MARCEL VAN RINSUM

# Performance Measurement and Managerial Time Orientation

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PROEFSCHRIFT

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# CHAPTER 1
# INTRODUCTION

## 1.1 Introduction

This dissertation analyzes the effects of properties of the performance measurement system and individual level variables on managerial time orientation, both theoretically and empirically.

Managerial time orientation (MTO) is defined in this dissertation as *the time-span within which managers seek to optimize the returns from their investments.* Managers with a long MTO are more focused on long-term results, while short-term oriented managers are more inclined to maximize short-term results.

The concept MTO has been defined in different terms in different streams of literature with no explicit generally accepted definition (National Academy of Engineering 1992; Bushman et al. 1996). Nevertheless, many studies consider a related concept which addresses a dysfunctional managerial short-term orientation, which is labeled myopia (short-sightedness) in the accounting literature (e.g., Merchant 1989; Merchant 1990; Chow et al. 1996; Bhojraj and Libby 2005):

> *"Myopia exists when managers' orientations to the short-term become excessive, when the managers are more concerned with short-term profits than entity value."* (Merchant 1998, p.460)

Other studies that have also investigated managerial short-term orientation refer to short-termism, or the unwillingness or impossibility of sacrificing short-run profit for long-term investments (e.g., Coates et al. 1995; Laverty 1996; Palley 1997; Demirag 1998b; Grinyer et al. 1998). Despite persisting attention to managerial short-term orientation, there is no consistent neutral definition of MTO, without an a-priori assumption about the possible dysfunctionality of a short-term managerial orientation, in the previous

literature. This study addresses the whole spectrum of MTO, from short to long, in accordance with the definition provided at the start of this paragraph.

Studying MTO and its determinants is of significant practical and theoretical relevance. The adoption by managers of a time orientation suitable for the circumstances, is considered crucial for the competitive position and long-term survival of firms (National Academy of Engineering 1992). Nevertheless, theoretical and empirical evidence on the effects of the performance measurement system (PMS) and of individual level variables on MTO is limited and relatively underdeveloped compared to research examining the effects of other (external) factors on MTO, such as pressure from the stock market (Laverty 1996, p.837). The scarcely available studies focus mainly on the effects of the use of accounting measures on myopia (e.g., Merchant 1990; Bhojraj and Libby 2005). Given the potential important influences of the PMS on MTO, more extensive study of this topic is valuable (National Academy of Engineering 1992). This dissertation provides such a study.

## 1.2 Research question

Most of the attention to myopia in the accounting literature has been devoted to the effects of the use of only one particular type of performance measure: accounting performance measures. Many researchers have voiced claims about the negative effects of these measures on long-term investments (e.g., Fisher 1992; McKenzie and Shilling 1998; Hope and Fraser 2003), and supporting empirical evidence exists (e.g., Merchant 1990; Van der Stede 2000; Moers 2001). Recently, the attention of both academics and practitioners in accounting has also been directed at the use of non-financial performance measures as a means of providing a more balanced set of incentives and preventing managers from making short-term decisions (Balanced Scorecard, Kaplan and Norton 1996), with only scarce empirical evidence available thus far (Moers 2001). But although non-financial measures can prevent myopia and gaming by measuring underlying dimensions of economic performance such as quality and customer satisfaction, whether and how non-financial measures work beyond the prevention of dysfunctional self-interested behavior to cognitively affect management and actually lengthen MTO, is unclear. Moreover, by using distinctions for performance measures in broad categories, such as financial versus non-financial, without specifying the process through which this categorization influences managerial behavior, the accounting literature to date suffers from a lack of theory about which characteristics or dimensions of performance measures affect MTO and how (cf. Ittner and Larcker 1998; Ittner and Larcker 2002, p. s60). The generalization of effects on MTO of broadly specified categories of performance measures and the accompanying lack of clear theoretical arguments illustrate a first major

shortcoming in the current literature, and this constitutes the first main issue which this dissertation addresses.

The second main issue addressed in this dissertation concerns the effect of variables at the individual level on MTO. First, the psychological literature has shown that individuals differ with respect to the consideration given to the future consequences of current actions (Strathman et al. 1994b). The question rises whether personal characteristics such as this affect MTO, and whether the use of performance measures could differentially affect MTO dependent on managerial personality characteristics. Second, the economic literature describes effects on MTO of the length of the employment horizon (length of employment contract), which is a personal situational variable. Taking into account the effects of individual characteristics and situational factors on MTO could provide valuable information on the relative effectiveness of personnel versus result controls (Merchant and Van der Stede 2003), with possible implications for the employee selection process and the design of the performance measurement system.

This dissertation aims at filling significant gaps in the literature, as identified above, by building on the existing accounting literature, using both psychological and economic literatures, to examine the following research question as mentioned at the beginning of §1.1:
*What are the effects of properties of the managerial performance measurement system and individual level variables on managerial time orientation*?

## 1.3 Position in the literature

The research question this dissertation investigates lies at the heart of the function of management control systems. These systems are described by Lowe (1971, p.5) as:

> *"a system of organisational information seeking and gathering, accountability and feedback designed to ensure that the enterprise adapts to changes in its substantive environment and that the work behavior of its employees is measured by reference to a set of operational sub-goals (which conform with the overall objectives) so that the discrepancy between the two can be reconciled and corrected for."*

One of the main functions of the management control system is motivating managers to act in the organization's interest (Merchant and Van der Stede 2003). When used for managerial performance evaluation, the PMS can be used as an instrument to provide motivation, for instance by setting difficult, specific, proximal goals (Bandura 1986; Locke and Latham 1990). However, the inherently specific and proximal nature of

performance measures used for evaluation can cause the maximization of the measured dimensions only, as well as invoke an undesirable MTO, leading to sub optimal organizational performance (e.g., Kerr 1975; Merchant 1990). This illustrates the importance of the correct direction of managerial effort, which includes an appropriate MTO.

Correspondingly, the length of the time orientation exhibited by management should be appropriate for the circumstances under which the company operates to ensure high levels of organizational performance (National Academy of Engineering 1992). While a relatively long-term perspective may be optimal for most companies, there is evidence that companies have a spectrum of time horizons which ranges from quite long to short; some well-managed companies may want to adopt a short-term horizon. In terms of the contingency approach (Donaldson 2001; Chenhall 2003; Gerdin and Greve 2004), organizations that have achieved a fit between contingency factors and MTO will outperform those companies that have failed to achieve that fit and are in misfit. Many contingency factors have been mentioned in previous studies, such as strategy, which is used here for illustrative purposes. A strategic focus on short-term profit, which is likely the case when a harvest or divest strategy is employed (Govindarajan and Gupta 1985), would require a short-term orientation (Merchant and Manzoni 1989). A build strategy, aimed at improving market share in the long-run, can be expected to lead to optimal organizational performance only when coupled with a managerial long-term orientation. It is important to note that, although strategy influences the MTO *required* to achieve optimal organizational results, there is no theory that predicts a direct effect of strategy on MTO (Van der Stede 2000; Chenhall and Moers 2006). Instead, strategy affects the design of the management control system (e.g., Abernethy and Brownell 1999; Bouwens and Abernethy 2000), which is a choice variable and can in turn be used as an instrument to influence MTO (Chenhall and Moers 2006). The same reasoning applies to other contingency factors: they affect the fit with MTO, but have no direct effect – see the lower three ovals in figure 1-1. Other factors besides strategy that can affect the *required* or desired MTO are [1] industry or product and business activity (National Academy of Engineering 1992); [2] situations with an immediate desire for profit to signal stability to external stakeholders (Merchant and Manzoni 1989), for instance in case of liquidity considerations or avoidance of bankruptcy (Said et al. 2003); [3] firm growth opportunities (Bushman et al. 1996); [4] the costs associated with eliminating a dysfunctional (short) time orientation (Thevaranjan et al. 2000).

In order to achieve the necessary focus, this study seeks to explain only the effects of several choice variables (properties) that are part of the design of the PMS and of individual level variables on MTO (indicated by the three gray ovals in figure 1-1). It refrains from predicting the effectiveness of the management control system design or the

MTO achieved, but only analyzes the effects of PMS properties, as well as individual level variables, on MTO. In doing so, it contributes to the research stream on MTO in managerial accounting (Merchant 1990; Chow et al. 1996; Van der Stede 2000) in map B as identified by Luft and Shields (2003). In contrast, much of the available evidence stems from studies that investigate the effects of contingency factors on the design of the PMS, *assuming* that this affects MTO. Although evidence from these studies will be used to derive the theoretical predictions, the goal of this dissertation is to provide empirical evidence on the direct relations between PMS properties and individual level variables, and MTO.

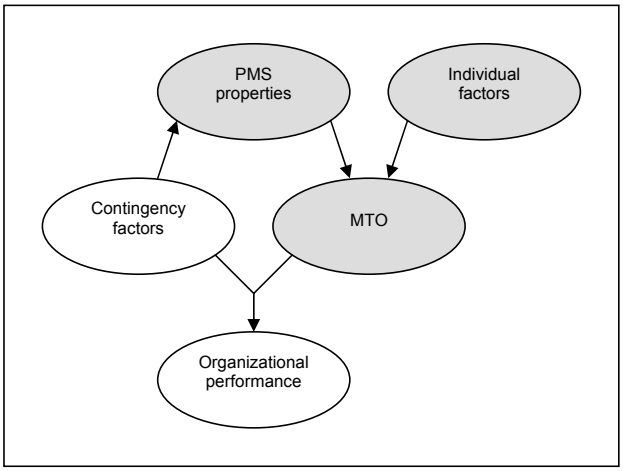



**Figure 1-1**: Research framework - the gray ovals indicate the focus of this dissertation.

## 1.4 Dissertation overview

This paragraph provides an outline for the remainder of this dissertation, as well as a list of contributions to the literature.

The next chapter provides a review of the literature regarding MTO, which is aimed at providing an overview of available theory and empirical evidence in the accounting literature, as well as in the fields of economics and psychology that it draws upon. In service of the research question, its particular purpose is to distill properties of the PMS and individual level variables affecting MTO from the literature.

The third chapter develops hypotheses, based on combinations of existing and development of new theoretical arguments, about how properties of the managerial PMS and individual level variables influence MTO, without an a-priori assumption about the (dys)functionality of a managerial short-term orientation. This as opposed to the literature

on MTO to date, that has primarily focused on managerial short-term orientation (Merchant 1990; Van der Stede 2000). Second, in building these theoretical arguments, it attempts to integrate behavioral and economic literatures, thus using an interdisciplinary approach which will provide a more complete picture of a complex practical problem (cf. Merchant et al. 2003).

The fourth chapter describes the survey study that was conducted among a representative sample of Dutch financial managers to test the derived hypotheses. This chapter provides direct empirical evidence on how PMS properties and individual level variables influence MTO, thus providing a generalizable initial test of the theoretical model developed in chapter three.

The fifth chapter gives a description of the experimental investigation, using student subjects, into three selected hypotheses from the theoretical model. Further investigation of these three hypotheses, concerning the effects of the evaluation period and the use of leading performance measures on MTO, was warranted based on the survey results. In addition, added value of the experiment lies in [1] isolating the effects of separate properties of the PMS on MTO that are confounded with other variables in the cross-sectional survey study; [2] demonstrating causality (Shadish et al. 2002); [3] enhancing reliability by employing a multi-method empirical test (McGrath et al. 1982; Birnberg et al. 1990) - by triangulating the findings of both methods, both external validity (by using a survey) and internal validity (by conducting the experiment) are optimized (McGrath et al. 1982); and [4] providing evidence on an underlying process of organizational performance, thus contributing to the scarce experimental literature considering dependent variables other than performance (Sprinkle 2003).

Finally, the sixth and last chapter provides a summary and conclusion.

# CHAPTER 2
# LITERATURE REVIEW

## 2.1 Introduction

This chapter provides a literature review on research regarding (managerial) time orientation. Its structure and content are guided by the following considerations.

First, the main goal of this chapter is to identify properties of the PMS and individual level variables affecting MTO, in accordance with the research question. As pointed out by Laverty (1996) in an overview of MTO research, influences on MTO originate from within the economy at large, from within the organization and from individual level variables, and these should ideally be considered simultaneously. However, the scope of this chapter is limited by the research question, which nevertheless addresses a complex practical issue that requires an interdisciplinary approach (Merchant et al. 2003). Studies regarding effects of the PMS and individual level variables on time orientation can be found in the accounting, economic and psychological literatures, and these are subsequently reviewed in this chapter. This structure enables an overview of factors that have been considered in different streams of literature, which is helpful for identifying opportunities for cross-fertilization and clarifying theoretical arguments.

Second, this dissertation aims to contribute to the existing management accounting studies on MTO in map B (Merchant 1990; Chow et al. 1996; Van der Stede 2000) as identified by Luft and Shields (2003). The level of analysis of these studies and of this dissertation is the sub-unit level. This implies that the focal point of attention is formed by properties of the PMS that play a role at middle-management levels, and not by (external) variables that affect the MTO of CEOs, such as stock market influences.

Third, the focus on PMS properties entails a choice in directing primary attention to performance measures and the way they are used for evaluation purposes[1]. Given the focus of the research question, this dissertation does not explicitly consider the type of incentives attached to performance measures[2]. It also does not analyze the specific form of the compensation formula (target setting).

The outline of this chapter is as follows. First, it describes the accounting, economic and psychological literatures that discuss properties of the PMS and individual level variables affecting time orientation in paragraphs two, three and four, respectively. This classification should not be seen as a strict separation between these streams of literature, which is both difficult and undesirable due to some degree of overlap. Rather, the purpose of these paragraphs is to provide a (not necessarily exhaustive) broad representative summary overview of the literature. Paragraph five concludes the chapter by pointing out avenues for further research.

## 2.2 Accounting literature

This paragraph discusses accounting studies regarding the effects of the PMS on MTO. The primary criterion for assigning a study to the accounting literature are its contents. Studies considering the effects of properties of the PMS and/or evaluations based on the PMS are classified as accounting studies, because they address issues of performance measurement which are at the core of accounting. This also applies to such studies that are based on economic theory.

In the accounting literature, several different sources of influences on MTO from the PMS are discussed. Subparagraph 2.2.1 describes a subgroup of studies that investigate the effects of different types of performance measures on MTO. The next two subparagraphs focus on the way the PMS is used in evaluations. Subparagraph 2.2.2

[1] This dissertation addresses the effects of the use of the PMS for decision control.

[2] It should be recognized that the effects of performance measures on MTO are influenced by incentive type (Coates et al. 1995; Guidry et al. 1999, p.140). For instance, it has been argued that a longer MTO is likely when career concerns are relatively more important (Coates et al. 1995; Day et al. 2002). Basing bonuses on managerial accomplishments from multiple periods – called "bonus banking" – alledgedly lengthens MTO (National Academy of Engineering 1992; Stern et al. 1995, p.43-44). More heavy weighting of rewards in later periods has also been claimed and shown to increase the length of MTO (Merchant 1989, p.75; Schotter and Weigelt 1992; Palley 1997, p.556), which is consistent with tournament theory (Lazear and Rosen 1981; Rosen 1986; Lambert et al. 1993). Finally, stock-based rewards are generally seen as inducive of a managerial long-term orientation (Palley 1997; Nagy et al. 1999). Consistently, these rewards have generally been shown to be more prevalent in firms with higher growth rates, longer product development and product life cycles, and higher R&D expenditures, all of which are contingency factors which require a long MTO (Lambert and Larcker 1987; Lewellen et al. 1987; Clinch 1991; Bizjak et al. 1993; Gaver and Gaver 1993; Pavlik et al. 1993; Bushman et al. 1996).

considers studies that analyze the degree of subjectivity. The length of the evaluation period is the subject of a group of studies listed in subparagraph 2.2.3.

### *2.2.1 Performance measure type*

For the most part, the literature has divided performance measures into two broad categories: financial and non-financial. The first category is often equated with accounting (transaction based measures, such as profit) or lagging measures, while the latter term is often used interchangeably with the term leading performance measures. This interchangeable use is not always appropriate. Table 2-1 contains definitions for each type of measure[3].

**Table 2-1:** Definitions of performance measure categories

| Type of measure | Definition |
|---|---|
| Financial | Measure expressed in monetary terms |
| Non-financial | Measure not expressed in monetary terms |
| Accounting | Transaction-based financial measure (profit-based) |
| Leading | Measure at the beginning or middle of the causal chain of the business process (indicator of actions or processes) |
| Lagging | Measure at the end of the causal chain of the business process (indicator of outcomes / end-results) |

The leading/lagging classification requires further clarification. Leading performance measures are performance measures that are causally linked to eventual end-results in terms of accounting performance. Figure 2-1 provides an illustration of the concept of leading performance measures. A change in a leading indicator affects accounting results with a time lag. The length of this time lag determines the degree to which the performance measure is leading (degree of lead). In the figure, customer satisfaction is a performance measure with a higher degree of lead than customer retention, because it has a longer time lag until accounting performance is affected. Although figure 2-1 shows only non-financial leading performance measures, leading indicators can be stated either in non-financial or financial terms (for example, quality costs).

[3] In order to achieve focus, the following categories of performance measures are not explicitly considered: group measures and measures at a higher organizational level, "new" value-based measures (e.g., Stern et al. 1995), market measures.

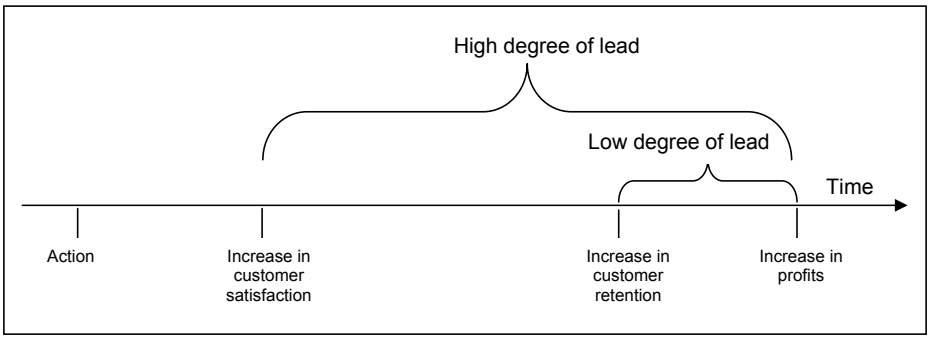



**Figure 2-1:** Business process causal chain, with performance measures that exhibit different degrees of lead.

These performance measure classifications are relevant when studying effects of the PMS on MTO, and the following effects have been identified in the literature.

Financial measures, and especially accounting measures, are generally seen as inducing short-term behavior. These measures are used to provide managers with incentives to strive for the overall organizational goal, but this implies that they are aggregated and summarized, and provide little indication of actions taken (Fisher 1992; Singleton-Green 1993). Managers can use the possibility for manipulation provided by the latitude in accounting principles to maximize compensation (Nagy et al. 1999; Libby et al. 2002). Subsequently, any myopic actions taken to enhance current accounting performance are not easily detected. At the same time, the cautious nature of accounting rules which do not recognize uncertain gains and, in the U.S., require R&D investments to be fully expensed immediately, is also argued to cause myopia (see Merchant 1989; Bushee 1998, p. 306).

Non-financial leading performance measures, if chosen and monitored correctly and not prone to manipulation (Baker 2002; Smith 2002), have been claimed to promote long-term behavior because they provide indications of the causal factors of business success (Fisher 1992; Singleton-Green 1993). Given the relative benefits of financial and non-financial measures, Kaplan and Norton call for a balanced use of both types of measures in a Balanced Scorecard (Kaplan and Norton 1996).

The next two sections describe analytical and empirical evidence on the effects of the different types of performance measures listed above on MTO, respectively. In the study citings, the original terminology regarding the type of performance measure is used in order to illustrate its use in the literature. The appropriateness of the interchangeable use of performance measure classifications is further explored at the end of this subparagraph.

*Analytical evidence*

A first subgroup of studies provide analytical evidence on the effects of different types of performance measures on MTO. The theoretical models developed in these studies are based on agency theory (Jensen and Meckling 1976). In short, this theory posits that managers (the agents) are self-interested and effort- and risk-averse, which makes their goals incongruent with the goals of the company or shareholders (the principal). Combined with the assumed presence of information-asymmetry between principal and agent, this results in an incentive problem. Different types of performance measures are predicted to be used in evaluations to affect managerial effort and MTO.

Narayanan (1985) developed a model which provides evidence on the effects of accounting measures. It shows that managers may be inclined to undertake short-term projects, when increasing earnings enhances their reputation and positively affects their value on the labor market.

Dikolli (2001) shows that the optimal incentive weights on different types of measures depend on the agent's employment horizon; the shorter the horizon, the greater the weight on the forward-looking performance measure. Forward-looking measures are shown to prevent an agent from being too focused on short-term performance, and leaving the firm before the long-term adverse effects of that myopia become apparent.

Sliwka (2002) provides an agency model demonstrating that if managers are mostly interested in current results, either inherently or to signal their value to other potential employers before quitting, it may not be possible to use an incentive plan based only on financial measures to provide incentives for increasing long-term performance. This observation is consistent with Narayanan (1985). The inclusion of non-financial measures in the compensation contract, however, can solve this problem by providing long-term incentives (Sliwka 2002).

Dutta and Reichelstein (2003) developed a model which shows that the need for leading performance indicators depends on both the agent’s and the principal’s planning horizon and their ability to make long-term contractual commitments. The model demonstrates that especially in case of short-term contracts, leading performance measures are essential to induce managers to make investments, because the manager could otherwise be deprived of the benefits in the future (Dutta and Reichelstein 2003).

In sum, analytical evidence demonstrates that non-financial leading performance measures can be used to induce a positive effect on MTO, while accounting measures can shorten MTO, especially though not exclusively in case of a short employment horizon.

*Empirical evidence*

Several distinct categories of studies provide empirical evidence on the effects on MTO of different types of performance measures. First, attention is focused on studies that are indirectly related to this relationship.

A first strand of research studies addresses the predictive ability of the different types of measures for future financial results. Many studies have investigated the time lag between current non-financial or financial performance and future financial performance – see Shields and Shields (2005) for an overview. For MTO, not this time lag itself but its effects on individual decision-making are of importance. Luft and Shields (2002) provide evidence on this issue by conducting an experimental study into the judgment performance of individuals predicting future financial performance. They provide subjects with financial and/or non-financial information, and find that judgment performance is better when financial measures are replaced with or supplemented by non-financial measures. This evidence is consistent with the inclination of individuals to look for causes in the near past and the capability of non-financial measures to reduce myopia by providing a temporal bridge and to create a focus on the future, as opposed to the historical focus of financial measures (Luft and Shields 2002, p.31).

A second subgroup of studies investigates the effects of contingency variables that affect the *required* MTO on the choice of performance measures. Figure 2-2 reproduces part of figure 1-1, that has been adapted to serve as a framework for the evidence that is considered here.

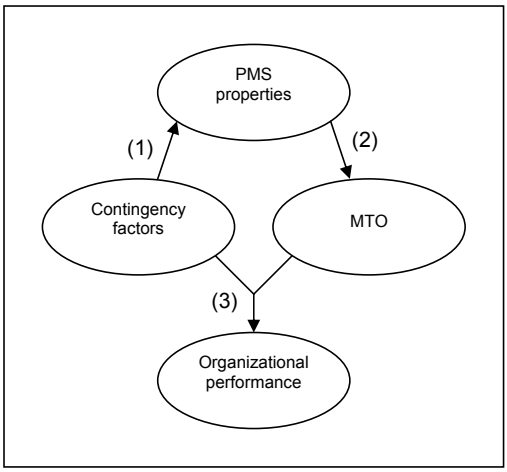



**Figure 2-2**: Conceptual framework for the effects of PMS properties on MTO.

The following studies do not directly address the effects of type of performance measure on MTO (link 2 in figure 2-2), but (implicitly) assume these effects. Empirically, they demonstrate only effects of contingency factors on the measures included in the PMS

(link 1) and sometimes on performance (part of link 3), although the expectations are based on a line of reasoning that assumes an effect on MTO.

Lambert and Larcker (1987) use both survey and archival data to examine the relative weight on accounting and market measures in CEO remuneration contracts. They find that high growth firms put relatively less weight on accounting measures, consistent with the conclusion that accounting measures are less useful when the consequences of current actions occur further in the future.

Said et al. (2003) argue that the use of non-financial measures in a Balanced Scorecard leads to a long-term perspective. Consequently, longer product life or development cycles are expected to make non-financial measures more informative and financial measures less informative. Additionally, distressed firms are expected to rely more on short-term financial measures to avoid bankruptcy. Furthermore, organizations are likely to make more or less use of short-term financial or forward-looking measures dependent on whether their strategy is that of a prospector or defender (see Miles and Snow 1978), respectively. A fit between the use of non-financial measures and the factors strategy, length of the product life cycle and financial distress is found to affect firm performance positively (Said et al. 2003).

Ittner et al. (1997) also argue that CEO compensation contracts will make relatively more use of non-financial indicators in case of a long-term innovative strategy (prospector), and relatively more use of financial indicators in case of financial distress. Their data confirms the hypothesis with regard to strategy, though not regarding financial distress.

HassabElnaby et al. (2005) study the decision by firms to retain or discard the use of non-financial performance measures using longitudinal archival data. They find that firms with an innovation-oriented strategy or a longer product life cycle are more likely to retain non-financial measures in their compensation contracts, while firms that are in financial distress tend to abandon the use of non-financial measures. Moreover, firms with a fit between these circumstantial variables and the use of non-financial measures exhibit higher levels of performance.

In sum, the representative studies listed above indicate that accounting measures are less useful and non-financial measures more useful when decisions affect results further in the future (Lambert and Larcker 1987; Luft and Shields 2002). Additionally, contingency factors such as the length of the product life and development cycle, financial distress, and whether the organization pursues an innovator or prospector strategy have been shown to influence the relative use of financial and non-financial performance measures consistent with the MTO that is theoretically required for optimal results (Ittner et al. 1997; AAA Financial Accounting Standards Committee 2002; Said et al. 2003; HassabElnaby et al. 2005). Theoretically, MTO should have been affected by the differential use of performance measures to achieve a fit with these variables resulting

in optimal performance (see figure 2-2), but an effect on MTO is only assumed and not empirically verified in these studies. Nevertheless, consistent with analytical evidence, these studies suggest that financial measures influence MTO negatively, while non-financial measures exert a positive effect on MTO length.

Empirical evidence on the direct link between type of measure and managerial time orientation, which is of primary interest here, can be found in the following studies.

Merchant (1989) conducted an empirical study among managers from twelve companies. He presents both questionnaire data obtained from corporate financial officers and interview data from profit center managers. He concludes from his observations that the failure to timely recognize good long-term decisions is the severest problem with accounting earnings measures. He judges that investment myopia, or inefficient amounts of long-term investments, occurs because gains are not recognized when they are uncertain (accounting conservatism). Based on the responses by managers, his view is that leading indicators (such as customer satisfaction measures) direct attention to the long-term (Merchant 1989, p.67).

In a later study, Merchant (1990) uses both interview and questionnaire data obtained from profit center managers to empirically test the effects of financial measures on managerial behavior. He finds that financial short term targets lead to a short-term managerial orientation and to manipulation of reported profit figures.

The results of Hoskisson et al. (1993), who study the effects of incentives based on short-term (annual) financial performance of the division by means of a questionnaire among CEOs, indicate that incentives based on these measures are negatively related to firm-level R&D. This is consistent with the proposition that these measures cause a short-term orientation and Merchant's (1990) results.

Van der Stede (2000) documented more empirical evidence on the effects of financial measures, based on a questionnaire of business-unit general managers. He finds a negative relation between budgetary slack and short-term orientation, consistent with the notion that accounting performance measures, when emphasized and difficult to achieve, cause a short-term orientation.

Chow et al. (1996) study the differences between Japan and the U.S. in dysfunctional effects due to control system tightness. Their results indicate that, given a level of control tightness, US managers engaged in dysfunctional behavior to a greater extent than their Japanese counterparts. The former manipulated performance measures more frequently and were more short-term oriented, as they felt discouraged by the control system to develop ideas about new long-term investments (Chow et al. 1996).

The study by Moers (2001) is the first to provide empirical evidence on the effects of non-financial measures on MTO. He hypothesized that evaluations based on financial measures shorten MTO while evaluations based on non-financial measures affect the

length of MTO positively, but these hypotheses were not supported by his questionnaire data. However, his data confirmed that when targets were used based on these measures, financial performance measures had a negative while non-financial measures had a positive effect on MTO length as expected. This suggests a certain level of tightness of controls based on performance measures is necessary to induce effects of those measures on MTO.

Farell et al. (2005) conduct an experiment to study the effects of contracting on a leading indicator on the type of effort exerted. They find that the use of leading indicators mitigates the self-interested behavior by subjects and reduces short-term orientations in case of a short employment contract. In case of a long employment contract, leading indicators increase effort directed at the long-term, though for a different reason: they help subjects to identify the optimal long-term task strategy.

Again, consistent with both analytical models and evidence regarding contingency factors, the empirical evidence listed above generally supports the propositions that the use of financial measures has a negative effect on MTO, while using non-financial measures positively affects MTO.

*Conclusion*

Overall, both analytical and empirical evidence is consistent with claims voiced by academics and practitioners that the use of financial measures leads to short-term behavior (e.g., Merchant 1990; Hoskisson et al. 1993), at least in Western cultures (Chow et al. 1996), while the use of non-financial measures prevents a managerial short-term orientation (Moers 2001; Farrell et al. 2005). It is important to note, however, that these effects can be dependent on the managerial employment horizon (Dikolli 2001; Dutta and Reichelstein 2003; Sliwka 2002) and on the extent to which the performance measure is manipulable (Eccles and Mavrinac 1995; Baker 2002; Smith 2002).

Theoretical arguments refer to the level of aggregation (Fisher 1992; Singleton-Green 1993) and the conservatism in *accounting*, not just financial, measures as a cause for myopia (Merchant 1989; Bushee 1998; Nagy et al. 1999; Libby et al. 2002), Nevertheless, financial measures have often been equated with accounting measures in empirical research (e.g., Merchant 1990; Hoskisson et al. 1993). With regard to non-financial measures, theoretical arguments indicate the importance of the extent to which performance measures are leading indicators of future (accounting) performance (Kaplan and Norton 1996). But leading indicators have often been equated with non-financial measures in empirical testing and occasionally also in theoretical arguments, while [1] financial indicators can also be leading indicators of long term results (for example, quality costs); and [2] not all non-financial indicators lead to the same extent because they do not occupy the same position in the causal chain of the business process (see figure 2-1). A more stringent use of terminology is called for. Moreover, the use of broad

categories has oversimplified studies on the determinants and effects of performance measures (Ittner and Larcker 1998; Said et al. 2003; Malina and Selto 2004). The literature on MTO seems to have under emphasized the process through which different types of performance measures affect MTO. To study this in more detail, a taxonomy of performance measures (cf. Pavlik et al. 1993, p.179) and an evaluation of the underlying characteristics of performance measures (cf. Ittner and Larcker 1998) is required.

### *2.2.2 Performance measure use: subjectivity*

While the previous set of studies considered different types of performance measures, this paragraph and the next deal with the way in which performance measures are used in evaluations. *Subjectivity* refers to a judgment by the supervisor of the subordinates performance, including a judgment of the actions taken to achieve that performance. Subjective evaluations can take different forms, such as [1] flexible weighting of objective performance measures ex-post (at the end of the evaluation period); [2] the use of subjective (qualitative) measures; [3] discretion in using additional performance criteria (Ittner et al. 2003; Moers 2005). In contrast, in completely objective evaluations the weights attached to quantitative performance measures are specified precisely ex-ante. Although analytical models have been developed which show that the use of subjective evaluations in addition to objective criteria can improve incentive contracts (Baker et al. 1994; Baiman and Rajan 1995), strong theory on the effect of subjectivity on MTO is lacking. Nevertheless, it is often argued that subjectivity allows the supervisor to correct for dysfunctional behavior, such as myopia, induced by incomplete performance measures (e.g., Gibbons 1998; Ittner and Larcker 1998, p.227; Baker 2002, p.750). In the next section the extent of the empirical evidence regarding the effect of subjectivity in performance evaluations on MTO is examined.

Anecdotal evidence on the effect of subjectivity is provided by Merchant (1989). In one of his interviews, a CEO indicated that he did not want the terms in the performance evaluation contract to be defined very specifically up-front. The reason was that he was worried that if managers figured out the rules of objective bonus formulas, they would find out how to play games to increase short-term performance only (Merchant 1989, p.135).

Stronger empirical evidence that indirectly supports a relation between subjectivity and MTO can be found in the following studies. These studies consider the effects of contingency variables that theoretically affect the *required* MTO – see figure 2-2 and the text elaborating on the figure in the previous paragraph.

First, Bushman et al. (1996) use a proprietary compensation database to study the role of individual performance evaluation in CEO-compensation. Individual performance

evaluation refers to evaluations that are not based on corporate measures of performance (either accounting or stock based), but are more individually geared, which is similar in meaning to the term subjective evaluation. A third of all firms are found to use individual performance evaluation. Bushman et al. (1996) further find that both this form of subjective performance evaluation as well as the use of long-term option grants are positively related to firm growth opportunities and to longer product development and life cycles, circumstances in which objective corporate measures of performance are less likely to capture value-enhancing actions fully. Because these are circumstances which require a longer MTO, this evidence is consistent with a positive effect of subjectivity on MTO.

Subjective evaluations are also predicted by Murphy and Oyer (2003) to be used to a greater extent in case of, among other factors, higher substantial growth and more investment opportunities, which are circumstances that require a long MTO. The authors are, however, unable to verify these hypotheses using a proprietary compensation data set.

Hayes and Schaefer (2000) analyze data obtained from surveys of executive compensation. They show that when subjective evaluation is used to a higher degree, CEO compensation is more positively related to future earnings. This can be seen as support for the assertion that subjective evaluations are used to provide incentives for investments that benefit the long-term and are not adequately reflected in objective performance measures (Hayes and Schaefer 2000).

Gibbs et al. (2004) study both causes and effects of subjectivity in incentive systems for middle-management in a sample of 250 car dealerships. They find that for those managers receiving a subjectively determined reward, that reward averages 20% of their total pay. They hypothesize that subjectivity in determining incentives will be higher [1] in case of less complete performance measurement, so that subjectivity can correct for the unmeasured dimensions of performance; [2] in case of a higher risk of a distorting short-term focus of accounting performance measures used and in case of a high level of long-term investments in intangibles, which are cases where subjectivity can correct for myopic behavior; [3] in case of performance measures that are more susceptible to manipulation, so that subjective evaluations can correct for any dysfunctional behavior. These hypotheses are (partly) supported – the study thus provides indirect evidence for the role of subjectivity in preventing dysfunctional behavior in general and myopia in particular.

In sum, the majority of the theoretical conjectures and empirical evidence to date suggests that subjective evaluation methods correct for or prevent myopic behavior. More subjectivity was found in cases of more growth opportunities, longer product development and life cycles (Bushman et al. 1996), and more risk of dysfunctional

effects like myopia (Gibbs et al. 2004). This evidence provides indirect support for a positive effect of subjectivity on MTO. Nevertheless, while subjective evaluations have been found to be used frequently (Bushman et al. 1996) and rewards determined by this method can form a substantial proportion of compensation at middle-management level (Murphy and Oyer 2003; Gibbs et al. 2004), the amount of empirical evidence is limited. The available evidence is mixed, and mostly causes, not effects, of subjectivity are examined (Moers 2005, p.69). Moreover, until now there is no direct empirical evidence on the relationship between subjectivity and MTO (link 2 in figure 2-2).

### *2.2.3 Performance measure use: evaluation period*

This paragraph focuses on the effect of the length of the evaluation period, which determines the frequency with which managerial performance in terms of accounting results is evaluated, on MTO. Measuring performance over a period shorter than the pay-off period of long-run investments, for example quarterly or annually may induce a short-term managerial orientation because long-term consequences are not apparent in current results (Laverty 1996).

Although the focus of this study is on the internal managerial evaluation period, valuable insight can be gained by briefly directing attention to the effect of the *stock market* measurement period first. The stock market's emphasis on *quarterly* earnings, combined with management's short tenure, has been found to lead to short-term thinking and little incentives to invest in R&D because of an over-emphasis on periodic results (Eccles 1991; Eccles and Mavrinac 1995; Demirag and Tylecote 1996; Demirag 1998a). Even when the market is not primarily interested in short-term returns, the mere perception by management that periodic external reports influence their performance rating in any way is enough to invoke short-term behavior (Demirag 1996; Demirag 1998a). The remainder of this subparagraph discusses the internal evaluation period.

