Kraft, 1987; Kim, 1998; Kraft, 1991; Kruse, 1993, 1991; Kumbhakar and Dunbar, 1993; Wadhvani and Wall, 1990). However, some studies argue that the positive effect of profit sharing on the firm's productivity is not necessarily translated into earnings (Defourney et al., 1985; Kim, 1998; Wadhvani and Wall, 1990).

With respect to the impact of profit sharing on profitability, prior research is motivated by the expectation that profit sharing should improve the firm's overall performance. Empirical evidence is mixed in this area. Some early studies that are

exploratory in nature, as well as more recent studies, have documented a positive relationship between adoption of profit sharing and firm earnings (Bell and Hanson, 1987; Metzger, 1978; Metzger and Colletti, 1971; Howard, 1979; Howard and Deitz, 1969; Bhargava, 1994; Conte, 1992; Fitzroy and Kraft, 1987; Florkowski and Shastri, 1992). However, other studies find no relationship between adoption of profit sharing and change in earnings (e.g., Blanchflower and Oswald, 1988a, 1988b; Poole and Whitfield, 1994). Yet, others argue that the change in firm profitability following profit sharing adoption could be attributed to factors other than profit sharing such as new management initiatives (Cable and Wilson, 1989; Estrin and Wilson, 1986).

2.6.2.2 Reduction of Monitoring Costs Motive: Although the incentive role of profit sharing is widely accepted, it is argued that some factors such as job characteristics may affect such incentive schemes and limit their effectiveness. According to agency theory, profit sharing could substitute hierarchy and provide an incentive for peer monitoring through "peer pressure" (Lazear and Kandel, 1992) and for "horizontal monitoring" (Fitzroy and Kraft, 1987). Therefore, profit sharing could be preferred by firms that need higher levels of self-monitoring and cooperation. Consequently, when the nature of a job requires self-directed performance, and employees' actions are not completely visible, profit sharing is more likely to be adopted to align the employees' goals with that of the firm because a higher level of cooperation is required in this situation. On the other hand, when the job can be subdivided into small tasks and monitored closely, then the need for

group-based compensation may be reduced because individual performance and compensation can be watched more closely. Therefore, there could be a correlation between the level of hierarchical control or supervision and adoption of profit sharing.

Empirical evidence on this issue is mixed. Long (1994) found that profit sharing firms had 31% fewer supervisors than those without profit sharing. In line with these results, Wagar and Long (1995) found a positive relationship between the extent of self-directed work teams and the presence of profit sharing. However, Gregg and Machin (1988) found a higher supervisor/employee ratio in profit sharing firms and Long (1997) found that the profile of the labour force (unionized, professional, or blue collar) that could signal the degree of self-oriented actions, had no significant correlation with the existence of profit sharing.

2.6.2.3 The Wage Flexibility Motive: It is argued that the marginal cost of labour is lower when profit sharing is adopted because a part of the labour cost becomes variable. Under profit sharing, firms pay workers less when earnings are lower and pay more when earnings are higher. Therefore, profit sharing offers the opportunity of sharing variability and uncertainty with employees. As a result, a firm can avoid a commitment to increased wages, which could not be easily reduced when the firm's profitability is lower (Bell and Neumark, 1993). When profit sharing is adopted, earnings become more responsive to changing economic conditions without the additional transaction costs of more frequent bargaining since the employees' remuneration is adjusted according to earnings changes (Florkowski and Shastri, 1992). Accordingly, firms with unstable financial circumstances

and lower operation prospects are more likely to adopt profit sharing to avoid high fixed wage commitments to employees.

The wage flexibility motive has received mixed support. While Wagar and Long (1995) and Cheadle (1989) found no relationship between instability and profit sharing adoption, other studies supported the wage flexibility motive (Kruse, 1996; Estrin and Wilson, 1989; Jones and Kato, 1993; and Kim, 1993).

It has been argued that successful firms too may be willing to use profit sharing for wage flexibility (Kruse, 1996). According to this argument, firms that are experiencing successful periods may use profit sharing to share their success with employees while avoiding higher fixed wage commitments to employees. Supporting evidence is found in Poole and Jenkins (1990) and Magnan et al. (1997).

2.6.2.4 Social Perspective Motive: According to this motive, profit sharing results in better wealth distribution in the society as employees have the same right as executives and shareholders in sharing corporate profits. Therefore, profit sharing is not merely a financial incentive, but it is a means of social reform and wealth distribution. Majerus (1984) found that unions stress the issue of better wealth distribution in their negotiation for profit sharing.

2.6.3 Moderating Factors

Although prior studies have documented that profit sharing provides wage flexibility and can be beneficial in increasing the firm's performance, why is it that only a fraction of firms adopt profit sharing? Specifically, what factors influence the adoption of

employee profit sharing by certain firms and not by others? The answers to such questions should lead to a better understanding of profit sharing adoption and use. Studies in this area that have investigated the determinants of profit sharing adoption are discussed below.

2.6.3.1 Firm Size: Some researchers argue that profit sharing is negatively associated with firm size because of the “1/n problem” (Kruse, 1993; Long, 2000). This means that the possibility of “free riders” is higher in large firms. The extent of this problem is lower in small firms as employees can monitor their colleagues more closely. Others argue that the costs associated with the establishment and administration of profit sharing are high and small firms are not willing or not able to afford such costs. Research findings are mixed on the association between the existence of profit sharing and firm size. Gregg and Machin (1988), Poole (1989), Carstensen, Gerlach and Hubler (1992), Fitzroy and Kraft (1995) and Long (1997) found a positive relation between firm size and existence of employee profit sharing. These results contradict the “1/n problem”. However, Estrin and Wilson (1989) found a negative association, and Cheadle (1989), Wagar and Long (1995), and Long (1989) found no relationship between firm size and the presence of profit sharing plans.

2.6.3.2 Firm Growth: Firms which experience higher growth rates may be more willing to adopt profit sharing to encourage employee cooperation. In this case, profit sharing can encourage employees to have longer relationships with the firm and attract new

employees. Poole and Jenkins (1990) and Magnan et al (1997) find a positive association between firm growth and the presence of profit sharing.

2.6.3.3 Managerial Philosophy: Long (1997) argues that management's philosophy can affect the firm's desire for implementing profit sharing. According to this view, adoption of profit sharing depends on management's style in managing employee affairs. Miles (1975) identifies three schools of thought: the classical school, the human relations school, and the industrial humanism school. According to the classical school, people are motivated only by economic self-interest. This school promotes tight control of employees' actions. The human relations school implies that people are motivated by the social rewards that the organization can offer and it suggests a control-oriented approach. However, control will be exercised through the development of group norms. According to the industrial humanism school, people can be self-motivated if their work is challenging and interesting. This school suggests providing employees with sufficient autonomy as if the employee's goal is integrated with that of the organization. It has been observed that managers who belong to the classical school of thought are less likely to have profit sharing, while managers who espouse the industrial humanism school are more likely to select profit sharing (Long 1997).

2.6.3.4 Union Status: It is argued that unions are generally reluctant to accept profit sharing as a means of compensation because they worry that profit sharing may undermine their members' commitment to the union and increase commitment to the firm. Kruse (1993) argued that profit sharing has been used in the United States for the purpose of union

avoidance. Also, unions are concerned about management discretion and manipulation of compensation payments under profit sharing.

Research findings are mixed on the union status issue. In the United States, Cheadle (1989), Kim (1993), and Cooke (1994) found a negative relationship between the existence of profit sharing and union status. On the other hand, Kruse (1993) found a positive association, and Kruse (1991) found no association. In Canada, studies have generally found a negative association (Long, 1989; Jones and Pliskin, 1991; McMullen, Leckie, and Caron, 1993; Betcherman et al., 1994; Wagar and Long, 1995). In the United Kingdom, Poole (1989) found a negative association, Gregg and Machin (1988) found a positive association, and Estrin and Wilson (1989) found no association between the existence of profit sharing and union status. Carestensen, Gerlach, and Hubler (1992) found no association between profit sharing adoption and union status in Germany.

2.6.4 Limitations of Prior Studies

While the positive effect of profit sharing on firm performance is generally supported, prior studies have not explained, either theoretically or empirically, why only a fraction of firms adopt profit sharing plans. For example, it is argued that the firm's financial instability may encourage profit sharing adoption because it provides the opportunity of avoiding fixed compensation payment commitments to employees. Others argue that even successful firms may also use profit sharing for the purpose of wage flexibility that provides the firm with an opportunity to share its success with employees while avoiding a fixed payment commitment to them. While this type of reasoning provides no useful insight in discriminating between profit sharing adopters and non-

profit sharing adopters, it ignores the higher agency costs associated with such a compensation scheme. According to compensation theories (e.g., agency), demotivational costs will increase when a compensation scheme is offered but is perceived to be less achievable or representative of employees' efforts. The wage flexibility motive does not indicate whether profit sharing plans are still useful when demotivational cost are deemed to be high.

The motivation to reduce monitoring costs also fails to demonstrate how a profit sharing plan can be beneficial to reduce monitoring costs when compensation payments under profit sharing are less predictable. Similarly, the social perspective does not explain whether employees prefer to have merely the right to a part of earnings (even if there are no earnings to share) or whether they value more the actual compensation payments. While this issue needs to be investigated, compensation theories imply that only a fraction of individuals seek non-monetary compensations (usually after their immediate financial needs are satisfied).

The moderating factors also fail to provide insights for discriminating between profit sharing and non-profit sharing firms, and for explaining why only a fraction of firms adopt profit sharing plans. For example, the empirical results are mixed for the firm size effect and provide no clear insight in explaining the adoption and use of profit sharing by firms. Managerial style is under-investigated as a determinant. Yet, the classification of managers based on their school of thought is a subjective matter that can vary from case to case. In addition, empirical evidence shows that adoption of profit sharing is a collective decision by a committee consisting of management and employee representatives (Tyson, 1996).

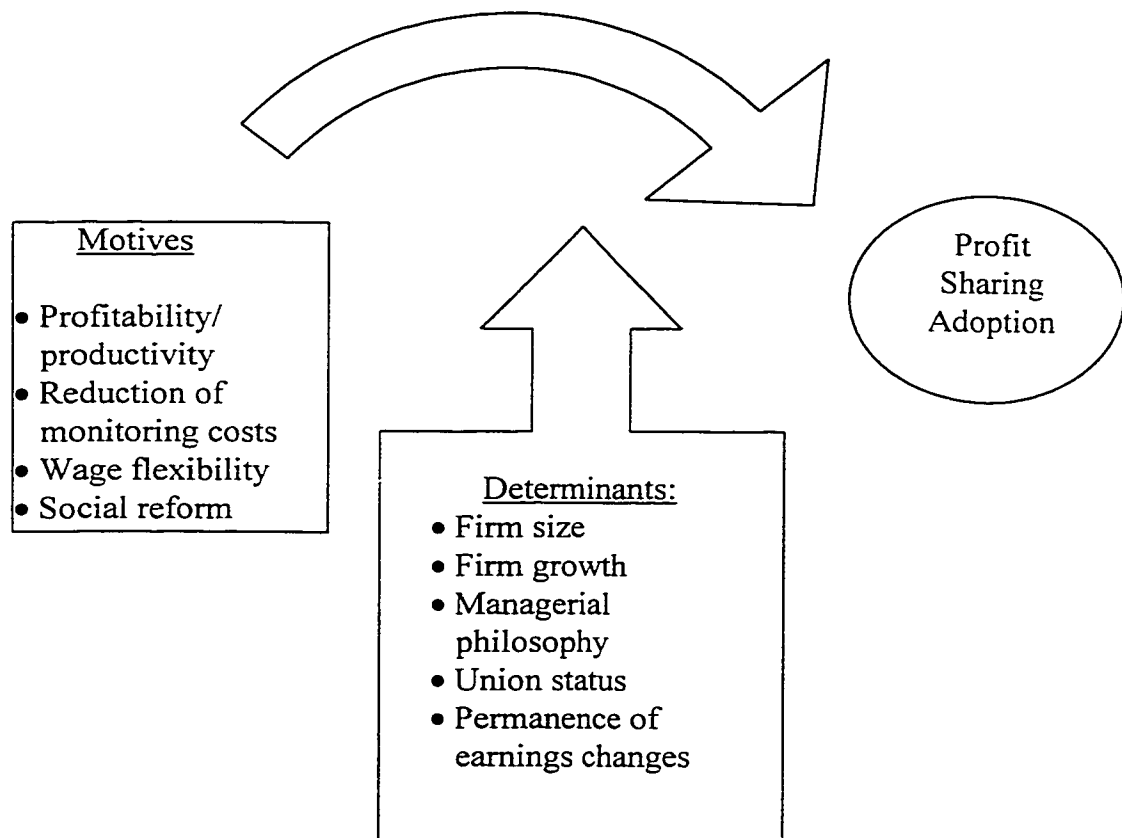
Firm growth also fails to explain under what conditions employees are willing to accept a contingent compensation when the firm pursues aggressive and prospective expansion plans because such plans increase uncertainty about compensation payments under profit sharing. In addition, the costs associated with expansion and technology developments may result in subsequent reduction in earnings, which causes a reduction in compensation payments under profit sharing. Finally, there is mixed empirical evidence about union status as an explanatory variable of profit sharing adoption.

The review of prior studies suggests that researchers may have overlooked an important moderating factor, which is the quality of the firm's earnings that reflect the employees' input and enhances the predictability of payments to employees under profit sharing plans. According to compensation theories, such as agency and expectancy, the predictability of payments underlies the success of profit sharing in motivating employees to increase their productivity. When the firm's performance is affected by factors that make earnings too volatile, then the employees' expectation of compensation payments under profit sharing decreases. Consequently, profit sharing becomes less effective in reflecting employees' efforts and in motivating them. Having an unsuccessful compensation scheme results in higher demotivational costs. Consequently, profit sharing would not be an effective means of motivation and compensation. On the other hand, when earnings changes are more predictable and current earnings changes are expected to last longer into the future, profit sharing becomes more attractive as a means of compensation and motivation because (1) compensation payments are more predictable and encouraging, and (2) the permanence of earnings changes is an indicator of improvement in the firm's operations. Therefore, the permanence of earnings changes

(the level of earnings predictability) can play an important role in profit sharing adoption decisions.

Figure 1 illustrates the contribution of this thesis to the literature. The next section explains in detail the role and effect of the permanence of earnings changes on the decision to adopt and to use profit sharing plans.

Figure 1: Motives for and factors that affect the adoption of profit sharing plans



2.7 Earnings Properties and Profit Sharing Adoption

Agency theory implies that the success of profit sharing in motivating employees depends on the conditions that underlie management and employee consensus on the appropriateness of profit sharing as a performance measure. Specifically, a performance measure that reflects the employees' effort is appropriate. This argument is reinforced by the expectancy theory, which indicates that a compensation plan is effective if employees believe they can change the firm's performance³ and consider the incentive scheme valuable. Also, management may be reluctant to offer a compensation plan if it doubts its effectiveness. A profit sharing plan is considered appropriate if it is expected to reflect the employee's effort and increase the employee's motivation. Since payments under a profit sharing plan are based on earnings, the nature of earnings changes can affect the decision to adopt profit sharing. If a significant portion of earnings changes is transitory in nature, then profit sharing may not be a successful means of employee motivation and compensation. Profit sharing is more likely to succeed in motivating employees if earnings changes indicate an improvement in the firm's operating environment. The next section explains the nature of the employee-firm relationship and illustrates the effect of earnings characteristics on profit sharing adoption.

³ According to the expectancy theory of motivation, a successful compensation must have three characteristics (Vroom, 1964): the employee must be sure that there is a compensation for higher performance, the compensation must be of value to employees, and employees must be sure that they can

2.7.1 The Nature of Firm-Employees Contractual Relations

Based on agency theory, employees may set the level of their input below the optimal level when there is no sufficient incentive for further input. To illustrate this point, assume an economy in which three parties are involved: an investor (capitalist), an executive (steward), and an employee (worker). In this case, the outcome can be distributed among the parties as follows:

$$INC_t = \alpha_1 IN_t + \alpha_2 EX_t + \alpha_3 EM_t \quad (1)$$

where IN_t , EX_t , and EM_t represent the investor, the executive, and the employee, respectively; INC_t denotes the income available to these three parties (after deducting charges due to services provided by them to the firm such as a fixed salary); and α_1 , α_2 , and α_3 reflect the proportions of income distributable to the three parties.

In this economy, ownership is separated from management (stewardship), and stewardship is separated from employment to highlight the differences in agency costs. This is a valid assumption because executives, not employees, are responsible to investors. This assumption facilitates the investigation of the actual relations between investors, executives, and employees. The parties are related to each other through contractual relationships since they have different skills that are demanded by the other parties, and they have unique supply and demand markets for their skills.

make a change in performance to reach the planned objective.

Three approaches exist to arrange the contractual relationship and compensation in the economy illustrated in equation (1) to minimize agency costs and to maximize the firm's value. First, when the investor accepts total risk and receives residual income; second, when the investor and the executive share total risk and receive residual income; and third, when the investor, the executive, and the employee share both total risk and residual income. These three situations are explained below.

Case 1- No profit sharing: In the first case, the investor absorbs total risk and receives all residual income, and the executive and the employee bear zero risk and receive fixed payments⁴. In this situation, α_2 and α_3 in equation (1) are not contingent on earnings changes and they are equal to zero. Because α_2 and α_3 are not sensitive to earnings innovations, a team moral hazard could exist (Holmström, 1979). Consequently, the executive and the employee may set their inputs below the optimal level which is required to maximize the firm's value. According to agency theory, an agent may not always act in the best interest of the principal. Rather, the agent may seek to increase his/her own utility through employment risk reduction, shirking and perquisite consumption.

The main reason for the existence of a team moral hazard is that the executive and the employee will be discouraged from continuing actions that maximize the firm's value

⁴ This definition is valid in the normal course of operation. In specific cases, such as the case of financial distress, the actual risk to the executive and the employee would be positive such as the risk of losing their jobs.

when their compensation is not adjusted accordingly. Lack of motivation will result in opportunistic behaviour that will appear in different forms. Agency theory studies have discussed widely the nature and types of the agent's opportunistic behaviour when an agency relationship exists (Berle and Means, 1932; Jensen and Meckling, 1976; and Baiman, 1990).

Lack of full cooperation and opportunistic behaviour brings additional costs to the investor. The investor can mitigate the effect of opportunistic behavior by establishing a monitoring system to observe the executive and to reduce agency costs. However, a complete monitoring system could be very costly and may not be effective to monitor such behaviour as withholding information. Therefore, other types of contractual arrangements may be preferable to reduce the costs associated with the opportunistic behaviour of the executive and the employee.

Case 2: Firm-executive profit sharing: Another option is linking the executive's and the employee's compensation to the firm's performance to reduce opportunistic behaviour. Researchers have found that the principal may rely more on variable incentive pay to align the agent's actions when it is difficult to monitor such actions (e.g., Baker et al., 1988; Tosi and Gomez-Mejia, 1989; Kren and Kerr, 1993; Jensen and Murphy, 1990).

Therefore, the second approach is that the investor and the executive share the total risk and receive the residual income jointly, and the employee bears zero risk and receives a fixed payment. The risk sharing between the investor and the executive is found to be used widely in the workplace. Furthermore, the number of executives on the board of directors is limited which facilitates linking their compensation to the firm's performance. When risk sharing takes place between the investor and the executive, α_1 and α_2 in equation (1) are set to be sensitive to earnings changes. The investor is willing to give away a portion of the residual income equal to the cost of the executive's non-eliminated opportunistic behaviour to maximize the firm's value. When risk sharing takes place, the executive will take actions that increase earnings because such actions benefit both the investor and the executive (Lambert and Larcker, 1987; and Sloan, 1993). Risk sharing may take place in different forms. For example, there could be a variable pay system under which a certain portion of pay is contingent on the firm's performance such as stock options (Lewellen et al., 1987; Tehranian et al., 1987; and Dechow and Sloan, 1991), earnings-based pay (Lambert and Larcker, 1987; Jensen and Murphy, 1990; and Baber et al., 1998) and fringe benefits (Zou, 1997).

Whether or not α_2 is linked efficiently to earnings changes, the firm has to bear the cost of the employee's opportunistic behaviour such as shirking and withholding information when the employee receives a fixed remuneration. Even if the executive's

opportunistic behaviour is eliminated successfully, the employee's opportunistic behaviour continues to exist because the employee has a separate contractual relation with the firm. The employee's agency costs may appear different from the executive's since they have different levels of control and influence on the firm's resources and decision-making process. Also, the executive has a dynamic labour market that facilitates his/her move from one firm to another or to serve more than one firm at a time to maximize his/her benefit.

The employee has a relatively less dynamic labour market (except for very highly skilled employees) and his/her move from one firm to another may be more difficult than the executive's move (Baker et al., 1988). Also, he/she has less control over the firm's resources and decision-making process. Therefore, the employee's agency costs may appear in different forms such as a low level of cooperation, absence from work, shirking, and withholding technical and work related information. The risk sharing arrangement between the investor and the executive may even result in higher agency costs for the employee because he/she may find it unfair when a percentage of earnings are distributed to the executive only. Therefore, the employee's opportunistic behavior continues to exist when α_3 is not set to be sensitive to the firm's earnings. Without incentives, any mutual monitoring that might occur within a work group will be limited only to the level needed to meet the minimal requirements of the job and to satisfy the social needs of the group (Welbourne, Balkin, and Gomez-Mejia, 1995). With expectation of high rewards commensurate with

high cooperation, the employee is more likely to engage in activities that reduce agency costs and increase work efficiency. Therefore, the second approach may not be efficient even if the firm can optimize α_2 in equation (1) due to the existence of a moral hazard associated with the employee's behaviour.

Case 3: Employee profit sharing: The third approach is that risk sharing takes place among the three parties to reduce the employee's agency costs as well as the executive's opportunistic behaviour. The reward for each party is contingent on the firm's net earnings, and α_2 and α_3 in the equation (1) are set to be sensitive to the changes in the firm's earnings. However, the magnitudes of α_1 , α_2 , and α_3 in equation (1) depend on the risk and return sharing arrangement among the parties. When α_3 is set to be sensitive to earnings changes, the employee has a financial incentive to increase his/her input. Therefore, the investor is willing to give up a percentage of earnings to obtain higher employee participation. Setting α_3 greater than zero underlies the incentive of offering profit sharing to the employee. The employee is more likely to engage in mutual monitoring if he/she believes that higher rewards are commensurate with such monitoring efforts (Walker and Pettigrew, 1984). He/she will also be willing to increase his/her cooperation and work innovations.

Therefore, the investor is willing to offer profit sharing in order to mitigate the employee agency costs that monitoring systems may fail to eliminate. Empirical studies have found that the greater use of incentive pay is positively related to total investor return and economic growth and that investors appreciate this type of risk sharing (Murphy, 1985; Abowd, 1990).

2.7.2 The Firm-Employee Inherent Costs Under Profit Sharing

Both the investor and the executive have an incentive to minimize employee agency costs and to increase cooperation. However, the participants in a profit sharing plan are faced with a risky situation even if there is no penalty for the employee when there is no positive change in earnings. When a profit sharing scheme is in place, the employee's job becomes more attractive to outsiders and demand for his/her job will increase. The employee is then faced with higher competition for his/her job. Also, the existence of the new scheme will reduce the employee's bargaining power for other types of compensation packages. Therefore, profit sharing is not cost free to the employee and the employee may not always welcome it since it is difficult to determine whether variations in the firm's performance are due to inferior employee performance or to non-employee factors. The employee may oppose profit sharing when he/she believes that greater efforts do not translate into higher earnings.

Profit sharing is also not cost-free to the firm, even if the firm does not pay any compensation when the desired earnings level is not met. Studies show that social influence and political behaviour are more likely to be observed as uncertainty in compensation increases (Pfeffer et al., 1976; Ferris and Mitchell, 1987; Fandt and Ferris, 1990; and Ferris and Porac, 1984). Furthermore, offering an incentive scheme that is not achievable will cause further shirking because of the negative effect of unachievable compensation, and would encourage the employee to engage in practices which are detrimental to organizational goals (Amihud and Lev, 1981). The employee may engage in manipulation, withholding, distorting, and fettering certain types of information to get the desirable outcome (Amihud and Lev, 1981; and Walsh and Seward, 1990). Also, empirical studies indicate that environmental turbulence and risk are negatively related to the use of incentive variable pay (Zajac and Westphad, 1994; and Beatty and Zajac, 1994). Unachievable compensation can lead to poor performance, demand for higher pay levels, and reduced commitment to the firm (Osterman, 1992).

The firm's objective is to create a variable incentive pay that is necessary to induce the employee to act in the firm's best interest. In this structure, optimal contracts must reflect the trade-offs inherent in this balance by using enough incentive pay to align the employee's interest with that of the firm. Therefore, the firm will not be willing to offer profit sharing if the goal of profit sharing is not expected to be achievable. This argument is

supported by the motivational theories such as agency and expectancy theories that imply that compensation schemes are effective if they reflect the employee's effort. The compensation schemes that are not achievable are less successful in employee motivation and there is less justification for offering them.

2.8. Role of Earnings Characteristics

As discussed earlier, the firm's primary choice centres on creating a balance between base pay and incentive pay that is necessary to induce the employee to act in the firm's best interest (Baiman, 1990). However, researchers agree that optimal compensation contracts must reflect the trade off inherent in this balancing by using enough incentive pay to align the employee's interest with that of the firm without shifting too much risk and compensation variability to the employee (Gibbons and Murphy, 1990; Jensen and Murphy, 1990). Therefore, the benefits from offering profit sharing (as a variable pay) must be evaluated by considering the inherent costs of offering a less effective compensation. Compensation theories (agency and expectancy) imply that compensation schemes are successful if they are achievable and representative of employees' efforts. In the case of profit sharing, the compensation payments are based on earnings. Hence, the achievability and representativeness of compensation under profit sharing are affected by earnings changes. Specifically, information about past earnings changes and expectations of future changes are important in assessing the usefulness of profit sharing and affect the profit sharing adoption decision. In this context, permanence of current earnings changes is informative in predicting how current earnings are

expected to persist into the future. If earnings are affected by factors that make them too volatile, then the predictability of compensation payments under profit sharing is reduced. In this situation, profit sharing is not expected to be successful in motivating employees and would not be a preferred means of compensation. In contrast, if earnings changes are caused by factors that produce more sustainable effects on earnings, which renders them more reliable and predictable, then compensation payments under profit sharing will be more predictable and representative of the employees' efforts. In this particular case, profit sharing would be more successful in motivating employees and is more likely to be adopted as a preferred compensation scheme. Therefore, permanence of current earnings changes can be an important determinant of profit sharing adoption.

The permanence of current earnings changes is investigated by considering earnings properties. Earnings innovations are classified into two components: transitory innovations and permanent innovations. Transitory innovations are those that are not expected to persist into the future and are temporary in nature such as the effect of the sale of a fixed asset or a one-time sale contract. Permanent innovations are those that have a longer effect on the firm's profitability and are expected to persist into the future such as improvement in the firm's market share, productivity, and competitive advantages. The permanent component of earnings innovations has been found to be of incremental importance to the users of earnings information in securities markets (Collins and Kothari, 1989; Ali and Zarowin, 1992; and Kormandi and Lipe, 1987).