The *internal* evaluation period or "accounting period" (Ridgway 1956) has been argued to affect the accomplishment of the organizational goal by affecting MTO. For instance, rigid adherence to annual financial targets is viewed by Hope and Fraser (2003) as leading to pressure for short-term actions, thus hindering innovation. These proponents of *beyond budgeting* therefore advise to set rolling forecasts or to set goals for a longer term than annually to prevent this. The next two sections describe empirical evidence regarding the effect of the length of the evaluation period.

*Earnings management*

Studies studying the phenomena of earnings management provide empirical evidence that the evaluation period affects managerial behavior, by documenting the manipulation of earnings due to *annual* bonus schemes (Healy 1985; Holthausen et al. 1995; Guidry et al. 1999). The reason is described by Jensen (2003), who criticizes the frequent use of non-

linear bonus schemes, which results in dysfunctional behavior when performance is at a level near the lower or upper bound. Figure 2-3 displays the form of a typical incentive scheme. When performance is between the lower and upper bound, or just below the lower bound, an incentive exists to manage earnings upward in order to collect a higher reward. When performance is far below the lower bound, so that a bonus is unlikely, or above the upper bound, earnings will likely be shifted from the current period into the next, making it easier to present favorable results and obtain a bonus in the next period.

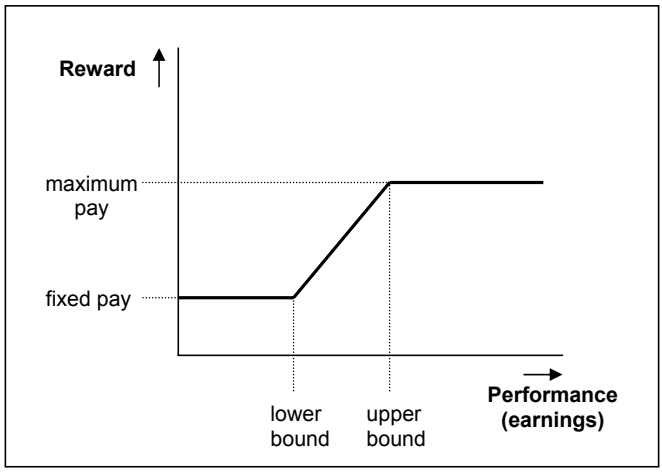



**Figure 2-3:** Typical reward scheme (based on Merchant and Van der Stede 2003, p.343).

Healy (1985) obtained access to the bonus contracts of executives in 94 companies and tested these earnings management hypotheses. Results indicate that executives manage earnings downward when their maximum periodic bonus has been reached. When performance is far below the lower bound, and an increase cannot be expected to increase earnings to a level eligible for a bonus, earnings are also managed downward. Earnings are managed upward when an increase in earnings is anticipated to increase compensation (between the lower and upper bound or just below the lower bound of the incentive scheme) (Healy 1985). Guidry et al. (1999) corroborate Healy's (1985) empirical results.

Using confidential data of executive short-term bonus plans, Holthausen et al. (1995) extend Healy's work in this area by using a different data-analysis method. They also find evidence that managers manipulate earnings downwards when their bonuses are at their maximum. However, unlike in Healy (1985), no evidence is found that managers

manipulate earnings downwards when earnings are below the minimum necessary to receive any bonus. Holthausen et al. (1995) also perform an empirical analysis into the effects of the bonus scheme on R&D expenditures, which can be seen as a way of detecting effects on MTO. However, they find no significant results indicating earnings management by adapting the level of real investment decisions.

Dechow et al. (1996) examine big cases of earnings management that are investigated by the SEC; they find no evidence of earnings management for the purpose of obtaining a larger bonus (but positive evidence for purpose of raising low-cost external financing).

A study by Degeorge et al. (1999) shows that there are three thresholds at which earnings management occurs. In order of importance, earnings are managed to produce positive earnings figures (>0), to sustain recent performance, and to live up to analysts' expectations. Only when the first threshold is surpassed, does the next one enter the manager's mindset and does it affect reporting behavior.

Leone and Rock (2002) argue that budget ratcheting coupled with earnings-based bonus schemes provides managers with incentives to manage earnings only when this leads to long-term performance increases. Accounting choices that only lead to a short-term gain are avoided, however, because targets in subsequent periods will be increased and cannot be continually achieved. Their statistical analyses of business unit data from a large multinational company confirm these expectations. Fundamental assumptions of the analysis are [1] asymmetrical ratcheting (losses lead to smaller target adjustments than gains); and [2] at least a five-year managerial horizon; if managers are planning to quit before then, they will be less concerned about future targets (Leone and Rock 2002, p.59).

The previous section contains references to influential and illustrative papers in this stream of literature. Reviews of the earnings management literature are provided by Guidry et al. (1999) and Healy and Wahlen (1999). Overall, this stream of research shows that accounting based bonus contracts are one of the main causes of earnings management (Healy and Wahlen 1999), unless there is a long managerial contract horizon and budgets ratchet (Leone and Rock 2002). While the evidence is quite strong with respect to reporting behavior (e.g., timing of recording transactions), resource allocation and MTO can also be affected. Annual formula-based bonus plans tend to over-emphasize short-term accounting returns and can therefore be expected to discourage long-term investments (Hope and Fraser 2003). Delaying or permanently cutting R&D expenses, for example, is another way to manage earnings (Bushee 1998). Evidence on the effects on investments is weak at best. Holthausen et al. (1995) considered these effects, but could not demonstrate any significant effect of annual bonus schemes on real R&D investment decisions. Overall, the amount of research on the

effects of annual accounting based bonus schemes on resource allocation is limited and there is much room for further study (Healy and Wahlen 1999; Leone and Rock 2002, p.66). Studies outside the earnings management literature provide some additional evidence on the effects of the evaluation period on MTO, though, and these are listed below.

*Other accounting studies*

Several studies that investigate the effects of accounting performance measures, as described in paragraph 2.2.1, also (implicitly) consider the effect of the evaluation period. For example, Merchant (1989, p.84) notes that myopia is not inevitable if managers are evaluated based on long-term performance, and finds that this is more likely for managers with significant decision authority over long-term investments, where myopic decisions would be very costly. Merchant (1990) reported that financial *short* term targets lead to manipulation of reported profit figures and to a short-term managerial orientation. It is not entirely clear whether it is primarily the type of measure or the length of the evaluation period that drives his results.

It is difficult to disentangle the effects of the evaluation period length, type of performance measure, and target difficulty from these correlational studies in the accounting literature in general and in the earnings management literature in particular. Only one study that attempts to isolate the effects of evaluation period length exists thus far (Bhojraj and Libby 2005). Bhojraj and Libby (2005) designed an experiment, in which they manipulated reporting frequency, the pattern of earnings and the likelihood of issuing stock. They hypothesized that if managers perceive disclosure of earnings to the market as an evaluation point, greater disclosure frequency will lead them to focus more on near-term results and will reduce planning for the long-term. Results indicate that myopia is either increased or reduced by an increased reporting frequency, depending on the pattern of earnings and the likelihood of issuing stock. Even when managers are acting in interests of existing shareholders, they can be inclined to focus on short-term earnings. Of main concern in the experiment is the signal that performance reports provide to external parties; internal reporting is held constant. Conclusive (experimental) evidence on the effect of the internal evaluation period on MTO is still absent in the accounting literature.

*Conclusion*

In sum, although many authors have concluded that the evaluation period affects managerial time orientation, empirical evidence is mostly limited to external reporting or indirect and confounded by other variables. In many earnings management and other accounting studies, it is unclear whether it is the type of performance measure (earnings/financial), properties of that measure, target difficulty, the length of the

evaluation period, or a combination of these variables that can explain the findings (e.g., Merchant 1990; Hoskisson et al. 1993). The scarce experimental evidence in the accounting literature has focused on the influence of external reporting only (Bhojraj and Libby 2005). Although the available evidence strongly suggests that a longer evaluation period increases MTO length, further empirical evidence on the relationship between the internal evaluation period and MTO is clearly called for. This topic particularly requires experimental research, that can easily isolate the effects of evaluation period. Related evidence exists in the economic literature, however, and is discussed in § 2.3.1.

## 2.3 Economic literature

This paragraph discusses the economic literature regarding MTO. Studies listed here are based on economic theory, and in general consider variables affecting MTO outside the context of a PMS[4].

The general implications for MTO of economic theory are as follows. Economic theory relies universally on discounted utility and assumes positive time preference and diminishing marginal utility, and it does not consider individual differences in temporal orientation (Loewenstein and Prelec 1991). This seems to suggest that managers would prefer faster returns over longer-term investments, and thus be inclined towards a short term orientation. This may hold in general, but the assumption that everyone has the same preference for faster outcomes under all circumstances has been disproved by a large body of research. First, Loewenstein and Prelec (1991; 1992) show both theoretically and empirically that neither negative nor positive time preference always prevails, and that individuals sometimes actually have a tendency to defer a desirable outcome. In a short sequence, most individuals show some preference for a sequence that starts well, but most also exhibit a strong liking for improving sequences (Loewenstein and Prelec 1991). The latter suggests that long-term investments that yield benefits later on may be deemed acceptable more easily than would be expected based on positive time preference alone. Furthermore, individual differences in preferences remain (Loewenstein and Prelec 1991). Although many other anomalies of standard economic theory exist (Frederick et al. 2002), there is one, myopic loss aversion, that is of particular importance to the research question. Paragraph 2.3.1 deals with a series of studies on this phenomena, that have identified effects of the evaluation period on MTO. Furthermore, based on standard economic reasoning (agency theory) which includes an assumption of self-interested behavior, a second stream of research has identified employment horizon as an individual situational factor influencing MTO. These studies are discussed in § 2.3.2.

[4] Several studies using economic theory, that included PMS variables, have been discussed as part of the accounting literature in §2.2.

### *2.3.1 Myopic loss aversion*

A recent stream of literature in experimental economics has also analyzed the effect of the length of the evaluation period on MTO, though not as part of a PMS. The concept of myopic loss aversion indicates that a longer evaluation period makes managers, who are loss-averse (see Kahneman and Tversky 1979; Chang et al. 2002, p.17), more likely to consider a specific investment opportunity as part of a long-term set of similar opportunities. Consequently, they will consider the risk of a loss attached to a separate investment as lower, and are generally inclined to invest more. In case of a short evaluation period, however, individuals will tend to view the investment as a one-shot deal, even when it is part of a sequence. In most cases, this causes individuals to invest significantly less than should be expected based on the expected value of the investment, thus leading them to act myopically (Benartzi and Thaler 1995; Gneezy and Potters 1997; Thaler et al. 1997; Gneezy et al. 2003; Langer and Weber 2003, 2005; Bellemare et al. 2005). Figure 2-4, which displays two gambles with their probability distribution and possible outcomes, can be used to illustrate the basic idea.

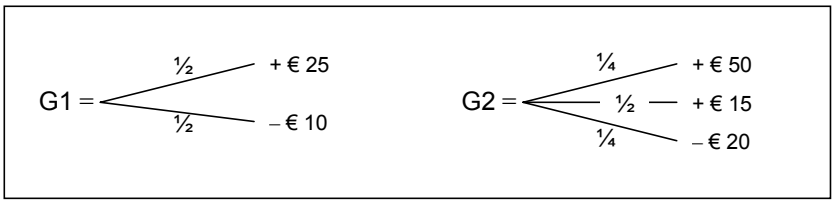



**Figure 2-4:** Myopic loss aversion. If losses loom three times larger than gains, accepting two instances of gamble 1 looks unattractive while an aggregation of two times G1 is acceptable – see G2 (based on Langer and Weber 2005).

Assume that an individual is loss-averse and assigns three times more value to a loss than to a gain. Such an individual will not take gamble 1 (G1) in figure 2-4, even though it has a positive expected value, because to him it has a negative value of (½ * + € 25) + *3* * (½ * – € 10) = – € 2,5. If the same person were offered a sequence of two of the same gambles, his acceptance decision would depend on how the problem is framed. If he evaluates per period and views the problem myopically, he is likely to see each gamble as separate (two times G1) and reject them at the start of each period. If he considers the decision tree for an aggregated gamble (G2) at the beginning, however, he more easily realizes that the bet has an attractive value of (¼ * + € 50) + (½ * + € 15) + 3 * (¼ * – € 20) = + € 5. Longer sequences look even more attractive when aggregated, which is more likely in case of a longer evaluation period (see Langer and Weber 2005).

The following studies contain empirical evidence on the concept of myopic loss aversion. Gneezy and Potters (1997) and Thaler et al. (1997) conducted experimental investigations into the effect of evaluation period length by examining the amount of money individuals were willing to pay for gambles. Results lend support to the concept of myopic loss aversion. In other studies, the concept was successfully applied to asset pricing in market settings (Benartzi and Thaler 1995; Gneezy et al. 2003). The evaluation period was varied in most studies by simultaneously manipulating both feedback frequency and binding (fixed decision for multiple periods). Langer and Weber (2003) disentangle these effects and provide experimental evidence that feedback frequency and the binding of decisions affect myopic decision-making separately and interactively. Theoretically, binding should force individuals to consider the whole period at the start. Less frequent feedback should also induce an aggregation of periods. Consistently, both binding and more limited feedback frequency are found to decrease myopic decision-making. When decisions are bound, however, not *limiting* the frequency of feedback but *increasing* it limits myopia – an interactive effect (Langer and Weber 2003). This conflicts with the findings of Bellemare et al. (2005), who demonstrate that varying feedback frequency alone is enough to influence the degree of myopia in decision-making, irrespective of binding. Langer and Weber (2005) extend the concept of myopic loss aversion to myopic prospect theory. They show that the effect of evaluation period length is not unidirectional, but depends on the risk profile of the decision. Their results indicate that a shorter evaluation period can actually *decrease* myopia in case of a small probability of a relatively large loss.

To sum up, there is relatively strong evidence that shortening the evaluation period increases myopia in decision-making, unless there is a small chance of a large loss. However, it is not clear whether this holds when decisions can be varied per period (no binding). Furthermore, empirical evidence is limited to gambles and asset pricings; no study in this literature stream has used investment decisions in (unbound) value-creating company projects as dependent variable. Further research is needed to investigate the generalizability of the findings to other settings and determine effects on MTO.

### *2.3.2 Employment horizon*

A research stream in the economic literature that focuses on managerial career concerns has identified *job mobility* as a potential cause of myopia (Palley 1997; Chang et al. 2002). Mannix and Loewenstein (1994) describe the economic reasons for the influence of job mobility on MTO as follows. A manager leaving the firm is unlikely to suffer the consequences from any decisions he has made that are detrimental in the long-run, given that the consequences of defection are spread out over a large number of people and

delayed in time. In the same way, the manager will not be able to benefit from the positive future pay-offs of previous decisions. Job mobility, and likewise quitting probability, is therefore expected to decrease MTO (Mannix and Loewenstein 1994). In a similar vein, contractual or employment horizon is expected to affect MTO.

Empirical evidence that indirectly supports an effect of employment horizon on MTO is provided by several studies, of which the following provide an illustration.

Lewellen et al. (1987) use age as a proxy for employment horizon. They argue that older executives have a short employment horizon because they are close to retirement, and will therefore be less likely to care about future results. They use this proxy as an independent variable in an effort to explain the proportion of stock-based incentives, which represent long-term incentives, relative to cash incentives, which represent short-term incentives. Results indicate that the more important the future firm growth opportunities and the older the manager, the smaller the relative weight on cash compensation and the greater the relative weight on stock-based compensation. These circumstances represent contingency factors in which a short-term orientation can be expected to be relatively more problematic (see figure 2-2). By showing that more long-term incentives are used in case of a shorter employment horizon, the results provide support for the conclusion that MTO is shorter in case of a shorter employment horizon.

Banker et al. (1996) conducted a field study in which they examine the impact of a performance contingent compensation plan. Consistent with economic theory, they suggest that temporary employees have only a short-term orientation, while a permanent employee is expected to invest more in the long term by acquiring more skills (also see Banker et al. 2001, p321). Their findings are consistent with these expectations; specifically, they find that the plan causes an increase in performance, which is found to be less for temporary than for permanent employees.

Further empirical evidence on the effect of employment horizon is available in studies that demonstrate effects on investments.

Like Lewellen et al. (1987), Dechow and Sloan (1991) use age to proxy for employment horizon. They theorize that when the CEO is about to retire or change employer, R&D expenditures will be diminished. Based on archival data, their expectation is verified empirically, indicating that short employment horizons cause a short-term managerial orientation.

Cheng (2002) documents results contrary to Dechow and Sloan (1991). In this archival study, R&D expenditures are not affected by CEOs nearing retirement. Instead, R&D expenditures are more strongly positively associated with CEO-compensation, which indicates that Boards of Directors adjust incentive payments to provide incentives

to invest in the long-term to overcome inclinations towards short-term behavior resulting from the short employment horizon (Cheng 2002).

Experimental evidence is available from two studies that were published in an organizational behavior journal. Mannix and Loewenstein (1993; 1994) conducted two similar experiments in which they manipulate employment horizon (job mobility). Findings indicate that subjects that are more likely to leave the firm are less likely to invest in the long-term (Mannix and Loewenstein 1993; 1994). Their experimental evidence clearly establishes the direction of causation from employment horizon to MTO. Their second paper is special in its acknowledgement that time orientation is influenced by both economic and psychological factors. In this study, Mannix and Loewenstein (1994) also manipulated whether groups or individuals were the decision makers. They found that groups exhibit a longer time orientation than individuals, possibly due to the development of a group identity, leading to social concerns or pressure for cooperative behavior (social identity theory, see, e.g., Worchel et al. 1998). Interestingly, the authors also acknowledge the existence of individual differences in time orientation (Mannix and Loewenstein 1994, p. 374) – a subject further explored in the next paragraph (§ 2.4).

In accounting studies that address issues related to MTO, employment horizon has played an important role, albeit often implicitly. For example, Eccles (1991) blames managerial short-term behavior on short tenure. Leone and Rock (2002) demonstrate how budget ratcheting can promote long-term investments, but only under the assumption of at least a five year employment horizon. Analytical papers, most of which have already been described in paragraph 2.2.1, provide a clear illustration of the importance of employment horizon. Narayanan (1985) demonstrated that managers may be inclined to undertake short-term projects to increase earnings and subsequently enhance their reputation, but they have less incentive to do so when their contract length increases. Sliwka (2002) assumes that managerial career concerns lead to a short-term horizon when management can signal its value to potential employers by increasing current results before quitting. Dikolli (2001) shows that in case of a shorter employment horizon for the agent, the optimal weight on forward-looking performance measures increases. Dutta and Reichelstein show that the need for leading performance indicators depends on both the agent's and the principal's planning horizon and their ability to make long-term contractual commitments, as well as that short-term contracting results in inefficiently low levels of investments (Dutta and Reichelstein 2003). Finally, an analytical model by Dutta (2003) shows when there is a severe managerial retention problem, there is a high need for a long-term incentive contract (option based instead of accounting based) in order to ensure appropriate investment decisions.

In summary, studies in the organizational, the accounting and foremost the economic literature have used (contractual) employment horizon as an indicator or predictor of MTO. There are relatively strong indications that a longer employment horizon has a positive effect on MTO, although there is only a limited number of studies establishing causality (Mannix and Loewenstein 1993; 1994). Furthermore, many factors that determine the *cause* of job mobility, which may affect its influence on MTO, have not been considered in the economic literature. For example, a high probability of a lay-off due to economic difficulty may not result in a decrease of MTO if there are no alternative opportunities in the labor market, because the individual wishes to remain with the firm (Mannix and Loewenstein 1993). Moreover, the relative importance of employment horizon for MTO compared to other factors such as the PMS, as well as how it interacts with the PMS, remains largely unexplored.

## 2.4 Psychological literature

Time orientation has been studied as a personality characteristic by psychologists quite extensively. In this stream of literature, time orientation is distinguished as a specific part of the broader term time perspective (De Volder 1979; Nuttin and Lens 1985), which is explored first below.

Time perspective refers to the extent to which different temporal periods are incorporated into the psychology of an individual. Some individuals are mainly past oriented, while others are present or future oriented (Lens and Moreas 1994, p.24). In their overview on time perspective, Lens and Moreas (1994) define future time perspective as the degree to which the future is integrated into the present life space, with individuals with a long future time perspective having relatively more goals in the more distant future. These individuals experience a given time interval into the future as relatively shorter compared to individuals with a shorter future time perspective. Additionally, individuals with a long future time perspective are better able to foresee the implications of their current actions for the future. Zaleski (1994) provides a comprehensive collection of articles related to time perspective, which shows that time perspective is a stable bias, which varies between individuals (also see Waller et al. 2001). Time perspective has been used in many studies, both as a dependent and an independent variable. An example of a factor that has been shown to influence time perspective is age (De Volder 1979; Strathman et al. 1994a). Findings with regard to age were very ambiguous (De Volder 1979), which is of particular interest given the use of this variable as a proxy for time horizon in studies based on economic theory. As an independent variable, time perspective has been argued and found to influence motivation and goal setting (Nuttin 1964; Strathman et al. 1994a; Zimbardo and Boyd 1999). A longer time perspective will lead individuals to consider long-term goals as more

important and more proximal. Individuals with a longer time perspective will therefore be motivated to work harder in the present to attain a future goal (Lens and Moreas 1994; Zaleski 1994; Waller et al. 2001).

Time orientation is considered part of time perspective. While time perspective is typically concerned with a more general preoccupation with the future (Zimbardo and Boyd 1999), time orientation is more specifically related to the extent to which possible future events influence decision-making in the present. Strathman et al. (1994b) have developed a construct called Consideration of Future Consequences (CFC), which is defined as the extent to which individuals take future consequences of their actions into consideration in current decisions (also see Petrocelli 2003). Like time perspective, time orientation (CFC) is considered a relatively stable dispositional characteristic (Zaleski 1994; Strathman et al. 1994a, 1994b; Waller et al. 2001). It can therefore be concluded that the individual characteristic time orientation or CFC represents a different construct than MTO. While CFC is a stable personality trait, MTO is a context-specific construct related to investments in a work environment, which can be influenced by personality characteristics as well as circumstantial variables, such as the PMS.

Individual time perspective and time orientation have been used very little in business research (Das 1987, p.204), although some use of this personality trait has been made in the organizational literature (see Waller et al. 2001). Bird (1992) published a theoretical paper in which individual time orientation is hypothesized to be related to strategy formulation and the opportunity vision of entrepreneurs, subsequently influencing organizational development. Specifically, a long future time perspective is expected to be particularly important for innovative products. However, no empirical studies on these relationships exist (Bird 1992, p. 15). The only related empirical evidence that could be found is the study by Das (1987), who used a questionnaire to study the effect of individual time orientation in managers on their strategic planning. The planning horizon is found to average 2.85 years. The paper poses that the planning horizon that is appropriate depends on the type of business and kind of decisions to be made. Findings further indicate that individuals with a present orientation tend to make plans with a shorter planning horizon compared to individuals with a future orientation, who have a longer planning horizon. As a conclusion, Das (1987) advises to assign managers to organizational operations which require a certain time orientation based on the managers' individual time orientation.

In sum, while individual time orientation as a personality characteristic has been shown to influence decision-making in general and strategic planning horizons in particular, and would therefore seem to be of interest to studies on MTO, its use in business research has

been very limited (Das 1987; Bird 1992). No empirical evidence on the effect of individual time orientation on MTO could be found.

## 2.5 Research opportunities

The previous paragraphs have provided an overview of available evidence regarding effects of performance measurement system properties and individual level variables on MTO from the accounting, economic and psychological literatures. This paragraph concludes this chapter by shortly summarizing these findings and identifying opportunities for further research.

Table 2-2 displays a summary overview of empirical evidence to date. It corroborates Laverty's conclusion that research in this field is underdeveloped (Laverty 1996, p.837), with the following gaps in the literature standing out. First, empirical evidence on the effects of non-financial performance measures on MTO is limited, in spite of theoretical models predicting these effects (Sliwka 2002; Dutta and Reichelstein 2003). A considerable amount of indirect evidence exists, demonstrating cognitive long-term effects of non-financial measures (Luft and Shields 2002) and (performance effects due to) increased relative use of non-financial measures in cases where contingency factors favor a long-term managerial orientation (e.g., Ittner et al. 1997; Said et al. 2003). But direct empirical evidence is limited (Moers 2001; Farrell et al. 2005). Furthermore, existing studies have used distinctions in broad categories, such as financial versus non-financial performance measures. Such categories oversimplify the properties of performance measures (cf. Malina and Selto 2004, p.444) and within these categories there can be variation between measures (cf. Said et al. 2003). Moreover, different classifications overlap and terms such as financial and accounting, as well as non-financial and leading, have sometimes been used interchangeably and inconsistently across studies, while their meaning does not exactly correspond (see § 2.2.1). This illustrates the lack of clear theoretical arguments in the accounting literature to date about which characteristics or dimensions of performance measures affect MTO (cf. Ittner and Larcker 1998; Ittner and Larcker 2002, p. s60).

Second, the amount of evidence that provides indirect support for a relation between subjectivity and MTO is considerable, generally demonstrating more subjectivity in circumstances requiring a long-term orientation (e.g., Bushman et al. 1996; Murphy and Oyer 2003; Gibbs et al. 2004). Nevertheless, evidence regarding middle-management levels is limited (Murphy and Oyer 2003; Gibbs et al. 2004), and no evidence on the direct effect of subjectivity on MTO could be found. There is also an absence of clear theory on the relation between subjectivity and MTO.

**Table 2-2:** Overview of empirical evidence regarding effects on MTO

| Literature | Topic | | Empirical evidence | Measurement instrument for MTO |
|---|---|---|---|---|
| **Accounting** | **Type of measure** | **Financial** | Considerable | • % of time spent generating short-term accounting returns<br>• R&D expenditures |
| | | **Non-financial** | Limited | • % of time spent generating short-term accounting returns |
| | **Subjectivity** | | None | n.a.[1] |
| | **Evaluation period** | | Limited | • selection of project generating long- or short-term financial results |
| **Economic** | **Myopic loss aversion (evaluation period)** | | Considerable | • amount paid for gamble sequence<br>• asset prices |
| | **Employment horizon** | | Limited[2] | • amount of long-term investments<br>• R&D expenditures |
| **Psychology** | **Individual time orientation** | | None[3] | n.a. |

[1] n.a. = not applicable: no direct evidence on MTO available.
[2] Most studies include proxies for employment horizon. Two studies provide direct experimental evidence (Mannix and Loewenstein 1993; 1994).
[3] Das (1987) provides empirical evidence on the effect on strategic planning horizon.

Third, conclusive evidence regarding the direct effect of evaluation period length on MTO is limited to a single experimental study in the accounting literature (Bhojraj and Libby 2005), which only considers the evaluation period for external, not internal, reporting. Although other accounting studies provide evidence on the effects of using short-term accounting measures based on archival or survey data, these studies do not vary evaluation period length (e.g., Merchant 1990, earnings management studies). More experimental evidence is available from the economic literature on myopic loss aversion, but that evidence involves dependent variables that do not clearly resemble MTO (see table 2-2 and § 2.3.1 for details).

Fourth, evidence on the effects of individual level variables is limited. Two experimental studies confirm the expected effect of employment horizon on MTO (Mannix and Loewenstein 1993; 1994), but the rest of the supporting evidence stems from studies that use proxies for employment horizon based on archival data (Lewellen et al. 1987; Dechow and Sloan 1991; Cheng 2002). Furthermore, the consequences of a short (expected) employment horizon may depend on the source of the employment risk, which

has not been considered in empirical studies thus far (Mannix and Loewenstein 1993). Empirical evidence on another individual level variable, the psychological characteristic individual time orientation, is limited to a single study showing effects on strategic planning horizon (Das 1987). No empirical evidence on the relative importance for MTO of these individual level variables is available in the literature. And with few exceptions (Dikolli 2001; Sliwka 2002; Dutta and Reichelstein 2003; Farrell et al. 2005), accounting studies have not explicitly investigated how these individual level variables interact with the PMS.

Fifth and finally, different measurement instruments have been used for MTO, with the choice of instrument largely method-dependent. Survey studies in the accounting literature have used the percentage of time allocated to activities aiming at generating short-term accounting returns (e.g., Merchant 1990; Van der Stede 2000; Moers 2001). Other studies, using experimental and archival data, use invested amounts (or R&D expenditures) for measuring MTO (e.g., Dechow and Sloan 1991; Mannix and Loewenstein 1993; 1994). Although the use of multiple instruments can in principle enhance the reliability of the findings related to MTO, consideration should be given to the relation between these different instruments. The time allocated to activities aimed at generating short-term returns may lead to effects on investments or R&D expenditures, although the latter is constrained by the investment opportunity set. Future research should attempt to use both measurement instruments and address whether these instruments yield similar results.

Taken together, the gaps in the literature that were identified above clearly illustrate the lack of cross-fertilization between different streams of literature. More specifically, the accounting literature to date has made too limited use of insights from experimental economics and the psychological literature in particular. This is particularly apparent with respect to the evidence available for the effects of evaluation period length. For that variable, studies in the accounting literature have made little or no use of the insights from studies in experimental economics. As a result, two separate research streams co-exist that could benefit greatly from each other (see table 2-2). A lack of cross-fertilization also applies to the evidence pertaining to the individual characteristic CFC. The economic literature has ignored this variable, and has instead used age as a proxy for time horizon. The accounting literature has also made no use of this variable, although it has attached great importance to MTO. Including individual level variables such as CFC could therefore significantly enhance the understanding of the determinants of MTO.

In sum, further development of theoretical arguments on the effects of PMS properties on MTO and additional empirical evidence are certainly called for; this dissertation aims at

filling part of the gaps in the literature as displayed in table 2-2. It does so by adopting a neutral approach to MTO, not focusing on myopic behavior and its prevention only. It enhances the reliability and generalizability of results by using multiple methods of measuring MTO. Moreover, it identifies theoretical arguments about the effects of performance measurement system properties that underlie previously used dichotomies, and it provides empirical evidence on the effects of these properties on MTO. In doing so, it answers calls to identify essential properties of performance measures (cf. Pavlik et al. 1993; Ittner and Larcker 1998), to re-examine the assumed short-term effect of accounting measures (Pavlik et al. 1993), and for empirical (experimental) research involving dependent variables other than performance (Sprinkle 2003). By integrating the aforementioned streams of literature, it also answers the plea of Merchant et al. (2003) for interdisciplinary research to further advance our knowledge about complex practical problems.

# CHAPTER 3
# HYPOTHESES

## 3.1 Introduction

This chapter develops hypotheses regarding the effects of PMS properties and individual level variables on MTO. The expectations that are derived in this chapter concern the research topics as outlined in table 2-2.

The next paragraph (§ 3.2) investigates the effects of PMS properties. The accounting literature has considered type of performance measure (financial vs. non-financial) as an important determinant of MTO. Subparagraph 3.2.1 demonstrates that the appropriate performance measure categories for predicting effects on MTO are actually leading and accounting measures. It also argues that the effects of these types of performance measures are dependent on the length of the evaluation period, which has been identified as an important factor for MTO in both the accounting and economic literatures. Next, subparagraphs 3.2.2 and 3.2.3 derive predictions with regard to subjectivity and (possibilities for) manipulation of accounting performance measures.

The third paragraph relates two individual level variables to MTO. Employment horizon was identified in the economic literature as an important factor. Psychological studies have stressed the importance of the personality characteristic consideration of future consequences. The last two hypotheses are devoted to these two variables.

## 3.2 Properties of the performance measurement system

This paragraph describes effects of the use different types of performance measures for evaluation purposes, and the way in which they are used, on MTO. The terminology used for performance measure type is consistent with paragraph 2.2.1 (see table 2-1 and figure 2-1). In the next three subparagraphs, predictions with regard to the following variables

related to the PMS will be derived respectively: leading performance measures, accounting evaluation period length, subjectivity, and manipulability of accounting performance measures.

### *3.2.1 Effects of leading and accounting performance measures*

This section analyzes the effects of the use of leading indicators, of accounting measures, and of the combination of those two types of measures on MTO.

*Leading measures*

Leading performance measures are performance measures that are causally linked to eventual end-results in terms of accounting performance (Kaplan and Norton 1996). Figure 3-1 reproduces figure 2-1 and provides an illustration of the concept of leading performance measures. A change in a leading indicator affects accounting results with a time lag. The length of this time lag determines the degree to which the performance measure is leading (degree of lead). As an illustration, in figure 3-1 customer satisfaction is a performance measure with a higher degree of lead than customer retention, because the time lag until accounting performance (lagging measure) is affected is longer. Figure 3-1 shows only non-financial leading performance measures, but leading indicators can be stated either in non-financial or financial terms (for example, quality costs). Although arguably most leading performance measures are non-financial, theoretical arguments center around the degree to which performance measures are leading, and not around their non-monetary nature. In the practitioner literature, claims have been voiced regarding a possible lengthening effect on MTO of leading performance measures (e.g., Eccles and Mavrinac 1995; Kaplan and Norton 1996).

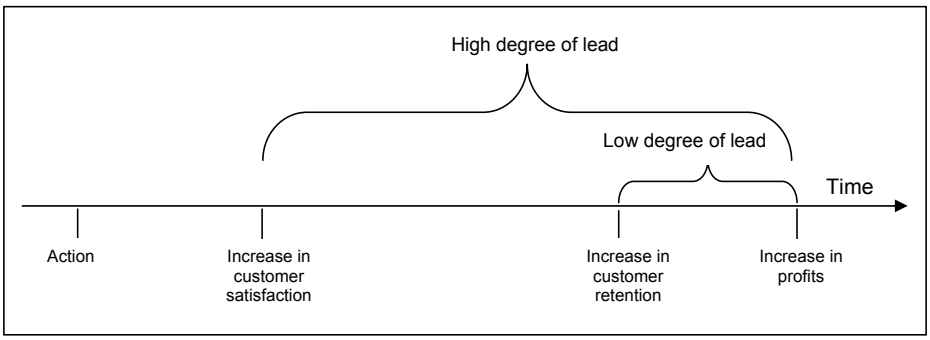



**Figure 3-1:** Business process causal chain, with performance measures that exhibit different degrees of lead.

Evaluations based on leading indicators can be expected to result in the following two effects on managerial behavior. First, managers tend to optimize measured dimensions of performance (e.g., Kerr 1975; Jenkins et al. 1998; Courty and Marschke 2004). Optimization of a leading performance measure in order to obtain a favorable performance evaluation can be achieved by investing more in long-term projects (Merchant 1989; Sliwka 2002). For example, increasing customer satisfaction may require an investment in employee training, with long term effects on profits. Enhancing leading performance measures for this reason does not necessarily extend managerial horizons, however, and therefore does not imply an effect on MTO. Managers can simply be engaged in optimizing the leading indicator, thus influencing their evaluation positively.

Second, the use of leading performance measures has a cognitive effect on MTO. Individuals tend to look for causes in the near past, but the use of leading indicators can reduce this myopic focus by providing a temporal bridge (Luft and Shields 2002). By making causal effects more salient, leading measures make managers consider lagged causal effects to a greater extent. If managers think about past causal factors of current financial performance and then look into the future, their planning horizon is increased (Das 1987, p.207). Leading measures thus cause managers to focus more on the future and lead managers to pay more attention to relations with future financial performance (AAA Financial Accounting Standards Committee 2002; Luft and Shields 2002). By identifying causal effects, they also facilitate the identification of the optimal long-term strategy (Farrell et al. 2005). These arguments point at a positive effect on MTO. This effect on MTO is expected to be stronger in case of a higher degree of lead, for the following reasons. First, individuals are more likely to look for causes which are relatively close in time to the present (Luft and Shields 2002). The effects of changes in a measure with a low degree of lead will appear relatively soon in accounting performance, making oversight by managers less probable. Second, a higher degree of lead will make managers consider lagged causal effects from further in the past. Consequently, their planning horizons can be expected to increase further into the future (Bluedorn and Denhardt 1988). This implies that MTO is increased to a greater extent when a leading indicator has a higher degree of lead. In other words, if a leading performance measure is selected that is located earlier in the causal chain of the business process (see figure 3-1), the positive effect on MTO will be stronger.

Based on the predicted cognitive effect of leading measures, the following is hypothesized:

***H1: A higher degree of lead of performance measures used for evaluation purposes positively affects MTO***

An empirical test of this hypothesis will contribute to the limited amount of evidence regarding the effect of leading indicators on MTO. The existing literature studied effects of the use of leading indicators in general, but not of specific attributes of these measures such as degree of lead (Moers 2001; Farrell et al. 2005).

*Accounting measures*

Previous research has found that accounting measures lead to myopia (Merchant 1989; 1990). The cause for this effect lies in the aggregated and summarized nature of these measures, which provide little indication of actions taken (Fisher 1992; Singleton-Green 1993). Accounting measures lack a clear link between actions taken in the short-run and long-run strategy, and they tend to focus management attention on the current impacts of decisions (Malina and Selto 2001, p.51). Accounting measures reflect historical results and do not consider variables that are important for long-term results, such as strategic position and market share (Merchant 1989; Jacobs 1991). Therefore, managers can take myopic actions to enhance current accounting performance, which are not easily detected (Nagy et al. 1999; Libby et al. 2002). Moreover, accounting measures are governed by cautious, conservative rules, which do not recognize uncertain gains. For instance, in the U.S. it is required to fully expense R&D investments immediately. By lowering current performance, this conservatism can discourage long-term investments and cause myopia (see Merchant 1989; Bushee 1998, p. 306). Consequently, accounting measures are less useful for evaluating performance when the consequences of current actions occur (further) in the future (Lambert and Larcker 1987).

Nevertheless, accounting performance approaches economic performance in the long-run, because results stemming from long-term investments are then realized and recognized in accounting performance (Merchant and Bruns 1986). Similarly, a failure to invest in long-term value-enhancing projects backfires in the long-run, because future accounting performance will be negatively affected. The effect on MTO of accounting measures is therefore dependent on the length of the period that is taken into consideration in managerial performance evaluation based on accounting measures (labeled hereafter: *evaluation period*). Evaluations based on periodic accounting measures provide incentives to manipulate reported performance and adjust investment behavior (Healy 1985; Holthausen et al. 1995; Guidry et al. 1999). The stock market's emphasis on short-term results has been found to lead to short-term thinking and little incentives to invest in R&D at top-management level, because of an over-emphasis on periodic results (Eccles 1991; Eccles and Mavrinac 1995; Demirag and Tylecote 1996; Demirag 1998b). Even

when the market is not primarily interested in short-term returns, the mere perception by management that periodic external reports influence their performance rating in any way is enough to invoke short-term behavior (Demirag 1996; Demirag 1998a). Bhojraj and Libby (2005) provide experimental evidence confirming that external reporting frequency affects investment behavior.

The concept of *myopic loss aversion* also implies effects of the evaluation period length on MTO (see § 2.3.1). A longer evaluation period makes loss-averse managers more likely to consider a specific investment opportunity as part of a long-term set of similar opportunities (see figure 2-4). Consequently, they will consider the risk of a loss attached to the investment as lower, and are thus inclined to invest more. In case of a short evaluation period, however, individuals will tend to view the investment as a one-shot deal, even when it is part of a sequence. A short evaluation period causes individuals to invest significantly less than should be expected based on the expected value, thus leading them to act myopically (Benartzi and Thaler 1995; Gneezy and Potters 1997; Thaler et al. 1997; Gneezy et al. 2003; Langer and Weber 2003, 2005; Bellemare et al. 2005).

In sum, in general it can be expected that a shorter evaluation period decreases MTO (cf. Bluedorn and Denhardt 1988), and vice versa. Despite the relatively large amount of empirical evidence, there is no conclusive empirical evidence on the effect of internal evaluation period length on MTO. Existing empirical research does not clearly distinguish the effect of the evaluation period length from effects of the type of measure (e.g., Merchant 1990).

Under the condition that accounting measures are being used for managerial evaluations, the following is predicted:

***H2: A longer evaluation period for accounting measures positively affects MTO***

*Interactive effect*

Furthermore, the evaluation period length for accounting measures is expected to moderate the effect of the degree of lead performance measures. The expected interaction indicates that the shorter the evaluation period for accounting performance, the weaker the effect of the degree of lead of leading performance measures, and vice versa.

A short evaluation period for accounting performance measures forces attention to these measures, which provides a powerful motivation to optimize current accounting performance (cf. Healy 1985; Merchant 1990; Holthausen et al. 1995). Evaluating accounting performance based on results from shorter periods will reinforce managers' tendency to focus on near-term results. Moreover, it will make these measures more

salient, which will limit the cognitive effect of degree of lead by reducing the (relative) saliency of lagged effects (cf. Luft and Shields 2002). Figure 3-2 illustrates the effect on managerial horizons graphically.

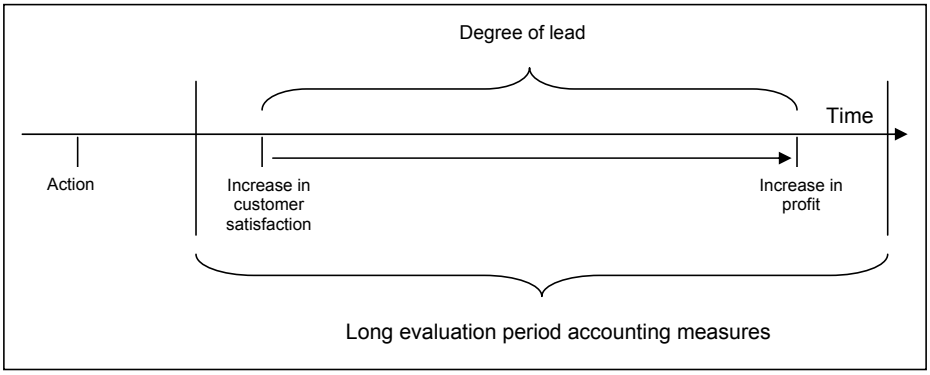



**Figure 3-2, panel A:** Combined effects of degree of lead and a long evaluation period. The expected managerial horizon is indicated by the arrow below the time-line.

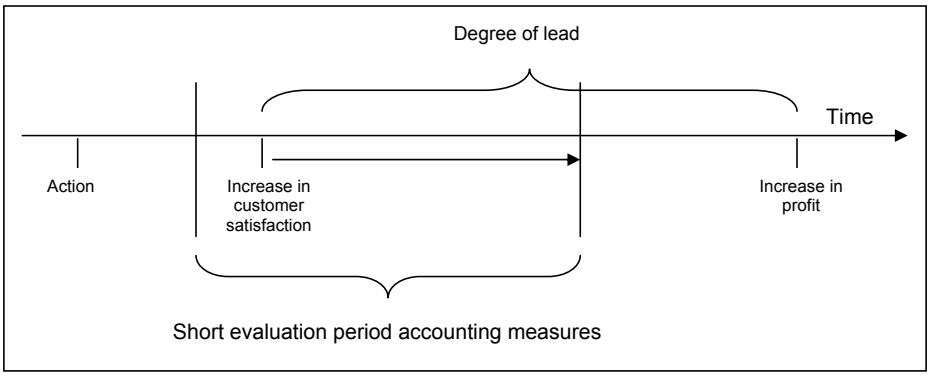



**Figure 3-2, panel B:** Combined effects of degree of lead and a short evaluation period. The expected managerial horizon is indicated by the arrow below the time-line.

Based on the reasoning above and conform figure 3-2, the strength of the positive effect of degree of lead on MTO is expected to be lower in case of a shorter evaluation period for accounting measures, and vice versa. The corresponding interactive effect is displayed graphically in figure 3-3, and results in the following hypothesis:

***H3: The positive effect of degree of lead on MTO is stronger in case of a long evaluation period than in case of a short evaluation period for accounting measures***

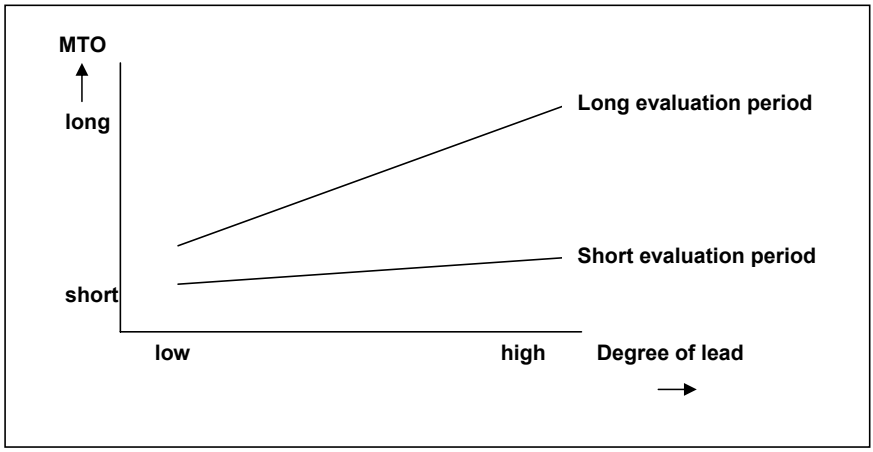



**Figure 3-3:** Interactive effect on MTO of degree of lead of leading indicators and evaluation period length for accounting measures

### *3.2.2 Effect of subjectivity*

The next hypothesis concerns the degree of subjectivity involved in managerial evaluations. Subjectivity refers to a judgment by the supervisor of the subordinate's performance, including a judgment of the actions taken to achieve that performance. Subjective evaluations can take different forms, such as [1] flexible weighting of objective performance measures ex-post (at the end of the evaluation period); [2] the use of subjective (qualitative) measures; [3] discretion in using additional performance criteria (Ittner et al. 2003; Sprinkle 2003; Moers 2005). In contrast, in completely objective evaluations the weights attached to quantitative performance measures are specified precisely ex-ante.

Subjectivity allows the supervisor to respond flexibly to the performance achieved by the subordinate. It allows the supervisor to back out dysfunctional behavior, which may be induced by a PMS that does not include all elements of performance perfectly (Ittner and Larcker 1998; Baker 2002). Therefore, subjective evaluations can be expected to prevent gaming and dysfunctional short-term managerial orientation (Merchant 1989, p.135), because this behavior is likely to result in a more negative performance evaluation. Consequently, when a short-term focus is more problematic, such as in case of high growth opportunities or long product cycles, more subjective evaluations are to be expected (Gibbs et al. 2004). Indeed, the use of subjectivity in evaluations has been found to increase with firm growth opportunities and product life cycle length (Bushman et al. 1996), consistent with the notion that subjective evaluations are required and used in situations in which a short-term orientation is particularly harmful. By preventing a

possible dysfunctional short-term orientation, subjectivity in evaluations can be expected to generally lengthen MTO[5]. Moreover, subjectivity can provide incentives to extend managerial horizons, by causing evaluations to be affected by long-term investments which are not adequately valued by completely objective performance measures (Hayes and Schaefer 2000).
No study to date provides empirical evidence on the direct effect of subjectivity on MTO. The following hypothesis will be empirically tested:

***H4: A higher degree of subjectivity in evaluations positively affects MTO***

### *3.2.3 Effects of ease-of-manipulation*

The ease with which performance measures can be manipulated influences whether or not they can be classified as causing a short-term orientation (Coates et al. 1995). This ease-of-manipulation, or distortion possibility, is a property of performance measures that has not been well explored in the literature (see Baker 2002). Ease-of-manipulation of accounting measures is argued below to affect MTO indirectly.
According to Libby et al. (2002), "*the inherent subjectivity of much accounting measurement allows managers flexibility to opportunistically report or manage earnings"*. Basically, a higher ease-of-manipulation of accounting measures allows managers to report better results. Earnings management studies provide empirical evidence of the manipulation of accounting data (Healy 1985; Holthausen et al. 1995; Guidry et al. 1999). Accounting performance can be managed by methods of strategic manipulation of information reporting such as smoothing, filtering and falsification (Hopwood 1972; Merchant 1990; Jaworski and Young 1992; Kohn 1993; Holthausen et al. 1995; Chow et al. 1996), but also by adjusting operating and investment decisions (Holthausen et al. 1995; Leone and Rock 2002). These two methods can be expected to have distinctly different consequences for *future* results. While strategic manipulation of information reporting can possibly be sustained in future periods, lowering investment in long-term projects to boost current accounting measures such as earnings would backfire on a manager in the long-run when earnings dry up due to a low level of activities (cf. Leone and Rock 2002). To the extent possible, the first method of managing earnings would thus be preferable because it maximizes both current and future reported earnings. Higher ease-of-manipulation of accounting measures is therefore predicted to lead to the

[5] This assumes that supervisors generally have a longer time orientation than subordinates, which is consistent with the increased importance of strategic objectives at higher organizational levels. Moreover, there is also an implicit assumption in the literature that there will be less occurrence of a dysfunctional long-term MTO for which supervisors correct. This is likely to hold in general, since there are relatively few circumstances that require a short MTO (such as financial distress or a divest strategy).

actual manipulation of accounting measures (labeled hereafter: accounting data manipulation). Because this alleviates short-term performance pressure, investment decisions are likely to be less short-term oriented, thus securing future accounting results. Accordingly, the corresponding hypotheses are posited, assuming accounting measures are used for evaluation purposes:

***H5a: Higher ease-of-manipulation of accounting measures increases accounting data manipulation***
***H5b: Accounting data manipulation positively affects MTO***

Ease-of-manipulation is also expected to have an indirect effect on MTO through subjectivity in evaluations. In case of higher ease-of-manipulation of performance measures, firms and supervisors are likely to try to prevent accounting data manipulation by using subjective evaluations. Accordingly, when performance measures are more susceptible to manipulation, evaluations will be more subjective, as found by Gibbs et al. (2004). Ease-of-manipulation therefore affects MTO indirectly by affecting subjectivity (see H4). The reasoning above implies the following hypothesis:

***H5c: Higher ease-of-manipulation of accounting measures increases subjectivity***

However, actual accounting data manipulation is expected to be lower in case of more subjectivity consistent with the increased possibilities to correct for dysfunctional behavior (Ittner and Larcker 1998; Baker 2002; Gibbs et al. 2004). This argument leads to the following prediction:

***H5d: A higher degree of subjectivity in evaluations decreases accounting data manipulation.***

Figure 3-4 displays the relationships predicted by H4 and H5a-d combined. Note that there is no predicted direct effect of the accounting performance measure property ease-of-manipulation on MTO. In sum, the figure shows that ease-of-manipulation lengthens MTO by enabling accounting data manipulation, but only insofar as this is not corrected for in the PMS by adjustments in the level of subjectivity.

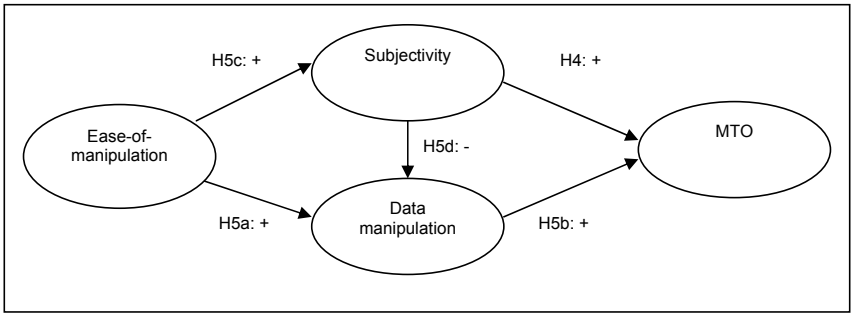



**Figure 3-4:** Indirect effects of ease-of-manipulation on MTO

## 3.3 Individual level variables

The second group of hypotheses derived in this chapter relate to the effects of individual level variables. Many researchers have acknowledged the influence of individual level variables on MTO (Loewenstein and Prelec 1991; Karniol and Ross 1996; Laverty 1996, p.840). Two such variables will be considered here, based on their salience in the literature: employment horizon (from the economic literature) and individual temporal orientation (a psychological construct).

*Employment horizon*

The individual level variable employment horizon influences MTO for the following reason. Assuming that managers are acting in their own self-interest, a shorter employment horizon makes it unlikely they will benefit from long-term investments (Mannix and Loewenstein 1994; Palley 1997). A shorter employment horizon can therefore result in a lack of long-term investments or investments in projects with low net present values, but high returns in the near future (Dutta and Reichelstein 2003). Thus, a shorter employment horizon can be expected to lead to a shorter MTO (Eccles 1991). Palley (1997) provides analytical evidence of this effect, which has been confirmed by two experimental studies (Mannix and Loewenstein 1993; 1994).

Many researchers have acknowledged the importance of employment horizon as a determining factor of MTO and have assumed a positive effect (Dechow and Sloan 1991; Banker et al. 1996; Dikolli 2001). Several researchers have used age as a proxy for employment horizon, assuming that older managers have a shorter horizon because they are closer to retirement (e.g., Lewellen et al. 1987; Dechow and Sloan 1991; Cheng 2002). Others explicitly incorporate employment horizon into their analysis (e.g., Dutta and Reichelstein 2003; Farrell et al. 2005), for instance by assuming that employees with a fixed contract focus more on the long-term than temporary employees (Banker et al.

1996, p.206). Although contract length and age are proxies for employment horizon, it is the *expected* length of the employment relationship that affects MTO. This is also affected by the probability of quitting and lay-offs (Palley 1997), and the intentions of both employer and employee. Temporary contracts can be renewed and temporary employees may anticipate this, and permanent employees can decide to quit despite their contracts. Moreover, probability to quit is influenced by social forces with respect to corporate loyalty (Palley 1997, p.555). What can be expected to affect MTO are therefore personal *intentions* regarding the employment horizon, because this determines how much of the benefits of long-term investments can be expected to accrue to the decision maker. Psychological studies have previously developed a construct called *propensity to leave* which reflects the psychological inclination to quit (Martin and Hunt 1980; Rahim and Afza 1993). Consistent with a positive effect of the (expected) length of the employment horizon, the following effect of propensity to leave is hypothesized:

***H6: A higher propensity to leave negatively affects MTO***

*Individual time orientation*

Individuals exhibit a personal bias in temporal orientation that affects their decision-making (Schotter and Weigelt 1992). Psychological studies provide an explanation for this, since they have found that individuals differ in their general orientation towards the future (Lens and Moreas 1994; Zaleski 1994). Those who are more future oriented attach greater importance to events that are relatively further into the future and perceive these as relatively closer to the present (Lens and Moreas 1994). Individuals differ in the extent to which they consider the future consequences of their current decisions (Strathman et al. 1994b). This construct called Consideration of Future Consequences (CFC) relates to both private and professional life, and is considered to be a relatively stable personality characteristic (Strathman et al. 1994a). CFC can be expected to persist in a work-related decision-making environment and to affect MTO. Managers that consider future consequences to a higher degree are likely to attach more importance or higher values to future returns from long-term investments (cf. Lens and Moreas 1994), consequently making them more willing to invest in the long-term. CFC is thus expected to influence MTO positively, as stated in the following hypothesis:

***H7: A higher Consideration of Future Consequences (CFC) positively affects MTO***

Figure 3-5 displays the full model including all hypothesized effects. The next two chapters describe the results of a survey and an experiment, respectively, which were designed to test the hypotheses derived in this chapter.

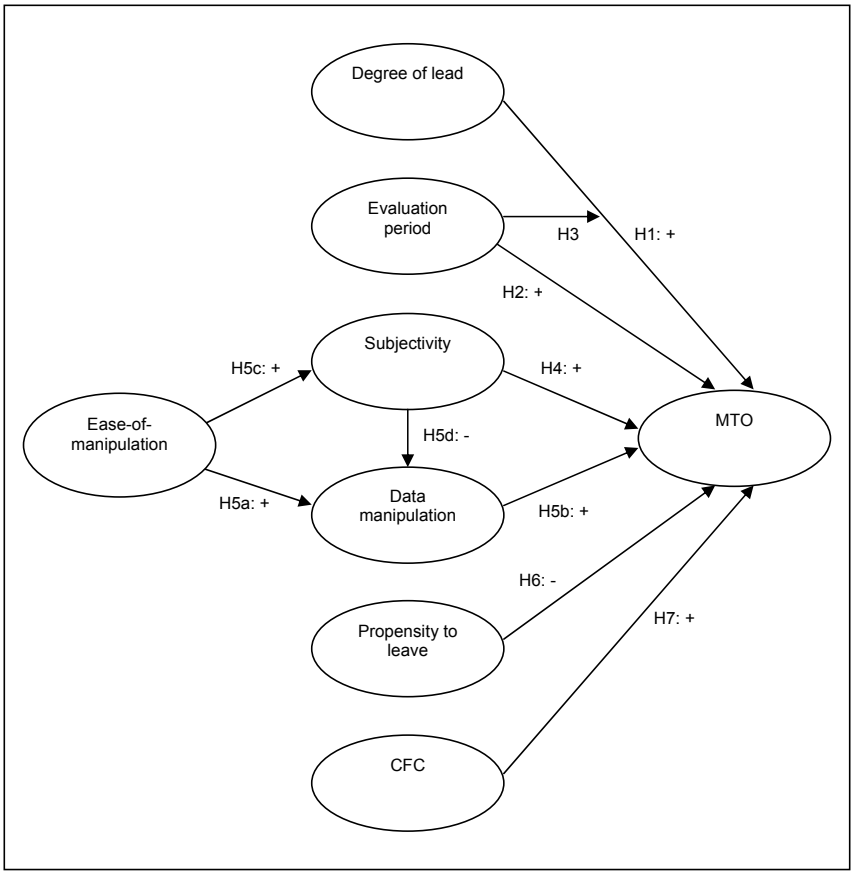



**Figure 3-5:** Hypothesized theoretical model

# CHAPTER 4
# SURVEY STUDY

## 4.1 Introduction

In order to test the hypotheses derived in the previous chapter, a survey study was conducted as a first generalizable empirical test of the theoretical model. Data was gathered using a questionnaire that was distributed among Dutch financial managers. This chapter subsequently describes the rationale and procedure behind the selection of respondents (§ 4.2), the preparation, pre-testing and design of the questionnaire (§ 4.3), and the procedure that was followed for distributing the questionnaire and maximizing response rate (§ 4.4). The next section, § 4.5, describes the response rate, after which the sample descriptives are discussed in paragraph 4.6. Next, the measurement instruments are outlined (§ 4.7), followed by descriptive statistics on the variables from the theoretical model in § 4.8. An analysis of non-response is presented in the next paragraph (§ 4.9), while § 4.10 shows the results of the data analysis relating to the hypotheses. The chapter ends with conclusions and a discussion (§ 4.11).

## 4.2 Sample selection

The survey for this study was presented as part of a joint research project between the practitioners' Controllers Institute (CI), the University of Amsterdam and Nyenrode University entitled "Performance Management in the Netherlands". The CI agreed to support this study due to its relevance for practicing financial managers and made its member list available for research purposes. The joint research project consisted of three separate related studies, one of which concerned this dissertation. For each of the three studies, a different questionnaire was sent out. A significant part of the three

questionnaires was identical and consisted of control questions and measures considered important for all three studies.

The rationale for selecting financial managers as respondents is as follows. Financial managers are often members of the management team and are involved in management decisions and investment decisions (confirmed by this survey). They are often personally evaluated and rewarded based on business unit financial or operational results. Moreover, previous research has found that managers who engaged in earnings management for the purpose of presenting better short-term results more often engaged in operational earnings management (e.g., expediting sales or shipments, lowering service levels or quality) than in financial earnings management (e.g., shifting funds between accounts, early recognitions of profits). The reason for this was that generally speaking they were unable to engage in these budget games because they lacked the authority to do so (Merchant 1989). Several hypotheses developed in chapter three relate to data manipulation – the sample of managers for the survey should therefore be able to affect this variable. As financial managers generally have the authority, opportunity and potentially the incentive to engage in this type of behavior, and because they are often involved in decision-making, they are considered appropriate subjects for this study.

Financial managers form a relatively diverse group of managers, with a broad possible range of tasks, and care should therefore be taken in the selection process. This study requires respondents that are involved in decision-making processes. Accordingly, the subsample of financial managers from the CI's member list was selected in the following way. A relatively homogenous group of respondents was obtained by selecting only those members of the CI who had the word "controller", "control", "management accountant", "management accounting" and "management reporting" in their job title. Members who were employed as "internal controllers" (Dutch: interne controle) were deleted, as the field of internal control in the Netherlands is traditionally much more focused on internal procedures and regulations than on performance measurement and management control in the broader sense of this dissertation. This selection process based on key terms also meant that members with job titles such as "financial reporting" (expected to be more oriented towards external reporting or bookkeeping only), "consultant" or "financial analyst" were not considered as respondents.

Furthermore, the intended sample addressed managers at middle-management levels. Financial managers who appeared to be working at the highest organizational levels, such as those with the job title Chief Financial Officer (CFO) and those who worked for a holding, were omitted. Subsequently, the *Amadeus* database was used to select only those financial managers working in companies that employed 250 employees or more. Not-for-profit companies were excluded as were financial managers residing or

working abroad. The procedure outlined above resulted in a group consisting of 1063 managers. A sample of 310 respondents was subsequently selected from this group of managers meeting the selection criteria. The final sample of 310 was randomly selected as much as possible, given the constraints of the project[6].

Summarizing, this study uses a sample of 310 members of the CI who are working as financial managers, who work for a company with 250 employees or more, and who work and live in the Netherlands.

## 4.3 Preparation, pre-testing, and design

The questions in the survey were worded in Dutch. This corresponded with the study being framed as part of an overall project on management control in The Netherlands, which was one of the selling arguments for enhancing the response rate. Several researchers that were experienced in reading and writing in English, including three professors, gave their opinion on the design of the questionnaire and the translation of items from existing constructs. They provided some valuable comments on the translation of certain items, but generally indicated that the design was acceptable.

The questionnaire was pre-tested in a group of second-year students in the Registered Controller program at the University of Amsterdam, who were also working as (assistant) financial manager. For their participation, they received an incentive (a cinema coupon of € 7,50 for one hour) and they were promised a summary of results if they were interested. The participants were asked to fill out the questionnaire in the presence of the researcher and to indicate if anything was unclear, ambiguous or if they were unable to answer a specific question. Afterwards, the layout, wording and content of the questions was discussed. This pretest lead to minor changes in the wording of some questions and also pointed out that the questionnaire was quite long.

The final design of the questionnaire was in accordance with Dillman's (2000) Tailored Design Method. It was a 16-page A4-booklet which was printed on high quality environmentally friendly (A3-size) paper with a cover of slightly heavier paper. The front

[6] One of the three studies in the overall project addressed a smaller sample of specific manufacturing firms only, which were selected through a different procedure. As a result, after random selection of respondents for the survey study described in this chapter, some subjects were selected to participate in two studies, which was deemed undesirable. These duplicates were allocated to one of the two studies. Respondents that were lost for the survey study described in this dissertation because they were assigned to the other study, were replaced by subjects from the same sector as much as possible. Also, where possible, a respondent from the same company was selected. This procedure, although not totally random, can be expected to have prevented any obvious bias in the sample.

cover stated the name of the overall project "Performance Management in the Netherlands" and the subtitle of this specific study, "Performance Measurement and Evaluation" (Dutch: "Prestatiemeting- en beoordeling"). To emphasize the importance of the project and the support it received, it also showed the logos of the three institutions supporting the project. The first two pages of the questionnaire provided instructions for filling out the questionnaire. It was also stated that it would take an estimated 30 minutes to complete the questionnaire, that respondents could indicate their interest in receiving a summary of the research findings at the end of the questionnaire, and it provided details on how to contact the researcher at his working address in case there were any questions. In addition, the first pages promised confidentiality of the data provided and stated explicitly that the data would only be available to the academic researchers, and not to anyone within their own organization nor to the CI. On the last page a space was provided to the respondent for making comments on the questions or providing clarifications about answers provided. The back cover page contained the questionnaire's number, which was used to identify the type of company the respondent was working for and to facilitate the follow-up procedures outlined below. A comment was added that indicated that the coding would not violate the confidentiality and anonymous treatment of responses, but was only used for administrative reasons.

## 4.4 Procedure

The survey procedure was also mostly in accordance with Dillman's (2000) Tailored Design Method.

The first step of the research project was the publication of an article authored by the research group which announced the overall project and explained its relevance for practice, while taking care not to divulge the exact purpose of any of the separate studies (Bouwens et al. 2003). This article was published in the professional magazine covering control topics that all members of the CI receive monthly. This made it likely that respondents who received a questionnaire remembered the study and its relevance and it could lead them to be more inclined to respond. The article replaced a pre-notice letter.

The questionnaire was sent the month after the publication of the article as part of a complete package. Apart from the questionnaire itself, this package consisted of a pre-stamped return envelope with the logo of the University of Amsterdam which was labeled with the working address of the researcher. It contained a high-quality Parker pen (value: € 2,50). A cover letter printed on stationary of the CI was included that was hand-signed by the researcher. The cover letter explained the relevance and purpose of the study, emphasized anonymity in the same way as described before and indicated the support by the professional organization for the study. To prevent damage to or loss of

the pen, the complete package was sent in a tough cardboard envelope with the Institute's logo on the front.

Approximately two weeks later, a postcard was sent to every subject, which thanked them in case they had already completed and returned the questionnaire and otherwise requested them to do so. Approximately two and a half weeks after that, a replacement questionnaire was sent only to those subjects who had not responded yet. The replacement questionnaire was part of a package which contained a cover letter similar to the first in all essential aspects and which was sent in an envelope of the CI. A copy of the article explaining the relevance of the project was attached to remind subjects of its importance.

Starting approximately three weeks later, attempts were made to contact the subjects that still had not responded by telephone at their working address, in order to inquire about the reasons of their non-response and to try to persuade them to participate. A few respondents indicated that the questionnaire was not applicable in their specific situation, for instance in case they were financial manager for a specific project. It was also found out that some respondents had changed job or were no longer working for the same company. Otherwise, respondents did not indicate, even when explicitly asked, any problems with the layout, structure or content of the questionnaire. The most commonly heard reason for non-response was “no time” or “other priorities”. Finally, an e-mail was sent to those respondents who still had not responded and could not be contacted by phone, asking them one last time if they would be willing to participate.

## 4.5 Response rate

A total of 310 questionnaires were sent out. During the final phase of the survey, the CI was asked to provide an update on the data of the respondents in order to contact them by telephone at their current working address. In the time between sending out the questionnaire and the final follow-up, the Institute had conducted its annual survey to update its member database.

It was found that 32 respondents appeared to have changed company. Of these 32, three respondents had changed their company name to that of a different unit within the same conglomerate, so effectively their company was unchanged – leaving 29 (or 9.4% of the 310 surveys sent out) with a real change of employer. These changes in company were viewed as randomly occurring across suitable companies and industries and therefore these respondents were considered suitable. However, four subjects no longer met the selection criteria. One subject changed to a job in the non-profit sector and one was now working and residing abroad. Two subjects were now working for a company that employed less than 250 employees. These four subjects reduced the effective sample size to 306. Furthermore, telephone calls to the office numbers of non-respondents

revealed that an additional eight subjects were no longer working in the same company. Their new working address could not be traced because they had not sent an update to the CI. These subjects were treated as inactive members of the CI and therefore considered inappropriate subjects, reducing effective sample size further to 298.

In addition, some subjects had changed job (sometimes also to another company) and were no longer employed as financial managers. One was now an interim manager, one a consultant, one a private businessman, one an investment manager, one a director of company management, one an interim manager and advisor, and one a work stream manager managerial reporting. Because these subjects were not in the target population of financial managers, they reduced effective sample size by a further seven subjects to 291.

The number of questionnaires that was returned is 162 (full sample size). Gross response rate, based on the original number of questionnaires sent out, is therefore 52% (162/310). However, eleven of the questionnaires that were received needed to be excluded for hypotheses testing because the respondents no longer met the selection criteria, leading to a reduced sample size of 151. If this number is divided by the corrected effective number of possible respondents, the effective response rate also amounts to 52% (151/291). The sample of 151 is used for hypothesis testing.

## 4.6 Sample descriptives

Descriptive statistics regarding the respondents to the survey are summarized in table A1-1 in appendix A1. On average, respondents were 38.3 years old and had been working for their current company for 6.3 years. They had been working for 3.5 years for the same organizational unit, and for 3.0 years in a similar type of function on average. Male respondents comprised 88% of the sample. Respondents reported some influence on the design of the incentive system, but more influence on the design of the performance measurement system (means of 2.01 and 2.99 on a five-point scale, respectively). Importantly, for effects of PMS properties are likely to be stronger in case of stronger incentives, a significant part of the respondents' reward is variable (17.4% on average). It is also noteworthy that respondents received negligible proportions of their reward in stock-based form – which demonstrates that effects of stock-based rewards on MTO, if any, are not likely to taint results. In fact, 72% of respondents received no such rewards whatsoever. Respondents further reported that they were working for an organizational unit that employed 2577 employees, within a company that employed 37960 people on average. The companies were active in the sectors of production (32%), trade (16%), financial services (20%) or other services (32%). Refer to table A1-2 (in appendix A) for the company descriptives.

Of specific interest given the purposes of this study is the task package of the respondents, which should be relevant in relation to the dependent variable, MTO. Table A1-3 in appendix A1 contains a summary overview of data on the respondents' tasks. It shows that 99% of respondents had at least some type of managerial tasks. The average share of the management-supporting task of the responding financial managers in their total task package was 39%, which was more than any of the other tasks. Furthermore, 66% was a member of the management team, while 70% of respondents were explicitly involved in decision-making regarding investment projects. This clearly demonstrates that the responses that were obtained are relevant to the issue at hand and can be used to test the model as developed in chapter 3.

## 4.7 Measurement instruments

The measurement instruments were taken from prior literature as much as possible. For multi-item instruments, this section also reports the results of a reliability and factor analysis[7]. For newly developed scales, the decision to retain or discard items is largely based on the results of these analyses. For existing constructs, the analyses are reported as a first exploration of the data, but all items are retained. This decision is based on the desire to maximize the comparability of the results of this study to those of previous studies. Additionally, the data-analysis technique employed to test the hypothesized theoretical model (PLS, see paragraph 4.10.2) takes the exact factor loadings of every item into account when estimating the path values. This makes discarding items based on separate factor analyses beforehand unnecessary.

Although the questionnaire contained more questions, only those that are relevant for this study are described below.

### *4.7.1 Managerial time orientation*

The dependent variable MTO was measured by an instrument based on that developed by Lawrence and Lorsch (1967). This instrument asks the respondent to *"indicate the percentage of time spent on activities that will show up in the profit and loss statement after (a) one month or less, (b) between one month and one quarter, (c) between one quarter and one year, and (d) between one and five years"*. Percentages should sum up to a total of 100%.

Merchant (1990), Van der Stede (2000) and Moers (2001) have subsequently used the same instrument. In their empirical analyses, these researchers have used the items that refer to a period of less than one year (items *a-c*) to represent a managerial short-term orientation.

[7] Based on the full sample of all returned questionnaires (162).

This study uses the same question with one adaptation: an item *(e) longer than five years* was added. The addition of this item is based on the argument that there is no a-priori reason to expect that no manager will be engaged in any activity with a horizon beyond five years. Excluding this category would force the respondents to allocate 100% among the remaining categories, which could distort measurement if some of their activities actually have a longer horizon. In that case, respondents could decide to exclude those activities and proportionally increase the percentages allocated to all other periods. The construction of the MTO variable as in previous studies would then inflate the short-term orientation. Percentages allocated to items *d* and *e* were summed to provide a measure of the length of the MTO for this study. A higher score thus indicated a longer MTO.

### *4.7.2 Data manipulation*

Accounting data manipulation was measured by a set of items based on the scale previously used by Merchant (1990). Respondents were asked how often they engaged in four budget-related potentially dysfunctional behaviors. A sample item is "*shifting funds between accounts to avoid budget overruns"*. Answers were given on a fully anchored 5-point Likert scale, ranging from *1=(almost) never* to *5= very often*. Table A2-1 in appendix A2 shows all four items and demonstrates that only one component was extracted using principal component analysis. Cronbach alpha for this four-item scale was 0.56 – this reliability coefficient has a generally accepted minimum acceptable level of 0.7, which may be lowered to 0.6 in exploratory stages of research (Hair et al. 1998, p.118). Although the alpha was somewhat too low, also in view of the one-factor structure that was obtained, it was decided to retain all items.