The permanent component of earnings innovations, which is total earnings less the transitory component, reflects the improvement in the firm's business characteristics and productivity. On the other hand, a higher level of the transitory component makes earnings

a noisier measure of performance measurement. Therefore, when the transitory component of earnings is higher, earnings are less likely to reflect the employees' efforts. Also, employees could be more risk-averse than executives and investors. This implies that their reactions to risk are inversely related to their current level of wealth and income (Bernstein, 1990; Sharp, 1990). Less wealth makes losses more painful. Therefore, employee motivation is reduced with higher levels of the transitory component of earnings because this increases the riskiness of profit sharing. Accordingly, profit sharing is considered more effective and it is more likely to be adopted when the permanent portion of earnings is higher because employee confidence in earnings as a measure of their performance is higher.

2.9 Hypothesis

Based on the above arguments, permanence of earnings changes, as measured by earnings persistence, is an important determinant of profit sharing adoption. Thus, α_3 in equation (1) is more likely to be positive when the level of earnings persistence is high. Hence, a positive association is expected between the probability of adopting an employee profit sharing plan and the level of the permanent component of earnings. Hence, the following hypothesis:

H₁: Firms that exhibit permanent earnings changes are more likely to adopt employee profit sharing plans than firms with transitory earnings changes.

Chapter 3

Methodology

3.1 Chapter Overview

This chapter explains the research methodology and sample selection. The sample, which includes 298 U.S. firms, consists of 149 profit sharing firms and 149 non-profit sharing firms. A Logit model is used to test the effect of earnings persistence on the probability of adoption of profit sharing. The dependent variable is the adoption of profit sharing, while the independent variables are the earnings persistence level and control variables. Earnings persistence is primarily measured using an Integrated Moving Average model, IMA (1,1). In addition, an Autoregressive Integrated Moving Average model, ARIMA (2,1,0), is used as an alternative model. The control variables include asset growth, future prospects for the firm's operations, financial instability, and contextual variables (firm size, industry membership, and time effect), which have been found relevant in prior studies.

3.2 Sample: Selection Procedure and Attributes

This study uses U.S. profit sharing data, based on company disclosures in IRS 5500 Form, and financial data, obtained from Compustat (U.S. active and research files, 1997). The sample consists of firms that had an employee profit sharing plan and those that did not

between the years 1990 and 1997. The form IRS 5500 database includes all different types of employee compensation plans such as 401(k) plan, employee stock ownership plan, profit sharing plans and others. However, the firms that had profit sharing plans were selected for the purpose of this study. The year 1997 was selected based on the availability of data since there is a delay of about two years before data from the IRS becomes readily available. Control firms are selected based on a matching procedure which is explained below.

3.2.1 Selection of Profit Sharing Firms

Some firms may have a profit sharing plan for only a specific group of employees or managers (Kruse, 1993; Tyson, 1996). Our objective is to study the firms that adopted profit sharing plans widely and also included the majority of employees in their plan. Therefore, we have selected only the firms in which the ratio of the number of participants in the profit sharing plan to the total number employees is equal to or higher than 50%. Firms with a ratio of less than 50% were excluded from the sample. This procedure ensures that the majority of the firm's employees are included in the plan, and it suggests that employees could also be involved in how the plan is adopted and administered. In addition, there are firms that either have more than one or have different profit sharing plans for different groups of employees. In these cases, the ratio of total participants to total

employees was calculated for all plans, and the plan that had a ratio equal to or higher than 50% was selected. If more than one plan had a ratio higher than 50%, the plan with the highest ratio was selected.

The adoption of a profit sharing plan can occur anytime during the year. However, annual financial information is used in this study. For this reason, the financial information available at the beginning of the year was used for the computation of the earnings persistence coefficient and control variables when the profit sharing plan was adopted during the first six months of the year. When the plan was adopted during the second six months of the year, the financial information available at the end of the fiscal year was used.

Following Baber et al. (1998), a minimum of 12 observations is required for the purpose of ARIMA computation. Thus, firms that did not have a minimum of 12 consecutive annual observations of income before extraordinary items prior to the plan adoption date were excluded from the sample. Further, we excluded those firms that did not meet the criterion of invertibility for ARIMA computation.

3.2.2 Matching Firms

The procedure used by Kumar and Sopariwala (1992) was adopted to identify matching firms (i.e., non-profit sharing firms) for this study. According to this procedure, the sample firms must meet the following criteria: they must be in the same industry (based

on the first two digits of the SIC code), they must have the same fiscal year end, and they must be similar in size with regards to total assets.. As shown in panel B of Table 1, the t-test for difference of means of the two groups is insignificant. In addition to these criteria, the matching firms must meet the invertibility criterion for ARIMA computation.

The final sample includes 298 firms (149 profit sharing firms and 149 matching firms). Panel A of Table 1 shows details of the sample selection procedure, and Table 2 presents the industry affiliation of the sample firms. Table 3 shows the distribution of plan adopters across industry groups and over time, 1990-1997.

Table 1
Sample Selection

Panel A: Sample selection procedure		<u>Number of Firms</u>
1. Firms that adopted profit sharing between 1990 and 1997 based on the IRS 5500 Form and that are listed on Compustat		945
2. Firms whose ratio of total participants to total employees is < .50		(463)
3. Firms that did not have a minimum of 12 consecutive annual observations of income before extraordinary items available on Compustat prior to the adoption date		(244)
4. Firms that do not meet the condition of invertibility (ARIMA assumption)		(89)
Profit sharing firms		149
Matching sample of non-profit sharing firms		149
Total sample		298

Panel B: Test for inequality of the sample's means in terms of the firm size (total assets)			
<i>Variable</i>	<i>Number of Cases</i>	<i>Mean</i>	<i>Standard Deviation</i>
<hr style="border-top: 1px dashed black;"/>			
Total assets:			
Profit sharing	149	1435.1822	5448.555
Non-profit sharing	149	1626.7776	6919.665
 <i>t-test for difference of means:</i>			
Mean difference		191.5955	
t-value		-0.27	
Two-tail significance		0.791	

Table 2

Industry Classification of Sample Firms

	<u>Number of Firms</u>
Basic Industries	22
Capital Goods	66
Construction	24
Consumer Goods	140
Energy	12
Finance	34
Total	<u>298</u>

The following approach is used to classify the samples into the different industries following Ali and Kumar, 1994:

Basic Industries:	1000-1299, 1400-1499, 2600-2699, 2800-2829, 2870-2899, 3300-3399.
Capital Goods:	3400-3419, 3440-3599, 3620-3629, 3670-3699, 3800-3849, 5080-5089, 5100-5129, 5160-5169, 7300-7399.
Construction:	1500-1999, 2400-2499, 3220-3299, 3430-3439, 5200-5219.
Consumer Goods:	0000-0999, 2000-2399, 2500-2599, 2700-2799, 2830-2869, 3000-3219, 3420-3429, 3600-3619, 3630-3669, 3700-3719, 3850-3899, 3900-3999, 4830-4899, 5000-5079, 5090-5099, 5130-5159, 5180-5199, 5220-5999, 7000-7299, 7400-9999.
Energy:	1300-1399, 2900-2999, 5170-5179.
Finance:	6000-6999.

Table 3**Distribution of the Profit Sharing Adopters Over Time**

Industry Classification	Number of Firms that Adopted Profit Sharing in Different Years								Total
	1990	1991	1992	1993	1994	1995	1996	1997	
Basic Industries		3	2	1	2	1	2		11
Capital Goods	3	5	3	5	8	4	5		33
Construction	3	1	2	1	2	1	1	1	12
Consumer Goods	10	6	8	6	15	9	12	4	70
Energy		2	2	1			1		6
Finance	2	1	4	2	4	3		1	17
Total	18	18	21	16	31	18	21	6	149

3.3 Empirical Model

The main objective of this thesis is to investigate whether earnings persistence information has any significant explanatory power in explaining the adoption of employee profit sharing plans. The dependent variable is profit sharing adoption, which is a binary variable, and the independent variables are the earnings persistence coefficient and control variables. A Logit model is used to test whether earnings persistence influences the probability of profit sharing adoption. Logit model is chosen over other probability and classification models such as Probit and Discriminat Analysis because Logit model does not require the normality assumption for the dependent and independent variables (Klecka, 1980; and Lewis-Beck, 1980).

The empirical model is defined as follows. Let $P_i = P(x_i, \beta)$ indicate the probability of adoption of an employee profit sharing plan for firm i based on the firm's earnings persistence information (x_i), where β is the coefficient for earnings persistence in the model. Using a Logit model, the probability of profit sharing adoption is given by the following model:

$$P_i = \frac{1}{1 + e^{-w_i}} \quad (2)$$

Where $w_i \cong x_i\beta$ and is a linear index of factors that determine profit sharing adoption.

The probability P_i and the index w_i are positively related. This implies that firms with a larger index value are more likely to adopt profit sharing. The coefficient β reflects the importance of x_i in relation to the probability of adoption. The sign of the coefficient indicates the direction of the effect of earnings persistence on the probability of profit sharing adoption.

Furthermore, we estimate a second model which includes earnings persistence as well as the control variables which are explained in section 3.4.3. These variables are asset growth (measured as the percentage change in total assets), financial instability (represented by the percentage change in quick, current, and debt ratios), future prospects for the firm's operations (reflected by the percentage change in inventory and accounts receivable turnovers, book-to-market, and price-earnings ratios) and contextual variables (firm size, industry membership, and time). The objective of estimating the second model is to test whether the effect of earnings persistence remains when the model is controlled for the effect of these variables, which were found relevant in prior studies. Accordingly, we define the empirical model as follows:

Let $P_i = P(x_i, \beta)$ indicates the probability of adoption of employee profit sharing for firm i based on the firm's characteristics (x_i). The vector $x_i = (1, x_{i,1}, x_{i,2}, x_{i,3}, \dots, x_{i,k})$, includes explanatory variables relevant to the profit sharing adoption decision (earnings persistence and control variables). $\beta = (\beta_0, \beta_1, \dots, \beta_k)$ are the coefficients for the variables

in the model and they reflect the effect of the respective variables on the probability of profit sharing adoption. Using a Logit model, the probability of profit sharing adoption is estimated as follows in the second model:

$$P_i = \frac{1}{1 + e^{-w_i}} \quad (3)$$

Where $w_i \equiv x_i\beta$ is a linear index of the adoption of profit sharing.

Similar to the first model, the probability P_i and the index w_i are positively associated. Therefore, firms with a larger index value are more likely to adopt profit sharing. The sign of the coefficient indicates the direction of the effect of the respective variables on the probability of adoption. In addition to earnings persistence, the vector x_i includes the percentage change of asset growth (AG), debt ratio (DRAT), current ratio (CRAT), quick ratio (QRAT), inventory turnover (INVTU), accounts receivable turnover (RECTU), book-to-market ratio (B/M), and price-to-earnings ratio (P/E). Control variables also include firm size (SIZE), industry membership (INDUS), and time (TIME).

3.4 Variable Measurement

This section discusses the method used to measure the dependent and independent variables. As discussed earlier, the dependent variable is the adoption of profit sharing

and the independent variables are the level of earnings persistence as well as the control variables. Measurement of these variables follows.

3.4.1 Profit Sharing Adoption

As discussed earlier, the samples are classified as profit sharing adopters and non-profit sharing adopters. Therefore, the dependent variable, profit sharing adoption, is a dummy variable in the model that indicates adoption or non-adoption of profit sharing.

3.4.2 Earnings Persistence

Prior studies have generally used the IMA⁵ (1,1) model to estimate the persistence of earnings innovations (e.g., Ball and Watts, 1979; Ali and Zarowin, 1992; Collins and Kothari, 1989; and Baber et al., 1998). The IMA (1,1) model parsimoniously captures the degree of persistence in a single parameter, which tends to vary between zero and one. Furthermore, this model is found to be appropriate for a linear earnings process (Ali and Zarowin, 1992; and Lipe and Kormandi, 1994). Baber et al. (1998) argue that the adoption of IMA (1,1) facilitates parsimonious empirical specification of both earnings innovations and earnings persistence.

⁵ IMA (1,1) indicates how the time series variable is related to its own shocks using a moving average approach. The model's coefficient shows what percentage of a new observation is expected to deviate from the moving average of the series. ARIMA (2,1,0) tends to do the same thing, but the estimation process is different. It estimates the coefficient by using an autoregressive approach instead of a moving average approach. More details are provided in Appendix C.

However, other time series models have been used in prior studies. These include ARIMA (0,1,0) and ARIMA (0,0,1) by Miller and Rock (1985); ARIMA (1,0,0) by Easton and Zmijewski (1987); and ARIMA (2,1,0) by Kormandi and Lipe (1987). Baginski et al. (1999) argue that measures of earnings persistence, such as high-order models, are more effectively related to the characteristics of the firm's economic environment, which are expected to influence earnings persistence. Their test shows that higher-order ARIMA models, such as ARIMA (2,1,0) and (4,1,0), yield higher adjusted R². Their findings are consistent with those of Lipe and Kormandi (1994) who argue that higher-order ARIMA models do a better job of capturing the value relevance of the current period earnings.