### *4.7.3 Propensity to leave*

The measurement scale for propensity to leave was partly taken from previous psychological studies (Martin and Hunt 1980; Rahim and Afza 1993). Item *(a)* read *"If circumstances permitted, I would jump at the chance to accept another job in another organization"* and item *(b)* was *"If I were completely free to choose, I would continue working in this organization"*. Two additional specifically designed items were added to this scale, for the following reasons. First, it can be expected that promotion opportunities within the company would significantly influence intent to leave while the existing instrument failed to capture this. Secondly, the existing items focused only on changes in company, while a change in function within the same company could be expected to have similar effects. The two items that were added are *(c) "My promotion opportunities within this company are excellent"* and *(d) "I expect to keep working in my current function for a long time"*. Subjects were required to indicate their agreement with the statements on a fully anchored 5-point Likert scale ranging from *1=strongly disagree* to

*5=completely agree*. Items *b-d* were reverse coded. Only one component was extracted using principal component analysis; see table A2-2 in appendix A2. Cronbach alpha for this scale was acceptable at 0.72.

### *4.7.4 Individual time orientation (CFC)*

The measurement scale for the construct Consideration of Future Consequences (CFC) as developed by Strathman et al. (1994b) was selected as a measure of individual time orientation (see § 3.3). The CFC construct *"refers to the extent to which individuals consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes. It involves the intrapersonal struggle between present behavior with one set of outcomes and one set of future outcomes."* (Strathman et al. 1994b, p.743). The instrument focuses on behavioral consequences and is one of the most commonly used with respect to time orientation (Petrocelli 2003).

Although previously validated in a limited sample by Strathman et al. (1994b), Petrocelli (2003) recently conducted a large-scale study designed to further validate this twelve-item measurement scale. He found a two-factor structure. The first of these factors consists of the reversed items plus item *b*, and deals with the focus on short-term outcomes. The remaining (non-reversed) items load on the second factor which represents concern with future consequences. The first factor, consisting of 8 items, was found to exhibit the best properties. The existence of a two factor structure indicated that the two factors are not exactly each others reverse, in other words a lack of focus on short-term results does not automatically imply high concern with future consequences (Petrocelli 2003).

Table A2-3 in appendix A2 contains details on the items and loadings in the initial factor analysis, which revealed five factors. No clearly distinguishable pattern emerges, except that some of the reversed items load together. However, when a two-factor structure was imposed, results were similar to those of Petrocelli (2003), except that item *f* did not load on any of the two factors and item *b* did not load on the same factor as the reversed items (see table A2-4 in appendix A2). In sum, all non-reversed items except item *f* loaded on one factor and all reversed items loaded on the second factor when two factors were imposed. Cronbach alpha for the complete scale including all items had a value of 0.63. Despite some unclarity in the factor structure, given the acceptable alpha value and the previous use and validation of the scale, all items were retained for further analyses.

### *4.7.5 Performance measure properties*

Ease-of-manipulation and degree of lead are two performance measure properties on which hypotheses were drafted.

*Ease-of-manipulation* was measured by three items, which were part of a set of statements placed in the same table with items that measured other properties of the PMS. The table referred to the most important accounting performance measure on which the subject was being evaluated, as indicated in an open question by the subject. The items for ease-of-manipulation (*a-c*) related to the objectivity and verifiability of the measure and were based on the property of *accuracy* as developed by Merchant (1989). The same table also contained three items measuring sensitivity (*d-f*), three items measuring controllability (*g-i*), and three items (*j-l*) regarding the emphasis placed on the measure for evaluation purposes. Although not all properties were used in this study for hypothesis testing, all items are shown here to be able to investigate whether respondents were able to distinguish between these characteristics. Results were almost entirely as expected, showing a four-factor structure; the only unexpected result was that item *i* did not load on the same factor as the other items measuring controllability. Regarding the ease-of-manipulation property which is used in the theoretical model for this study, the three items designed to measure it loaded on the same separate factor. This scale had an acceptable Cronbach alpha of 0.69. For an overview of the items and factor scores, see table A2-5 in appendix A2.

*Degree of lead* was measured with an open question, asking for the *average number of months it would take for a change in the level of the most important operational measure to affect profit levels*. Usable responses were carefully determined based on the most important non-financial measure that respondents had provided in a previous open question. Only those respondents that were evaluated based on measures related to the business process (such as product quality) were considered viable responses, while others that were primarily rewarded based on personal or administrative objectives (such as the quality of internal reporting), which are not theoretically linked to MTO, were omitted from further analyses.

### *4.7.6 Other PMS properties*

Three further characteristics of the PMS were measured.

*Subjectivity* was measured by an instrument which was developed based on the elements of subjective evaluation described by Gibbs et al. (2004). Each of the causes of subjectivity was translated into an item for the measurement scale. The three items were the following: *(a) "The criteria used in my evaluation are subjectively determined with hindsight by my supervisor"; (b) "My evaluation and compensation are dependent on subjective judgments about my performance"; (c) "My own performance as well as other factors are taken into account in my evaluation"*. Respondents were asked to indicate

their level of agreement with these statements on a 5-point Likert scale. Principal component analysis revealed that items *a* en *b* loaded on the same factor, while item *c* did not (see table A2-6 in appendix A2). It would seem that although the use of subjective evaluations creates the possibility for the supervisor to take factors outside the manager's influence into account, this is not often the case. Item *c* was therefore omitted from further analyses. Cronbach alpha for the reduced scale consisting of items *a* en *b* was 0.71.

Second, the *evaluation period* length was determined by asking respondents an open question to indicate how often a report was made regarding the most important accounting measure they were evaluated on ("..once per _____").

Finally, *slack* was used in the analyses as a control variable, because previous research indicates it that affects MTO (Van der Stede 2000). Because it may also affect data manipulation, a link with that variable was also included in the model. Slack was measured with the five items previously used by Van der Stede (2000), all on a five-point Likert scale. Refer to table A2-7 in appendix A2 for details on items and factor loadings. In spite of the fact that factor analysis reveals two factors, it was decided to retain all the original items. Cronbach alpha for the entire scale was acceptable with a value of 0.60.

## 4.8 Descriptive statistics

Table 4-1 below presents descriptive statistics for the measurement instruments described above. Values for variables that were measured by a multi-item Likert-scale were constructed by calculating the mean score for all items. This way of constructing a variable as opposed to the use of factor scores is often the most suitable, especially when generalizability or transferability are desired (Hair et al. 1998, p.120).

**Table 4-1:** Descriptive statistics for survey measurement instruments

| *Variable* | *n* | *Unit of measurement* | *Theoreti-cal range* | *Actual range* | *Mean* | *Median* | *Standard deviation* |
|---|---|---|---|---|---|---|---|
| MTO | 136 | % | 0-100 | 0.00-100.00 | 26.88 | 20.00 | 24.67 |
| Degree of lead | 69 | months | ≥1 | 1.00-36.00 | 8.24 | 6.00 | 6.54 |
| Evaluation period | 103 | days | ≥1 | 14.00-365.00 | 86.96 | 30.42 | 120.93 |
| Subjectivity | 150 | Likert-scale | 1-5 | 1.00-5.00 | 3.06 | 3.00 | 0.88 |
| Data manipulation | 148 | Likert-scale | 1-5 | 1.00-2.67 | 1.24 | 1.17 | 0.27 |
| Ease-of-manipulation | 88 | Likert-scale | 1-5 | 1.33-5.00 | 2.42 | 2.33 | 0.73 |
| Propensity to leave | 148 | Likert-scale | 1-5 | 1.50-5.00 | 2.80 | 2.75 | 0.69 |
| CFC | 148 | Likert-scale | 1-5 | 3.00-4.75 | 3.72 | 3.67 | 0.33 |
| Slack | 147 | Likert-scale | 1-5 | 1.2-4.0 | 2.34 | 2.40 | 0.51 |

Based on 151 questionnaires.

The following general observations are apparent from the data. The median respondent devoted 20% of time spent to long-term (>1 year) issues (MTO-variable). If a leading indicator was used in the managers evaluation system, the median time lag until it affected financial performance was 6 months (degree of lead variable). Median and most common evaluation interval for accounting measures was 1 month (30 days). Respondents did not report a high level of data manipulation on average, possibly due to reasons of social desirability or to high levels of professional ethics. However, the range of responses on this variable was not too limited (1-2.67).

It should be noted that the number of observations was (much) more limited for some variables than for others. Not all respondents were evaluated based on a leading and an accounting measure. As a result, the number of observations is lower regarding evaluation period, ease-of-manipulation, and especially degree-of-lead. The non-use of certain PMS elements is be expected given the degrees of freedom that companies enjoy when designing a PMS. The conclusion of this chapter and of this dissertation (chapter 6) provide more details on the resulting limitations.

## 4.9 Non-response analysis

To test whether the sample exhibits a non-response bias, early respondents were compared to late respondents with respect to differences in the variables of the theoretical model. Late respondents are assumed to be more likely to represent non-respondents, which means that significant differences between early and late respondents imply a biased sample.

The sample was split at the median response date (17-06-2003)[8]. Table A3-1 in appendix A3 shows the results of an independent t-test that tests for significant differences in the means of the variables between the two groups. Results indicate the absence of any significant difference between early and late respondents. The use of the non-parametric test Mann-Whitney U-test (see table A3-2 in appendix A3), which tests whether two independent groups are likely to originate from the same sample, provides similar results.

In sum, there is no apparent evidence of any non-response bias in the sample.

[8] The three responses received on that date were omitted from the non-response analysis.

## 4.10 Results

### *4.10.1 Correlations*

Table 4-2 below presents bivariate correlations among the dependent and independent variables that are included in the theoretical model. These correlations provide a first opportunity to explore the hypotheses.

**Table 4-2:** Correlations

| *Variable* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* |
|---|---|---|---|---|---|---|---|---|---|
| 1. MTO | | **0.26** | 0.02 | 0.09 | 0.04 | -0.10 | -0.10 | **0.21** | 0.13 |
| | | ***0.040*** | *0.868* | *0.284* | *0.673* | *0.357* | *0.274* | ***0.013*** | *0.150* |
| | | 64 | 97 | 136 | 135 | 86 | 135 | 135 | 135 |
| 2. Degree of lead | **0.45** | | 0.05 | -0.08 | -0.01 | -0.16 | -0.02 | -0.10 | 0.03 |
| | ***0.000*** | | *0.707* | *0.505* | *0.960* | *0.294* | *0.900* | *0.434* | *0.799* |
| | 64 | | 56 | 69 | 68 | 45 | 68 | 68 | 68 |
| 3. Evaluation period | 0.11 | 0.16 | | **-0.16** | -0.04 | 0.11 | 0.10 | -0.15 | 0.09 |
| | *0.308* | *0.235* | | ***0.098*** | *0.718* | *0.308* | *0.317* | *0.128* | *0.362* |
| | 97 | 56 | | 103 | 101 | 86 | 101 | 101 | 101 |
| 4. Subjectivity | 0.13 | -0.02 | -0.10 | | 0.08 | 0.16 | **0.28** | **-0.20** | **0.25** |
| | *0.126* | *0.845* | *0.314* | | *0.342* | *0.130* | ***0.001*** | ***0.015*** | ***0.003*** |
| | 136 | 69 | 103 | | 148 | 88 | 148 | 148 | 147 |
| 5. Data manipulation | -0.01 | -0.08 | 0.01 | -0.00 | | **0.33** | **0.24** | -0.09 | 0.07 |
| | *0.889* | *0.532* | *0.953* | *0.991* | | ***0.002*** | ***0.003*** | *0.274* | *0.387* |
| | 135 | 68 | 101 | 148 | | 86 | 148 | 148 | 147 |
| 6. Ease-of-manipulation | -0.07 | -0.21 | 0.14 | 0.10 | **0.31** | | **0.33** | -0.05 | **0.26** |
| | *0.530* | *0.169* | *0.197* | *0.346* | ***0.004*** | | ***0.002*** | *0.623* | ***0.018*** |
| | 86 | 45 | 86 | 88 | 86 | | 86 | 86 | 86 |
| 7. Propensity to leave | -0.07 | -0.07 | 0.07 | **0.29** | **0.23** | **0.28** | | -0.11 | 0.11 |
| | *0.400* | *0.554* | *0.498* | ***0.000*** | ***0.004*** | ***0.009*** | | *0.170* | *0.172* |
| | 135 | 68 | 101 | 148 | 148 | 86 | | 148 | 147 |
| 8. CFC | **0.19** | -0.09 | -0.13 | **-0.19** | **-0.17** | -0.08 | -0.11 | | -0.04 |
| | ***0.029*** | *0.474* | *0.185* | ***0.023*** | ***0.040*** | *0.456* | *0.187* | | *0.600* |
| | 135 | 68 | 101 | 148 | 148 | 86 | 148 | | 147 |
| 9. Slack | **0.16** | 0.03 | 0.04 | **0.28** | 0.01 | **0.18** | 0.13 | 0.01 | |
| | ***0.065*** | *0.817* | *0.710* | ***0.001*** | *0.864* | ***0.098*** | *0.116* | *0.874* | |
| | 135 | 68 | 101 | 147 | 147 | 86 | 147 | 147 | |

Reported are correlation coefficients, below that the corresponding *p-value* (two-tailed) and n. Correlations that are significant at the 10% level are indicated in boldface. Figures below the diagonal are Pearson correlation coefficients, above the diagonal Spearman correlation coefficients (nonparametric).

First, the hypotheses about the variables that directly affect MTO are evaluated. Based on the Pearson correlations in the first column, degree of lead and CFC are positively and significantly related to MTO. This provides preliminary evidence in support of hypotheses 1 and 7. Hypothesis 4 regarding subjectivity can also be considered supported, albeit weakly, with a marginal significance level of just above 10% (two-tailed; one-tailed p-value for hypothesis testing is 0.063). Hypotheses 2, 5b and 6, however, which predicted direct effects of the evaluation period, data manipulation and propensity to leave, do not appear to hold based on the insignificant values of their correlations with MTO. Hypothesis 3 refers to an interaction and cannot be tested by the data in the table.

The remaining hypotheses referred to effects among independent variables. The significant correlation between ease-of-manipulation and data manipulation supports H5a. Hypothesis 5c, however, which predicted an effect of ease-of-manipulation on the level of subjectivity, does not appear to hold based on the insignificant correlation between these variables. This is inconsistent with the findings of Gibbs et al. (2004). Hypothesis 5d also does not appear to hold based on the insignificance of the correlation between subjectivity and data manipulation. Regarding the effect of the control variable slack, the positive correlation with MTO is in line with findings from previous research (Van der Stede 2000).

Any conclusion based on bivariate correlations only should be made very cautiously. Preferably, all relations between variables should be considered simultaneously. Furthermore, the preliminary conclusions drawn based on these correlations sometimes differ when Spearman instead of Pearson correlations are analyzed – this is especially true with regard to the subjectivity variable.

Finally, there is no apparent problem of multicollinearity given the low values of the correlations among independent variables.

### *4.10.2 Partial Least Squares analysis of the model*

The model was analyzed using the Partial Least Squares (PLS) technique, which is a specific form of structural equation modeling (SEM). PLS is a combination of factor analysis, representing the relation between constructs and measures, and path analysis of the structural relations between constructs (Fornell and Larcker 1981). It provides estimates of standardized regression path coefficients and calculates factor loadings and weights of indicators of constructs, as well as an $R^2$ for dependent variables (Chin 1998; Sosik and Godshalk 2000). In fact, the primary objective of PLS is the maximization of variance explained for all endogenous constructs (Hulland 1999). Several reasons arise to select the PLS-method for this study. No assumptions regarding data distribution, observation independence and variable metrics underlie this method. This makes PLS a well-suited method for statistical testing of theoretical models in early stages of development and small sample sizes, as is the case in this study. Traditional SEM-techniques (like LISREL) are less applicable since they assume a specific multivariate data distribution and require a larger sample size (Chin 1998; Chin and Newsted 1999).

The model was tested using the PLS-graph 3.0 software developed by Chin (2001). The original measurement scales as used in previous research and described above were first entered unaltered. The results that were obtained are displayed in figure 4-1.

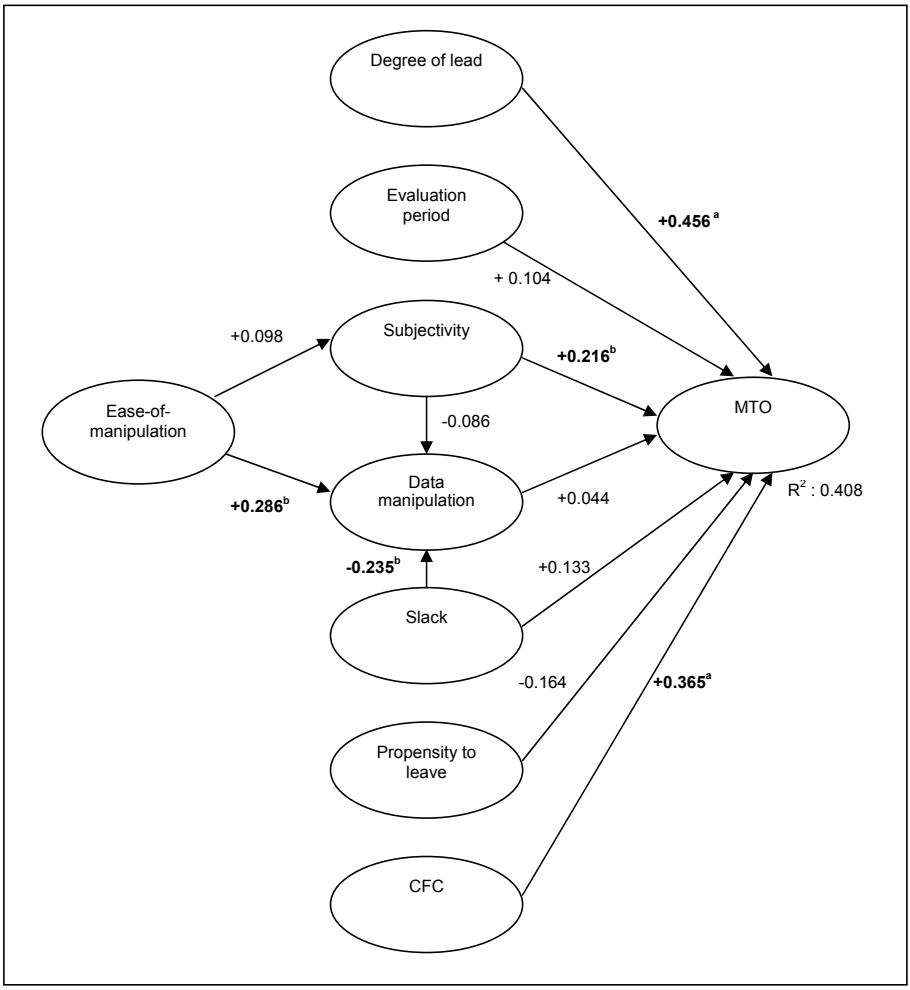



**Figure 4-1:** PLS results
[a] p<0.01; [b] p<0.05 (two-tailed).

The model includes all independent variables, as well as the control variable slack. The interaction between degree of lead and evaluation period is not included due to data limitations. The number of observations on this interaction term is much lower than for the other variables, which results in difficulties when interpreting results[9]. As a consequence, the interaction predicted in H3 is tested separately (see next subparagraph).

[9] To test for the interaction, the data was standardized, which yields results comparable to those in figure 4-1. When the interaction is included, however, almost all significant paths become insignificant. Given the correlations (see table 4-2) and the fact that the significance of the paths in figure 4-1 is insensitive to

The results appear to confirm H1, which predicted a positive effect of degree of lead on MTO. This main effect should be interpreted carefully, however, because the strength of this effect was hypothesized to depend on evaluation period length, and the interaction was not included. The data also show a positive and significant effect of both subjectivity and CFC on MTO, thus confirming H4 and H7. The other hypothesized effects on MTO were not confirmed by the results. Finally, significant results regarding budget data manipulation demonstrate that it is influenced negatively by budget slack and positively by ease-of-manipulation, as expected in H5a. The model explains 40.8% of the variance in the dependent variable MTO.

With the PLS method, path coefficients and item loadings are simultaneously estimated. The obtained PLS output therefore provides another opportunity and imperative to investigate measurement issues, and to improve measurement instruments.

With respect to *reliability*, the factor loadings of individual items should be assessed (see table A4-1 in appendix A4). Not entirely surprising given the results obtained in § 4.7, which indicated multidimensionality of some scales, many item loadings fall short of the desired minimum loading of 0.5 (Chin 1998; Hair et al. 1998). This applies especially to the CFC and slack constructs. Internal composite reliability of the measurement scales, a measure similar to the Cronbach alpha except that it does not assume equal weights for all indicators, is at acceptable levels (>0.5) for all constructs. Average Variance Extracted (AVE), which is the average proportion of variance that a construct shares with its measures, however, falls short of the minimum acceptable level of 0.5 (Hair et al. 1998) for four of the constructs (data manipulation, propensity to leave, CFC, and slack).

A second measurement validity issue relates to discriminant validity. Discriminant validity is achieved when items measure only the specific construct they are designed to measure, and do not exhibit a high degree of overlap with other constructs (Chin 1998; Smith et al. 2001). Table A4-2 in appendix A4 provides cross-loadings of all measurement items on the latent PLS-variables. From the rows of the table, it is apparent that there are a few items that load higher on a construct they were not designed to measure than on their own construct. This is the case for item *f* of the CFC construct, and for items *b*, *c* and *d* of the slack construct. Additionally, an analysis of the table columns reveals that item *d* of the propensity to leave construct loads lower on its own construct than several other items that belong to other constructs (see column for variable 4). Table A4-3 also provides evidence on discriminant validity. This table displays correlations

adding or omitting any other path, the results in figure 4-1 can be interpreted with confidence. The most likely cause for the dramatic drop in significance due to the inclusion of the interaction term are data limitations.

between latent PLS-variables and square roots of the AVE for each variable. When the square root of AVE is larger than any of the correlations, more variance is shared by the items intended to measure the construct than with any other construct (Chin 1998). The data in table A4-3 do not indicate any problems regarding discriminant validity.

In order to address the measurement validity issues that arose above, several constructs were improved by omitting items. Table A4-4 in appendix A4 shows the new factor loadings (above >0.7 as selection criterion), internal composite reliability and average variance extracted values after item trimming. The values for these measures are now all at at least acceptable levels. Discriminant validity is also excellent (tables A4-5 and A4-6 in appendix A4). Figure A4-1 displays results for the new measurement model. The model now accounts for 33.8% of the variance in the dependent variable MTO. Importantly, results regarding the hypotheses are essentially unchanged, except for a drop in significance levels for the degree of lead and subjectivity constructs.

Sensitivity analyses further show that results also remain essentially unchanged when the control variables organizational size, strategy or industry are introduced[10] (not reported).

To sum up, PLS results confirm H4, H5a and H7. Subjectivity and CFC positively affect MTO, and ease-of-manipulation increases data manipulation. However, the predicted effects of ease-of-manipulation on subjectivity (H5b), subjectivity on data manipulation (H5c) and of data manipulation on MTO (H5d) were not confirmed. Further, propensity to leave did not significantly affect MTO, which fails to support H6.

Finally, results seem to confirm H1 which stated that degree of lead positively affects MTO. There is no main effect of evaluation period length (no support for H2). Conclusions should be drawn cautiously with regard to these two independent variables, however, because the strength of the effect of degree of lead was predicted to depend on evaluation period length. This interactive effect is investigated in the next subparagraph.

Further discussion of the results is deferred to the conclusion of this chapter.

[10] Paths between these control variables and MTO were introduced in the model. See appendix A5 for measurement of these variables.

### *4.10.3 Tests for interaction H3*

The interaction between degree of lead and evaluation period length, as predicted in H3, is investigated below. First, a regression analysis was performed – see table 4-3.

**Table 4-3:** Regression analysis; dependent variable = MTO.

| *Variable* | *Expected sign* | *Standardized ß-coefficient* | *p-value* |
|---|---|---|---|
| *Constant* | | | 0.000 |
| Degree of lead (L) | + | +0.04 | 0.823 |
| Evaluation period (P) | + | +0.05 | 0.805 |
| Interaction (L x P) | + | +0.48 | **0.044** |

n = 52. F-value = 6.473 ( p=0.001). Adj. $R^2$ = 0.24.
The analysis is based on standardized variables.

It can be concluded from the significant ($p<0.05$) interaction term that the effects of degree-of-lead and evaluation period on MTO are interdependent. The positive sign of the interaction coefficient is consistent with the prediction that a higher degree-of-lead lengthens MTO more in case of a long evaluation period than in case of a short evaluation period, as displayed in figure 3-3.

The regression was re-run including organizational size, strategy, and industry as control variables – see table A5-1 in appendix A5. Results were essentially unchanged.

A further exploration of the nature of the interaction was conducted. To enable further testing, the two independent variables were dichotomized. Degree-of-lead was split at the median (6.00). The evaluation period was divided into a group shorter and a group longer than semi-annually[11]. Table 4-4 shows that, consistent with the expectation in H3, correlation coefficients are much higher in case of a long evaluation period than in case of a short evaluation period (table shows two-tailed sign. levels).

**Table 4-4:** Correlations between degree of lead and MTO

| | | ***Correlation between degree of lead and MTO*** | |
|---|---|---|---|
| | | Pearson | Spearman |
| ***Evaluation period*** | SHORT | 0.080<br>p = 0.601<br>n = 45 | 0.115<br>p = 0.454<br>n = 45 |
| | LONG | 0.753<br>p = 0.051<br>n = 7 | 0.734<br>p = 0.060<br>n = 7 |

[11] 1,0% of respondents reported a two-weekly evaluation interval, 75,7% a monthly interval, 7,8% a quarterly interval, and 15,5% of respondents were anually evaluated. No respondents indicated an evaluation period length in the relatively long range between quarterly and annually, such a semi-annually. Consequently, this was the natural point at which to split the sample.

The form of the interaction is further confirmed by ANOVA-analyses. A full-factorial ANOVA confirmed the interactive effect - see table A6-2 in appendix A6. A significant one-way ANOVA (F=6.803, p=0.001) also indicated that there are differences in the mean value for MTO between the four subgroups that were formed based on the two dichotomized variables. The value for MTO was highest for the group with a long evaluation period and a high degree of lead (see table 4-5). This mean is significantly different from the other means at the 0.05 confidence level[12].

**Table 4-5:** Mean analysis. Dependent variable = MTO

| | | ***Degree of lead*** | |
|---|---|---|---|
| | | HIGH | LOW |
| ***Evaluation period*** | SHORT | Mean: 27.98<br>n = 23 | Mean: 22.05<br>n = 22 |
| | LONG | Mean: 63.00<br>n = 5 | Mean: 12.50<br>n = 2 |

These results all support H3 and indicate that the positive effect of degree of lead on MTO is stronger in case of a longer evaluation period. There are a few caveats, however. First, the sample is relatively limited, with only a few observations in some subgroups. Second, the data does not meet the assumption of both regression and ANOVA analyses of a normal distribution (see figure A6-1 and table A6-1 in appendix A6). Nevertheless, the nonparametric Spearman correlations that do not assume normality also corroborate the interactive effect (table 4-4).

## 4.11 Conclusion and discussion

The results of the survey are summarized in table 4-6. The results can be classified into three groups, which are discussed below.

Hypotheses 1 through 3 relate to the combined effects of degree of lead and evaluation period. The predicted interactive effect is supported by the data, as shown in § 4.10.3. Degree of lead lengthens MTO (also supported by correlation table and PLS-results), and this effect is stronger in case of a longer evaluation period. Several limitations of these results must be acknowledged, however. First, as discussed above, limitations in the data necessitated a separate analysis of this interactive effect. This detracts to some extent from the possibility to generalize the findings to the entire population of financial managers. Moreover, the effects of degree of lead and evaluation period are likely correlated to the type of industry. Although these effects were controlled

[12] Both in post-hoc LSD and Bonferroni analyses.

for, the relatively crude proxies for industry may not have been entirely adequate for this purpose. Finally, the survey data does not shed light on the reason for the effect of degree of lead on MTO. The hypothesis regarding this variable was based on predicted cognitive effects of degree of lead, which are confounded in survey data by incentive effects. In other words, attention to long-term matters or long-term investments may have increased just because the manager maximized the leading performance measure, while the manager's horizon (MTO) was unaffected.

Given [1] that the survey results provide a first confirmation of the interactive effect; [2] limitations in the survey data; [3] a desire to confirm the cognitive effects of degree of lead; [4] a desire to control for industry effects, and [5] a desire to definitely establish causation, it was decided to conduct an additional empirical test of H1-3. The experiment that provides additional evidence on this interactive effect is outlined in the next chapter. This experiment also answers recent calls for experimental research investigating dependent variables other than performance (Sprinkle 2003).

**Table 4-6:** Results of hypothesis testing

| Hypothesis | Independent variable | Dependent variable | Predicted sign | Results |
|---|---|---|---|---|
| 1 | Degree of lead (L) | MTO | + | See H3 |
| 2 | Evaluation period (P) | MTO | + | See H3 |
| 3 | Interaction (L x P) | MTO | + | Supported |
| 4 | Subjectivity | MTO | + | Supported |
| 5a | Ease-of-manipulation | Data manipulation | + | Supported |
| 5b | Data manipulation | MTO | + | Not supported |
| 5c | Ease-of-manipulation | Subjectivity | + | Not supported |
| 5d | Subjectivity | Data manipulation | - | Not supported |
| 6 | Propensity to leave | MTO | - | Not supported |
| 7 | CFC | MTO | + | Supported |

Hypotheses 4 and 5a-d provided a set of predictions regarding subjectivity and data manipulation. Hypothesis 4 was supported, thus providing evidence that subjectivity positively affects MTO. The predicted positive effect of data manipulation on MTO, as posited by hypothesis 5b, was not confirmed. Ease-of-manipulation affected data manipulation positively, confirming H5a, but did not significantly influence subjectivity. The main conclusion from this set of hypotheses is that (possibilities for) data manipulation do not affect MTO, but subjectivity in evaluations does.

The last two hypotheses concern individual level variables. Propensity to leave had no significant effect on MTO, thus not corroborating H6. The personality characteristic Consideration of Future Consequences (CFC), on the other hand, affected MTO

positively. This implies that the selection of managers that exhibit a certain level of CFC is crucial. Thus, personnel controls (Merchant and Van der Stede 2003) may be as important in achieving a desired MTO as result controls.

The implications and limitations of the survey are discussed in more detail in chapter 6. In that concluding chapter, the experimental evidence obtained on the first three hypotheses (see next chapter) is also integrated into the conclusions.

# CHAPTER 5
# EXPERIMENTAL STUDY

## 5.1 Introduction

As described in the previous chapter, three hypotheses (H1-3) were subjected to an additional empirical test by means of an experiment. These hypotheses on the effects of degree of lead and evaluation period length were derived in chapter 3 and are re-iterated below:

*H1: A higher degree of lead of performance measures used for evaluation purposes positively affects MTO*
*H2: A longer evaluation period for accounting measures positively affects MTO*
*H3: The positive effect of degree of lead on MTO is stronger in case of a long evaluation period than in case of a short evaluation period for accounting measures*

The additional experimental test was motivated by the empirical findings from the survey (see chapter 4). Moreover, it provides the opportunity to explore the hypothesized effects without any possible confounding influence of industry. With regard to the degree of lead variable, the experiment provides the opportunity to isolate the cognitive effects of the use of leading indicators from incentive effects (increasing long-term investments for self-interested reasons). These effects are difficult to disentangle in real-world survey data. Furthermore, an added benefit of the experimental method in general is that it allows establishing causation rather than cross-sectional correlation only, as in the survey. Given the relative strengths and weaknesses of each of the different methods, researchers have called for the use of multiple methods in order to triangulate results (McGrath et al. 1982; Birnberg et al. 1990). This chapter follows that recommendation.

The remainder of this chapter outlines the experimental design (paragraph 5.2) and presents and discusses the results (paragraphs 5.3 and 5.4).

## 5.2 Experimental design

### *5.2.1 General outline*

A 2x2 between-subjects computerized experiment was designed in which the two independent variables, degree of lead and evaluation period length, were manipulated. It consisted of 16 periods in which subjects were required to make an investment decision, from which their MTO was deduced.

The experiment was conducted with student subjects from a third-year accounting course on a voluntary basis. Students were offered a course-credit as well as a financial reward for their participation. Students with knowledge of accounting and finance were considered appropriate subjects for the following reasons. The use of student subjects in experimental research regarding investment decisions has been shown to yield effects similar in direction compared to the use of practitioners (cf. Ashton and Kramer 1980; Liyanarachchi and Milne 2005). Furthermore, student subjects are often preferable when general human decision-making processes are involved, to avert any noisy influence from biases induced by individual practical experiences (cf. Libby et al. 2002).

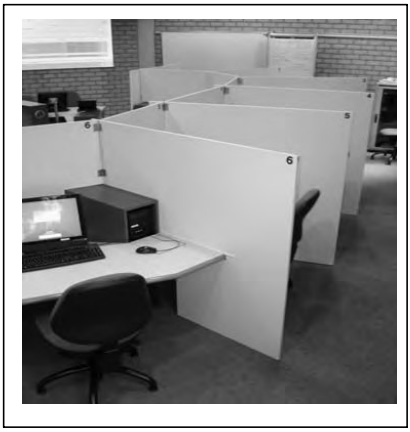


**Figure 5-1:** Physically separated individual working places in the experimental room.

The experimental procedure was as follows. Subjects were first guided to a room opposite the experimental computer laboratory. They were shown a short introductory video, in which a female presenter outlined general procedural issues during the experiment (length of the session, seating procedure, use of the computers, reward pay-out procedure, etc). Afterwards, the experimenter shuffled and then handed out envelopes containing seat numbers for the laboratory, ensuring random seating and distribution across conditions. The subjects then entered the computer room and were asked to follow the task instructions on screen. By using only video-taped and computerized instructions, no experimenter effect is likely to be present. The working places in the computer room were physically separated from each other, preventing interaction between subjects – see figure 5-1.

After every subject had completed the computer program, the rewards that were earned were paid out to the subjects. The earned amounts as well as subjects' progress during the experiment were monitored by the session leader from a central working place (displayed in figure 5-2 at the bottom left). The duration of the entire experimental session was approximately one hour.

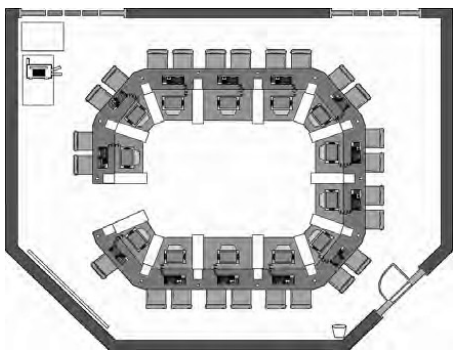


**Figure 5-2:** Schematic overhead view of the lay-out of the experimental room.

### *5.2.2 Operationalization of variables*

The dependent variable (DV), MTO, was operationalized by the amounts invested in an investment project. For determining the subject's bonus, the invested amounts were subtracted from the current-period profit. Subjects could invest low amounts, increasing their current bonus and lowering their future bonus, or high amounts that lowered their current bonus but increased future bonuses. Any amount invested yielded a positive return in the future, and increased both the subject's total bonus as well as value for the company. Higher invested amounts thus signaled a longer managerial time orientation (cf. Mannix and Loewenstein 1993; 1994).

The manipulation of the independent variables was achieved through different incentive schemes. The *evaluation period* length for accounting measures was manipulated by providing subjects with a report on their profit-based bonus either every period (short evaluation period) or only twice during the experiment, after 8 and after 16 periods (long evaluation period). In the latter case, subjects were rewarded based on the cumulative profits over the previous 8 periods (cf. Gneezy and Potters 1997). The reward paid was € 0.06 per 1000 profit. Actual profit-based rewards paid to subjects varied from € 6.74 to € 10.20 (theoretical range: 6.03-10.20), with a mean of € 8.99.

*Degree of lead* was manipulated by rewarding subjects every period based on a non-financial leading indicator that increased almost immediately (the next period) after an investment (high degree of lead), or based on an indicator with a more lagged-effect, which increased only one period before a profit increase was noticeable (low degree of lead). The measure with a high degree of lead was customer satisfaction, while the measure with a low degree of lead was customer retention. Including the leading indicator in the incentive scheme along with the financial measure was deemed necessary to make the leading measure salient.