This thesis uses IMA (1,1) primarily to measure earnings persistence and to provide results comparable to the findings of prior studies. Researchers agree that the best ARIMA model is a parsimonious model that provides the best result with the least number of parameters in the model. IMA (1,1) offers this opportunity as the model provides a single coefficient for earnings persistence. Therefore, the interpretation of the results is more straightforward. The selection of the IMA (1,1) model is also consistent with common sense, as IMA (1,1) assigns more weight to the most recent changes in earnings. Managers and employees are indeed likely to consider the most recent changes in the income numbers when formulating their perceptions about future earnings. In other words, they are likely to investigate how the most recent changes in earnings will persist into the future. Also, as Ali

and Zarowin (1992) explain, the IMA (1,1) model allows a random walk model when the moving average coefficient is zero. However, to test the robustness of the results, a higher-order model, ARIMA (2,1,0), is used.

Using the IMA (1,1) model, the earnings persistence coefficient for firm i (EP_i) is computed as follows, as per Collins and Kothari (1989), Ali and Zarowin (1992), and Baber et al. (1998):

$$EP_i = (1 - \theta) \quad (4)$$

where θ is the IMA (1,1) coefficient.

The coefficient of the model shows the expected effect of past shocks to earnings on future earnings. The coefficient $1 - \theta$ reflects the shocks that are expected to persist. The IMA (1,1) model's coefficient varies between -1 and 1. Accordingly, the earnings persistence coefficient will vary between zero and two. A higher level of earnings persistence implies that a larger portion of earnings changes is expected to persist into the future.

3.4.3 Control Variables

As discussed earlier, prior studies have documented the association between some influential factors and the adoption of profit sharing. These variables are included in the

empirical test to examine the incremental effect of earnings persistence information. Measurement of the control variables follows.

Asset growth: Profit sharing firms have been found to have a higher asset growth rate than other firms (Magnan et al, 1997). Asset growth could also be an antecedent to profit sharing (Lingle and Schiemann, 1996) and future earnings changes (Ou and Penman, 1989). Therefore, profit sharing adoption may be observed more in firms with high asset growth rate. To control the effect of this variable on the adoption of profit sharing plans, asset growth is included in the model a control variable. Asset growth is measured as the average growth of total assets in the two years prior to the date of profit sharing adoption.

Future prospects of the firm's operations: Although the earnings persistence information may be a signal about the firm's future prospects, it is also an indicator of the firm's overall performance, which may also be affected by non-operating activities. For example, earnings include certain financing activities which are not necessarily directly related to the firm's operating activities. Therefore, the future prospects of the firm's operations may influence profit sharing adoption. Kruse (1996) reports that firms with good performance may be willing to share their success with employees through profit sharing. Prior studies have also documented that profit sharing firms had good

performance even prior to plan adoption (Magnan et al., 1997; and Poole and Jenkins, 1990). In this thesis, two sets of measures of the firm's operating prospects are used. The first set consists of two stock price-based measures. These are the changes in book-to-market and earnings-to-price ratios. Prior studies have shown that these two ratios are used frequently as measures of future prospects (e.g., Basu, 1983; Reinganum, 1981; Holthausen and Larcker, 1992; Beaver, 1998). Therefore, it may be argued that employees use these measures to find out about the firm's future prospects. To control for the possible effects of these variables on the adoption of profit sharing plans, they are included in the model. The second set comprises two operation-based measures, which are inventory and accounts receivable turnovers. Inventory turnover signals a firm's ability to sell its products. A complement to inventory turnover is accounts receivable turnover, which indicates the firm's ability to collect the sale proceeds from its customers. For example, a firm may be able to stimulate sales through different credit policies or advertisement, but still experience difficulty in collecting sale proceeds. A significant decline in accounts receivable turnover signals a problem in maintaining customer confidence in the firm's products. In many situations, an increase in accounts receivable turnover indicates that increased demand for the firm's products is possible without offering unnecessary credit policy concessions to customers.

Inventory and accounts receivable turnovers are thus used as measures of the quality of the firm's operations because they can signal difficulties in generating sales and the existence of a low demand for the firm's products (Blinder and Maccini, 1991). Thus, employees may use the information about these variables to study the firm's future prospects. Therefore, profit sharing adoption may be observed more in firms with higher growth in the accounts receivable and inventories turnovers. To control the effect of this variable on the adoption of profit sharing plan, these two variables are included in the model.

Financial instability: It is argued that firms with higher levels of instability may be more likely to prefer profit sharing in order to avoid the fixed commitments of wage increases and also to protect themselves in case of trouble (Kruse, 1996; Wagar and Long 1995). Other studies have found that the effect of organizational risk is negatively associated with the use of performance-based pay (Beatty and Zajac, 1994; Bloom and Milkovich, 1995). Therefore, financial instability can be a factor that influences profit sharing adoption. To control for the effect of this factor three measures of financial instability are used. The quick and current ratios are used as measures of short-term instability while the debt ratio is used as a measure of long-term instability. These variables are included in the model as control variables.

Firm size: The matching procedure used in this thesis assures that the two samples are similar in size, as measured by total assets. Therefore, the size effect is not a relevant factor in this study. The t-test results presented in Table 1, Panel B, indicate that the profit sharing and non-profit sharing samples are not significantly different in terms of firm size.

Industry membership: Industry membership is another factor, which may influence the adoption of profit sharing. When a compensation policy becomes common practice in an industry, firms in that industry may be under pressure to provide the same opportunity to their employees. In addition, operational characteristics may make contingent compensation different from one industry to another. The findings of prior studies about the industry effect are mixed. While no industry effect was found in Kruse (1996), a weak effect is reported in Conte (1992). In this thesis, industry membership is one of the criteria used in selecting the sample of control firms. Thus, industry membership is automatically controlled for in the empirical test. However, as an additional test, industry membership is entered into the model as a dummy variable. The sample is classified into five groups based on the classification presented in Table 2 and the groups are included in the model as dummy variables with the lowest group as the reference group.

Time effect: Our sample includes firms that adopted profit sharing from 1990 to 1997, and they are included in the empirical test simultaneously. To investigate whether adopters of profit sharing in earlier years influence later adopters, a time variable is also included into the model. The period of 1990 to 1997 is divided into three periods of 2, 3 and 3 years respectively. These are included in the empirical model as dummy variables with the first group as the reference group.

Chapter 4

Empirical Results

4.1 Chapter Review

The empirical results are presented in this chapter. They consist of descriptive statistics of the variables included in this study and the results of tests conducted to evaluate the effect of earnings persistence on the probability of profit sharing adoption. The results show a significant relationship between the earnings persistence level and the probability of profit sharing plan adoption. Control and contextual variables are then included in the testing procedure. The results from this latter test indicate that the effect of earnings persistence remains significant even when these variables are considered. The results also indicate that future prospects of the firm's operations (measured by the growth rate in accounts receivable turnover) are positively related to the probability of plan adoption whereas the firm's financial stability (measured by the growth rate in the debt ratio) exhibits a negative relationship with the probability of plan adoption. Finally, earnings persistence is estimated using an alternative model, ARIMA (2,1,0), and the tests are again repeated. The test results confirm the robustness of the previous findings.

4.2 Descriptive Statistics

Table 4 provides descriptive statistics about the estimated earnings persistence coefficient for both the profit sharing firms and the matching firms. The mean of the earnings persistence coefficient for the total sample is .83, which is relatively consistent with the mean values of .86 and .85 reported by Baber et al. (1998) and Ali and Zarowin (1992) respectively. Also, the table shows that the mean of the earnings persistence coefficient for the profit sharing firms is .902, compared to a mean of .755 for the non-profit sharing firms. The standard deviations of the earnings persistence coefficients for the profit sharing and non-profit sharing firms are almost equal.

Table 4
Descriptive Statistics for the Earnings Persistence Coefficient

	<u>Profit sharing firms</u>	<u>Matching firms</u>	<u>Total Sample</u>
Mean	.902	.755	.828
Median	.885	.723	.769
Minimum	.214	.050	.050
Maximum	1.820	1.829	1.829
Standard deviation	.364	.379	.371

The earnings persistence coefficient is equal to $1 - \theta$, where θ is the IMA (1,1) coefficient based on equation (4) noted in section 3.4.2.

4.3 The Effect of Earnings Persistence

4.3.1 Test Results

The model used to test the hypothesis is (as discussed in chapter 2):

$$P_i = \frac{1}{1 + e^{-w_i}} \quad (2)$$

Where $w_i \cong x_i\beta$ and is a linear index of factors that determine profit sharing adoption, and the coefficient (β) is used to test the main hypothesis that a positive and significant relationship exists between earnings persistence and the probability of profit sharing adoption. The estimated coefficient for earnings persistence (in the form of its natural logarithm), presented in Table 5, is positive and significant at the .000 level, which supports the main hypothesis. The estimated coefficient, .883, indicates the change in the log odds of adopting profit sharing for a one-unit increase in earnings persistence. The model's chi-square test (which is similar to the F test in regression models) equals 16.5 and is significant at the .000 level. The chi-square measure is computed using $-2 \log$ likelihood function which tests the efficiency of the model as explained in section 4.3.2. The model's classification rates are also shown in Table 5. The overall correct classification rate of the model is 60% with a classification rate of 62% for profit sharing adopters and 58% for non-profit sharing adopters. While the significance tests for the earnings persistence coefficient and chi-square are sufficient for the hypothesis testing, these classification rates are

provided for further information about the model's efficiency. Further information about the model's efficiency is provided in section 4.3.2.

Table 5
The Effect of Earnings Persistence
Independent variable: earnings persistence coefficient measured by
Model: IMA (1,1)

<u>Variables</u>	<u>Coefficient</u>	<u>Wald¹</u>	<u>Significance</u>		
CONSTANT	.270	3.856	.004	-2 log likelihood:	396.6
EP	.883	12.859	.000	Chi-square	16.5
				Level of significance	.000
				NPSHCCR	58%
				PSHCCR	62%
				OCCR	60%

Legend:

CONSTANT = the model's intercept.
EP = natural logarithm of the earnings persistence measure
NPSHCCR = correct classification rate for matching firms
PSHCCR = correct classification rate for profit sharing firms
OCCR = overall correct classification rate.

¹ The Wald statistic has a chi-square distribution and is used to test whether the coefficient is equal to zero.

4.3.2 The Model's Efficiency

The chi-square test is used to investigate whether any of the predictors in the model is linearly related to the log odds of profit sharing adoption. It tests the null hypothesis which posits that all the coefficients in the model equal zero against the alternative hypothesis that at least one coefficient is non-zero. As shown in Table 5, the chi-square test result is 16.5 and is significant at the .000 level, indicating that the null hypothesis is rejected.

In addition to the test for the significance of the coefficient and chi-square, the measure -2 log likelihood is used to test the efficiency of the model. This measure provides evidence on how likely the estimated results are representative of the sample. The lower the level of this measure, the better the fit of the model⁶. This measure is usually compared with that of the model that excludes the predictor of interest. In our case, the -2 log likelihood computed for the model without an earnings persistence coefficient (i.e., the model with a constant only) is 413.1. The existence of earnings persistence coefficient in the model reduces (improves) the -2 log likelihood by 16.5.

4.3.3 The Linearity Assumption

The linearity assumption is an important assumption in logistic regression analysis and the results are legitimate only if this assumption is valid. The linearity assumption

⁶ As it is a probability measure, its value is less than one. It is customary that this probability be expressed by multiplying the natural logarithm of the probability by -2. If the model fits the data perfectly, the probability will be 1. Accordingly, -2 times the log likelihood will be zero.

implies the existence of a linear relationship between the predictor in the model and the Logit. To test the validity of this assumption, the grouping and plotting method is used. Based on this method, the earnings persistence coefficients (the predictor in the logistic regression) are placed into four groups based on quartiles. These groups are represented by dummy variables with the lowest group as the reference group. The dummies are then substituted into the Logit model instead of the earnings persistence coefficients and the model is re-estimated. The estimated coefficients are plotted against the midpoint of each group. (Quartile 1 is usually ignored as its coefficient is captured by the model's intercept.) If the plotted line is a straight line, then the linearity assumption is valid.

The results of grouping earnings persistence coefficients and the related estimates are provided in Table 6. Figure 2 shows a plot of the information in Table 6. The line connecting the estimated coefficients is approximately straight and thus supports the validity of the linearity assumption.

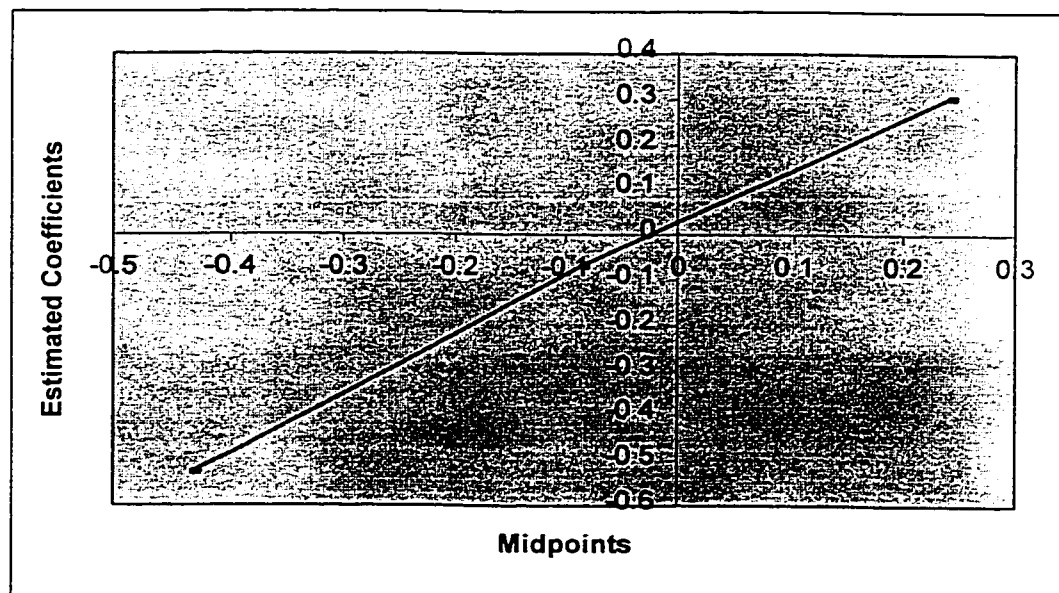
Table 6

Estimations for the Linearity Assumption

<u>Variables in the model</u>	<u>Estimated Coefficient</u>	<u>Quartile's Midpoint</u>
Intercept*	-.007	
Quartile 2	-.526	-.43
Quartile 3	-.101	-.13
Quartile 4	.302	.24

* The effect of quartile 1 is captured by the model's intercept.

Figure 2 - Test of the Linearity Assumption



4.3.4 Interpretation of the Model's Coefficient

The interpretation of the Logit model coefficient is not straightforward because it is an exponential model and is non-additive in the probabilities⁷. Accordingly, the effect of a given predictor on the probability is not constant and is a function of all explanatory variables in the model⁸. The logistic regression coefficient is interpreted as a change in the log odds associated with a one-unit change in the independent variable⁹. However, as the probability is easier to interpret than the log of the probability, the logistic equation is written as follows:

$$P_i = e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2 \dots \beta_k x_k} = e^{\beta_0} e^{\beta_1 x_1} e^{\beta_2 x_2} \dots e^{\beta_k x_k}$$

Therefore, e^{β_i} indicates the effect of predictor i on the probability. When β_i is positive, the factor e^{β_i} will be greater than 1, indicating an increasing effect on the probability. It will be less than 1 when β_i is negative, indicating a decreasing effect on the probability. It has no effect on the probability when β_i is 0. In our model, the earnings persistence coefficient is $0.883 > 0$ and $P = e^{0.883} = 2.4$ indicating that earnings persistence has an increasing effect on the odds of profit sharing adoption. The number 2.4 is compared with 1 ($P = e^0 = 1$) when the coefficient of earnings persistence is zero

7 This contrasts with the linear regression model which estimates the change in the dependent variable that results from a one-unit change in the independent variables.

8 The model coefficients in the case of linear regression also change when a new variable is either included or excluded from the model. However, its effect on the dependent variable remains constant when the model is estimated because the model is additive. This is not true in the case of logistic regression because the model is not additive. To explain this point, the logistic model [equation (3), section 3.3] can be written as $P_i = [\exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 \dots \beta_k x_k)] / [1 + \exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 \dots \beta_k x_k)]$. The net partial effect of a predictor on P_i is given as $\beta_j (P_i)(1 - P_i)$ (DeMaris, 1992). The partial effect of the predictor j is not a constant because of P_i .

indicating that earnings persistence has no effect on the probability of profit sharing adoption. A number greater than indicates that earnings persistence has a positive effect on the probability. A greater number indicates greater effect. However, the marginal effect of earnings persistence on the probability of plan adoption is not constant due to nonlinearity of the Logit model.

4.3.5 Influence of Earnings Persistence

The effect of the change in the earnings persistence coefficient on the probability of profit sharing adoption is investigated by considering the linear index of earnings persistence, w_i , in model (2) (section 3.3). Based on the estimated coefficient presented in Table 5, $w_i = .883 \ln(x_i)^{10}$, where x_i is the earnings persistence coefficient for firm i . We estimated the probability of adoption of a profit sharing plan from the distribution of earnings persistence coefficients for the following levels: .25, .50, .75, 1.00, and 1.25. The results are presented in Table 7 and show that the probability of adopting a profit sharing plan increases by 14.5% (from 27% to 41.5%) when the earnings persistence coefficient increases from .25 to .50. It continues to increase by another 8.5% for the firms that have an earnings persistence coefficient of .75. The probability increases to 56% for firms with an earnings persistence coefficient of 1 and to 61% for firms with an earnings persistence of 1.25.

9 To illustrate this point, equation (3), section 3.3, can be written as: $\text{Log} [P_{(\text{profit sharing adopter})} / P_{(\text{non adopter})}]$.

10 The model is based on the natural logarithm of x_i .

Table 7

Analysis of the Change in the Probability of Profit Sharing Adoption

<u>Level of Earnings Persistence</u>	<u>w_i</u>	<u>P_i</u>	<u>ΔP_i</u>
.25	-.954	27%	
.50	-.342	41.5%	14.5%
.75	.016	50%	8.5%
1.00	.270	56%	6%
1.25	.460	61%	5%

The Levels of Earnings Persistence represent specific points in the earnings persistence distribution. As indicated in section 3.4.2, the earnings persistence coefficients vary between zero and two.

w_i is a linear index of earnings persistence in the Logit model discussed in section 4.3.1.

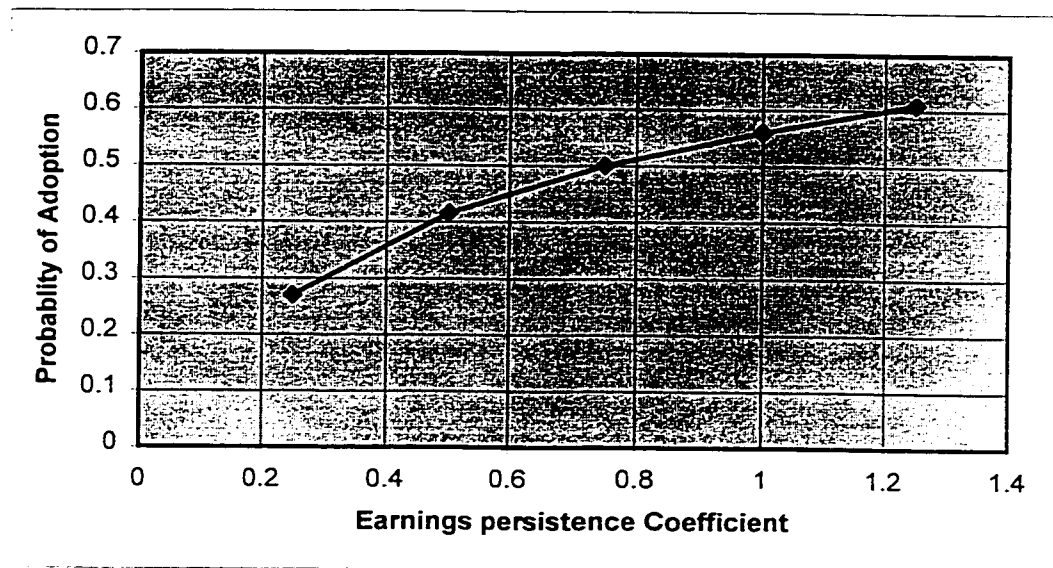
P_i is the probability estimated by the Logit model.

ΔP_i is the change in the probability P_i .

Figure 3 illustrates the increase in the probability of adoption of a profit sharing plan when the level of earnings persistence increases. This figure shows that a higher level of earnings persistence is associated with a higher probability of profit sharing adoption. This supports the argument that earnings persistence is a significant determinant of profit sharing adoption. The analysis indicates that management and employees are more

willing to set α_3 in equation 1 (section 2.7.1) based on the firm's earnings when current earnings changes are more likely to persist into the future.

Figure 3 - The Relationship Between Earnings Persistence Level and the Probability of Profit Sharing Adoption



4.4 Effects of Control Variables

4.4.1 Descriptive Statistics

Table 8 presents descriptive statistics for control variables¹¹. The average asset growth and related standard deviation are slightly higher for the profit sharing firms than for the matching firms. This finding is consistent with the finding reported in Magnan et al.

¹¹ Examination of the data indicated that three firms had extreme values for the control variables. Thus, these firms and their matched firms are excluded. The final samples used to investigate the effect of the control variables are 292 including 146 profit sharing firms and 146 non-profit sharing firms.

(1997). In term of future prospects of the firm's operations, profit sharing firms have higher growth in inventory turnover. Similarly, book-to-market and earnings-to-price ratios are higher for profit sharing firms. In terms of financial stability variables, profit sharing firms have a higher growth in the current and quick ratios (and higher standard deviations) and a lower growth rate in their debt ratio than the matching sample. In general, the measures of financial stability show that profit sharing firms have higher financial stability in term of higher liquidity (measured by the current and quick ratios) and lower debt (measured by the debt ratio). Pair-wise correlations between these variables are presented in Table 9. None of the control variables has a significant correlation with the earnings persistence coefficient. The correlation between the control variables is not significantly high, with the exception of the correlation between the current ratio and the quick ratio.

Table 8

Descriptive Statistics for the Control Variables and the Earnings Persistence Coefficient

Panel A: Descriptive statistics for the control variables:

	Profit sharing firms				Matching firms				Total Sample						
	Mean	S.D	Median	Min	Max	Mean	S.D	Median	Min	Max	Mean	S.D	Median	Min	Max
AG	.389	.838	.315	-.525	1.580	.320	.756	.281	-.798	1.840	.327	.797	.298	-.798	1.840
RECTU	.065	.051	.055	-.684	.985	.043	.038	.048	-.943	1.154	.058	.049	.051	-.943	1.154
INVTU	.069	.235	.067	-.283	.995	.051	.251	.078	-.747	.881	.066	.241	.071	-.747	.995
B/M	.073	.112	.060	-.875	.860	.065	.195	.075	-.477	.782	.068	.147	.071	-.875	.860
E/P	.104	.351	.129	-1.670	2.130	.098	.375	.106	-1.899	2.510	.101	.362	.110	-1.899	2.510
QRAT	.664	2.552	.512	-.957	2.140	.547	2.312	.495	-.937	2.158	.584	2.415	.550	-.957	2.158
CRAT	.295	1.018	.205	-.782	1.238	.221	.956	.198	-.930	1.320	.247	.998	.201	-.930	1.320
DRAT	.348	.289	.302	-.990	1.112	.665	.505	.604	-1.500	2.681	.466	.406	.442	-1.500	2.681

Panel B: Descriptive statistics for the earnings persistence coefficient:

EP	.908	.366	.886	.218	1.820	.759	.382	.725	.050	1.829	.830	.380	.802	.050	1.829
----	------	------	------	------	-------	------	------	------	------	-------	------	------	------	------	-------

Variables:

AG = growth rate in total assets

RECTU = growth rate in accounts receivable turnover

INVTU = growth rate in inventory turnover

B/M = growth rate in book-to-market ratio

E/P = growth rate in earnings-to-price ratio

QRAT = growth rate in quick ratio

CRAT = growth rate in current ratio

DRAT = growth rate in debt ratio (total debt to total assets)

SD = standard deviation

EP = earnings persistence coefficient

* After excluding the outliers.

Table 9
Correlation (Pearson) Matrix of Variables Included in the Expanded Model

	EP	AG	CRAT	DRAT	INVTU	B/M	E/P	QRAT
AG	.070 P= .237							
CRAT	-.028 P= .633	.175 P= .003						
DRAT	.006 P= .914	.022 P= .699	.002 P= .997					
INVTU	-.065 P= .271	.043 P= .467	-.072 P= .221	.049 P= .406				
B/M	-.074 P= .205	.013 P= .820	-.064 P= .277	.010 P= .864	-.043 P= .459			
E/P	-.049 P= .401	-.031 P= .596	-.056 P= .341	-.027 P= .638	.006 P= .908	.153 P= .003		
QRAT	-.022 P= .706	.009 P= .815	.867 P= .000	.014 P= .801	-.053 P= .365	-.047 P= .425	-.037 P= .524	
RECTU	-.103 P= .078	.142 P= .016	-.027 P= .643	-.025 P= .673	.274 P= .001	-.071 P= .225	-.051 P= .389	-.018 P= .759

4.4.2 Test Results

Table 10 presents the effect of earnings persistence and other control variables on the probability of adoption of a profit sharing plan. The coefficient for earnings persistence is significant at the .001 level. The correlation matrix presented in Table 9 shows that earnings persistence is not highly correlated with any of the control variables. This suggests that the earnings persistence variable continues to be a significant determinant in the decision to adopt a profit sharing plan even after considering the effects of other explanatory variables.

These findings support the results presented in the previous section and imply that higher levels of earnings persistence are associated with a higher probability of adoption of a profit sharing plan even when the effect of control variables are considered. Table 10 shows that the model is significant at the .000 level, and that the model's efficiency (measured by the chi-square test) increases from 16.5 to 26.8 when the control variables are included. The other measure of the model's efficiency (-2 log likelihood) also indicates improvement by 31.1 (396.6 – 365.5), which reflects the effect of control variables on the probability of profit sharing adoption.

Table 10

**The Effect of the Earnings Persistence and Control Variables
on the Probability of Profit Sharing Plan Adoption**
Independent variables: earnings persistence and control variables
Model: IMA (1,1) - Forward Method ^a

<u>Variables in the model</u>			
	<u>Coefficient</u>	<u>Wald^b</u>	<u>Significance</u>
CONSTANT	.695	6.507	.011
EP	.832	13.877	.001
RECTU	.235	5.460	.019
DRAT	-.207	4.908	.026

-2 log likelihood:	365.5
Chi-square	26.8
Level of significance	.000
NPSHCCR	61%
PSHCCR	66%
OCCR	64%

<u>Variables not in the model:</u>		
	<u>Score^c</u>	<u>Significance</u>
AG	.071	.789
CRAT	.171	.679
QRAT	.006	.938
INVTU	.443	.505
B/M	2.182	.139
E/P	.069	.792

Variables (natural logarithm):
 EP = earnings persistence measure
 AG = growth rate in total assets
 RECTU = growth rate in accounts receivable turnover
 INVTU = growth rate in inventory turnover
 B/M = growth rate in book-to-market ratio
 E/P = growth rate in earnings-to-price ratio
 QRAT = growth rate in quick ratio
 CRAT = growth rate in current ratio
 DRAT = growth rate in debt ratio (total debt to total assets)
 CONSTANT = the model's intercept

NPSHCCR = correct classification rate for matching firms
 PSHCCR = correct classification rate for profit sharing firms
 OCCR = overall correct classification rate.

a The Forward method is a stepwise method that selects the variables to be included in the model. Removal testing is based on the probability of the likelihood-ratio statistic based on maximum-likelihood estimates.

b The Wald statistic has a chi-square distribution and is used to test whether the coefficient is equal to zero.

c The Score statistic is an alternative to the Wald statistic for hypothesis testing. However, unlike the Wald statistic, it does not require the explicit computation of parameter estimates. Thus, it is useful where recalculating parameter estimates for different models would be computationally unreasonable. It is used for variables not in the model because Wald statistic and Score statistic are equivalent in large samples when the null hypothesis is true (Rao, 1973).