The hypothesized effect of degree of lead was based on cognitive effects of leading performance measures. Complete evidence regarding this effect therefore requires evidence on the process through which these measures affect MTO. The experimental materials included a table which contained the lagged causal effects of an investment in the project on all performance measures. To facilitate the detection of the cognitive effect, the use of that table was recorded as a variable (see next subparagraph and instruction screen 3 in appendix B1).

Care was taken to ensure that subjects in every condition faced exactly the same project, because only when investment opportunities are equal can conclusions be drawn with regard to the same DV. This meant that subjects in all conditions saw the same table with lagged causal effects regarding the investment project - see instruction page 3 of the

experimental materials (appendix B1). It also meant that subjects could not be rewarded based on exactly the same leading performance measure. Rewarding subjects based on the same measure (for instance, customer satisfaction) with a different degree of lead would vary the nature of the project. Differences in invested amounts could then be attributed to preferences for different types of projects[13]. It was thus deemed necessary to hold the degree of lead of specific measures constant and use two different measures. Nevertheless, both measures that were used were related to the same (customer) perspective from the Balanced Scorecard, preventing any obvious bias.

Care was also taken that there would not exist a material difference in the sacrifice made for future returns between subjects in the high versus the low degree of lead conditions. If subjects in the high degree of lead condition had received a considerable bonus based on increased non-financial performance early on, they would have made less of a sacrifice than subjects in the low degree of lead conditions. This would render these conditions less comparable with respect to the DV, and hinder the detection of cognitive effects of degree of lead. Sensitivity of the bonus based on the leading indicator was therefore set at a (very) low level. This was achieved by rewarding the subjects based on the cumulative score on their leading indicators for the 16 plants they were responsible for (see experimental materials and screen examples in appendices B1 and B3). Actual rewards based on non-financial performance paid to subjects varied from € 4.14 to € 4.38 (theoretical range: 4.10-4.38), with a mean of € 4.28.

Investing in the project always cost the subject much more in current reward, due to the profit decrease, than the gain in reward based on the increased non-financial performance. The expected value of the total reward, as well as of the rewards based on profit and non-financial performance, was identical across conditions[14].

Manipulation checks were performed at the start of the experiment, where subjects could only proceed to the investment periods by answering questions on the (non)financial performance measure that formed the basis of their reward and evaluation period length correctly. If they answered incorrectly, they were automatically taken back to the instruction page of interest before given an opportunity to answer again (for the questions, see appendix B2).

[13] To be more precise, an earlier increase in customer satisfaction could be argued to be generally preferable over a later increase.

[14] Total reward (rewards based on profit and non-financial performance) varied between € 11.04 and € 14.57 (theoretical range: 10.13-14.58), with a mean of € 13.27. Rounding and timing differences led to negligible differences in pay between the low and high degree of lead conditions (approximately 3 cent or 0.2% of the mean total reward).

Conditions were labeled according to table 5-1:

**Table 5-1:** Experimental conditions

| | | *Degree of lead* | |
|---|---|---|---|
| | | HIGH | LOW |
| *Evaluation period* | SHORT | I | III |
| | LONG | II | IV |

Figure 5-3 below displays the hypotheses graphically, including the condition numbers.

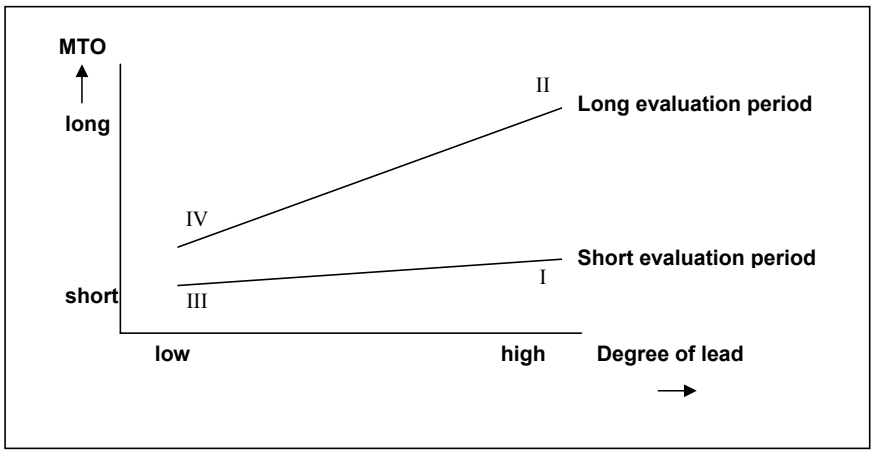



**Figure 5-3:** Interactive effect on MTO of degree of lead of leading indicators and evaluation period length for accounting measures. The Roman numbers indicate the experimental conditions.

### *5.2.3 Detailed experimental design*

The experimental design was first extensively tested by a group of 10 fellow researchers and subsequently by a group of 28 students from a first year course in accounting, which lead to several small adaptations in the experimental design.

*Experimental materials*

The final experimental materials (see appendix B1) outlined that the subject was employed as a BU-manager with considerable decision-making power. The BU consisted of 16 similar plants, in each of which an investment opportunity existed. The duration of the computerized experiment was 16 periods. At the beginning of each period, subjects were asked how much of their current profit (a fixed amount of 10000) they wanted to invest in the project in one of the plants that had not been invested in before. They could invest any amount in the range between 0 and 10000. Investing in the project affected the two non-financial leading indicators at different points in time as described before, and generated the first financial returns after 6 periods. Any investment yielded a 10% total return, which was equally spread between two future periods: half the initial investment was paid back plus return after 6 periods, and the same amount was accumulated after 7 periods. Figure 5-4 displays a time-line for an investment of 10000 at the beginning of period 3. This figure was not included in the experimental materials. Instead, the lagged effects could be detected by subjects with some effort from a table which provided examples of the causal effects of similar investments on all three performance measures (see instruction screen 3 of the experimental materials in appendix B1).

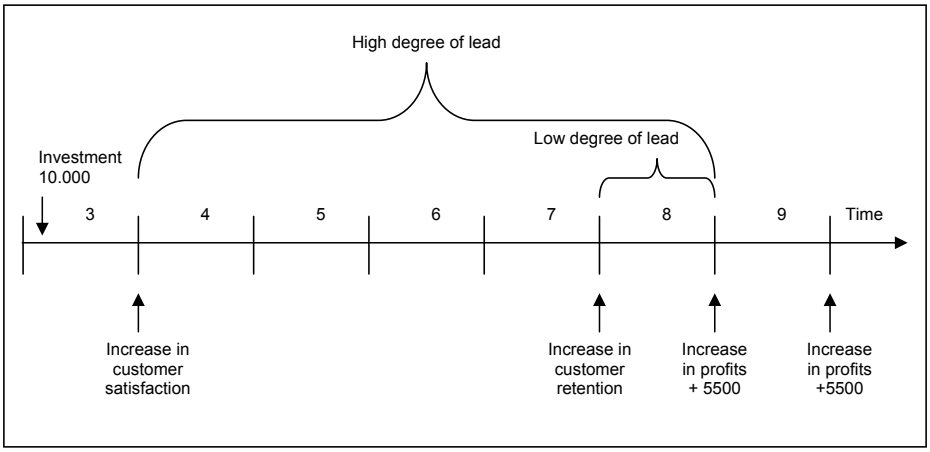



**Figure 5-4:** Partial time-line for the experiment, showing the effect of a 10.000 investment at the beginning of period 3. Profit increases occur 6 and 7 periods after the investment, at the end of periods 8 and 9. Increases in leading indicators occur after 1 period and after 5 periods.

Risk was included in the experimental design because it is normally part of investment decisions. Moreover, the concept of myopic loss aversion predicts effects of evaluation period length on MTO specifically in the presence of risks.

The experimental materials outlined that there was a 5% independent chance that an investment made in a specific period would not yield any financial return or payback (non-financial performance measures were always affected)[15]. The 5% risk was in fact not actually present during the task; in other words, invested amounts always yielded a return. This was done to prevent any noisy effects of a bad investment on future investments at a subject-specific time in the task, which would then have to be co-varied out in the data-analysis. Thus, all subjects had the same amount of "luck" and should have perceived the same amount of risk[16].

*Covariates*

To enable tests for possible effects of other factors, the following variables were measured as covariates. *Risk aversion* was included as a covariate because the investment project contained risk, which might have affected individuals differentially. Second, as some subjects might be more inclined to behave naturally in the interests of the company, *ethical behavior* was also included as a covariate. Based on hypothesis 7 (see chapter 3), *Consideration of Future Consequences* (CFC) was included as a measure of individual temporal orientation. Previous experience in developing a performance measurement system and with the Balanced Scorecard were also used as covariates to correct for any practical experiences subjects may have had. Finally, the general characteristics sex and age were also measured.

*Structure of computer program*

The experiment was programmed in Authorware and was structured as follows.

First, three questions measuring the covariate risk aversion were posed in random order. The five instruction pages describing the task appeared next – see appendix B1. The first provided a general introduction of the task. The second page outlined the determination of the reward based on the BU's financial performance (profit) and non-financial performance (customer satisfaction or customer retention). The third page provided a table which showed the time lagged effects of different amounts invested in similar projects on the performance indicators. As discussed, the use of this table was recorded as a variable to enable detection of cognitive effects of degree of lead. The third page also described the risk involved. The fourth page provided a summary and the fifth

[15] As an illustration, investing the maximum amount of 10.000 at the beginning of period 3 would payback 5.500 at the end of period 8, and also 5.500 at the end of period 9, with a probability of 95%. Because of a 5% chance the investment would be lost, the expected value of this investment was 10.450. Given the expected positive pay-off of 4,5%, the optimal strategy would be to invest the maximum amount each period up to and including period 10, after which the returns would fall outside the length of the experiment and would no longer benefit the subject.

[16] The relatively high mean score on the debriefing item *v* (see appendix B7) provides evidence that subjects indeed experienced that their investment decisions were risky.

and last screen displayed a timeline for the experimental study, among other things indicating the timing of the bonus determination (evaluation period length).

After the instructions were read, a series of basic questions about the task (i.e. duration, performance measures used for reward, risk percentage involved, length of evaluation period) followed that had to be answered correctly in order to proceed. This included the manipulation checks. In case of a false answer, subjects were taken back to the appropriate section of the instructions before they were give the opportunity to answer the question again – thus ensuring comprehension of the task to the greatest extent possible (for the questions, see appendix B2).

Then, the actual task followed consisting of 16 periods in which subjects were asked how much they wanted to invest in the project. After a decision was made in each period, a bonus report followed based on the results so far. This report always showed non-financial performance, and dependent on the condition, either every period or every 8$^{th}$ period also financial performance. Appendix B3 contains example screen shots from periods within each treatment condition.

The final part of the experiment was a questionnaire which first posed debriefing questions related to the task in random order, then measured several covariates (both the order of the constructs and the items were randomized), and finally required information on general characteristics of the subject (i.e. age, sex).

## 5.3 Results

### *5.3.1 Sample*

One hundred eighty-eight (188) students from a third-year accounting course at the University of Nijmegen were recruited as participants in the experiment. There were 17 experimental sessions, each with a maximum of 12 participants. Occasional no-shows resulted in varying actual numbers of participants in each session. There were five sessions with 12 participants, seven with 11, three with 10, and one session had 9 participants. These small differences in participant numbers are unlikely to have affected experimental results. Participants were randomly assigned to one of the treatment conditions. Observations were equally distributed across experimental conditions, with 47 observations per cell.

Sample demographics were as follows. The participants varied between 20 and 35 years of age (mean = 22.39, s.d. = 2.09). Female participants represented 27% of the sample. Most participants (174 or 93%) had no working experience in the area of accounting & finance. All demographic variables were investigated for differences among treatment conditions. Neither ANOVA nor nonparametric Kruskal-Wallis tests for the demographic variables measured on a continuous scale, nor Kruskal-Wallis and

Pearson Chi-square tests for the demographic variables measured on a nominal scale, revealed significant differences between treatment conditions (at a 0.05 confidence level; not reported).

### *5.3.2 Assumption testing*

The main method of analysis of the experimental data is ANOVA, which is based on several assumptions.

The first assumption tested is normality of the data. As the next subparagraph explains, there are two possible DVs. Both are investigated here to check data normality. A summation of the amounts invested during all 16 investment periods yields a first possible DV. This DV is labeled "sum invested amounts – all periods". The Kolmogorov-Smirnov normality test results in an insignificant value (*K-S* = 0.979, *p* = 0.294), indicating that the distribution is not significantly different from a normal distribution – see panel A in figure 5-5. The distribution of this variable is also normal within each of the four treatment conditions (see figure B4-1 and table B4-1 in appendix B4). The next DV, which consists of a summation of the invested amounts from periods 11-16, is not normally distributed (*K-S* = 1.934, *p* = 0.001). This DV is labeled "sum invested amounts – periods 11-16". Panel B of figure 5-5 displays a histogram of the distribution of this variable.

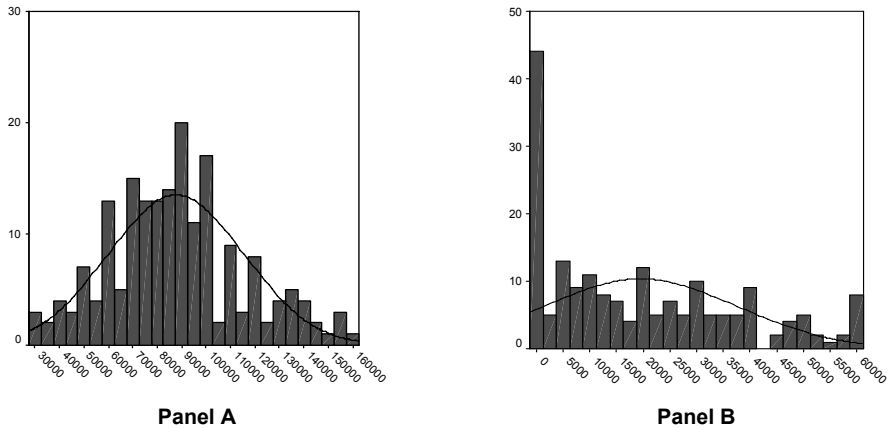



**Figure 5-5**: Histogram of two alternative dependent variables

Although this variable is not normally distributed when aggregated across conditions, more detailed analysis shows that the distribution of this variable is only significantly different from the normal distribution in condition I. Moreover, the distribution of this variable is skewed in a similar way (positively) in all conditions (see figure B4-2 and table B4-2 in appendix B4). This suggests that the violation of the normality assumption is not problematic (Norusis 2002; Karpinski 2003; StatSoft 2003).

A second assumption for ANOVA requires homogeneity of variance in all treatment conditions. Levene's test yields a non-significant value for the first DV, "sum invested amounts – all periods ($F = 2.521$ , $p = 0.059$). For this variable, the requirement of equal variance across conditions has been sufficiently met. For the second DV, "sum invested amounts – periods 11-16", Levene's test shows a significant value ($F = 2.688$, $p = 0.048$) There was only a limited spread in variance across conditions, however, with the smallest variance less than 4 times the largest variance (see table 5-4 and table B4-2). Combined with a relatively large sample size and an equal number of observations in each condition, this suggests that the between-subjects ANOVA is fairly robust despite the deviation from equal variances and normality (cf. Hair et al. 1998, p. 348-349; Field 2000, p. 275; Norusis 2002p. 301-302). Furthermore, results in upcoming sections are not materially affected by the choice of DV. Because the first DV meets the assumptions, this demonstrates that violation of neither the first nor the second assumption is a major concern.

Another assumption concerns independence of observations. The experimental design ensured data independence as much as possible. First, a randomized between-subjects design was employed. ANOVA and nonparametric Kruskal-Wallis and Pearson Chi-square tests (not reported) revealed no significant differences among treatment conditions for both demographic variables and covariates at the 0.05 confidence level. Furthermore, any interaction between subjects during the experiment was prevented. Regression analyses of the two independent variables and the interaction term on both dependent variables, with the observations in the correct temporal order, were conducted to investigate correlation between error terms. The resulting Durbin-Watson statistics are close to 2, signaling that the adjacent residuals are uncorrelated (DW = 2.166 and DW = 2.011). Therefore, data independence can be safely assumed.

Based on the analysis above, where present, violations of ANOVA assumptions are not considered problematic.

### *5.3.3 Hypothesis testing*

The invested amounts provide the measurement instrument for MTO. Several alternatives for constructing the DV arise. As introduced in the previous section, the first possibility is to aggregate all the invested amounts throughout the entire experiment, in periods 1-16

("sum all invested amounts – all periods"). An ANOVA test of this DV was conducted as a first exploration of results, which are displayed in table 5-2.

**Table 5-2:** ANOVA; DV = sum invested amounts - all periods

| *Source* | *Type III Sum of Squares* | *d.f.* | *Mean square* | *F* | *p-value* |
|---|---|---|---|---|---|
| Corrected model | 9921178907[1] | 3 | 3307059636 | 4.557 | 0.004 |
| Intercept | 1.447E+12 | 1 | 1.447E+12 | 1994.240 | 0.000 |
| *Degree of lead (L)* | 26182369 | 1 | 26182369 | 0.036 | 0.850 |
| *Evaluation period (P)* | 8588431495 | 1 | 8588431495 | 11.834 | **0.001** |
| *Interaction (L x P)* | 1306565044 | 1 | 1306565044 | 1.800 | 0.181 |
| Error | 1.335E+11 | 184 | 725733777 | | |
| Total | 1.591E+12 | 188 | | | |
| Corrected total | 1.435E+11 | 187 | | | |

[1] $R^2$=0.069, Adj. $R^2$=0.054.

The significant p-value (0.001) for evaluation period length indicates a significant main effect for this variable, confirming H2. No main effect of degree of lead and interaction effect appear present in the data given the insignificant p-values for these variables. Thus, the data provide no support for H1 and H3.

The following considerations favor another construction of the DV. Subjects in the low degree of lead conditions see the first change in non-financial performance at the end of period 5 (provided they decided to invest). Subjects in the conditions with a long evaluation period see their first on-screen profit bonus report at the end of period 8. The possibility for learning effects regarding these manipulations provide an argument to exclude the amounts invested early in the experiment. Only at the end of period 8 has every subject received at least one profit-based bonus report. Alternative constructions of the DV based on the amounts invested in the second half of the experiment are therefore investigated next.

The amounts invested in periods 9 and 10 are likely unaffected by learning effects because every subject has experienced a profit-based reward after period eight. Moreover, in these periods no end-game effects are present yet. Later, at the beginning of period 11, it is no longer in the subject's interest to invest because the resulting profit increase has a six-period time lag and therefore falls outside the duration of the experiment.

Table B5-1 in appendix B5 shows the significance of separate ANOVA analyses on the amounts invested in individual periods. The analysis reveals that the bulk of the differences are located in periods 11-16. There are also some significant differences in periods 1-10, mostly indicating higher investments in conditions with a long evaluation

period (conditions II and IV – see table B5-2). However, only one one-way ANOVA (of period 7) and two full factorial ANOVAs (of periods 2 and 7) are significant in the first ten periods. Correspondingly, ANOVAs on the summed invested amounts in the first half of the experiment (periods 1-8), on the sum of the invested amounts in periods 9 and 10, and on the summed amounts invested in the first ten periods (1-10) are not significant (not reported). The concentration of significant effects in periods 11-16 suggests that there is an effect on MTO mostly when subjects are faced with a short (employment) horizon. Based on these results, the sum of the invested amounts in periods 11-16 is used as the DV in further analyses. It should be noted that results are not materially different when the sum of the invested amounts in all periods is used as the DV instead. Table 5-3 reports the results of an ANOVA on the DV "sum invested amounts – periods 11-16". Table 5-4 shows results per condition, and table 5-5 investigates the significance of the differences in means between conditions.

**Table 5-3:** ANOVA; DV = sum invested amounts – periods 11-16

| ***Source*** | ***Type III Sum of Squares*** | ***d.f.*** | ***Mean square*** | ***F*** | ***p-value*** |
|---|---|---|---|---|---|
| Corrected model | 7152548018[1] | 3 | 2384182673 | 8.084 | 0.000 |
| Intercept | 7.146E+10 | 1 | 7.146E+10 | 242.281 | 0.000 |
| *Degree of lead (L)* | 119212162 | 1 | 119212162 | 0.404 | 0.526 |
| *Evaluation period (P)* | 6776618742 | 1 | 6776618742 | 22.977 | **0.000** |
| *Interaction (L x P)* | 256717114 | 1 | 256717114 | 0.870 | 0.352 |
| Error | 5.427E+10 | 184 | 294930896 | | |
| Total | 1.329E+11 | 188 | | | |
| Corrected total | 6.142E+10 | 187 | | | |

[1] $R^2$=0.116, Adj. $R^2$=0.102.

**Table 5-4:** Results per experimental condition;
DV= sum invested amounts – periods 11-16

| | | ***Degree of lead*** | |
|---|---|---|---|
| | | HIGH | LOW |
| ***Evaluation period*** | SHORT | Condition I<br>N = 47<br>Mean: 11527<br>S.D.: 15260<br>Var.: 232880510 | Condition III<br>N = 47<br>Mean: 15457<br>S.D.: 15596<br>Var.: 243245728 |
| | LONG | Condition II<br>N = 47<br>Mean: 25872<br>S.D.: 19030<br>Var.: 362148855 | Condition IV<br>N = 47<br>Mean: 25127<br>S.D.: 18478<br>Var.: 341448458 |

**Table 5-5:** Condition comparison of means from table 5-4

| *condition* | *minus condition* | *mean difference* | *p-value* |
|---|---|---|---|
| I | II | -14345 | **0.000** |
| | III | -3930 | 0.269 |
| | IV | -13600 | **0.000** |
| II | III | 10415 | **0.004** |
| | IV | 744 | 0.834 |
| III | IV | -9671 | **0.007** |

Post-hoc (LSD) analysis. Differences that are significant in the table are also significant ($p<0.05$) with the more conservative Bonferroni-test.

Results are consistent with those from the previous ANOVA analysis based on the amounts invested during the entire experiment. The low p-value (<0.001) for evaluation period in table 5-3 indicates a significant main effect of evaluation period length, clearly supporting H2 for this DV based on the invested amounts in the last periods[17]. No main effect of degree of lead and interaction effect appear present in the data, as indicated by the high p-values for these variables in table 5-3. No support is therefore provided for H1 and H3. Additionally, table 5-5 demonstrates that the differences between conditions I and III and between II and IV, are insignificant. Degree of lead therefore does not significantly affect the DV.

This is illustrated further by a graph of the mean invested amounts, as displayed in figure 5-6[18]. The difference in height of the two lines represents the main effect of evaluation period length. However, there is no effect of degree of lead nor an interactive effect, as can be seen by the relatively flat-sloped lines with only slightly differing slope values.

[17] There are also significant ($p<0.05$) main effects of evaluation period in periods 2 and 7.
[18] The figure is not exactly scaled.

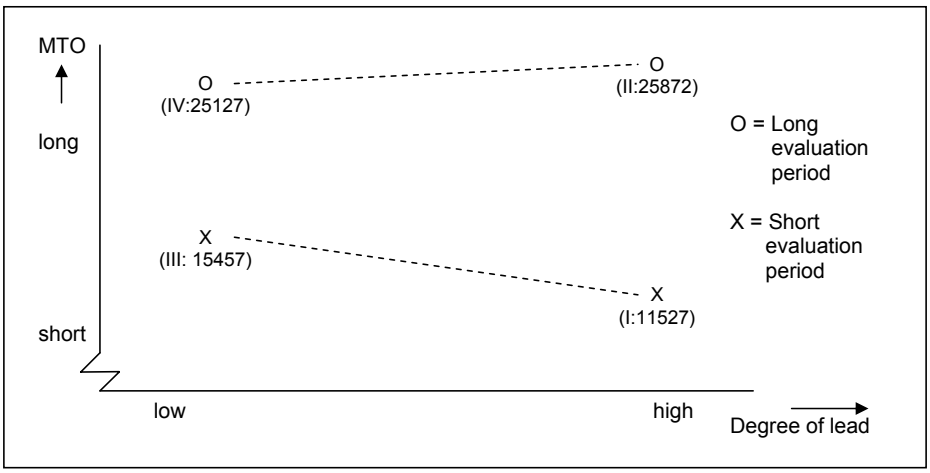



**Figure 5-6:** Graph of results

*Additional evidence*

The next step in analyzing the results involves including the covariates. For descriptive statistics and measurement details on the covariates, see appendix B6. Table B6-4 shows an ANCOVA analysis that demonstrates that results are insensitive to the inclusion of the covariates[19]. Moreover, none of the covariates, including CFC and risk aversion, significantly influence the DV[20]. Therefore, covariates need not be considered further in analyzing the results.

An in-depth analysis also requires attention to the processes that underlie the effects of the two independent variables on MTO. The debriefing questionnaire contained several questions posed to subjects in order to provide insight in these processes (for the items and descriptive statistics, see appendix B7).

Additional evidence for the effect of evaluation period length is considered first. The following items show significant ANOVA results for evaluation period (detailed results in appendix B7): item *f*, which read "The total duration of the task (16 periods) was an important factor in determining the amounts I invested", and item *h*, "I took the future consequences of my investment decisions for the company after the task was over into

[19] A regression yields similar results. Covariates remain insignificant after stepwise deletion of insignificant variables.
[20] This is independent of the choice of DV.

consideration". Subjects in conditions with a long evaluation period (II and IV) scored significantly lower on item *f* and significantly higher on item *h*. This implies that a longer evaluation period indeed assisted or induced subjects to look beyond the duration of the task. It thus provides corroborating evidence, suggesting that a longer evaluation period lengthens MTO in case of ending employment contracts.

Items *n*, *o* and *w* also show a significant effect of evaluation period length. Results for items *n* and *o* indicate that subjects were willing to invest more in the short evaluation period conditions (I and III) at the expense of their next reward, and that they were less focused on their next reward. These results are not necessarily contradictory to the previous finding that a longer evaluation period lengthens MTO, as the analysis of the invested amounts has shown. In case of a shorter evaluation period, subjects necessarily have to sacrifice more short-term rewards to maximize returns in the long-run.

Finally, the result for item *w* indicates that a shorter evaluation period assisted subjects in identifying causal linkages. Thus, a higher frequency of profit reports clarified the interrelations between the non-financial and the financial measures. This effect was expected for the other independent variable, degree of lead.

Regarding degree of lead, two debriefing items (*i* and *j*) show significant effects. Although evidence for both items seems to indicate that a higher degree of lead induced subjects to act more in the company's interests, this did not affect their investment decisions, as previous results have shown.

The experimental design also allowed for more direct measurement of the effects of degree of lead by registering the number of times instruction page 3 was consulted. This page contained the table containing the causal linkages between performance measures. Its use provides an indication of the predicted effects on cognitive searches by the subjects for lagged effects and causal relations among performance measures. Results from an ANOVA analysis are displayed in table 5-6.

**Table 5-6:** ANOVA; DV = #times instruction page 3 consulted during task

| ***Source*** | ***Type III Sum of Squares*** | ***d.f.*** | ***Mean square*** | ***F*** | ***p-value*** |
|---|---|---|---|---|---|
| Corrected model | 93.761[1] | 3 | 31.254 | 4.671 | 0.004 |
| Intercept | 1190.048 | 1 | 1190.048 | 177.851 | 0.000 |
| *Degree of lead (L)* | 29.920 | 1 | 29.920 | 4.472 | **0.036** |
| *Evaluation period (P)* | 44.048 | 1 | 44.048 | 6.583 | **0.011** |
| *Interaction (L x P)* | 19.793 | 1 | 19.793 | 2.958 | 0.087 |
| Error | 1231.191 | 184 | 6.691 | | |
| Total | 2515.000 | 188 | | | |
| Corrected total | 1324.952 | 187 | | | |

[1] $R^2$=0.071, Adj. $R^2$=0.056

Given the significant p-values (<0.05) for both variables, these results suggest both a main effect of evaluation period length and of degree of lead. Additional analysis, a condition comparison of means (see table 5-7), reveals that in condition IV, the number of times the table with the causal linkages was studied during the task was significantly higher than in the other three conditions. Results thus indicate that both a longer evaluation period and the use of a *short*-lead measure increase attention to lagged effects. This is contrary to the prediction. Increased attention to lagged causal effects was expected to depend only on the degree of lead of the performance measure – with a *higher* degree of lead increasing attention to lagged effects. Further discussion of this finding is deferred to the next section.

**Table 5-7:** Condition comparison of means for the use of instruction page 3

| ***condition*** | ***minus condition*** | ***mean difference*** | ***p-value*** |
|---|---|---|---|
| I | II | -0.32 | 0.551 |
| | III | -0.15 | 0.780 |
| | IV | -1.77 | **0.001** |
| II | III | 0.17 | 0.750 |
| | IV | -1.45 | **0.007** |
| III | IV | -1.62 | **0.003** |

Post-hoc (LSD) analysis. Results are also significant (p<0.05) with the more conservative Bonferroni-test.

## 5.4 Conclusions

The main finding of this experiment is that a longer evaluation period for accounting performance measures positively affects MTO, mostly when the employment horizon is short. A longer evaluation period led subjects to invest more in the final periods of the experiment, when investing was no longer in their interest. These subjects were apparently helped by the decreased evaluation frequency to look beyond the duration of the task, thus overcoming myopia and extending their horizon into the future. Evidence from the debriefing questionnaire provides strong support for this conclusion[21].

[21] The experiment was carefully designed to exclude the possibility that subjects were unaware of the end of the task. The comprehension check at the start of the experiment involved a question asking subjects for the duration of the experiment (question 2 in appendix B2). Furthermore, at the end of every period subjects proceeded to the next by pressing a button labeled "go to period # (of 16)" – see appendix B3. Finally, statistical analysis of the investment patterns between subsequent periods revealed identical patterns across conditions (see appendix B8). These patterns clearly showed a decrease in invested amounts between periods 10 and 11, the point at which the horizon problem becomes relevant. This provides evidence that subjects in every condition were aware of end-game effects on their reward.

This finding is in line with the theory that formed the basis for H2. This hypothesis predicted a positive effect of evaluation period length on MTO. Results of the experiment suggest that this effect is present mostly in the final stages of the employment relationship. Given the ever-present possibility of terminating employment contracts in practice, this evidence stresses the importance of the PMS-design for achieving the desired MTO.

Regarding the effects of degree of lead, the experiment showed no significant effects on MTO. Several alternative explanations for this lack of effect arise[22].

Based on the evidence from table 5-7, subjects in the low degree of lead conditions appear to have compensated the lack of clarity about causal effects by initiating a search for lagged effects. Although subjects in the *high* degree of lead conditions were expected to exhibit increased attention to lagged effects, the evidence from the use of the information on lagged causal effects indicates that a *low* degree of lead (combined with a long evaluation period) leads to a more intensive use of information on causal relationships. It thus appears that when the effect of investment decisions is not easily or quickly apparent in performance measures, more information on these effects is needed. This initiates a search for causal linkages, at least in a (necessarily) relatively simple experimental setting.

Nevertheless, it could still hold that the use of a measure with a higher degree of lead focuses attention on lagged casual effects more than the use of a measure with a low degree of lead. That is, it could be that a high degree of lead immediately makes lagged causal effects more transparent or salient, thus limiting the need for an extensive investigation of lagged effects. However, this cannot be demonstrated with the experimental data that was obtained.

It should also be noted that even if the degree of lead of a performance indicator may not influence MTO, the inclusion of a leading indicator itself may. Furthermore, this experiment set out to detect *cognitive* effects of degree of lead, not incentive effects due

[22] Another possible explanation is that the manipulation of this variable was not extreme enough. The difference in degree of lead between the high (five period lead) and low (one period lead) degree of lead conditions was four periods. Based on constraints for the experimental design, however, this was deemed the maximum variation possible. The total length of the experiment was set at no more than 16 periods to prevent boredom and irritation by subjects with the amount of repetition. This implied a maximum length of the evaluation period of eight periods, to ensure that every subject had at least seen one profit based bonus report halfway through the task. This ensured that subjects understood their bonus determination method also in the long evaluation period conditions and it enabled analysis of the invested amounts during the second half of the experiment as the DV. In turn, the maximum length for the evaluation period of eight periods meant that the two profit increases had to be timed before that, the first in periods 6 and 7, which made the maximum degree of lead five periods. Given that the manipulation of degree of lead significantly affected other variables, namely subjects' search strategies as well as debriefing items, conservatism in the manipulation does not seem a likely cause for the lack of effects of this variable on MTO.

to the increase in reward. Nevertheless, positive incentive effects of the inclusion of leading indicators on the level of long-term investments are likely to be present in reality. Many studies have shown that individuals respond to rewards based on performance measures by enhancing their performance, at least on the measured dimensions of performance (Kerr 1975; Jenkins et al. 1998; Courty and Marschke 2004). Such incentive effects of degree of lead would not be likely to extend managerial horizons and thus not impact MTO, although they would be likely to influence the amount of long-term investments positively (due to self-interest behavior). The survey evidence from chapter 4 provides support for this.

The next and final chapter, containing the conclusions of this dissertation, provides more discussion of the limitations and implications of the experiment. It also considers the relation between the findings from the survey and the experiment in more detail.

# CHAPTER 6
# SUMMARY & CONCLUSIONS

## 6.1 Introduction

This last chapter provides a summary of this dissertation. Paragraph 6.2 outlines the structure and content. Next, in paragraph 6.3, the findings of the two empirical studies are re-iterated, integrated and discussed. Paragraph 6.4 discusses the implications of the empirical results and reviews the contributions of this dissertation. Finally, paragraph 6.5 concludes with a description of the limitations and suggestions for further research.

## 6.2 Summary overview

This study set out to investigate the effects of PMS properties and individual level variables on MTO.

Chapter 1 provided an introduction, which indicated the relevance of and motivation for this study. Achieving a MTO appropriate for the circumstances is crucial for companies to be successful (National Academy of Engineering 1992). Both the PMS and individual level variables are important factors that influence MTO, but research in this field is not yet well developed (National Academy of Engineering 1992; Laverty 1996). This study aimed at contributing to this area of research.

The literature review in chapter 2 provides an overview of the literature on MTO. It drew primarily from the accounting literature, but also from the underlying economic and psychological disciplines. From these different fields, it identified factors from within the PMS and individual level variables that have been shown or argued to affect MTO. The main conclusions of the review are that [1] the accounting literature is full of claims about the effect of PMS properties, but only a few empirical studies exist; [2] studies to date have analyzed broad performance measure categories, under emphasizing properties of performance measures that can cause effects on MTO; and [3] relatively

little cross-fertilization exists between the different streams of literature. This dissertation aimed at filling these gaps.

The third chapter developed a model with hypothesized links between the factors identified in the literature review as potentially affecting MTO. The variables that were expected to influence MTO directly are degree of lead (+), evaluation period length (+), subjectivity (+), data manipulation (+), propensity to leave (-) and Consideration of Future Consequences (+). The model provides a first attempt to integrate both individual level and PMS variables in one model that predicts MTO, while also including linkages between independent variables.

Chapter 4 described the survey study that was conducted with the participation of the CI. A representative sample of financial managers was selected from this institute's member list. The purpose of the survey study was to conduct a first generalizable empirical test of the theoretical model. Results are re-iterated in the next paragraph.

Chapter 5 outlines the experimental study that was designed as an additional in-depth test of the hypothesized interactive effect of degree of lead and evaluation period. Moreover, its specific goals were [1] to establish evidence of causality in addition to the correlational evidence obtained by the survey, thus triangulating results (McGrath et al. 1982; Birnberg et al. 1990); [2] to explore the hypothesized effects without any possible confounding influence of industry; [3] to isolate the cognitive effects of the use of leading indicators from incentive effects (increasing long-term investments for self-interested reasons), which are difficult to disentangle in real-world survey data. The results of the experiment are also re-iterated in the next paragraph.

## 6.3 Discussion of findings

Table 6-1 provides a summary overview of the findings from both the survey and the experiment.

Hypotheses 1 through 3 relate to the combined effects of degree of lead and evaluation period. The predicted interactive effect is supported by the survey data. Degree of lead lengthens MTO and this effect is stronger in case of a longer evaluation period for accounting measures. These results are subject to several limitations, however. The sample was especially limited in size for these two variables, which detracts to some extent from the possibility of generalizing the findings to the entire population of financial managers. Moreover, the effects of degree of lead and evaluation period are likely correlated with the type of industry. Although these effects were controlled for in the empirical analyses, the relatively crude proxies for industry may not have been entirely adequate for this purpose. Finally, it is not possible based on the survey data to definitely determine whether cognitive effects are the cause for the effects of degree of lead on MTO. Alternatively, attention to long-term matters or long-term investments may

have increased just because the manager maximized the leading performance measure, while the manager's horizon was unaffected.