The effects of each control variable on the probability of adoption of profit sharing plans are discussed below.

Asset Growth: Table 10 shows that the effect of asset growth is not significant in the model, indicating a lack of association between this variable and the adoption of a profit sharing plan. This finding is inconsistent with the notion that firms with a higher rate of expansion (measured by total assets) may consider profit sharing as a means of compensation to encourage employee participation. On the other hand, the findings are consistent with Fazzari et al.'s (1988) view that expansion decisions are based more on the liquidity position and cash flow than on operational characteristics.

Financial Instability: Table 10 shows that debt ratio is significantly associated with the probability of adoption of profit sharing. The coefficient of this variable is negative, indicating that as the debt ratio increases, the probability of adoption of profit sharing decreases. This implies that the preference for profit sharing decreases as the firm's financial leverage increases. This may be because (a) the firm's financial risk is negatively associated with the preference for profit sharing, and/or (b) a higher level of debt results in a higher interest expense and lower earnings. This result is consistent with the notion that organizational risk is negatively associated with the use of performance-based compensations (Beatty and Zajac, 1994; Bloom and Milkovich, 1995). The results are

consistent with Theodossiou et al.'s (1996) findings that the debt ratio is significantly associated with the firm's distress. However, it is not consistent with the argument that firms with higher instability are more likely to adopt profit sharing to reduce their fixed payment commitment to employees (Kruse, 1996; Wagar and Long, 1995). In contrast, our results provide support for the notion that profit sharing is less preferred when the ambiguity about the firm's financial situation increases.

The relationship between the current and quick ratios and the probability of adoption of profit sharing is insignificant. These findings suggest that short-term fluctuations in the firm's financial situation are not significant determinants in the decision to adopt a profit sharing plan.

Future Prospects of the Firm's Operations: Four measures are used to control for the effect of the future prospects for the firm's operations. The test results in Table 10 show that only accounts receivable turnover growth is significantly related to profit sharing adoption. An increase in the accounts receivable turnover may indicate improvement in the firm's ability to sell its products coupled with an increased efficiency of the firm's credit department to collect credit sales from customers. The positive association between this variable and profit sharing adoption could imply that the preference for profit sharing increases when future prospects of the firm's operations improve. This finding is consistent with the argument that accounts receivable turnover may signal information about the quality of the

firm's operation (Lev and Thiagarajan, 1993; Blinder and Maccini, 1991). However, the test results indicate that the inventory turnover growth is not a significant determinant of profit sharing adoption. This may imply that the growth in inventory turnover is not necessarily perceived as a measure of future prospects in decisions on profit sharing adoption. Furthermore, Table 10 indicates that the stock price-based variables (B/M and E/P ratios) are not significant determinants in the decision to adopt profit sharing plans. This is consistent with the notion that stock prices are affected by macroeconomic factors and are thus considered less relevant in the decision to adopt profit sharing plans.

4.5 Effects of Contextual Variables

In this section, we investigate the effects of the contextual variables (time-effect, industry membership, and firm size) on the results presented in the previous section. The measurement of these variables has been discussed in section 3.4.3. The results in Table 11 indicate that none of these variables is significant. Hence, the contextual variables do not affect our results. These results were expected for firm size and industry membership as the procedure used to select the control (matching) firms has controlled for the effects of these two variables. Thus, this finding supports the validity of our matching procedure. Given the insignificant effect of the time variable (YEAR), there is no indication that adopters of profit sharing in earlier years influenced those firms that adopted such plans at a later date. The insignificant effect of the time variable is also evident in Table 3 (chapter 3), which

shows that the adoption of profit sharing plans is spread throughout the sample period. The model properties, such as chi-square and -2 log likelihood, did not change considerably as a result of the presence of the contextual variables – again reinforcing the insignificant effects of these variables.

Table 11

Effect of the contextual variables
Independent variables: earnings persistence, control variables, and contextual variables
Model: IMA (1,1) – Forward Method^a

<u>Variables in the model</u>			
	<u>Coefficient</u>	<u>Wald^b</u>	<u>Significance</u>
CONSTANT	.688	6.376	.012
EP	.825	12.931	.000
RECTU	.236	5.486	.017
DRAT	-.206	4.858	.027

-2 log likelihood:	363.6
Chi-square	27.7
Level of significance	.000
NPSHCCR	62%
PSHCCR	66%
OCCR	64%

<u>Variables not in the model:</u>	<u>Score^c</u>	<u>Significance</u>
AG	.056	.812
CRAT	.115	.733
QRAT	.020	.997
INVTU	.512	.474
B/M	2.196	.138
E/P	.062	.803
SIZE	.435	.509
INDUS	.182	.669
YEAR	.415	.519

Variables (natural logarithm):
 EP = earnings persistence measure
 AG = growth rate in total assets
 RECTU = growth rate in accounts receivable turnover
 INVTU = growth rate in inventory turnover
 B/M = growth rate in book-to-market ratio
 E/P = growth rate in earnings-to-price ratio
 QRAT = growth rate in quick ratio
 CRAT = growth rate in current ratio
 DRAT = growth rate in debt ratio (total debt to total assets)
 SIZE = firm size measured by total assets
 INDUS = dummy variable for industry membership
 YEAR = dummy variable for the time effect

NPSHCCR = correct classification rate for matching firms
 PSHCCR = correct classification rate for profit sharing firms
 OCCR = overall correct classification rate

a The Forward method is a stepwise method that selects the variables to be included in the model. Removal testing is based on the probability of the likelihood-ratio statistic based on maximum-likelihood estimates.
 b The Wald statistic has a chi-square distribution and is used to test whether the coefficient is equal to zero.
 c The Score statistic is an alternative to the Wald statistic for hypothesis testing.

4.6 Alternative Measure of Earnings Persistence

4.6.1 ARIMA (2,1,0)

An alternative measure of earnings persistence is used in this section to test the robustness of the results. The alternative model, ARIMA (2,1,0), is selected for the following reasons. First, ARIMA (2,1,0) is based on the autoregressive behaviour of earnings while IMA (1,1) is based on the moving average behaviour of earnings. Autoregressive behaviour emphasizes the past (time-lagged) series and shows how observed values of earnings are likely to behave over time and how they are related to the immediate past value of earnings. On the other hand, a moving average process emphasizes the past (time-lagged) earnings shocks. It places greater emphasis on the shocks to earnings and how the shocks will likely persist into the future.

A second reason for selecting ARIMA (2,1,0) as an alternative measure is that recent studies (e.g., Lipe and Kormandi, 1994; and Baginski et al, 1999) have argued that higher order ARIMA models perform better than lower order ARIMA models such as IMA (1,1). Therefore, the use of ARIMA (2,1,0) provides an opportunity to incorporate recent research findings on the efficiency of higher order ARIMA models into research in this area.

However, the ARIMA (2,1,0) model provides two coefficients that could make the interpretation of the results difficult. This is not the case with the IMA (1,1) model

because it is parsimonious. To facilitate interpretation and also to provide comparable results, the model discussed by Kormandi and Lipe (1987), and Collins and Kothari (1989) and used by Baginski et al. (1999) is used to compute a single earnings persistence factor. This model is presented below:

$$EP_A = \frac{1 - \sum_{i=1}^q B^i \theta_i}{(1 - B)^d (1 - \sum_{j=1}^p B^j \varphi_j)} - 1 \quad (5)$$

where:

EP_A = Earnings persistence as measured by model (5) above.

$B = 1/(1+r)$ where r is an appropriate discount rate. The rate is set to 10%,

consistent with prior research.

θ_i = Moving average parameter

d = Level of consecutive differencing

φ_j = Autoregressive parameter

p = Order of the autoregressive parameter

q = Order of the moving average parameter

The descriptive statistics for EP_A is provided in Table 12. The mean of EP_A for the total sample is 8.89 with a standard deviation of 3.71. This is comparable to the mean of

8.93 (and a standard deviation of 3.41) reported by Kormandi and Lipe (1987). The test result for EP_A is presented in Table 13. The test shows that the association between EP_A and the probability of profit sharing adoption is significant. The model is also significant (chi square = 19.8). This result indicates that the previous findings are robust when an alternative measure of earnings persistence is used.

4.6.2 Present Value of Earnings Persistence Coefficient

EP_A is the discounted value of the revisions in expected future earnings caused by one dollar of current earnings changes. By contrast, EP computed according to IMA (1,1) is not discounted and it is the actual coefficient of revisions in expected future earnings caused by one dollar of current earnings changes. Therefore, we see a considerable difference between the value of EP and EP_A . To provide a comparable result, the descriptive statistics presented in Table 4 are revised based on the present value of the IMA (1,1) coefficients. The results are presented in Table 12. EP_B is computed using the model suggested by Collins and Kothari (1989) as follows:

$$EP_B = (1 - \theta) / r \quad (6)$$

where θ is the IMA (1,1) coefficient and r is an appropriate discount rate. A discount rate of 10% is used consistent with prior studies (e.g., Baginski et al. 1999). EP_C is based on

model (5), which is a general model used to summarize the time-series properties into a single measure.

Table 12 shows that EP_B and EP_C are higher for the profit sharing firms than for the matching firms. It also shows that EP_A , based ARIMA (2,1,0), is slightly lower than EP_C , but it is however more comparable with the perpetuity value of EP, which is EP_C . As an additional test, the association between earnings persistence and the adoption of profit sharing is retested using EP_C . The results in Table 14 show that the association remains significant.

Table 12
Descriptive Statistics for Different Measures of Earnings Persistence

<u>Estimated Earnings Persistence Coefficients</u>						
<u>Model</u>	<u>Profit sharing firms</u>		<u>Matching firms</u>		<u>Total Sample</u>	
	<u>Mean</u>	<u>S D</u>	<u>Mean</u>	<u>S D</u>	<u>Mean</u>	<u>S D</u>
a. EP	.902	.364	.755	.379	.828	.371
b. EP_A	9.647	3.501	8.131	3.924	8.889	3.712
c. EP_B	9.025	3.641	7.547	3.793	8.286	3.717
d. EP_C	10.124	3.683	8.631	3.836	9.377	3.759

Notes:

- a. EP is based on model (4) discussed in section 3.4.2.
- b. EP_A is computed based on model (5) and ARIMA (2,1,0) discussed in section 4.6.1.
- c. EP_B is based on model (6) discussed in section 4.6.2.
- d. EP_C is based on model (5) and IMA (1,1) discussed in section 4.6.1.

Table 13

The Effect of Earnings Persistence [Per EP_A]

**Independent variable: earnings persistence coefficient measured by
Model: ARIMA (2,1,0)**

<u>Variables</u>	<u>Coefficient</u>	<u>Wald¹</u>	<u>Significance</u>		
CONSTANT	.568	5.407	.002	-2 log likelihood:	381.6
EP_A	.957	13.349	.001	Chi-square	19.8
				Level of significance	.000
				NPSHCCR	59%
				PSHCCR	64%
				OCCR	62%

Legend:

CONSTANT = the model's intercept.
 EP_A refers to the natural logarithm of the earnings persistence measure based on model (5) and ARIMA (2,1,0)
 NPSHCCR = correct classification rate for matching firms
 PSHCCR = correct classification rate for profit sharing firms
 OCCR = overall correct classification rate.

¹ The Wald statistic has a chi-square distribution and is used to test whether the coefficient is equal to zero.

Table 14

The Effect of Earnings Persistence [Per EP_c]

**Independent variable: earnings persistence coefficient measured by
Model: IMA (1,1)**

<u>Variables</u>	<u>Coefficient</u>	<u>Wald¹</u>	<u>Significance</u>	
CONSTANT	.351	4.641	.001	-2 log likelihood: 398.7
EP_c	.812	12.971	.000	Chi-square 15.9
				Level of significance .000
				NPSHCCR 57%
				PSHCCR 62%
				OCCR 59%

Legend:

CONSTANT = the model's intercept.
 EP_c refers to the natural logarithm of the earnings persistence measure based on model (5) and IMA (1,1)
 NPSHCCR = correct classification rate for matching firms
 PSHCCR = correct classification rate for profit sharing firms
 OCCR = overall correct classification rate.

¹ The Wald statistic has a chi-square distribution and is used to test whether the coefficient is equal to zero.

4.6.3 Higher Order ARIMA Model and Effect of the Control Variables

In this section, we investigate whether the previous findings about the effect of the control variables hold when a higher order ARIMA model is used to measure earnings persistence. The results, in Table 15, show that earnings persistence, the growth rates in the debt ratio and the accounts receivable turnover are significant¹². These findings support the previous argument that the effect of earnings persistence on the probability of profit sharing adoption remains significant when a higher order ARIMA model is used.

¹² The samples for this test exclude the outliers discussed in footnote 11.

Table 15

Effects of the Earnings Persistence [Per EP_A] and Control Variables
Independent variables: earnings persistence and control variables
Model: IMA (2,1,0) - Forward Method^a

<u>Variables in the model</u>			
	<u>Coefficient</u>	<u>Wald^b</u>	<u>Significance</u>
CONSTANT	.789	8.914	.002
EP_A	.915	13.678	.001
RECTU	.208	4.440	.035
DRAT	-.225	5.897	.015

-2 log likelihood:	361.5
Chi-square	28.5
Level of significance	.000
NPSHCCR	60%
PSHCCR	68%
OCCR	65%

<u>Variables not in the model:</u>		
	<u>Score^c</u>	<u>Significance</u>
AG	.065	.798
CRAT	.156	.692
QRAT	.022	.880
INVTU	.789	.374
M/B	1.236	.266
E/P	.015	.901

Variables (natural logarithm):
 EP_A = earnings persistence measure based on ARIMA (2,1,0)
 AG = growth rate in total assets
 RECTU = growth rate in accounts receivable turnover
 INVTU = growth rate in inventory turnover
 B/M = growth rate in book-to-market ratio
 E/P = growth rate in earnings-to-price ratio
 QRAT = growth rate in quick ratio
 CRAT = growth rate in current ratio
 DRAT = growth rate in debt ratio (total debt to total assets)

NPSHCCR = correct classification rate for matching firm
 PSHCCR = correct classification rate for profit sharing firms
 OCCR = overall correct classification rate

a The Forward method is a stepwise method that selects the variables to be included in the model. Removal testing is based on the probability of the likelihood-ratio statistic based on maximum-likelihood estimates.

b The Wald statistic has a chi-square distribution and is used to test whether the coefficient is equal to zero.

c The Score statistic is an alternative to the Wald statistic for hypothesis testing.

4.6.4 Effect of Sample Selection

Based on the sample selection procedure described in section 3.2.1 and Table 1, 89 firms were excluded because they did not meet the condition of invertibility for the IMA (1,1) model. However, this assumption is not required for ARIMA (2,1,0). Therefore, we test whether inclusion of the 89 firms from the sample has a significant effect on the findings when the model ARIMA (2,1,0) is used to estimate the earnings persistence coefficients.

To investigate this point, EP is computed for the 89 firms and it is compared with EP computed for the main sample. The results are presented in Table 16. The t-test shows that the mean difference of EP between the two samples is not significant, indicating that these two samples are not significantly different from each other. The medians and standard deviations of the two samples do not show significant differences. Therefore, it can be concluded that inclusion of the 89 will not alter the main findings of this study.

Table 16

Comparison of Earnings Persistence Coefficients

<u>EP^a</u>	<u>The Sample of 89 Firms</u>	<u>Main Sample</u>	<u>Difference</u>
Average	9.957	9.647	.310
Median	9.663	9.211	.452
Standard deviation	3.199	3.501	.302

a EP is earnings persistence coefficient using ARIMA (2,1,0)

t-test for difference of means:

Mean difference	.310
t-value	.594
Two-tail significance	.553

Chapter 5

Summary and Discussion

5.1 Chapter Overview

This chapter presents a summary of the issues discussed in this thesis, methods of testing, and results. It is followed by a discussion of the study's contributions to the compensation and accounting literature as well as the usefulness of the results to compensation professionals. Lastly, the study's weaknesses, as well as some avenues for future research in this area, are presented and discussed.

5.2 Summary

Prior studies have generally documented a positive effect of profit sharing adoption on firm performance. Surveys have also shown that the use of profit sharing plans has increased around the world. However, an issue that is not well investigated is why only a fraction of firms adopt profit sharing plans despite the documented advantages. Answers to such a fundamental and challenging question should lead to a better understanding of the factors affecting the success of these plans, and the conditions under which this compensation scheme is preferred. Also, the study's results would be beneficial in aiding management to avoid the adoption of profit sharing plans that may be unsuccessful.

Prior studies argue that firms adopt profit sharing plans for different purposes such as employee motivation, wage flexibility, reduction of monitoring costs, and social perspective. Also, some moderating factors may influence the adoption of profit sharing such as firm size, management style, future prospects, and union status.

Employee motivation studies argue that profit sharing provides financial incentives that may influence employee performance. Thus, firms adopt profit sharing to align the firm's and employees' goals. Such motivation is likely to help build a more cooperative relationship between the firm and its employees which may lead to lower agency costs and higher firm performance. Wage flexibility studies argue that profit sharing provides the opportunity for firms to avoid making fixed compensation payment commitments to employees when the firm's financial situation is weak, which can be contrasted with increases in the base salary that are considered a fixed payment commitment. Profit sharing is therefore preferred by firms that expect to have a higher level of instability in the future. It is also argued that successful firms may use profit sharing for wage flexibility purposes because it provides them an opportunity to share their success with their employees while avoiding the fixed compensation payment commitment.

Reduction in monitoring costs studies argue that firms with a higher level of job complexity and supervision prefer profit sharing to align the employees' interest with that of the firm. Firms with a lower level of supervision and job complexity, on the other

hand, may prefer piece rates and fixed compensation. Therefore, the level of supervision and job complexity is associated with the probability of profit sharing adoption. The fourth objective, that of social perspective, suggests that employees show interest in profit sharing because it offers them a right to earnings similar to that of investors and executives.

Moderating factors such as firm growth, management philosophy, future prospects, and union status are deemed to influence the adoption of profit sharing. There are two different explanations for the effect of firm size on profit sharing adoption. Some researchers argue that small firms may prefer profit sharing because the allocated profit is distributed to fewer employees, thereby ensuring that each employee's share of the profit is higher. Conversely, other researchers argue that since the cost of establishing and administering a profit sharing plan is high, it is more affordable and preferred by large firms.

Management philosophy implies that not all managers view the firm-employee relationship in the same way. While some managers value the inter-relationship between the firm and employees, others stress merely the economic relationship. Another moderating factor, the firm's future prospects, implies that firms with a higher rate of business growth and expansion prefer profit sharing because their prospective plans require higher employee participation and motivation. Therefore, firms with a higher rate

of growth and future prospects are more willing to adopt profit sharing. It is also posited that unions are generally opposed of profit sharing because of their concern that profit sharing encourages employees' higher commitment to the firm rather than to the unions. Therefore, unionism is negatively related to the probability of profit sharing adoption.

The review of the literature on the role of these variables, presented in section 2.5, shows that the empirical results are mixed for most of these factors, and supporting evidence is not consistent. In addition, previous studies have not considered other factors that are associated with profit sharing objectives and that affect profit sharing adoption. For example, prior studies have missed the effect of the demotivational costs of offering an unsuccessful compensation plan. As a result, they do not identify the instances where profit sharing is considered ineffective in motivating employees.

Using a three-partner model of compensation structure, presented in section 2.6, this thesis argues that employees consider profit sharing as a proper means of compensation and motivation if they believe that compensation payments are achievable and that their earnings can reflect their work efforts. This notion is supported by compensation theories, such as agency and expectancy, which imply that compensation schemes are successful in motivating employees if they offer an achievable compensation that reflects employees' efforts. Therefore, profit sharing is successful in motivating employees if payments under profit sharing are relatively predictable and achievable. As

payments under profit sharing are affected by changes in earnings, the nature of earnings changes is important in the analysis of profit sharing usefulness. If earnings are affected by factors whose effects on future earnings changes are less predictable, then payments under profit sharing become less predictable and achievable. Consequently, profit sharing is less likely to be an effective compensation scheme for employee motivation and is thus less likely to be adopted by firms. On the other hand, when earnings changes are caused by factors such as improvement in the firm's operations and market share, future earnings changes become more predictable and payments under profit sharing become more achievable. Consequently, profit sharing is more likely to be successful in motivating employees and it is more likely to be adopted. Therefore, management and employee preference for profit sharing plans is affected by the perception about how current earnings changes will affect future earnings. When permanence of current earnings changes is high, current earnings changes are expected to persist into the future, and future earnings predictability is higher. On the other hand, when permanence of current earnings changes is low, earnings become too volatile and current earnings changes present less information about future changes in earnings. Accordingly, this thesis argues that the level of permanence of current earnings changes can be beneficial in understanding the adoption of profit sharing by firms. It is hypothesized that a positive relationship exists between the level of permanence of current earnings changes and the

probability of profit sharing adoption. This issue was not explored by prior studies that ignored the effect of earnings changes on the preference for profit sharing.

The permanence of current earnings changes is measured by the level of persistence of current earnings innovations which consist of two components: a permanent component and a transitory component. The permanent component is a portion of earnings changes that is expected to persist into the future. On the other hand, the transitory component is temporary in nature and is not informative about future earnings changes. The coefficient of earnings persistence is computed using the time-series IMA (1,1) model. Then, a Logit model is used to investigate the effect of earnings persistence on the probability of profit sharing adoption. In addition, control variables are included into the model. As an additional test, an alternative measure, ARIMA (2,1,0), is used to compute the earnings persistence coefficient, and the tests are then repeated. A final sample of 292 firms is selected, which includes 146 profit sharing and 146 non-profit sharing firms.

The descriptive statistics indicate that the average of earnings persistence coefficient for profit sharing firms is .902 while that of the non-profit sharing sample is .755, indicating that profit sharing firms had a higher level of earnings persistence prior to the adoption date. The Logit analysis indicates that the probability of adoption of profit sharing is positively associated with the level of earnings persistence. Analysis of the

change in the probability of profit sharing adoption indicates that when the level of earnings persistence increases from .25 to .50, the probability of adoption increases by 14.5%. It is followed by another increase of 8.5% when the level of earnings persistence increases from .50 to .75. The probability of adoption reaches 61% when the level of earnings persistence is 1.25.

These results support the hypothesis that the earnings persistence level is a significant determinant of profit sharing adoption. It implies that profit sharing is preferred when earnings changes are affected by factors that improve the quality of future earnings. The research findings are robust when the test incorporates control variables. The results are also robust when an alternative measure of earnings persistence, ARIMA (2,1,0), is used.

The study's findings suggest that firms with a higher level of earnings persistence are more likely to adopt profit sharing plans. In other words, firms with less predictable earnings are more likely to avoid profit sharing plans in order to avoid the demotivational effect of unachievable compensation, as suggested by compensation theories. This supports prior studies in that the probability of profit sharing being successful in motivating employees, and employees' reaction to such a compensation scheme influence management's decision to adopt profit sharing.

5.3 Contribution and Implications

This thesis contributes to the literature in different capacities, as explained below.

5.3.1 Contribution to the Compensation Literature

This thesis contributes to our understanding of why only a fraction of firms adopt profit sharing. It argues that prior studies fail to consider the effect of earnings characteristics on the preference for profit sharing plans. Such a consideration is beneficial to investigate the conditions under which a profit sharing plan is considered successful in motivating employees. Accordingly, this thesis suggests that the permanence of earnings changes is a significant determinant of profit sharing adoption. Furthermore, the three-partner model of compensation presented in this thesis is helpful in examining how the interests of investors, executives, and employees are linked. This model can be distinguished from previous models of profit sharing compensation that tend to ignore the role of employees and their reaction to profit sharing plans. Further, the three-partner model should benefit future studies in the analysis of inter-relationships between investors' interest, executives' concerns, and employees' behavior.

5.3.2 Contribution to the Accounting Literature

Though there is an increasing volume of studies on the use and application of accounting information for earnings-return association analysis, there is a comparatively smaller volume of research on the use of accounting information for the study of executive compensation. There is even less information on the use and application of accounting information for internal compensation analyses, such as employee performance-based incentive plans. The current literature does not indicate how these compensation schemes are adopted, established, and maintained. Payments under such compensation schemes as profit sharing are directly linked to earnings changes. Therefore, the analysis of earnings changes should be beneficial in understanding both the use and the adoption of such compensation schemes. This thesis thus contributes to the accounting literature by demonstrating the usefulness of accounting information for such a purpose.

5.3.3 Implications for Compensation Professionals and Accountants

Empirical evidence shows that practitioners are aware of the importance of the negative effects (such as demotivational costs) of an unsuccessful compensation scheme (Tyson, 1996). However, there is less evidence about how the available information can be used to evaluate the appropriateness of compensation schemes such as profit sharing.

This study provides employee compensation professionals with a practical method of using earnings information for this purpose by analyzing the permanence of current earnings changes and their effects on profit sharing adoption. It explains why and how the permanence of current earnings changes affects the appropriateness of profit sharing. Such an analysis could assist management in deciding on the adoption of profit sharing plans. It could help compensation practitioners avoid adopting potentially unsuccessful compensation schemes.

5.4 Limitations and Avenues for Future Research

The research findings are based on a sample of firms that are listed on the Compustat database. Although Compustat includes almost if not all of the publicly traded companies, it does not include small firms that are not publicly traded. Further, the sample was restricted to have a minimum of 12 consecutive annual measures of income before extraordinary items. Future studies may improve this research by using a larger database that includes small and non-traded firms.

In addition, this study did not incorporate some factors that have been found to be relevant in prior studies, such as managerial style and union membership, due to unavailability of data. Future studies may therefore extend this research by incorporating these variables.

Another potential motive for adoption of profit sharing plan is tax incentives. Employees can defer a part of their income tax when the profit sharing plan is registered with the government as a retirement vehicle (as explained in section 2.6.1.2). However, this study did not control for the possible effect of tax savings on profit sharing plan adoption due to unavailability of information about the marginal tax savings or rates for employees. Future research may extend this study by incorporating the effect of tax savings.

This thesis also can be extended by testing whether the persistence of earnings improves over time for firms that adopted profit sharing plans.