**Table 6-1:** Summary overview of findings

| Hypo-thesis | Independent variable | Dependent variable | Predicted sign | Survey results | Experimental results |
|---|---|---|---|---|---|
| 1 | Degree of lead (L) | MTO | + | See H3 | Not supported |
| 2 | Evaluation period (P) | MTO | + | See H3 | Supported |
| 3 | Interaction (L x P) | MTO | + | Supported | Not supported |
| 4 | Subjectivity | MTO | + | Supported | n.a.[1] |
| 5a | Ease-of-manipulation | Data manipulation | + | Supported | n.a. |
| 5b | Data manipulation | MTO | + | Not supported | n.a. |
| 5c | Ease-of-manipulation | Subjectivity | + | Not supported | n.a. |
| 5d | Subjectivity | Data manipulation | - | Not supported | n.a. |
| 6 | Propensity to leave | MTO | - | Not supported | (employment horizon effect) |
| 7 | CFC | MTO | + | Supported | (n.s.[2] as covariate) |

[1] n.a. = not applicable; [2] n.s. = not significant

In contrast, the experimental evidence did not provide support for the interactive effect. Additionally, degree of lead did not significantly affect MTO. The predicted cognitive effect of a higher degree of lead, in the form of increased attention to lagged effects, could not be demonstrated. Instead, subjects had increased attention to lagged causal effects in the condition with a low degree of lead and a long evaluation period. By doing this, they seem to have compensated for the lack of clear indications of lagged effects in their PMS. It could therefore hold that a high degree of lead immediately makes lagged causal effects more transparent or salient, which would limit the need for an extensive investigation of lagged effects. This cannot be demonstrated with the experimental data that was obtained, however.

The experiment showed that the accounting evaluation period significantly affects MTO. A longer evaluation period led subjects to invest more mostly in the final periods of the experiment, when investing was no longer in their interest. These subjects were apparently helped by the decreased evaluation frequency to look beyond the duration of the task, thus extending their horizon into the future.

Taken together, the results from the survey and the experiment suggest the following. A longer evaluation period increases MTO, especially when the (contractual) employment horizon is short. Degree of lead affects MTO for incentive, not cognitive reasons. In other words, leading indicators can increase attention to long-term matters for self-interested reasons when evaluations are based on these indicators, but no evidence

could be found that they increase MTO due to increased attention to lagged causal effects. In practice, these two variables, degree of lead and evaluation period length, interact as demonstrated by the survey evidence.

Hypotheses 4 and 5a-d provided a set of predictions regarding subjectivity and data manipulation. These predictions were tested only by the survey study, and the findings are repeated below. Hypothesis 4 was supported, thus providing evidence that subjectivity positively affects MTO. Subjectivity had no effect on data manipulation (as predicted in H5d), however. Ease-of-manipulation affected data manipulation positively, confirming H5a, but did not significantly influence subjectivity (H5c). The predicted positive effect of data manipulation on MTO, as posited by hypothesis 5b, was not found. The main conclusion from this set of hypotheses was that (possibilities for) data manipulation do not affect MTO, but subjectivity in evaluations does.

The last two hypotheses (6 & 7) concerned individual level variables. Propensity to leave did not significantly affect MTO in the survey study, thus not corroborating H6. On the other hand, the experimental study showed that the effects of evaluation period length are strongest at the end of the employment horizon. Because propensity to leave influences the expected employment horizon, this variable could also interact with evaluation period length. This could not be tested further due to limitations of the survey sample, however.

The personality characteristic Consideration of Future Consequences (CFC) had a significant positive influence on MTO in the survey. In the experimental study, this variable was included as a covariate and as such, it had no significant effect on MTO. The evidence thus suggests that in practice, managers are either selected or self-select themselves for a job that requires a MTO that fits their CFC.

## 6.4 Implications and contributions

The findings from the two empirical studies in this dissertation have important implications for the design of management control systems by organizations. The dissertation also provides significant contributions to the existing management accounting literature.

The results have shown that the PMS design exerts a significant influence on MTO. More in particular, the length of the evaluation period for accounting measures has a positive effect on MTO. This suggest that companies should carefully tune the evaluation period for internal evaluation purposes to the desired MTO, and not automatically equate it with an external reporting period as required by law. The evaluation period was also found to moderate the effect of leading indicators. The degree of lead of these indicators affected MTO positively, and more strongly so for a longer

evaluation period. This suggests that when a BSC (Kaplan and Norton 1996) is implemented, not only the selection of measures is important for balancing short- and long-term objectives, but also the evaluation interval for the financial perspective. Additionally, companies should be careful when selecting a leading indicator and attaching a weight to it for evaluation purposes. The reason is that this study did not show any cognitive effects of degree of lead. Because no evidence was obtained that the use of a leading indicator extends managerial horizons, the danger exists that managers will just maximize the measured dimension.

Second, subjectivity in evaluations affected MTO positively. Apparently, on average, companies and supervisors are more long-term oriented than subordinate managers. This corroborates an assumption that was made in previous studies (e.g., Bushman et al. 1996; Murphy and Oyer 2003), and provides the first empirical evidence directly supporting the positive relation between subjectivity and MTO. This dissertation also showed that (opportunities for) data manipulation, which could alleviate short-term pressure, do not significantly affect MTO.

Third, individual level variables have been shown to significantly affect MTO. More specifically, employment horizon, and possibly propensity to leave, affects the strength of the effect of evaluation period length and perhaps also of other PMS properties. Additionally, the personality characteristic CFC influences MTO positively. Consequently, companies should attract managers with a high CFC when a long MTO is required. Thus, personnel controls (Merchant and Van der Stede 2003) may be as important in achieving a desired MTO as result controls.

Overall, this dissertation provides a significant contribution to the existing accounting literature. It does so by isolating properties of the PMS that influence MTO, both theoretically and empirically. This contributes to the existing literature, that has primarily used broad performance measure categories (such as financial versus non-financial) and has underemphasized the process through which MTO is influenced (cf. Ittner and Larcker 1998; Ittner and Larcker 2002, p. s60). The theoretical model included all variables that were identified as potentially affecting MTO, and also included their interrelations. Moreover, this dissertation used an interdisciplinary approach, thus providing a more complete picture of a complex practical problem (cf. Merchant et al. 2003). Regarding the first three hypotheses, it employed a multi-method empirical test to enable triangulation of results (McGrath et al. 1982; Birnberg et al. 1990). Finally, it included individual level variables, which demonstrated the importance for MTO of personnel controls in addition to result controls.

## 6.5 Limitations and directions for further research

As any empirical study, this study is subject to several limitations. These can be classified into limitations that are generally associated with the survey and experimental methods, and more specific limitations.

First, in the survey study, the variables consisted of perceptual measures. This is not a problem for any of the independent variables, because it is exactly how managers experience the criteria for their evaluation that will influence their behavior. For the DV (MTO), however, an additional more 'objective' measure would have been desirable. An example of such a measure is data on invested amounts. To some extent, with respect to the first three hypotheses, the experimental study alleviates this limitation because it collected hard 'objective' data. Nevertheless, future research should attempt to replicate the survey findings and validate the results with a more objective measure for MTO.

Second, a general problem with survey studies is the "common-method" problem, which occurs when respondents are inclined to report socially desirable and consistent answers (Podsakoff and Organ 1986). This can bias the results in favor of confirming the hypotheses. This problem was limited by the design of the questionnaire, which also contained many questions that were not directly related to this study. This made hypothesis-guessing unlikely. More specifically related to this study, social desirability may have affected one variable in particular: data manipulation. A low tendency to report this manipulative behavior might have biased the results. Future research should aim at triangulating results by collecting objective data for this variable.

Third, the survey study provided only cross-sectional correlational evidence (Young 1996). To establish causality on all the predicted relationships, more longitudinal or experimental research would be required.

Fourth, the data gathered for the survey study originated from diverse industries. Although industry effects were controlled for to the extent possible in the statistical analyses, this may still have been a confounding factor. A future study using a sample based on a single industry can resolve this issue. The experimental study provided a test that controlled for industry effect regarding H1-3.

Fifth, the survey used a sample of financial managers. This was an appropriate sample, because these respondents were in a position to affect some of the variables included in the theoretical model that are less under the influence of other managers (for example, data manipulation). Nevertheless, the number of observations was limited for some variables in the sample, because not all variables were part of every respondent's PMS. More research can improve the generalizability of the findings to other types of managers for most of the hypotheses.

The experimental study is also not without its limitations.

First, the experiment involved student subjects. Although this prevents biased results from practitioners with context-specific experiences (cf. Libby et al. 2002) and although decisions made by students have been shown to yield effects similar in direction as decisions by practitioners (cf. Ashton and Kramer 1980; Liyanarachchi and Milne 2005), it could still limit the generalizability to other groups of subjects. Additionally, necessarily by design, the experiment involved a simple task that was compressed in time. This could limit the applicability of the findings to the more complex continuing circumstances in practice.

More specifically related to this particular experimental design, the experiment involved a manipulation of degree of lead with two levels: low and high. An interesting question that can be answered by future research is whether the use versus non-use of a leading indicator results in cognitive effects and influences MTO. Obtaining evidence on this issue would require a similar experiment with extra treatment conditions that do not include a leading indicator in the PMS.

Based on the findings of this dissertation, some interesting further general avenues for additional research present themselves. First, evidence from the experiment suggests that an individual level variable, employment horizon, is an important factor in determining the strength of the effect of evaluation period length on MTO. Second, the survey evidence shows a significant effect of the individual characteristic CFC on MTO. More studies examining the ways in which individual level variables interact with properties of the PMS to affect MTO are called for. Additionally, the relative importance of individual level variables and PMS properties needs to be investigated further. This could determine the relative importance of result versus personnel controls for achieving the desired MTO, with important implications for the design of the management control system.

More general directions for future research can be derived by extending the topic of this dissertation. First, empirical evidence, especially experimental, on dependent variables other than performance is generally limited within the management accounting literature (Sprinkle 2003). The effects of PMS properties on DVs other than MTO that can also affect investment behavior, such as risk taking, are worth studying. As a second illustration, this dissertation did not focus on the effects of different types of incentives attached to the PMS on MTO. Therefore, the effects of stock-based incentives (Lewellen et al. 1987; Clinch 1991; Bizjak et al. 1993; Gaver and Gaver 1993; Bushman et al. 1996), bonus banking (National Academy of Engineering 1992; Stern et al. 1995) and career concerns (Coates et al. 1995; Day et al. 2002) were not analyzed. Nevertheless, this would appear a potentially very fruitful area for future research.

# APPENDIX A
## SURVEY STUDY

# APPENDIX A1

**Table A1-1:** Respondents demographics

| *Variable* | *Descriptive* |
|---|---|
| Age | 38.3 (mean) |
| Sex | 88% male |
| Tenure with organization | 6.3 years (mean) |
| Tenure with organizational unit | 3.5 years (mean) |
| Tenure in same type of function | 3.0 years (mean) |
| Influence on design of performance measurement system[1] | 2.99 (mean) |
| Influence on design of incentive system[1] | 2.01 (mean) |
| Percentage of variable pay[2] | 17.4 (mean) |
| Percentage of stock-based reward (stock, options)[3] | 2.0 (mean) |

[1] Measured on a five-point Likert-scale.
[2] All respondents receive a partly variable reward, with a minimum of 3%.
[3] 72% of respondents do not receive any part of their reward in stock-based form.

**Table A1-2:** Sample characteristics

| *Variable* | | *Descriptive* |
|---|---|---|
| Organizational size | | 37960 (mean) |
| Organizational unit size[1] | | 2577 (mean) |
| Type of industry | Agrarian/industrial production | 32% |
| | Trade | 16% |
| | Financial services | 20% |
| | Other services | 32% |

[1] Refers to unit at which the respondents' activities are aimed, not to financial/ accounting department.

**Table A1-3:** Respondents' tasks

| *Variable* | *%* |
|---|---|
| At least some management-supporting tasks | 99 |
| Average share of management-supporting tasks in total task package | 39 |
| Member of management team | 66 |
| Management tasks are part of job | 92 |
| Average share of management tasks in total task package | 44 |
| Involved in investment decisions | 70 |

# APPENDIX A2

Unless mentioned otherwise, items are measured on a 5-point Likert scale as follows:
Question: Please indicate your level of (dis)agreement with the following statements
Answering format: (1) strongly disagree; (2) disagree; (3) neither agree nor disagree; (4) agree; (5) strongly agree.

**Table A2-1:** Items and factor analysis data manipulation
Question: How frequently do you take the following actions?
Answering format: (1) (almost) never; (2) now and then; (3) regularly; (4) often; (5) very often

| | ***Items*** | ***Component 1*** |
|---|---|---|
| *a* | *Het boeken van winsten behorende bij een toekomstige periode in de huidige periode door een benodigde uitgave uit te stellen*<br>Pulled profits from future periods into the current period by deferring a needed expenditure | 0.798 |
| *b* | *Het boeken van winsten behorende bij een toekomstige periode in de huidige periode door een ontvangst te versnellen*<br>Pulled profits from future periods into the current period by accelerating a sale | 0.775 |
| *c* | *Het verschuiven van gelden tussen verschillende rekeningen om verschillen t.o.v. het budget weg te werken of te voorkomen*<br>Shifted funds between accounts to avoid budget overruns | 0.446 |
| *d* | *Extern onderdelen of benodigdheden inkopen met als reden dat deze uitgaven dan op de balans kunnen worden opgenomen in plaats van als kostenpost, hoewel de artikelen ook intern geleverd hadden kunnen worden*<br>Bought equipment from outside (the company) so that the expenditure could be capitalized, even though the job could have been done as well within (the company) | 0.587 |
| | Eigenvalue | 1.780 |
| | Variance extracted | 44.5% |

Extraction method: principal component analysis. KMO measure: 0.573. Bartlett's test (p-value): 75.07 (0.000). Analysis based on full sample (n=159). Items from Merchant (1990).

**Table A2-2:** Items and factor analysis propensity to leave

| | *Items* | *Component 1* |
|---|---|---|
| *a* | *Als de omstandigheden het toe zouden laten, zou ik direct een baan in een andere onderneming willen aanvaarden*<br>If circumstances permitted, I would jump at the chance to accept another job in another organization | 0.845 |
| *b* | *Als ik volledig vrij zou zijn in mijn keuze, zou ik het liefst werkzaam blijven bij de onderneming waar ik nu werk*<br>If I were completely free to choose, I would continue working in this organization [reversed] | 0.872 |
| *c* | *Mijn kansen op promotie binnen mijn huidige onderneming zijn uitstekend*<br>My promotion opportunities within this company are excellent [reversed] | 0.556 |
| *d* | *Ik verwacht nog lang in mijn huidige functie te blijven werken*<br>I expect to keep working in my current function for a long time [reversed] | 0.668 |
| | Eigenvalue | 2.230 |
| | Variance extracted | 55.8% |

Extraction method: principal component analysis. KMO measure: 0.676. Bartlett's test (p-value): 163.51 (0.000). Analysis based on full sample (n=159). Items *a* and *b* from Martin and Hunt (1980), Rahim and Afza (1993).

**Table A2-3:** Items and factor analysis Consideration of Future Consequences (CFC)

| | *Items* | *Com-ponent 1* | *Com-ponent 2* | *Com-ponent 3* | *Com-ponent 4* | *Com-ponent 5* |
|---|---|---|---|---|---|---|
| *a* | *Ik hou rekening met hoe dingen in de toekomst zullen zijn, en ik probeer dingen te beïnvloeden met mijn dagelijkse gedrag*<br>I consider how things might be in the future, and try to influence those things with my day to day behavior | | 0.727 | | | |
| *b* | *Ik onderneem vaak acties waarvan het resultaat pas na vele jaren merkbaar kan zijn*<br>Often I engage in a particular behavior in order to achieve outcomes that may not result for many years | | 0.804 | | | |
| *c* | *Ik handel alleen om aan onmiddellijke behoeften te voldoen, denkend dat de toekomst zichzelf wel regelt*<br>I only act to satisfy immediate concerns, figuring the future will take care of itself [reversed] | 0.728 | | | | |
| *d* | *Mijn gedrag wordt alleen beïnvloed door de onmiddellijke (binnen enkele dagen of weken) resultaten van mijn acties*<br>My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions [reversed] | 0.646 | | | | |
| *e* | *Mijn gemak is een belangrijke factor in de besluiten die ik neem en de acties die ik onderneem*<br>My convenience is a big factor in the decisions I make or the actions I take [reversed] | | | | | 0.765 |

| | *Items [Table A2-3 cont.]* | *Com-ponent 1* | *Com-ponent 2* | *Com-ponent 3* | *Com-ponent 4* | *Com-ponent 5* |
|---|---|---|---|---|---|---|
| *f* | *Ik ben bereid om mijn huidige geluk of welzijn op te offeren om toekomstige resultaten te realiseren*<br>I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes | | | | 0.680 | |
| *g* | *Ik vind het belangrijk om waarschuwingen over negatieve gevolgen serieus te nemen, zelfs als het negatieve gevolg vele jaren na nu zal optreden*<br>I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years | | | | | 0.777 |
| *h* | *Ik vind het belangrijker om een actie te ondernemen die belangrijke toekomstige consequenties heeft dan een actie met minder belangrijke directe consequenties*<br>I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate outcomes | | | 0.844 | | |
| *i* | *In het algemeen negeer ik waarschuwingen over mogelijke toekomstige problemen omdat ik denk dat de problemen opgelost zullen zijn voordat ze het niveau van een crisis bereiken*<br>I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level [reversed] | 0.488 | | 0.450 | | |
| *j* | *Ik denk dat opofferingen nu in het algemeen onnodig zijn, aangezien met toekomstige gevolgen later wel afgerekend kan worden*<br>I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time [reversed] | | | | 0.701 | |
| *k* | *Ik handel uitsluitend om aan directe behoeften te voldoen, denkend dat ik met toekomstige problemen later wel afreken*<br>I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date [reversed] | 0.543 | | | 0.476 | |
| *l* | *Aangezien mijn dagelijkse werk specifieke uitkomsten heeft, is dat belangrijker voor me dan acties die uitkomsten in de verdere toekomst zullen hebben*<br>Since my day to day work has specific outcomes, it is more important to me than behavior that has distant outcomes [reversed] | 0.651 | | | | |
| | Eigenvalue | 2.692 | 1.457 | 1.237 | 1.213 | 1.045 |
| | Variance extracted | 22.4% | 12.1% | 10.3% | 10.1% | 8.7% |

Extraction method: principal component analysis. Rotation method: Oblique (Oblimin). Reported are pattern matrix, loadings over 0.4 only. KMO measure: 0.674. Bartlett's test (p-value): 254.00 (0.000). Analysis based on full sample (n=157). Items from Strathman et al. (1994b).

**Table A2-4:** Items and factor analysis consideration of future consequences (CFC)
Imposed two-factor structure

| | ***Items*** | ***Com-ponent 1*** | ***Com-ponent 2*** |
|---|---|---|---|
| *a* | *Ik hou rekening met hoe dingen in de toekomst zullen zijn, en ik probeer dingen te beïnvloeden met mijn dagelijkse gedrag*<br>I consider how things might be in the future, and try to influence those things with my day to day behavior | | 0.733 |
| *b* | *Ik onderneem vaak acties waarvan het resultaat pas na vele jaren merkbaar kan zijn*<br>Often I engage in a particular behavior in order to achieve outcomes that may not result for many years | | 0.644 |
| *c* | *Ik handel alleen om aan onmiddellijke behoeften te voldoen, denkend dat de toekomst zichzelf wel regelt*<br>I only act to satisfy immediate concerns, figuring the future will take care of itself [reversed] | 0.530 | |
| *d* | *Mijn gedrag wordt alleen beïnvloed door de onmiddellijke (binnen enkele dagen of weken) resultaten van mijn acties*<br>My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions [reversed] | 0.577 | |
| *e* | *Mijn gemak is een belangrijke factor in de besluiten die ik neem en de acties die ik onderneem*<br>My convenience is a big factor in the decisions I make or the actions I take [reversed] | 0.579 | |
| *f* | *Ik ben bereid om mijn huidige geluk of welzijn op te offeren om toekomstige resultaten te realiseren*<br>I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes | | |
| *g* | *Ik vind het belangrijk om waarschuwingen over negatieve gevolgen serieus te nemen, zelfs als het negatieve gevolg vele jaren na nu zal optreden*<br>I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years | | 0.413 |
| *h* | *Ik vind het belangrijker om een actie te ondernemen die belangrijke toekomstige consequenties heeft dan een actie met minder belangrijke directe consequenties*<br>I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate outcomes | | 0.533 |
| *i* | *In het algemeen negeer ik waarschuwingen over mogelijke toekomstige problemen omdat ik denk dat de problemen opgelost zullen zijn voordat ze het niveau van een crisis bereiken*<br>I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level [reversed] | 0.548 | |
| *j* | *Ik denk dat opofferingen nu in het algemeen onnodig zijn, aangezien met toekomstige gevolgen later wel afgerekend kan worden*<br>I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time [reversed] | 0.566 | |
| *k* | *Ik handel uitsluitend om aan directe behoeften te voldoen, denkend dat ik met toekomstige problemen later wel afreken*<br>I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date [reversed] | 0.741 | |
| *l* | *Aangezien mijn dagelijkse werk specifieke uitkomsten heeft, is dat belangrijker voor me dan acties die uitkomsten in de verdere toekomst zullen hebben*<br>Since my day to day work has specific outcomes, it is more important to me than behavior that has distant outcomes [reversed] | 0.640 | |

| *[Table A2-4 cont.]* | *Com-ponent 1* | *Com-ponent 2* |
|---|---|---|
| Eigenvalue | 2.692 | 1.457 |
| Variance extracted | 22.4% | 12.1% |

Extraction method: principal component analysis. Rotation method: Oblique (Oblimin). Imposed two-factor structure. Reported are pattern matrix, loadings over 0.4 only. KMO measure: 0.674. Bartlett's test (p-value): 254.00 (0.000). Analysis based on full sample (n=157). Items from Strathman et al. (1994b).

**Table A2-5:** Items and factor analysis performance measure properties
Properties of most important accounting measure (for evaluation)

| | *Items* | *Com-ponent 1* | *Com-ponent 2* | *Com-ponent 3* | *Com-ponent 4* |
|---|---|---|---|---|---|
| *a* | *De resultaten op deze maatstaf kunnen gemakkelijk worden gemanipuleerd of vertekend met een lage kans op ontdekking*<br>The results expressed by this measure can easily be manipulated or misreported, with a low chance of discovery [ease-of-manipulation] | | 0.641 | | |
| *b* | *De gerealiseerde prestatie uitgedrukt in deze maatstaf wordt objectief bepaald*<br>Realized performance expressed by this measure is objectively determined [ease-of-manipulation; reversed] | | 0.778 | | |
| *c* | *Het vastgestelde prestatieniveau op deze maatstaf kan worden geverifieerd door een onafhankelijk persoon*<br>The determined level of performance expressed by this measure can be verified by an independent person [ease-of-manipulation; reversed] | | 0.838 | | |
| *d* | *Als ik hard werk leidt dat tot betere prestaties uitgedrukt in deze maatstaf*<br>If I work hard, performance as expressed by this measure will improve [sensitivity] | 0.770 | | | |
| *e* | *Het verrichten van inspanningen in mijn baan leidt tot betere prestaties uitgedrukt in deze maatstaf*<br>Making an effort in my job will lead to better performance as expressed by this measure [sensitivity] | 0.886 | | | |
| *f* | *Toewijding en inspanning in mijn baan leiden tot betere prestaties op deze maatstaf*<br>Dedication and effort in my job lead to better results in this performance dimension [sensitivity] | 0.912 | | | |
| *g* | *Onbeïnvloedbare factoren, zoals economische omstandigheden en het gedrag van klanten, leveranciers en concurrenten, hebben een grote invloed op mijn prestaties uitgedrukt in deze maatstaf*<br>Uncontrollable factors, such as economic conditions and the behavior of customers, suppliers and competitors, exert a large influence on my performance as expressed by this measure [controllability; reversed] | | | | 0.819 |
| *h* | *Het uiteindelijk vastgestelde prestatieniveau op deze maatstaf is voor mij nooit een verrassing*<br>The performance level expressed in this measure that is ultimately determined, never comes as a surprise to me [controllability] | | | | 0.463 |
| *i* | *Mijn prestaties uitgedrukt in deze maatstaf worden nauwkeurig gemeten*<br>My performance expressed by this measure is measured accurately [controllability] | | | 0.531 | |
| *j* | *Er is een sterke nadruk op deze maatstaf bij de beoordeling van mijn prestaties*<br>This measure is strongly emphasized in my performance evaluation [evaluation emphasis] | | | 0.760 | |
| *k* | *Mijn beloning is sterk afhankelijk van het prestatieniveau uitgedrukt in deze maatstaf*<br>My rewards is strongly dependent on the performance level as expressed in this measure [evaluation emphasis] | | | 0.720 | |
| *l* | *Deze maatstaf wordt gezien als een belangrijke indicatie van mijn functioneren*<br>This measure is seen as an important indicator of my job-performance [evaluation emphasis] | | | 0.646 | |

| *[Table A2-5 cont.]* | *Com-ponent 1* | *Com-ponent 2* | *Com-ponent 3* | *Com-ponent 4* |
|---|---|---|---|---|
| Eigenvalue | 3.348 | 1.979 | 1.630 | 1.054 |
| Variance extracted | 27.9% | 16.5% | 13.6% | 8.8% |

Extraction method: principal component analysis. Rotation method: Oblique (Oblimin). Reported are pattern matrix, loadings over 0.4 only. KMO measure: 0.706. Bartlett's test (p-value): 363.25 (0.000). Analysis based on full sample (n=92). Items *a-c* based on Merchant (1989), items *d-i* based partly on Moers (2001).

**Table A2-6:** Items and factor analysis subjectivity

| | *Items* | *Component 1* | *Component 2* |
|---|---|---|---|
| *a* | *De bij mijn beoordeling gebruikte criteria worden op subjectieve wijze achteraf vastgesteld door mijn leidinggevende*<br>The criteria used in my evaluation are subjectively determined with hindsight by my supervisor | 0.886 | |
| *b* | *Mijn beoordeling en beloning zijn afhankelijk van subjectieve oordelen over mijn prestaties*<br>My evaluation and compensation are dependent on subjective judgments about my performance | 0.881 | |
| *c* | *Bij de beoordeling van mijn prestaties wordt rekening gehouden met zowel mijn prestaties als met andere factoren*<br>My own performance as well as other factors are taken into account in my evaluation | | 0.999 |
| | Eigenvalue | 1.563 | 1.000 |
| | Variance extracted | 52.1% | 33.3% |

Extraction method: principal component analysis. Rotation method: Oblique (Oblimin). Reported are pattern matrix, loadings over 0.4 only. KMO measure: 0.496. Bartlett's test (p-value): 59.690 (0.000). Analysis based on full sample (n=159). Items based on Gibbs et al. (2004).

**Table A2-7:** Items and factor analysis slack

| | *Items* | *Component 1* | *Component 2* |
|---|---|---|---|
| *a* | *Ik slaag erin om makkelijk haalbare budgetten in te dienen*<br>I succeed to submit budgets that are easily attainable | | 0.893 |
| *b* | *Budgetdoelen leiden tot hoge productiviteit in mijn bedrijfseenheid*<br>Budget targets induce high productivity in my business unit [reversed] | 0.817 | |
| *c* | *Budgetdoelen vereisen dat de kosten nauwlettend in de gaten worden gehouden in mijn bedrijfseenheid*<br>Budget targets require costs to be managed carefully in my business unit [reversed] | 0.808 | |
| *d* | *Budgetdoelen hebben er niet toe geleid dat ik bijzondere aandacht aan efficiency in mijn bedrijfseenheid heb geschonken*<br>Budget targets have not caused me to be particularly concerned with improving efficiency in my business unit | 0.718 | |
| *e* | *Mijn budget is zeer gemakkelijk te halen*<br>My budget is easily attainable | | 0.836 |
| | Eigenvalue | 1.978 | 1.441 |
| | Variance extracted | 39.6% | 28.8% |

Extraction method: principal component analysis. Rotation method: Oblique (Oblimin). Reported are pattern matrix, loadings over 0.4 only. KMO measure: 0.610. Bartlett's test (p-value): 135.02 (0.000). Analysis based on full sample (n=154). Items based on Van der Stede (2000).

# APPENDIX A3

**Table A3-1:** Non-response bias analysis, independent t-tests

| *Variable* | *Mean (s.d)* | | *t-value*[1] | *p-value (two-tailed)* |
|---|---|---|---|---|
| | *Early respondents* | *Late respondents* | | |
| MTO (length) | 27.92 (23.88) | 26.10 (26.11) | 0.42 | 0.676 |
| Degree of lead | 8.09 (5.59) | 8.46 (7.47) | -0.23 | 0.819 |
| Evaluation period | 96.78 (128.79) | 76.35 (113.75) | 0.85 | 0.399 |
| Subjectivity | 2.97 (0.92) | 3.17 (0.84) | -1.42 | 0.157 |
| Data manipulation | 1.26 (0.28) | 1.20 (0.19) | 1.50 | 0.137 |
| Ease-of-manipulation | 2.34 (0.65) | 2.50 (0.82) | -0.96 | 0.339 |
| Propensity to leave | 2.83 (0.69) | 2.75 (0.70) | 0.66 | 0.509 |
| CFC | 3.69 (0.32) | 3.76 (0.33) | -1.41 | 0.162 |
| Slack | 2.29 (0.47) | 2.40 (0.55) | -1.27 | 0.206 |

[1] Equal variances not assumed.

**Table A3-2:** Non-response bias analysis, Mann-Whitney U-test

| *Variable* | *Mann-Whitney U-test* | *Wilcoxon W* | *Z-value* | *Asymp. p-value (two-tailed)* |
|---|---|---|---|---|
| MTO (length) | 2011.5 | 3964.5 | -0.860 | 0.390 |
| Degree of lead | 558.0 | 1188.0 | -0.242 | 0.809 |
| Evaluation period | 1125.0 | 2206.0 | -1.284 | 0.199 |
| Subjectivity | 2350.5 | 5200.5 | -1.373 | 0.170 |
| Data manipulation | 2417.0 | 4902.0 | -0.853 | 0.394 |
| Ease-of-manipulation | 876.5 | 1911.5 | -0.408 | 0.683 |
| Propensity to leave | 2517.0 | 5002.0 | -0.430 | 0.667 |
| CFC | 2226.0 | 5076.0 | -1.585 | 0.113 |
| Slack | 2296.5 | 5146.5 | -1.175 | 0.240 |

# APPENDIX A4

**Table A4-1:** Reliability analysis, original scales

| *Variable* | *Internal composite reliability* | *Average Variance Extracted* | *Item* | *Factor loading* |
|---|---|---|---|---|
| Subjectivity | 0.875 | 0.779 | a | 0.854 |
| | | | b | 0.910 |
| Data manipulation | 0.724 | 0.419 | a | 0.820 |
| | | | b | 0.806 |
| | | | c | 0.434 |
| | | | d | 0.410 |
| Ease-of-manipulation | 0.834 | 0.626 | a | 0.773 |
| | | | b | 0.765 |
| | | | c | 0.833 |
| Propensity to leave | 0.754 | 0.468 | a | 0.862 |
| | | | b | 0.742 |
| | | | c | 0.728 |
| | | | d | 0.220 |
| CFC | 0.647 | 0.158 | a | 0.653 |
| | | | b | 0.725 |
| | | | c | 0.230 |
| | | | d | 0.499 |
| | | | e | 0.322 |
| | | | f | 0.185 |
| | | | g | 0.211 |
| | | | h | 0.317 |
| | | | i | 0.194 |
| | | | j | 0.284 |
| | | | k | 0.301 |
| | | | l | 0.384 |
| Slack | 0.593 | 0.306 | a | 0.826 |
| | | | b | -0.061 |
| | | | c | 0.255 |
| | | | d | 0.262 |
| | | | e | 0.842 |

**Table A4-2:** Cross-loadings, original scales

| *Variable* | *Item* | *1* | *2* | *3* | *4* | *5* | *6* |
|---|---|---|---|---|---|---|---|
| 1. Subjectivity | a | **0.873** [a] | -0.018 | 0.044 | 0.345 [a] | 0.039 | 0.117 |
| | b | **0.893** [a] | -0.127 | 0.080 | 0.395 [a] | -0.035 | 0.000 |
| 2. Data manipulation | a | -0.052 | **0.866** [a] | 0.148 | 0.101 | -0.070 | -0.247 [a] |
| | b | -0.068 | **0.830** [a] | 0.287 [a] | 0.020 | -0.109 | -0.145 [c] |
| | c | -0.084 | **0.362** [a] | 0.056 | -0.037 | 0.000 | -0.055 |
| | d | -0.023 | **0.408** [a] | 0.145 | 0.178 [b] | -0.099 | -0.066 |
| 3. Ease-of-manipulation | a | 0.084 | 0.241 [b] | **0.798** [a] | 0.157 | -0.076 | 0.001 |
| | b | 0.074 | 0.096 | **0.751** [a] | 0.333 [a] | -0.154 | -0.027 |
| | c | 0.017 | 0.214 [b] | **0.806** [a] | 0.256 [b] | -0.107 | -0.125 |
| 4. Propensity to leave | a | 0.378 [a] | 0.033 | 0.308 [a] | **0.875** [a] | -0.152 [c] | 0.055 |
| | b | 0.227 [a] | 0.137 [c] | 0.346 [a] | **0.749** [a] | -0.018 | 0.099 |
| | c | 0.328 [a] | 0.056 | 0.061 | **0.725** [a] | -0.081 | 0.080 |
| | d | -0.053 | 0.046 | 0.128 | **0.253** [a] | -0.010 | -0.083 |
| 5. CFC | a | -0.076 | 0.004 | -0.136 | -0.176 [b] | **0.520** [a] | 0.021 |
| | b | 0.132 | 0.030 | -0.124 | -0.008 | **0.749** [a] | 0.020 |
| | c | -0.217 [a] | -0.066 | -0.273 [a] | -0.092 | **0.230** [a] | 0.120 |
| | d | -0.048 | -0.167 [b] | -0.184 [c] | -0.149 [c] | **0.500** [a] | 0.038 |
| | e | 0.024 | -0.077 | -0.003 | -0.053 | **0.368** [a] | 0.092 |
| | f | -0.194 [b] | -0.039 | 0.292 [a] | -0.076 | **0.172** [b] | 0.058 |
| | g | -0.012 | -0.027 | -0.056 | -0.093 | **0.233** [a] | -0.129 |
| | h | 0.045 | -0.245 [a] | -0.070 | 0.035 | **0.268** [a] | -0.070 |
| | i | -0.232 [a] | -0.178 [b] | -0.046 | -0.139 [c] | **0.200** [b] | 0.002 |
| | j | -0.148 [c] | -0.086 | 0.147 | -0.093 | **0.305** [a] | -0.145 [c] |
| | k | -0.151 [c] | -0.041 | -0.149 | -0.194 [b] | **0.337** [a] | 0.053 |
| | l | -0.126 | -0.030 | -0.047 | -0.147 [c] | **0.435** [a] | -0.109 |
| 6. Slack | a | -0.005 | -0.113 | -0.031 | 0.141 [c] | 0.050 | **0.850** [a] |
| | b | 0.272 [a] | 0.160 [b] | 0.201 [c] | 0.160 [b] | 0.075 | **-0.140** [c] |
| | c | 0.203 [b] | -0.066 | 0.014 | -0.056 | 0.067 | **0.159** [b] |
| | d | 0.252 [a] | 0.036 | 0.195 [c] | 0.089 | -0.011 | **0.241** [a] |
| | e | 0.151 [b] | -0.168 [b] | -0.018 | 0.081 | -0.017 | **0.821** [a] |

[a] $p<0.01$; [b] $p<0.05$; [c] $p<0.10$ (two-tailed). For discriminant validity, items should load higher on their own construct (in bold) than on other constructs and no other item should load higher on a construct that it was not supposed to measure. (Factor loadings may differ from table A4-1 due to rounding errors.)