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Appendix A

Practice of Profit Sharing in the United States

In this appendix, general aspects of the practice of profit sharing in the United States are discussed. Part one explains general issues in establishing and administering a profit sharing plan. Part two discusses the regulatory agencies that monitor the practice of profit sharing in the United States.

These policies are discussed in various publications such those issued under the Employee Retirement Income Security Act (ERISA), the Pension and Welfare Benefit Administration (PWBA), and the Internal Revenue Service (IRS). Professional publications (e.g., Tyson 1996) provide practical procedures for the establishment and administration of profit sharing plans. The general principles and procedures related to profit sharing are discussed below.

Administration

When a profit sharing plan is established and communicated to employees, a committee is generally selected to administer the plan. Some firms (especially small firms) may not have a formal profit sharing committee, yet they consult with employees informally. Existence of a profit sharing committee is preferable as it facilitates employee involvement and communication, two activities that are essential in achieving

the goal of profit sharing. The make-up of the committee and the service terms of the members of the committee that administers the plan can be similar to those of the committee that established the plan. The responsibilities of the profit sharing committee include the following (Tyson, 1996):

- Reviewing financial and operating results
- Reviewing and/or suggesting revisions to the profit-sharing plan
- Assessing employee suggestions for improving profitability
- Providing general feedback to management on the operation of the plan
- Approving any proposed communication to employees about the plan
- Reviewing the investment results if the plan has a deferred component
- Approving requests for withdrawals if there is a deferred component.

In addition to the profit sharing committee, a person or unit such as a human resources manager or department is usually responsible for the day-to-day administration of the plan.

Profit Sharing Plan Features

Selection and administration of a profit sharing plan requires different activities and considerations. To illustrate how the selection of profit sharing could be an

important issue for a firm and employees, some features of these plans are discussed below.

Employer's Contribution: The employer's contribution can be based on a pre-defined formula or on a discretionary formula. In the case of a pre-defined formula, the percentage of the employee's share of income is defined in advance and it normally does not vary from year to year. In the case of a discretionary formula, the percentage is unknown in advance and it is determined each year by the company (through the profit sharing committee). In any case, the formula can be set equal to a percentage of profit or a percentage of an amount in excess of a minimum profit. In the case of a discretionary formula, the profit sharing committee may recommend the percentage to management.

Frequency of Payment: The employees' share of the firm's income is paid at regular intervals (e.g., annually, semi-annually, quarterly). If there are multiple payments per year, then the last payment for the year is adjusted when the fiscal year profit is finalized.

Membership in the Plan: Membership in the plan can be based on category of employment, length of service, union status, and other criteria set by the profit sharing committee. This policy is normally set by the company through that committee.

Vesting: When the employee's share of profit is calculated and the money is deposited in a trust account, the employee may not have an automatic right to that money. The employee's ownership of that money depends on the vesting regulation of the plan. Some plans allow immediate vesting. Other plans require the employees to stay with the firm (or plan) for a certain period of time before being entitled to the money. This practice is consistent with the long-term objective of profit sharing plans.

Forfeitures: Forfeitures take place when an employee leaves the plan but his or her funds are not fully vested. In this case, the employee is not entitled to receive his or her share. There are two options for forfeitures. The money remains in the fund or is returned to the company.

Withdrawals: Under a deferred profit sharing plan, employees are allowed to withdraw their funds at any time (after the vesting period). Some plans may restrict withdrawals.

Investment: The trust account can be invested in securities especially when withdrawals are low or restricted. Regulations may limit the type of investments that can be made by the trustee of the fund (e.g. foreign investments can be restricted).

Employee Profit Sharing and Regulatory Agencies

The IRS and ERISA monitor the practice of the employee compensation including profit sharing plans. While the IRS sets the conditions under which a profit sharing plan qualifies for exemption of tax deduction at source, ERISA “sets uniform minimum standards to assure that employee benefit plans are established and maintained in a fair and financially sound manner” (ERISA Newsletter, November 1997). In particular, ERISA (Newsletter, November 1997) requires the persons and entities that manage and control plan funds to:

- manage plans for the exclusive benefit of participants and beneficiaries
- carry out their duties in a prudent manner and refrain from conflict-of-interest transactions expressly prohibited by law
- comply with limitations on certain plan’s investments in employer securities and properties
- fund benefit in accordance with the law and plan rules
- report and disclose information on the operations and financial condition of plans to the government and participants
- provide documents required in the conduct of investigations to assure compliance with the law.

The plan administrators must file an annual report with the Department of Labor each year containing financial and other information concerning the operation of the plan. Plans with 100 or more participants must file Form 5500. Plans with fewer than 100 participants must file Form 5500-C(R). Form 5500-C is filed at least once every three years, and Form 5500-R is an abbreviated report that is filed for each year for which Form 5500-C is not filed. However, a plan may voluntarily file Form 5500-C every year. In addition, ERISA requires plan administrators to provide the plan participants and beneficiaries with a summary of the information in the annual report. A penalty of up to \$1,000 per day may be assessed against plan administrators who fail or refuse to comply with annual reporting requirements. Also, the Act sets penalties ranging from five percent to 100 percent of the amount against parties who engage in prohibited transactions. Some non-profit organizations also provide assistance to employers that have adopted profit sharing or are studying the possibility of plan adoption. The Profit Sharing Council of America is a non-profit association established in 1947 and its primary objectives are to represent companies that practice profit sharing and to develop, collect, and communicate profit sharing information among its members. The Profit Sharing Research Foundation is also a non-profit organization that, since 1951, has supported research and education in profit sharing. The activities of the Council and the

Foundation include a broader support for profit sharing, employee stock ownership, gain sharing, and other participation programs.

Profit Sharing and the US Tax Regulation

The primary tax legislation that affects the tax benefits of deferred profit sharing plans is the Federal Internal Revenue (FIR) Code. However, the relation between employers and employees is governed by labour laws that are regulated by the federal government in the United States. The Employee Retirement Income Security Act of 1974 and the Retirement Equity Act of 1984 also monitor the overhaul of pension and profit sharing plans.

Appendix B

Practice of Profit Sharing Plans in Canada

Although the empirical part of this study is based on U.S. profit sharing and financial data, the findings can be extended to the Canadian environment as the U.S. and Canada share many economic and industrial characteristics. The exercise of profit sharing is similar in both countries in many aspects especially in terms of the objective of profit sharing plans. However, there are some differences in terms of income tax regulations applied to profit sharing plans in both countries. The special features of Canadian profit sharing plans are summarized below.

Types of Profit Sharing Plans in Canada

There are four types of profit sharing plans in Canada: cash plan, deferred profit sharing plan, employee profit sharing plan, and combination plan. The cash plan in Canada is similar to the cash plan in the U.S. However, there are some differences between American deferred profit sharing plans and Canadian deferred profit sharing plans. Deferred profit sharing plans are subject to the Canadian Income Tax Act, Section 147, which restricts the employer's contribution to the profit sharing funds up to a certain maximum. Within this limit, the employer's contribution is a deductible expense, and the employee's share of the firm's profit is not subject to tax deduction at source if the money

is deposited in a trust account registered with Revenue Canada. Section 147 of the Canadian Income Tax Act defined a deferred profit sharing as “an arrangement under which payments computed by reference to an employer’s benefits from the employer’s business”. The Act also restricts the membership in a deferred profit sharing plan. The following persons can not be members of a deferred profit sharing plan in Canada:

1. A person related to the employer
2. A specified shareholder of the employer who owns 10% or more of the company share
3. A person related to a specified shareholder of the employer
4. A person related to a partner of a partnership.

Section 147(2) of the Canadian Income Tax Act explains the conditions under which a profit sharing plan is considered qualified. Some parts of this regulation are discussed below.

Employee Profit Sharing Plan

Employee profit sharing plans are distinguished from deferred profit sharing plan in Canada as, under this plan, the employee’s share of profit is subject to tax deduction at source (Canadian Income Tax Act, Section 144). Therefore, the money is deposited in a

trust account net of tax and employees do not pay tax when they withdraw it as they have paid the tax already. The plan is not subject to registration with the Canadian Customs and Revenue Agency and there are no limitations on the types of fund investments. However, the payment under employee profit sharing is a deductible expense for the employer. This plan can be considered as a complementary plan to the deferred profit sharing plan when the employees' share of the firm's profit exceeds the limit proposed by Section 147 of the Canadian Income Tax Act.

Combination Plan

A combination plan can consist of two or more different types of profit sharing plans. For motivational purposes, a combination plan which includes a cash plan and a deferred plan (for example) can be useful as the cash plan has an instant effect on the employees' motivation and the deferred plan has a long-term effect on their motivation.

Features of Profit Sharing Plans in Canada

Other features of profit sharing plans in Canada are similar to those of the U.S. However, there are some differences in terms of the Income Tax Act regulations for vesting, investment, and withdrawals.

Vesting: Section 147 of the Income Tax Act requires that the employee be vested for at least two years. There are no vesting requirements for employee profit sharing plans as they are subject to tax deduction at source. However, employers may establish a vesting period (internally) for their employee profit sharing plans.

Forfeitures: According to the Income Tax Act, Section 147, any forfeiture must be returned to the company. However, it can be paid back to the fund, but it should be considered in the computation of the maximum contribution for the year when the payment is made back to the fund.

Investment: Investment for a deferred profit sharing plan is restricted by the Income Tax Act, Section 204. The major restrictions are that the deferred profit sharing fund can not be invested in debt instruments such as bonds of the employer or shares of a privately owned corporation. All other investments are acceptable including investments in the employer's share when it is a publicly owned corporation.

Canadian Profit Sharing and Regulatory Agencies

Canadian Labour Law is significantly different from the US Labour Law since the Canadian Labour Act is a provincial act while the US Labour Law is a federal act.

However, some industries such as banking, railroads and telecommunications are federally regulated in Canada, and as in the US, the Income Tax Act is a federal responsibility. Therefore, Canadian tax regulations for profit sharing plans apply to all provinces.

Ceasing operations several years ago, the Profit Sharing Council of Canada was a non-profit organization that had similar objectives to the Profit Sharing Council of America.

Appendix C

The Nature of ARIMA Models

The objective of ARIMA models is to find a good model that describes how the observations in a single time series are related to each other. The advantages of ARIMA models over other conventional models are described below (Pankratz, 1983):

1. ARIMA models are a family of models, not only a single model, and normally an appropriate model is selected from this family of models.
2. ARIMA models are based on a solid foundation of classical probability theory and mathematical statistics. Other univariate models are based on “ad hoc” or “intuitive” approaches.
3. ARIMA models produce optimum univariate forecasts, implying that no other single univariate model can provide a better forecast with a smaller mean-squared forecast error.

The common ARIMA model

There are two common ARIMA processes that are discussed in this section. The first process shows that a time series variable (y_t) is related to its own past values:

$$y_t = c + \Phi_1 y_{t-1} + e_t \quad (1)$$

where y is the time series variable, c is a constant term, Φ_1 is a fixed coefficient determining the relationship between y_t and y_{t-1} , and e_t is the random shock element.

The parameters c and Φ_1 together indicate the predictable part of y_t . This process is called the autoregressive process (AR) and the number of successive observations of the lagged variable y represents the order of the model. This is shown as AR (p), where p indicates the order. The general form of an autoregressive process is:

$$y_t = c + \Phi_p y_{t-p} + e_t$$

The second process indicates that the time series variable y_t is related to its own past shocks as follows:

$$y_t = c - \theta_1 e_{t-1} + e_t \quad (2)$$

where θ_1 is a fixed coefficient determining the relationship between y_t and the shocks to past y_t shown as e_{t-1} , and y , c , and e_t are as defined above.

This second process is called the moving average process (MA) and the number of lagged variables represents the order of the model. The process is shown as MA (q), where q indicates the order of the model. A general form of a moving average process is as follows:

$$y_t = c - \theta_q e_{t-q} + e_t \quad (3)$$

Equations (1) and (2) are essentially the same, however their estimation processes are different (Enders, 1995 and Parkratz, 1983). The combination of equations (1) and (2) provides an ARMA (1,1) model as follows:

$$y_t = c + \Phi_1 y_{t-1} - \theta_1 e_{t-1} + e_t \quad (4)$$

The lagged variables reflect the order of the model. For example, model ARMA (2,1,0) below uses two lagged observations of y (y_{t-1} and y_{t-2}) and one lagged observation of e (e_{t-1}).

$$y_t = c + \Phi_1 y_{t-1} + \Phi_2 y_{t-2} - \theta_1 e_{t-1} + e_t \quad (5)$$

The general form of the ARMA (p,q) model is therefore :

$$y_t = c + \Phi_1 y_{t-1} + \Phi_2 y_{t-2} \dots + \Phi_n y_{t-n} - \theta_1 e_{t-1} - \theta_2 e_{t-2} \dots - \theta_q e_{t-q} + e_t \quad (6)$$

ARIMA models assume stationarity of the time series data. If the data is not stationary, then the problem can be solved by differencing as explained in the next section. As a result, one more term, d , is added to the model to show the order of differencing. In this case, the model is called Autoregressive Integrated Moving Average, ARIMA (p,d,q) where d represents the order of differencing, and p and q are the orders of the autoregressive and moving average variables, respectively.

Assumptions

The first assumption of ARIMA models is that the time series data must be stationary. In general, a stationary time-series has a mean, a variance and an autocorrelation

function. If the series is stationary, the mean of any subset of the series is approximately the same as the overall mean. However, if the series is not stationary, the means of different subsets could be different from the overall mean and this makes the behaviour of the series unpredictable.

As the behaviour of only a stationary time series is predictable, it is therefore essential to check whether the time series meets this condition before performing any analysis. However, most of the non-stationarity problems can be solved using the differencing technique by calculating successive c