**Table A4-3:** Correlations between PLS-variables, original scales

| *Variable* | *1* | *2* | *3* | *4* | *5* | *6* |
|---|---|---|---|---|---|---|
| 1. Subjectivity | **0.883** | | | | | |
| 2. Data manipulation | -0.078 | **0.647** | | | | |
| 3. Ease-of-manipulation | 0.098 | 0.292 [b] | **0.791** | | | |
| 4. Propensity to leave | 0.440 [a] | 0.144 | 0.293 [a] | **0.684** | | |
| 5. CFC | 0.009 | -0.101 | -0.135 | -0.146 | **0.397** | |
| 6. Slack | 0.084 | -0.260 [a] | -0.063 | 0.104 | 0.045 | **0.553** |

[a] $p<0.01$; [b] $p<0.05$ (two-tailed). Diagonal elements represent the square root of the average variance extracted (bold). Off-diagonal elements are Pearson-correlations. If diagonal elements are larger than off-diagonal elements, discriminant validity is achieved.

**Table A4-4:** Reliability analysis after item trimming

| *Variable* | *Internal composite reliability* | *Average variance extracted* | *Item* | *Factor loading* |
|---|---|---|---|---|
| Subjectivity | 0.874 | 0.776 | a | 0.836 |
| | | | b | 0.923 |
| Data manipulation | 0.858 | 0.752 | a | 0.856 |
| | | | b | 0.879 |
| Ease-of-manipulation | 0.837 | 0.631 | a | 0.773 |
| | | | b | 0.765 |
| | | | c | 0.833 |
| Propensity to leave | 0.836 | 0.632 | a | 0.878 |
| | | | b | 0.790 |
| | | | c | 0.708 |
| CFC | 0.813 | 0.686 | a | 0.788 |
| | | | b | 0.866 |
| Slack | 0.857 | 0.750 | a | 0.860 |
| | | | e | 0.871 |

**Table A4-5:** Cross-loadings after item trimming

| *Variable* | *Item* | *1* | *2* | *3* | *4* | *5* | *6* |
|---|---|---|---|---|---|---|---|
| 1. Subjectivity | a | **0.858** [a] | 0.024 | 0.069 | 0.335 [a] | 0.108 | 0.161 [c] |
| | b | **0.909** [a] | -0.125 | 0.108 | 0.390 [a] | 0.054 | 0.027 |
| 2. Data manipulation | a | -0.042 | **0.881** [a] | 0.148 | 0.145 [c] | 0.020 | -0.239 [a] |
| | b | -0.067 | **0.854** [a] | 0.316 [a] | 0.041 | -0.018 | -0.161 [c] |
| 3. Ease-of-manipulation | a | 0.097 | 0.226 [a] | **0.804** [a] | 0.161 | -0.088 | -0.011 |
| | b | 0.115 | 0.160 | **0.783** [a] | 0.320 [a] | -0.182 [c] | 0.062 |
| | c | 0.038 | 0.232 [b] | **0.791** [a] | 0.254 [b] | -0.159 | -0.079 |
| 4. Propensity to leave | a | 0.412 [a] | 0.062 | 0.305 [a] | **0.886** [a] | -0.095 | 0.090 |
| | b | 0.242 [a] | 0.156 [c] | 0.343 [a] | **0.789** [a] | 0.027 | 0.136 |
| | c | 0.332 [a] | 0.066 | 0.056 | **0.698** [a] | -0.088 | 0.145 [c] |
| 5. CFC | a | -0.048 | 0.054 | -0.146 | -0.157 [c] | **0.695** [a] | 0.033 |
| | b | 0.152 [c] | -0.026 | -0.141 | -0.016 | **0.927** [a] | 0.073 |
| 6. Slack | a | 0.007 | -0.187 [b] | -0.029 | 0.151 [c] | 0.104 | **0.875** [a] |
| | e | 0.169 [b] | -0.217 [a] | -0.002 | 0.107 | 0.014 | **0.857** [a] |

[a] $p<0.01$; [b] $p<0.05$; [c] $p<0.10$ (two-tailed). For discriminant validity, items should load higher on their own construct (in bold) than on other constructs and no other item should load higher on a construct that it was not supposed to measure. (Factor loadings may differ from table A4-4 due to rounding errors.)

**Table A4-6:** Correlations between PLS-variables after item trimming

| *Variable* | *1* | *2* | *3* | *4* | *5* | *6* |
|---|---|---|---|---|---|---|
| 1. Subjectivity | **0.881** | | | | | |
| 2. Data manipulation | -0.074 | **0.867** | | | | |
| 3. Ease-of-manipulation | 0.103 | 0.273 [b] | **0.794** | | | |
| 4. Propensity to leave | 0.408 [a] | 0.106 | 0.302 [a] | **0.795** | | |
| 5. CFC | 0.063 | 0.012 | -0.184 | -0.095 | **0.828** | |
| 6. Slack | 0.097 | -0.229 [a] | -0.018 | 0.150 [c] | 0.064 | **0.866** |

[a] $p<0.01$; [b] $p<0.05$; [c] $p<0.10$ (two-tailed). Diagonal elements represent the square root of the average variance extracted (bold). Off-diagonal elements are Pearson-correlations. If diagonal elements are larger than off-diagonal elements, discriminant validity is achieved.

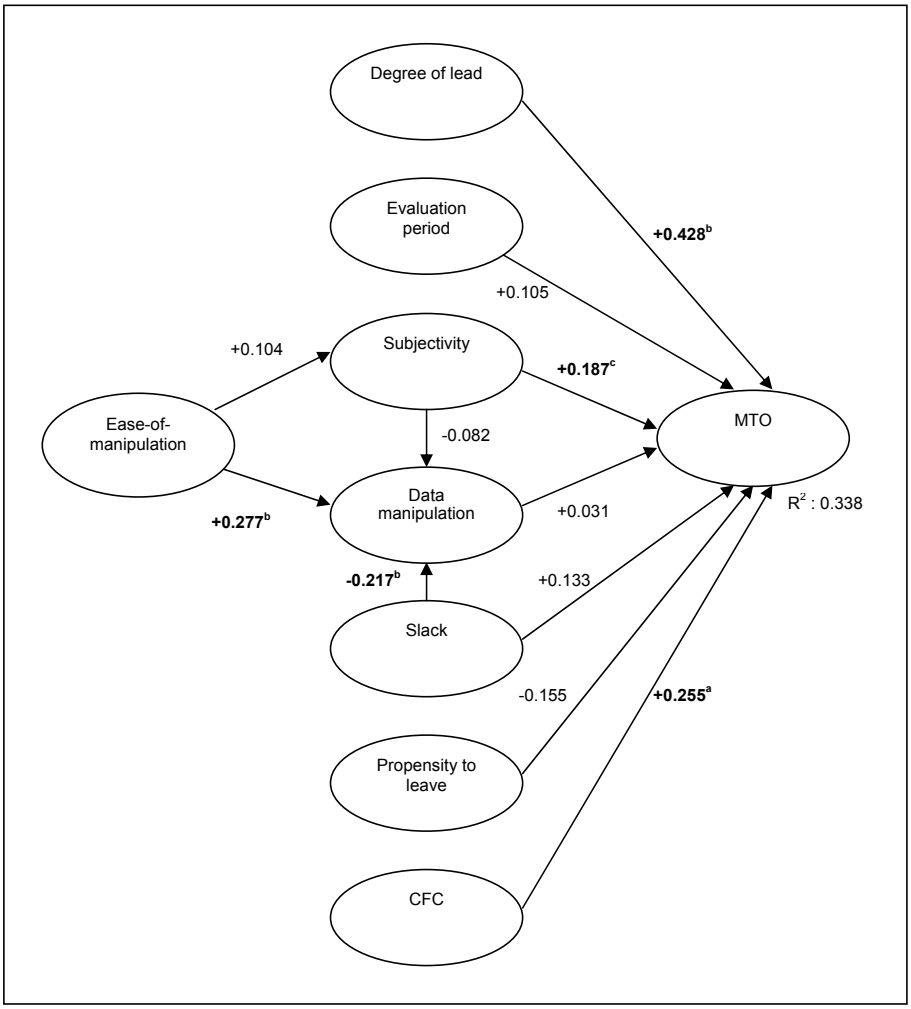



**Figure A4-1:** PLS results after item trimming
[a] p<0.01; [b] p<0.05; [c] p<0.10 (two-tailed).

# APPENDIX A5

**Table A5-1:** Regression analysis; dependent variable = MTO

| *Variable* | *Expected sign* | *Standardized β-coefficient* | *p-value* |
|---|---|---|---|
| *Constant* | | | 0.301 |
| Degree of lead (L) | + | -0.01 | 0.980 |
| Evaluation period (P) | + | -0.03 | 0.869 |
| Interaction (L x P) | + | +0.59 | **0.029** |
| Industry[1] | | +0.26 | 0.067 |
| Strategy[2] | + | +0.04 | 0.750 |
| Organizational size[3] | | -0.23 | 0.091 |

n = 52. F-value = 3.907 ( p=0.004). Adjusted $R^2$ = 0.28.
The analysis is based on standardized variables.

[1] Industry was measured by a dummy (1 if production, 0 otherwise). Including other dummies also (for trade and financial services) does not materially affect results, with the interaction term still having a significant p-value.

[2] Strategy was measured with the instrument developed by Govindarajan and Gupta (1985); higher values for strategy correspond to a more build oriented, and presumably longer term strategy.

[3] Organizational size was measured by the natural logarithm of the number of employees.

# APPENDIX A6

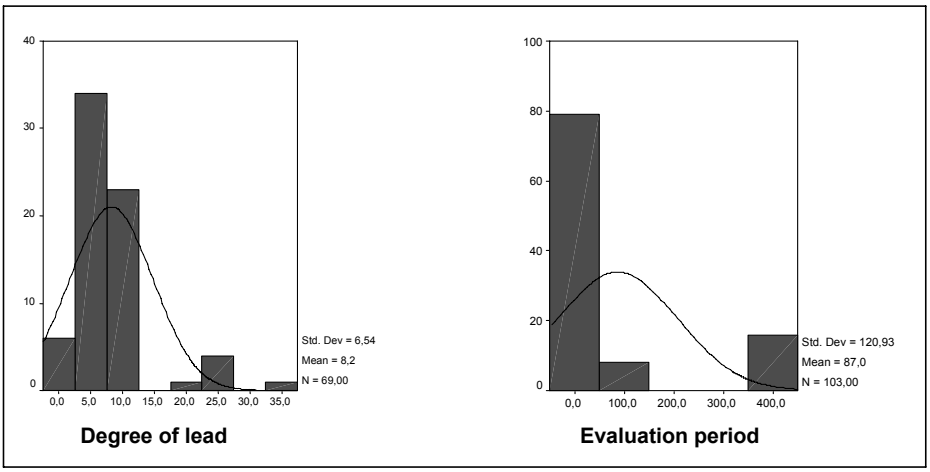



**Figure A6-1:** Histograms

**Table A6-1**: Descriptive statistics

| *Variable* | *Mean* | *Standard deviation* | *Skewness* | *Kurtosis* | *K-S value*[1] | *p-value*[2] |
|---|---|---|---|---|---|---|
| Degree of lead | 8.24 | 6.54 | 1.921 | 4.654 | 1.655 | 0.008 |
| Evaluation period | 86.96 | 120.93 | 1.862 | 1.599 | 4.536 | 0.000 |

[1] Kolmogorov-Smirnov test for normality; [2] Significance (two-tailed) of K-S value

**Table A6-2:** ANOVA; DV = MTO

| *Source* | *Type III Sum of Squares* | *d.f.* | *Mean square* | *F* | *p-value* |
|---|---|---|---|---|---|
| Corrected model | 7077[1] | 3 | 2359 | 6.291 | 0.001 |
| Intercept | 20307 | 1 | 20307 | 54.159 | 0.000 |
| *Degree of lead (L)* | 3660 | 1 | 3660 | 9.762 | 0.003 |
| *Evaluation period (P)* | 800 | 1 | 800 | 2.134 | 0.150 |
| *Interaction (L x P)* | 2888 | 1 | 2888 | 7.702 | 0.008 |
| Error | 19497 | 52 | 375 | | |
| Total | 71066 | 56 | | | |
| Corrected total | 26574 | 55 | | | |

[1] $R^2$=0.266, Adj. $R^2$=0.224.

# APPENDIX B

EXPERIMENTAL STUDY

# APPENDIX B1

**Experimental materials: instruction screens**

Reproduced and translated (original screens in Dutch)

**Instruction: general information (page 1/5)**

General information

This study investigates investment decisions.
The study consists of a task in which you are asked how much you would like to invest in a specific project.

Introduction of the task

Assume you are working as a manager in a large company. Your job as a manager is to take decisions that are in the interest of the company. The company you work for is a for-profit organization with the objective to maximize long term value. The company has enough cash to repay all its debts.

As a manager, you are in charge of a business unit which produces 16 products, each in a separate plant. The plants are essentially identical en produce similar products, but for different target markets.

At this time, you have the possibility to invest in 1 of the plants. This investment will increase customer satisfaction and customer retention of the customers of this plant and it will also increase the profit of the plant. This investment opportunity will also apply to the other plants in later periods. However, you can only invest in one plant at a time, to a maximum amount of 10.000 per period.

In total you will be working for 16 periods as a manager for this company. At the start of each of these periods, you can invest any amount in the range of 0-10.000 in 1 of the plants in your business unit.

The next instruction page describes how your reward is determined.

**Instruction: your reward scheme (page 2/5)**

Your reward is based on a financial and a non-financial indicator.

Every period, you will be rewarded based on the profit of your business unit that period. Your reward based on profit, for all plants together, will be determined at the end of each period[1].

For every 1.000 profit, you will receive a reward of 0,06 euro.

Your current profit level is 10.000 per period – this amount of profit stems from current activities and will remain unchanged in the absence of any further action (such as investments).

To determine your reward, the amount invested that period will be subtracted from your profit level, while any returns from investment in previous periods will be added to the profit level.

Every period, you will also be rewarded based on the score for customer satisfaction for the products of all plants in your business unit together. Every period you score 1 point for the determination of your reward for every 1% customer satisfaction[2]. The 16 products of your business unit now all have 80% customer satisfaction[2] each – therefore, you score 16 x 80 = 1280 points for customer satisfaction[2] for the determination of your reward. Customer satisfaction[2] will also remain unchanged in the absence of any further action (such as investments).

Per 100 points of customer satisfaction[2], you will receive a reward of 0,02 euro.

Payment:
The reward you earn during the task will be periodically reported to you during the task, and will actually be paid to you at the end of the study!!!

The next instruction page provides an overview of investment projects similar to the one you can invest in, that have been carried out in similar plants by managers in different business units.

[1] Condition specific: in conditions with a long evaluation period, this paragraph read as follows: *You will be rewarded based on the profit level of your business unit at the end of periods 8 and 16. Your reward will be based on the cumulative profits from the previous eight periods, for all plants in your business unit together.*
[2] Condition specific: in conditions with a *low degree of lead* the performance indicator was *customer retention* instead of customer satisfaction.

**Instruction: investment table (page 3/5)**

The table below provides an overview of previous experiences with similar projects in 4 other business units in the company. The table shows the effects of four separate projects. The left column indicates the amount the manager in charge decided to invest. The other columns show the effects of the amount invested on customer satisfaction (percentage of customers that indicates they are satisfied), customer retention (percentage of customers that repeatedly purchase), and profit of 1 plant. In order to enable a comparison, all investments were brought to the same moment in time (t=0). The 10.000 profit from t=0 onwards is an amount that is equal in each period which stems from other current activities.

| **Investment** | **Customer satisfaction (%)** | | | | | | **Customer retention (%)** | | | | | | **Profits** (the invested amounts at t=0 have not been deducted) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| start t=0 | start t=0 | end of per. 1 | end of per. 2 | end of per. 3 | end of per. 4 | end of period **5 and later** | start t=0 | end of per. 1 | end of per. 2 | end of per. 3 | end of per. 4 | end of period **5 and later** | start t=0 | end of period 1 | end of period 2 | end of period 3 | end of period 4 | end of period **5** | end of periods **6 & 7** | end of period **8 and later** |
| 10.000 | 80 | 90 | 90 | 90 | 90 | 90 | 80 | 80 | 80 | 80 | 80% | 98,25 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 15500 | 10000 |
| 7.500 | 80 | 87,5 | 87,5 | 87,5 | 87,5 | 87,5 | 80 | 80 | 80 | 80 | 80% | 93,96 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 14125 | 10000 |
| 2.000 | 80 | 82 | 82 | 82 | 82 | 82 | 80 | 80 | 80 | 80 | 80% | 83,65 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 11100 | 10000 |
| 9.000 | 80 | 89 | 89 | 89 | 89 | 89 | 80 | 80 | 80 | 80 | 80% | 96,43 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 14950 | 10000 |

The reported figures have been rounded, but have been measured reliably and objectively without error. Experience has shown that the effects on customer satisfaction and customer retention always occur after an investment and that these effects last in every future period. Profits, however, are only affected in two future periods. After that, profits return to the original level, in other words the level that the profit figure would have had in the absence of that investment, because competitors have followed your investment decision in the mean time. See the table.

After each investment there is a 5% probability that competitors will follow your decision immediately. In that case, profits do not increase in any period due to this investment (the other measures are affected). Therefore, there is a 95% probability there will be an effect on profit in two future periods. In the case of the investments listed in the table, competitors did not follow immediately and profits have been affected.

Based on the results the company has concluded that an investment in this type of project can yield a return of 10% of the invested amount in terms of profit. This return is made divided over two periods, which are timed 6 and 7 periods after the investment. This return will occur with a probability of 95%, while there is also a 5% probability that profits will not increase at all.

**Instruction: summary (page 4/5)**

* Your task is to take an investment decision.

* Investing has an effect on customer satisfaction, customer retention, and (possibly) profit – see table

* At the start of each of the 16 periods you will be asked to make an investment decision

* Each period you can invest in another plant; the decisions are therefore independent

* You may invest any amount in the range 0-10000 in each period

* Your reward will be based on both profit and customer satisfaction[2], based on the figures for your whole business unit (all plants/product together)

* Your reward based on profit and your reward based on customer satisfaction[2] will be determined at the end of each period[1]

* At the start of each period, your profit is 10000 (from other current activities; this will change only when you decide to invest (>0))

* To determine your reward, the invested amount is subtracted from your profit level and returns from investments in previous periods are added to your profit level

* There is a 5% probability that your competitors will follow your decision immediately and that an investment (>0) does not lead to higher profit levels in future periods and will generate no financial returns at all. The non-financial indicators are always affected if you invest (>0).

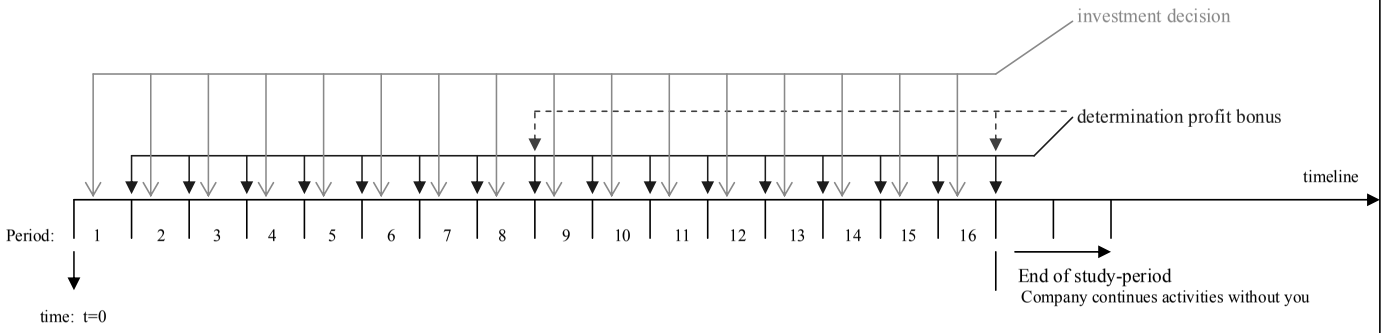
Assume there are no interest- and tax considerations, in other words that both the tax rate and the interest percentage are 0%.

The next and final instruction page provides a summarizing timeline for this study.

[1] Condition specific: in conditions with a long evaluation period, this paragraph read as follows: *Your reward based on profit will be determined after every eight periods over cumulative profits; your reward based on customer satisfaction[2] will be determined at the end of each period.*

[2] Condition specific: in conditions with a *low degree of lead* the performance indicator was *customer retention* instead of customer satisfaction.

**Instruction: Timeline (page 5/5)**




Additionally, your reward based on the non-financial indicator will be determined at the end of each[1] period.

Before your reward based on profits is calculated, it will first be determined whether or not your competitors have followed your investment decision (probability=5%).

Explanation: the figure depends on the condition. The solid "determination profit bonus" line was displayed only in the short evaluation period conditions; the dashed line above it was displayed only in the long evaluation period conditions (at the same height as the solid line, just above the time-line, not dashed).
[1] "each" was underlined in long evaluation period conditions, to emphasize the difference with the profit evaluation interval.

# APPENDIX B2

**Manipulation and comprehension check questions**

Reproduced and translated (original screens in Dutch)

Questions 1-8: in case of an incorrect answer, subjects were automatically taken back to the appropriate instruction screen until a correct answer was provided.

1. Which of the following performance measures form(s) the basis for the determination of your reward?

Multiple answers possible

- ❑ customer satisfaction
- ❑ customer retention
- ❑ profit

[answer: customer satisfaction and profit for conditions I and II, customer retention and profit for conditions III and IV]

2. Of how many periods, in which you will be asked to make an investment decision, does this study consist?

____ periods

[answer: "16"]

3. What is the frequency of the determination of your reward based on profit?

Once per ____ period(s)

[answer: "1" for conditions I and III, "8" for conditions II and IV]

4. What is the frequency of the determination of your reward based on a non-financial measure?

Once per ____ period(s)

[answer: "1"]

5. Suppose that you decide to invest (investment>0), what is the probabiltiy that this investment will not affect profits in future periods?

Probability = ____ %

[answer: "5"]

6. Suppose that you decide to invest (investment>0), what is the probabiltiy that this investment will not affect non-financial indicators in future periods?

Probability = ____ %

[answer: "0"]

7. Suppose that you decide to invest at the beginning of period 1 (t=0), at the end of which period will this investment affect profits for the first time?

Assume that the competitors did not follow your decision to invest (in other words, an effect is certain)

First effect on profits at the end of period ____

[answer: "6"]

8. Suppose that you decide to invest at the beginning of period 1 (t=0), at the end of which period will this investment affect profits for the last time?

Assume that the competitors did not follow your decision to invest (in other words, an effect is certain)

Last effect on profits at the end of period ____

[answer: "7"]

9. How much will profits increase in period 6 due to an investment of 4000 at the beginning of period 1 (t=0)?

Assume that the competitors did not follow your decision to invest (in other words, an effect is certain)

Profits will increase with ____

[answer: "2200". After the subject had provided an answer, the following example calculation was shown: "An investment of 4000 yields a 10% return, so 4400 in total. This return is booked in two periods, 6 and 7 periods after the investment. Thus, 4400 / 2 = 2200 per period. Note: during the investment task there is also a 5% chance that the competitors will follow immediately and you will get no payback at all from your investment."]

# APPENDIX B3

**Screenshots of performance reports from first eight periods**
Reproduced and translated (original screens in Dutch)
Invested amounts in example: 5000, 7500, 9000, 10000, 2500, 6000, 1000, 500.

### Screenshot condition I, period 1

Period 1 – Bonus determination at end of period

| | | |
|---|---|---|
| Profit this period (fixed base amount): | 10.000 | |
| Invested this period: | 5.000 | - |
| Profit this period: | 5.000 | |
| Profit from investments in earlier periods: | 0 | + |
| Total profit | 5.000 | |

Your reward this period based on profit: 5.000 x E 0.06 per 1000 = E ,3

| | | |
|---|---|---|
| Customer satisfaction this period: | | |
| 15 factories, 80% each → points: | 1.200 | |
| Invested in factory 1 this period: 5.000. Customer satisfaction: 85% → points: | 85 | + |
| Customer satisfaction total this period: | 1.285 | |

Your reward this period based on customer satisfaction: 1.285 x E 0,02 per 100 = E ,26

Your total reward this period: E ,3 + E ,26 = E ,56

While studying these results you may return to the instructions, and afterwards you can continue to the next period:

Introduction | Reward scheme | Investment table | Summary | Timeline | **To period 2 (of 16)**

## Screenshot condition I, period 8

Period 8 – Bonus determination at end of period

| | | |
|---|---|---|
| Profit this period (fixed base amount): | 10.000 | |
| Invested this period: | 500 | - |
| Profit this period: | 9.500 | |
| Profit from investment of 7.500 in period 2: | 4.125 | + |
| Profit from investment of 9.000 in period 3: | 4.950 | + |
| Total profit | 18.575 | |

Your reward this period based on profit: 18.575 x E 0.06 per 1000 = E 1,11

Customer satisfaction this period:

| | | |
|---|---|---|
| 8 factories, 80% each → points: | 640 | |
| Invested in 1 of the factories this period: 500. Customer satisfaction: 80,5% → points: | 80,5 | + |
| From investments in earlier periods (earliest first): 85; 87,5; 89; 90; 82,5; 86; 81 → | 601 | + |
| Customer satisfaction total this period: | 1.321,5 | |

Your reward this period based on customer satisfaction: 1.321,5 x E 0,02 per 100 = E ,26

Your total reward this period: E 1,11 + E ,26 = E 1,38

Total reward including all previous periods:
Based on profits: ,3 + ,15 + ,06 + 0 + ,45 + ,41 + ,95 + 1,11 = 3,43;
Based on customer satisfaction: ,26 + ,26 + ,26 + ,26 + ,26 + ,26 + ,26 + ,26 = 2,09;
Total: 3,43 + 2,09 = 5,53

While studying these results you may return to the instructions, and afterwards you can continue to the next period:

Introduction | Reward scheme | Investment table | Summary | Timeline | **To period 9 (of 16)**

## Screenshot condition II, period 1

Period 1 – Bonus determination at end of period

Your reward based on profits is not determined this period.

At the end of periods 8 and 16, your reward based on profits will be determined on the basis of the cumulative profits from the preceding eight periods. The cumulative profits will be determined by subtracting the invested amounts from the periodic fixed amounts of profits and adding returns from previous investments to the periodic fixed amounts of profits.

Customer satisfaction this period:

| | | |
|---|---|---|
| 15 factories, 80% each → points: | 1.200 | |
| Invested in factory 1 this period: 5.000. Customer satisfaction: 85% → points: | 85 | + |
| Customer satisfaction total this period: | 1.285 | |

Your reward this period based on customer satisfaction: 1.285 x E 0,02 per 100 = E ,26

Your total reward this period: E ,26

While studying these results you may return to the instructions, and afterwards you can continue to the next period:

Introduction | Reward scheme | Investment table | Summary | Timeline | **To period 2 (of 16)**

## Screenshot condition II, period 8

Period 8 – Bonus determination at end of period

| | | |
|---|---|---|
| Profit each period (fixed base amount): 10.000 x 8 periods: | 80.000 | |
| Invested in periods 1-8 (earliest first): 5.000+7.500+9.000+10.000+2.500+6.000+1.000+500= | 41.500 - | |
| Profit this rewardperiod: | 38.500 | |
| Profit from investments, booked in period 6: | 2.750 + | (2.750 from inv. in period 1) |
| Profit from investments, booked in period 7: | 6.875 + | (2.750 from inv. in period 1 and 4.125 from period 2) |
| Profit from investments, booked in period 8: | 9.075 + | (4.125 from inv. in period 2 and 4.950 from period 3) |
| Total profit | 57.200 | |

Your reward this period based on profit: 57.200 x E 0.06 per 1000 = E 3,43

Customer satisfaction this period:

| | | |
|---|---|---|
| 8 factories, 80% each → points: | 640 | |
| Invested in 1 of the factories this period: 500. Customer satisfaction: 80,5% → points: | 80,5 | + |
| From investments in earlier periods (earliest first): 85; 87,5; 89; 90; 82,5; 86; 81 → | 600 | + |
| Customer satisfaction total this period: | 1.321,5 | |

Your reward this period based on customer satisfaction: 1.321,5 x E 0,02 per 100 = E ,26

Your total reward this period: E 3,43 + E ,26 = E 1,38

Total reward including all previous periods:
Based on profits: 3,43
Based on customer satisfaction: ,26 + ,26 + ,26 + ,26 + ,26 + ,26 + ,26 + ,26 = 2,09;
Total: 3,43 + 2,09 = 5,53

While studying these results you may return to the instructions, and afterwards you can continue to the next period:

Introduction | Reward scheme | Investment table | Summary | Timeline | **To period 9 (of 16)**

## Screenshot condition III, period 1

Period 1 – Bonus determination at end of period

| | | |
|---|---|---|
| Profit this period (fixed base amount): | 10.000 | |
| Invested this period: | 5.000 | - |
| Profit this period: | 5.000 | |
| Profit from investments in earlier periods: | 0 | + |
| Total profit | 5.000 | |

Your reward this period based on profit: 5.000 x E 0.06 per 1000 = E ,3

Customer retention this period:

16 factories, 80% each (unchanged) → points: 1.280

Customer retention total this period: 1.280

Your reward this period based on customer retention: 1.280 x E 0,02 per 100 = E ,26

Your total reward this period: E ,3 + E ,26 = E ,56

While studying these results you may return to the instructions, and afterwards you can continue to the next period:

Introduction | Reward scheme | Investment table | Summary | Timeline | **To period 2 (of 16)**

**Screenshot condition III, period 5**
This is the first period showing an effect on the customer retention measure

Period 5 – Bonus determination at end of period

| | | |
|---|---|---|
| Profit this period (fixed base amount): | 10.000 | |
| Invested this period: | 2.500 | - |
| Profit this period: | 7.500 | |
| Profit from investments in earlier periods: | 0 | + |
| Total profit | 7.500 | |

Your reward this period based on profit: 7.500 x E 0.06 per 1000 = E ,45

| | | |
|---|---|---|
| Customer retention this period: | | |
| 15 factories, 80% each → points | 1.200 | |
| Invested in a factory in period 1: 5.000. Customer retention this period: 89,13% → points: | 89,13 | + |
| Customer retention total this period: | 1.289,13 | |

Your reward this period based on customer retention: 1.289,13 x E 0,02 per 100 = E ,26

Your total reward this period: E ,45 + E ,26 = E ,71

Total reward including all previous periods:
Based on profits: ,3 + ,15 + ,06 + 0 + ,45 = ,96;
Based on customer retention: ,26 + ,26 + ,26 + ,26 + ,26 = 1,28;
Total: ,96 + 1,28 = 2,24

While studying these results you may return to the instructions, and afterwards you can continue to the next period:

Introduction | Reward scheme | Investment table | Summary | Timeline | **To period 6 (of 16)**

## Screenshot condition III, period 8

Period 8 – Bonus determination at end of period

| | | |
|---|---|---|
| Profit this period (fixed base amount): | 10.000 | |
| Invested this period: | 500 | - |
| Profit this period: | 9.500 | |
| Profit from investment of 7.500 in period 2: | 4.125 | + |
| Profit from investment of 9.000 in period 3: | 4.950 | + |
| Total profit | 18.575 | |

Your reward this period based on profit: 18.575 x E 0.06 per 1000 = E 1,11

Customer retention this period:

| | | |
|---|---|---|
| 12 factories, 80% each → points: | 960 | |
| Invested in a factory in period 4: 10.000. Customer retention this period: 98,25% → points: | 98,25 | + |
| From investments in earlier periods (earliest first): 89,13; 93,96; 96,42 → | 279,24 | + |
| Customer retention total this period: | 1.337,49 | |

Your reward this period based on customer retention: 1.337,49 x E 0,02 per 100 = E ,27

Your total reward this period: E 1,11 + E ,27 = E 1,38

Total reward including all previous periods:
Based on profits: ,3 + ,15 + ,06 + 0 + ,45 + ,41 + ,95 + 1,11 = 3,43;
Based on customer retention: ,26 + ,26 + ,26 + ,26 + ,26 + ,26 + ,26 + ,27 = 2,07;
Total: 3,43 + 2,07 = 5,51

While studying these results you may return to the instructions, and afterwards you can continue to the next period:

Introduction | Reward scheme | Investment table | Summary | Timeline | **To period 9 (of 16)**

## Screenshot condition IV, period 1

Period 1 – Bonus determination at end of period

Your reward based on profits is not determined this period.

At the end of periods 8 and 16, your reward based on profits will be determined on the basis of the cumulative profits from the preceding eight periods. The cumulative profits will be determined by subtracting the invested amounts from the periodic fixed amounts of profits and adding returns from previous investments to the periodic fixed amounts of profits.

Customer retention this period:

16 factories, 80% each (unchanged) → points: 1.280

Customer retention total this period: 1.280

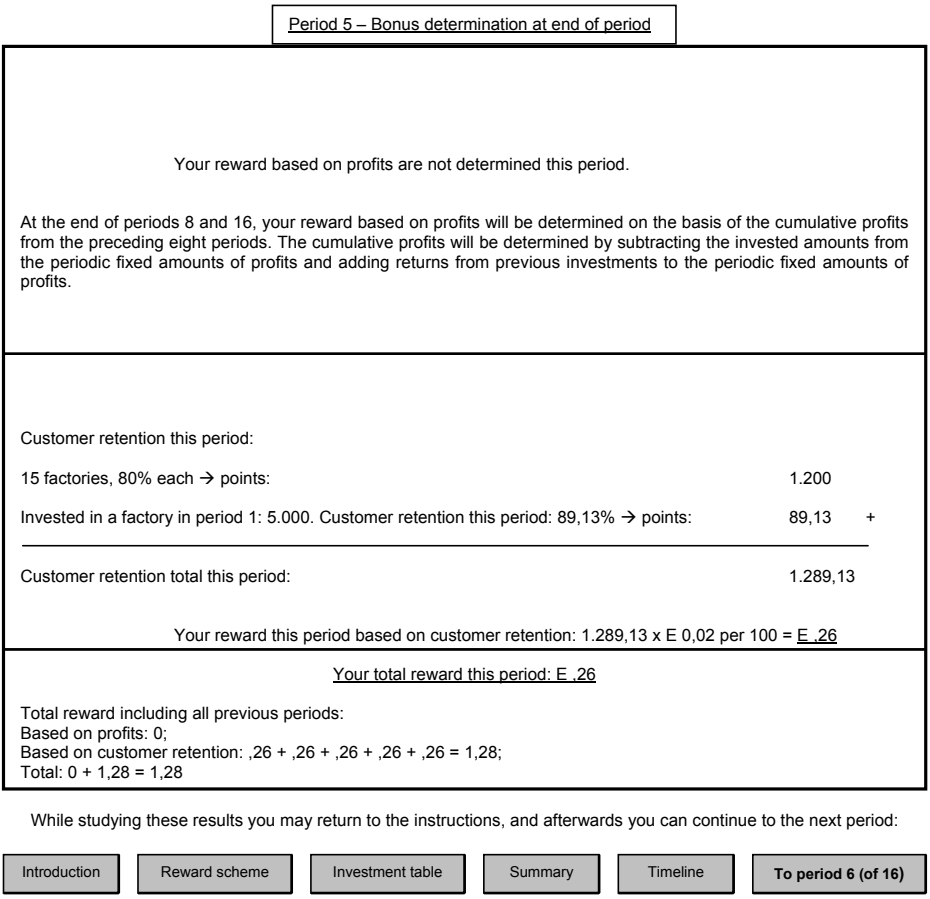
Your reward this period based on customer retention: 1.280 x E 0,02 per 100 = E ,26

Your total reward this period: E ,26

While studying these results you may return to the instructions, and afterwards you can continue to the next period:

Introduction | Reward scheme | Investment table | Summary | Timeline | **To period 2 (of 16)**

**Screenshot condition IV, period 5**
This is the first period showing an effect on the customer retention measure



## Screenshot condition IV, period 8

Period 8 – Bonus determination at end of period

| | | |
|---|---|---|
| Profit each period (fixed base amount): 10.000 x 8 periods: | 80.000 | |
| Invested in periods 1-8 (earliest first): 5.000+7.500+9.000+10.000+2.500+6.000+1.000+500= | 41.500 - | |
| Profit this rewardperiod: | 38.500 | |
| Profit from investments, booked in period 6: | 2.750 + | (2.750 from inv. in period 1) |
| Profit from investments, booked in period 7: | 6.875 + | (2.750 from inv. in period 1 and 4.125 from period 2) |
| Profit from investments, booked in period 8: | 9.075 + | (4.125 from inv. in period 2 and 4.950 from period 3) |
| Total profit | 57.200 | |

Your reward this period based on profit: 57.200 x E 0.06 per 1000 = E 3,43

Customer retention this period:

| | | |
|---|---|---|
| 12 factories, 80% each → points: | 960 | |
| Invested in a factory in period 4: 10.000. Customer retention this period: 98,25% → points: | 98,25 | + |
| From investments in earlier periods (earliest first): 89,13; 93,96; 96,42 → | 279,24 | + |
| Customer retention total this period: | 1.337,49 | |

Your reward this period based on customer retention: 1.337,49 x E 0,02 per 100 = E ,27

Your total reward this period: E 3,43 + E ,27 = E 3,7

Total reward including all previous periods:
Based on profits: 3,43
Based on customer retention: ,26 + ,26 + ,26 + ,26 + ,26 + ,26 + ,26 + ,27 = 2,07;
Total: 3,43 + 2,07 = 5,51

While studying these results you may return to the instructions, and afterwards you can continue to the next period:

Introduction | Reward scheme | Investment table | Summary | Timeline | **To period 9 (of 16)**

# APPENDIX B4

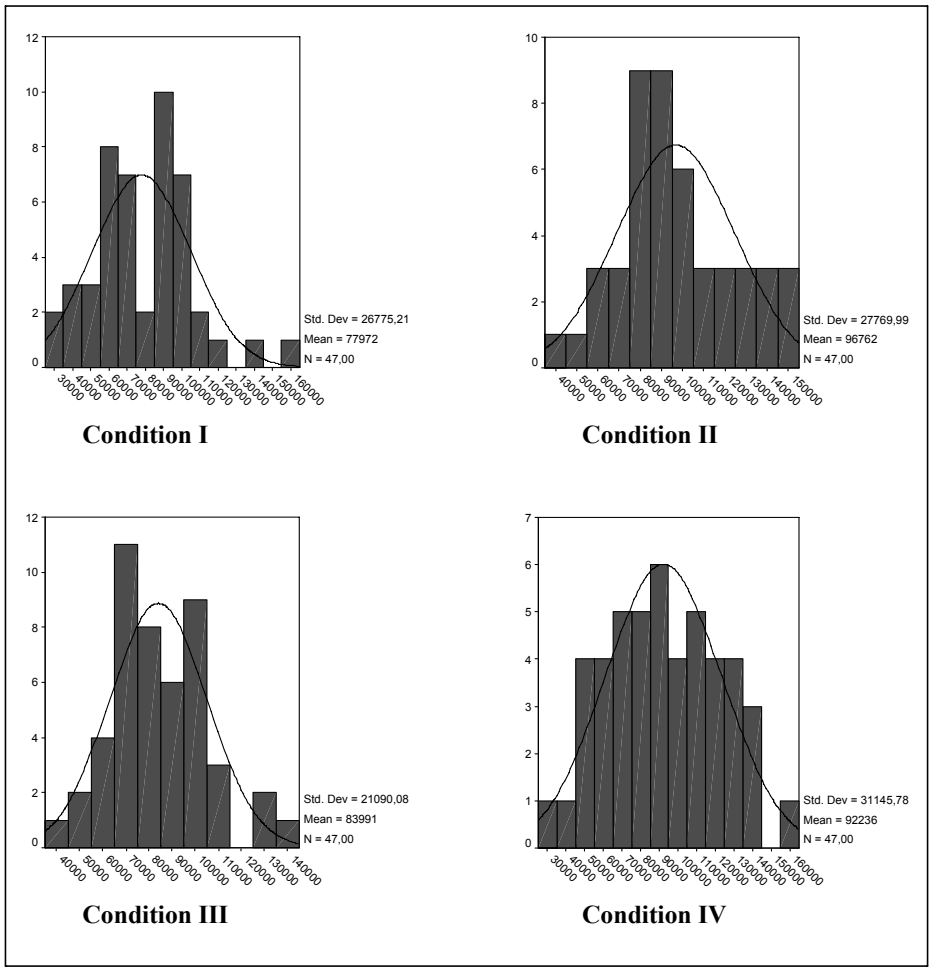



**Figure B4-1:** Histograms for each condition of DV "sum invested amounts – all periods"

**Table B4-1:** Descriptives per treatment condition
DV = sum invested amounts – all periods

| *Condition* | *N* | *Mean* | *Variance* | *Standard deviation* | *Skewness* | *Kurtosis* | *K-S value*[1] | *p-value*[2] |
|---|---|---|---|---|---|---|---|---|
| I | 47 | 77972 | 716911763 | 26775 | 0.469 | 0.485 | 0.589 | 0.878 |
| II | 47 | 96762 | 771172511 | 27770 | 0.304 | -0.282 | 0.878 | 0.423 |
| III | 47 | 83991 | 444791348 | 21090 | 0.354 | 0.220 | 0.647 | 0.796 |
| IV | 47 | 92236 | 970059487 | 31146 | 0.090 | -0.662 | 0.473 | 0.979 |

[1] Kolmogorov-Smirnov test for normality; [2] Significance (two-tailed) of K-S value.

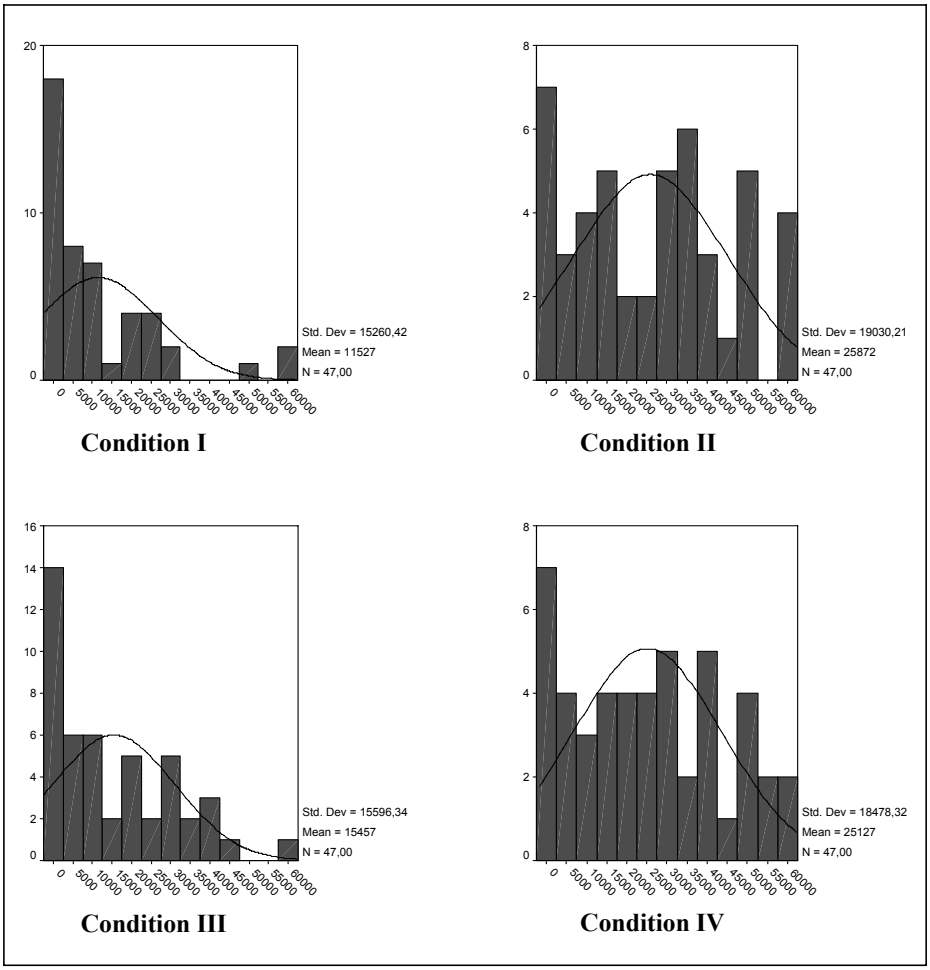



**Figure B4-2:** Histograms for each condition of DV "sum invested amounts – periods 11-16"

**Table B4-2:** Descriptives per treatment condition
DV = sum invested amounts - periods 11-16

| *Condition* | *N* | *Mean* | *Variance* | *Standard deviation* | *Skewness* | *Kurtosis* | *K-S value*[1] | *p-value*[2] |
|---|---|---|---|---|---|---|---|---|
| I | 47 | 11527 | 232880510 | 15260 | 1.790 | 3.104 | 1.543 | 0.017 |
| II | 47 | 25872 | 362148855 | 19030 | 0.204 | -1.094 | 0.656 | 0.782 |
| III | 47 | 15457 | 243245728 | 15596 | 0.863 | -0.058 | 1.163 | 0.134 |
| IV | 47 | 25127 | 341448458 | 18478 | 0.246 | -1.014 | 0.626 | 0.827 |

[1] Kolmogorov-Smirnov test for normality; [2] Significance (two-tailed) of K-S value.

# APPENDIX B5

**Table B5-1:** One-way ANOVA-analyses on invested amounts per period

| *Variable* | *F-value* | *p-value* |
|---|---|---|
| Amount1 | 0.512 | 0.674 |
| Amount2* | 2.557 | 0.057 |
| Amount3 | 0.741 | 0.529 |
| Amount4 | 1.541 | 0.205 |
| Amount5 | 1.186 | 0.316 |
| Amount6 | 1.878 | 0.135 |
| Amount7* | 2.910 | **0.036** |
| Amount8 | 2.446 | 0.065 |
| Amount9 | 0.227 | 0.877 |
| Amount10 | 1.692 | 0.170 |
| Amount11 | 6.006 | **0.001** |
| Amount12 | 3.820 | **0.011** |
| Amount13 | 4.425 | **0.005** |
| Amount14 | 7.473 | **0.000** |
| Amount15 | 4.760 | **0.003** |
| Amount16 | 7.954 | **0.000** |

* In addition to the last 6 periods, full factorial ANOVAs reveal a significant main effect of evaluation period for amount2 and amount7

**Table B5-2:** Post-hoc (LSD) condition comparisons; significant differences ($p<0.05$)

| *variable* | *condition* | *minus condition* | *mean difference* | *p-value* |
|---|---|---|---|---|
| Amount2* | I | II | -1351 | 0.046 |
| | | IV | -1532 | 0.024 |
| Amount4 | I | II | -1491 | 0.039 |
| Amount6 | II | IV | -1666 | 0.025 |
| **Amount7*** | I | IV | 1960 | 0.007 |
| | III | IV | 1654 | 0.022 |
| Amount8 | I | IV | 2000 | 0.008 |
| Amount10 | I | IV | -1674 | 0.026 |
| **Amount11** | I | II | -2283 | 0.005 |
| | | IV | -3251 | 0.000 |
| | III | IV | -1834 | 0.022 |
| **Amount12** | I | II | -1855 | 0.019 |
| | | IV | -2487 | 0.002 |
| **Amount13** | I | II | -2420 | 0.002 |
| | | IV | -2126 | 0.005 |
| | II | III | 1527 | 0.044 |
| **Amount14** | I | II | -2659 | 0.000 |
| | | IV | -2500 | 0.001 |
| | II | III | 2359 | 0.001 |
| | III | IV | -2200 | 0.003 |
| **Amount15** | I | II | -2178 | 0.002 |
| | | IV | -1512 | 0.031 |
| | II | III | 2084 | 0.003 |
| | III | IV | -1418 | 0.043 |
| **Amount16** | I | II | -2950 | 0.000 |
| | | IV | -1724 | 0.013 |
| | II | III | 2662 | 0.000 |
| | III | IV | -1437 | 0.037 |

Variables with a significant one-way ANOVA are printed bold.
Insignificant differences ($p>0.05$) are not reported.
* In addition to the last 6 periods, full factorial ANOVAs reveal a significant main effect of evaluation period for amount2 and amount7

# APPENDIX B6

**Table B6-1:** Descriptive statistics covariates

| *Variable* | *Items* | *Cronbach α* | *Theoretical range* | *Actual range* | *Mean* | *Median* | *Standard deviation* |
|---|---|---|---|---|---|---|---|
| CFC | See survey section[1] | 0.76 | 1-5 | 1.83-4.83 | 3.57 | 3.63 | 0.47 |
| Risk aversion | See table B6-2 | 0.84 | 0-1 | 0.15-1.00 | 0.60 | 0.57 | 0.15 |
| Ethical behavior | See table B6-3 | 0.37 | 1-5 | 1.50-5.00 | 3.68 | 4.00 | 0.70 |
| Experience PMS | Dummy variable[2] (1=yes) | - | 0-1 | 0-1 | 0.15 | 0 | 0.36 |
| Knowledge BSC | Dummy variable[3] (1=yes) | - | 0-1 | 0-1 | 0.96 | 1 | 0.19 |
| Gender | Dummy variable (1=female) | - | 0-1 | 0-1 | 0.27 | 0 | 0.44 |
| Age | - | - | 18+ | 20-35 | 22.39 | 22.00 | 2.09 |

[1] Factor analysis revealed a 4-factor structure. Consistent with Petrocelli (2004) (except for item *b*) and with the results of the survey, forcing a 2-factor structure revealed that all reversed items loaded together as did all non-reversed items. To enable comparison with the survey results and with previous research, all items were retained and the average was used as a variable. See the survey chapter for further explanation and motivation.
[2] The question asked was whether the subject had any experience with designing a PMS.
[3] The question asked was whether the subject was familiar with the BSC concept.

**Table B6-2:** Items and factor analysis risk aversion

| | ***Items*** | ***Component 1*** |
|---|---|---|
| *a* | *Veronderstel de volgende situatie. Iemand is bereid om u met zekerheid 10 Euro te geven, of om u een kansspel te laten doen dat 20 Euro uitbetaalt met kans* p *, en 0 Euro (dus niets) met kans* 1-p *. Wat zou kans* p *(tussen 0 en 1) minimaal moeten zijn zodat u de voorkeur geeft aan het kansspel?*<br>Suppose the following situation. Someone is willing to give you 10 Euro for certain, or to give you a gamble that pays 20 Euro with probability p, and 0 Euro (nothing) with probability 1-p. What would probability p (between 0 and 1) have to be at a minimum to make you prefer the gamble? | 0.842 |
| *b* | Identical to item a, except with amounts of 50 euro and 100 euro respectively | 0.918 |
| *c* | Identical to item a, except with amounts of 100 euro and 200 euro respectively | 0.851 |
| | Eigenvalue | 2.3 |
| | Variance extracted | 75.8% |

Extraction method: principal component analysis. KMO measure: 0.681. Bartlett's test (p-value): 242.1 (0.000).
Items based on Young (1985) and Moers (2001).

**Table B6-3:** Items ethical behavior

| | ***Items*** |
|---|---|
| *a* | *Als een manager besluit niet te investeren in een project dat de waarde van de onderneming vergroot omdat dat zijn/haar beloning verlaagt, dan zou dat onethisch zijn*<br>If a manager decides not to invest in a project that would enhance the value of the company because it would lower his/her bonus, that would be unethical |
| *b* | *Mijn eerste prioriteit als manager in de praktijk zou zijn om het beste voor de onderneming te doen, en niet om mijn eigen beloning te maximaliseren*<br>My first priority as a manager in practice would be to do what is best for the company, and not to maximize my own reward |

Items were measured on a 5-point Likert scale as follows:
Question: Please indicate your level of (dis)agreement with the following statements
Answering format: (1) strongly disagree; (2) disagree; (3) neither agree nor disagree; (4) agree; (5) strongly agree.

**Table B6-4:** ANCOVA; DV = sum invested amounts – periods 11-16

| ***Source*** | ***Type III Sum of Squares*** | ***d.f.*** | ***Mean square*** | ***F*** | ***p-value*** |
|---|---|---|---|---|---|
| Corrected model | 9962366265[1] | 10 | 996236627 | 3.427 | 0.000 |
| Intercept | 511980909 | 1 | 511980909 | 1.761 | 0.186 |
| *Degree of lead (L)* | 111939695 | 1 | 111939695 | 0.385 | 0.536 |
| *Evaluation period (P)* | 7086319838 | 1 | 7086319838 | 24.375 | **0.000** |
| *Interaction (L x P)* | 162015476 | 1 | 162015476 | 0.557 | 0.456 |
| *CFC* | 72116440 | 1 | 72116440 | 0.248 | 0.619 |
| *Risk aversion* | 111074722 | 1 | 111074722 | 0.382 | 0.537 |
| *Ethical behavior* | 520570699 | 1 | 520570699 | 1.791 | 0.183 |
| *Experience PMS* | 678876229 | 1 | 678876229 | 2.335 | 0.128 |
| *Knowledge BSC* | 523497755 | 1 | 523497755 | 1.801 | 0.181 |
| *Gender* | 872972229 | 1 | 872972229 | 3.003 | 0.085 |
| *Age* | 84232389 | 1 | 84232389 | 0.290 | 0.591 |
| Error | 5.146E+10 | 177 | 290720150 | | |
| Total | 1.329E+10 | 188 | | | |
| Corrected total | 6.142E+10 | 187 | | | |

[1] $R^2$=0.162, Adj. $R^2$=0.115.

# APPENDIX B7

**Table B7-1:** Descriptive statistics and analysis of debriefing questions

| | *Items* | *Mean* | *Median* | *Standard deviation* | *ANOVA results*[1] | *Condition comparison*[2] |
|---|---|---|---|---|---|---|
| *a* | *Ik hield rekening met de relatie tussen de niet-financiële indicator waarop ik beloond werd en de winst bij het nemen van mijn investeringsbeslisssing*<br>I took the relation between the non-financial indicator in my reward scheme and profit into consideration when I made my investment decision | 3.44 | 4.00 | 1.01 | n.s. | n.s. |
| *b* | *Ik hield rekening met de lange-termijn effecten van mijn investeringsbeslissingen*<br>I took the long term effects of my investment decisions into account | 3.69 | 4.00 | 1.11 | n.s. | n.s. |
| *c* | *De niet-financiele indicator in mij beloningsschema leidde ertoe dat ik nadacht over lange-termijn effecten van de investering*<br>The non-financial indicator caused me to think about the long term effects of my investment | 3.02 | 3.00 | 1.08 | n.s. | n.s. |
| *d* | *Ik zou meer geïnvesteerd hebben als de periode waarover mijn beloning bepaald werd langer geweest zou zijn*<br>I would have invested more if the period over which my reward was determined would have been longer | 3.54 | 4.00 | 1.18 | n.s. | n.s. |
| *e* | *Ik nam de gehele duur van de taak (16 perioden) in beschouwing bij het nemen van mijn investeringsbeslissingen in de afzonderlijke perioden*<br>I took the whole duration of the task (16 periods) into consideration when I made my investment decisions in the separate periods | 3.79 | 4.00 | 1.05 | n.s. | n.s. |
| *f* | *De totale duur van de taak (16 perioden) was een belangrijke factor voor het bepalen van mijn investeringen*<br>The total duration of the task (16 periods) was an important factor in determining the amounts I invested | 3.96 | 4.00 | 1.04 | Evaluation period<br>(F = 9.984,<br>p = 0.002) | I > II<br>I > IV |
| *g* | *Voor het bepalen van mijn investeringen richtte ik me vooral op mijn eerstvolgende beloning op basis van mijn behaalde winst*<br>To determine the amounts I invested, I mainly focused on my first upcoming reward based on my profit figure | 2.97 | 3.00 | 1.13 | n.s. | n.s. |
| *h* | *Ik betrok de toekomstige gevolgen voor de onderneming na de duur van de taak bij mijn investeringsbeslissingen*<br>I took the future consequences of my investment decisions for the company *after* the task was over into consideration | 2.54 | 2.00 | 1.25 | Evaluation period<br>(F = 7.397,<br>p = 0.007) | I < II<br>I < IV |

| | ***Items [Table B7-1 cont.]*** | ***Mean*** | ***Median*** | ***Standard deviation*** | ***ANOVA results[1]*** | ***Condition comparison[2]*** |
|---|---|---|---|---|---|---|
| *i* | *Ik probeerde investeringsbeslissingen te nemen die juist waren voor de onderneming*<br>I tried to make the correct investment decisions for the company | 3.24 | 3.00 | 1.09 | Degree of lead<br>(F = 5.978,<br>p = 0.015) | II > III |
| *j* | *Als iemand de investeringen in de laatste perioden zou verlagen omdat hij/zij zelf geen bonus meer zou ontvangen op basis van de winst van deze investeringen, dan zou dat onethisch zijn*<br>If someone would lower investments in the last periods because he/she would not receive a bonus based on the profits from this investments, that would be unethical | 3.08 | 3.00 | 1.24 | Degree of lead<br>(F = 5.905,<br>p = 0.016) | I > III |
| *k* | *Minder investeren gedurende de taak dan optimaal voor de onderneming zou onethisch zijn*<br>To invest less than optimal for the company during the task would be unethical | 2.86 | 3.00 | 1.05 | n.s. | n.s. |
| *l* | *Ik ervaarde sociale druk om goed te presteren gedurende de taak*<br>I experienced social pressure to perform well during the task | 2.62 | 2.00 | 1.22 | n.s. | n.s. |
| *m* | *Ik hield rekening met effecten op mijn reputatie bij het nemen van de investeringsbeslissingen*<br>I took effects on my reputation into account when making my investment decisions | 2.40 | 2.00 | 1.16 | n.s. | n.s. |
| *n* | *Ik was bereid hoge bedragen te investeren als deze naar verwachting meer geld zouden opleveren dan kosten, zelfs als dat ten koste zou gaan van mijn eerstvolgende beloning*<br>I was prepared to invest large amounts of money if the expected return was higher than the costs, even if it would hurt my first upcoming reward | 3.71 | 4.00 | 1.07 | Evaluation period<br>(F = 5.199,<br>p = 0.024) | I > IV<br>III > IV |
| *o* | *Ik wilde zo snel mogelijk (in de eerste perioden) een hoge beloning verdienen*<br>I wanted to earn a high reward as early as possible (in the first periods) | 2.62 | 2.00 | 1.13 | Evaluation period<br>(F = 11.748,<br>p = 0.001) | I < IV<br>II > III<br>III < IV |
| *p* | *Het was me gedurende de taak vooral te doen om de beloning op basis van winst*<br>I was mainly concerned with the profit based reward during the task | 3.62 | 4.00 | 1.08 | n.s. | I > II |
| *q* | *Ik zag snel effect van mijn investeringen*<br>I noticed effects of my investments quickly | 2.99 | 3.00 | 1.04 | n.s. | n.s. |
| *r* | *Ik probeerde mijn investeringen te optimaliseren over de gehele duur van de taak*<br>I tried to optimize my investments over the entire duration of the task | 3.59 | 4.00 | 1.08 | n.s. | n.s. |

| | *Items [Table B7-1 cont.]* | *Mean* | *Median* | *Standard deviation* | *ANOVA results*[1] | *Condition comparison*[2] |
|---|---|---|---|---|---|---|
| *s* | *Ik heb redelijk veel aandacht besteed aan de causale relatie tussen de drie indicatoren klanttevredenheid, klantentrouw en winst*<br>I paid a reasonable amount of attention to the causal relationship among the three indicators customer satisfaction, customer retention and profit | 2.76 | 2.50 | 1.07 | n.s. | n.s. |
| *t* | *De relatie tussen klanttevredenheid, klantentrouw en winst heb ik goed bestudeerd*<br>I studied the relation between customer satisfaction, customer retention and profit well | 3.09 | 3.00 | 1.01 | n.s. | n.s. |
| *u* | *Bij het nemen van mijn beslissingen woog ik mee dat er een risico van 5% was dat mijn investering geen winst zou opleveren*<br>I considered that there was a risk of 5% that my investment would not yield any profit when making my decisions | 3.43 | 4.00 | 1.30 | n.s. | n.s. |
| *v* | *Ik was me ervan bewust dat er 5% kans was dat mijn investeringen helemaal geen winst zouden opleveren*<br>I was aware that there was a 5% chance that my investments would not yield any profits at all | 4.32 | 4.00 | 0.86 | n.s. | I > IV |
| *w* | *Het was me duidelijk hoe effecten op klanttevredenheid, klantentrouw en winst met elkaar samenhingen*<br>It was clear to me how the effects on customer satisfaction, customer retention and profit were interrelated | 3.09 | 3.00 | 1.05 | Evaluation period (F = 7.187, p = 0.008) | I > IV<br>III > IV |

Items are measured on a 5-point Likert scale as follows:
Question: Please indicate your level of (dis)agreement with the following statements
Answering format: (1) strongly disagree; (2) disagree; (3) neither agree nor disagree; (4) agree; (5) strongly agree.
Items were displayed on screen in random order.

[1] ANOVA results of an analysis including the two independent variables and the interaction are summarily reported. Listed are significant variables ($p<0.05$) only. n.s. = no significant results.
[2] Column reports results of a post-hoc condition comparison (LSD). Reported are differences between means in treatment conditions that are significant at the 0.05 confidence level. For example, I >II means that subjects in condition I scored significantly higher on this item than subjects in condition II. Differences that are not mentioned are not significant. n.s. = no significant results.

# APPENDIX B8

**Table B8-1:** Paired samples t-tests of mean differences: condition I

| *difference* | *mean difference* | *p-value* |
|---|---|---|
| amount1-amount2 | 1032 | 0.052 |
| amount2-amount3 | -249 | 0.634 |
| amount3-amount4 | 430 | 0.535 |
| amount4-amount5 | -511 | 0.354 |
| amount5-amount6 | 36 | 0.940 |
| amount6-amount7 | -1164 | **0.017** |
| amount7-amount8 | -74 | 0.877 |
| amount8-amount9 | -79 | 0.890 |
| amount9-amount10 | 1702 | **0.004** |
| amount10-amount11 | 3074 | **0.000** |
| amount11-amount12 | 460 | 0.344 |
| amount12-amount13 | 469 | 0.228 |
| amount13-amount14 | 299 | 0.323 |
| amount14-amount15 | 44 | 0.857 |
| amount15-amount16 | 447 | 0.078 |

**Table B8-2:** Paired samples t-tests of mean differences: condition II

| *difference* | *mean difference* | *p-value* |
|---|---|---|
| amount1-amount2 | -787 | 0.078 |
| amount2-amount3 | 212 | 0.669 |
| amount3-amount4 | -172 | 0.761 |
| amount4-amount5 | 50 | 0.921 |
| amount5-amount6 | -330 | 0.561 |
| amount6-amount7 | 1033 | 0.060 |
| amount7-amount8 | -270 | 0.589 |
| amount8-amount9 | -459 | 0.482 |
| amount9-amount10 | 500 | 0.231 |
| amount10-amount11 | 1670 | **0.010** |
| amount11-amount12 | 887 | 0.138 |
| amount12-amount13 | -96 | 0.828 |
| amount13-amount14 | 60 | 0.878 |
| amount14-amount15 | 525 | 0.178 |
| amount15-amount16 | 326 | 0.380 |

**Table B8-3:** Paired samples t-tests of mean differences: condition III

| *difference* | *mean difference* | *p-value* |
|---|---|---|
| amount1-amount2 | 764 | 0.117 |
| amount2-amount3 | -285 | 0.625 |
| amount3-amount4 | -330 | 0.598 |
| amount4-amount5 | 362 | 0.598 |
| amount5-amount6 | -162 | 0.795 |
| amount6-amount7 | -437 | 0.316 |
| amount7-amount8 | 379 | 0.390 |
| amount8-amount9 | -703 | 0.173 |
| amount9-amount10 | 689 | 0.234 |
| amount10-amount11 | 2536 | **0.001** |
| amount11-amount12 | 938 | 0.087 |
| amount12-amount13 | 514 | 0.341 |
| amount13-amount14 | 893 | **0.007** |
| amount14-amount15 | 250 | 0.344 |
| amount15-amount16 | 253 | 0.435 |

**Table B8-4:** Paired samples t-tests of mean differences: condition IV

| *difference* | *mean difference* | *p-value* |
|---|---|---|
| amount1-amount2 | -181 | 0.754 |
| amount2-amount3 | 468 | 0.237 |
| amount3-amount4 | 404 | 0.455 |
| amount4-amount5 | 734 | 0.155 |
| amount5-amount6 | 0 | 1.000 |
| amount6-amount7 | 428 | 0.423 |
| amount7-amount8 | -34 | 0.954 |
| amount8-amount9 | -2294 | **0.000** |
| amount9-amount10 | 243 | 0.597 |
| amount10-amount11 | 1498 | **0.015** |
| amount11-amount12 | 1224 | **0.025** |
| amount12-amount13 | 829 | 0.050 |
| amount13-amount14 | 74 | 0.771 |
| amount14-amount15 | 1032 | **0.029** |
| amount15-amount16 | 234 | 0.450 |

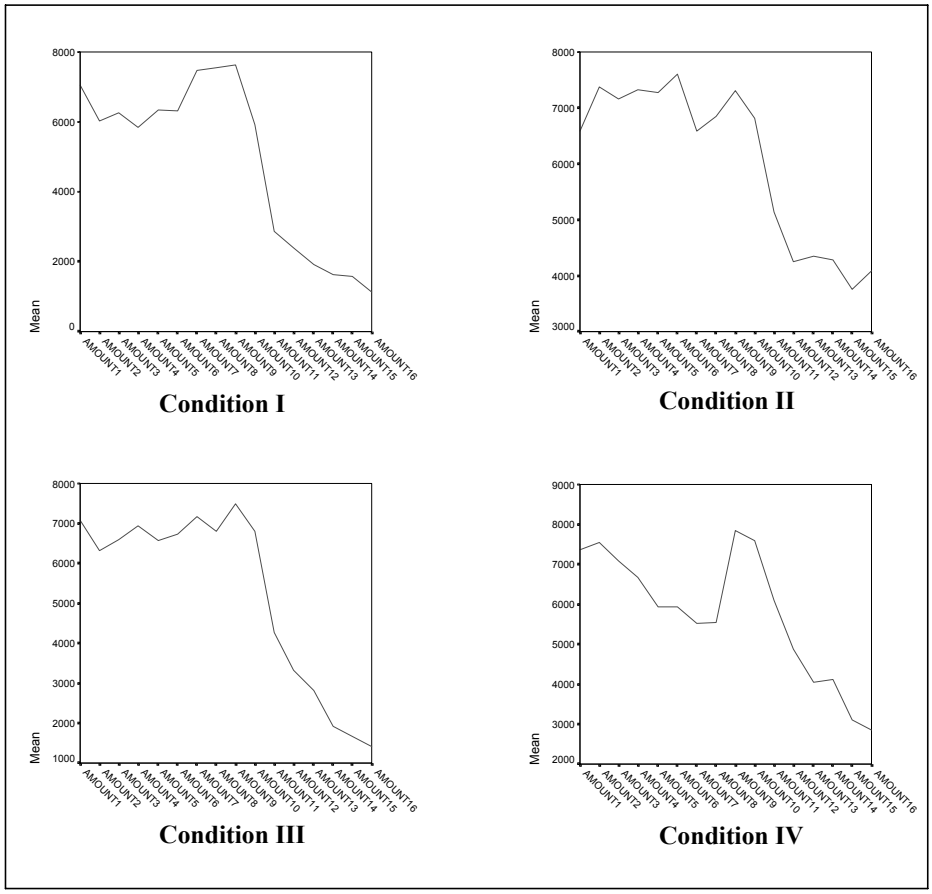



**Figure B8-1:** Graphs of invested amounts per condition

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# SUMMARY IN DUTCH
# NEDERLANDSE SAMENVATTING

Dit proefschrift beschrijft een studie naar de effecten van het prestatiemeetsysteem, en variabelen op individueel niveau, op de tijdsoriëntatie van managers.

Hoofdstuk 1 bevat een inleiding ten aanzien van het onderwerp en geeft de relevantie van de studie aan. De tijdsoriëntatie van managers (Managerial Time Orientation, MTO) is in dit proefschrift gedefinieerd als de tijdsspanne waarbinnen managers de opbrengsten van hun investeringen optimaliseren. Het bestuderen van factoren die MTO beïnvloeden heeft zowel theoretische als praktische relevantie. Het beschikken over een MTO die passend is voor de omstandigheden waarin de onderneming verkeert, is essentieel voor de concurrentiepositie en het overleven van ondernemingen op lange termijn.

Kenmerken van het prestatiemeetsysteem (PMS) en variabelen op individueel niveau kunnen beide van invloed zijn op MTO, maar hier is nog relatief weinig onderzoek naar gedaan. In de accounting literatuur zijn tot nu toe vooral de effecten van financiële (accounting) prestatiemaatstaven op MTO bestudeerd. Er is echter nog weinig bewijs aangaande de effecten van andere kenmerken van het PMS op MTO. Bovendien worden in de literatuur conclusies getrokken ten aanzien van algemene, brede categorieën prestatiemaatstaven, zoals financieel t.o.v. niet-financieel, terwijl veelal niet specifiek wordt ingegaan op de processen die leiden tot effecten op MTO. Verder is in de accounting literatuur (te) weinig rekening gehouden met variabelen op individueel niveau, zoals [1] individuele tijdsoriëntatie, een persoonlijkheidskarakteristiek geïdentificeerd in de psychologische literatuur; en [2] werkhorizon (lengte arbeidsovereenkomst), een variabele uit de economische literatuur. Dit proefschrift is gericht op het dichten van genoemde gaten in de bestaande literatuur door onderstaande centrale vraag te beantwoorden:
*Wat zijn de effecten van kenmerken van het prestatiemeetsysteem en variabelen op individueel niveau op de tijdsoriëntatie van managers?*

In hoofdstuk 2 wordt een overzicht gegeven van de literatuur met betrekking tot tijdsoriëntatie (van managers). Het hoofdstuk beschrijft voornamelijk studies in de accounting literatuur, maar identificeert ook studies aangaande dit onderwerp uit de onderliggende economische en psychologische disciplines. Uit deze verschillende literatuurstromingen worden kenmerken van het PMS en individuele factoren geïdentificeerd die in verband gebracht zijn met MTO.

Het derde hoofdstuk ontwikkelt een theoretisch model, waarin wordt aangegeven hoe de verschillende variabelen die in hoofdstuk 2 zijn geïdentificeerd met elkaar en met MTO samenhangen. Hieronder worden de hypotheses ten aanzien van directe effecten op MTO besproken.

De eerste hypothese betreft het effect van het gebruik van *leading indicators* (prestatiemaatstaven met een voorspellende waarde voor toekomstige accounting resultaten) op MTO. Verwacht wordt dat de *degree of lead* (lengte van de tijdsspanne tussen de leading indicator en een effect op accounting resultaat) van de gebruikte prestatiemaatstaf een positief effect heeft op MTO. De reden is dat de manager door de leading indicator in geval van een grotere *degree of lead* geholpen wordt om verder in de toekomst te kijken.

De tweede hypothese voorspelt dat ook een langere evaluatieperiode voor accountingresultaten een positief effect heeft op MTO, omdat dit de manager helpt een langere beslissingshorizon aan te nemen.

Hypothese 3 beschrijft het modererende effect van de evaluatieperiode op het effect van *degree of lead*. In geval van een korte evaluatieperiode, zal het effect van *degree of lead* op MTO naar verwachting minder sterk zijn. De manager moet dan namelijk meer focussen op korte termijn accountingresultaten, en zal minder geneigd zijn acht te slaan op de leading indicator en dientengevolge verder in de toekomst te kijken.

Ten vierde, subjectiviteit in evaluaties heeft naar verwachting een positief effect op MTO, aangezien leidinggevenden meer mogelijkheden hebben de evaluatie te corrigeren voor evt. dysfunctioneel korte-termijn gedrag van de ondergeschikte manager. Dit in tegenstelling tot het gebruik van objectieve, vooraf vastgestelde beloningsformules.

Voorts werd voorspeld dat manipulatie van accounting data een positief effect zal hebben op MTO. De reden hiervoor is dat flexibiliteit bij het rapporteren over het behaalde resultaat druk tot het verminderen van lange-termijn investeringen kan wegnemen, omdat het eenvoudiger wordt goede korte-termijn resultaten te rapporteren.

Tenslotte zijn twee variabelen op individueel niveau in verband gebracht met MTO. Van de geneigdheid om de organisatie te verlaten (“propensity to leave”) werd een negatief effect op MTO verwacht. Managers die verwachten niet lang meer in functie te blijven, zullen immers waarschijnlijk de opbrengsten van lange-termijn investeringen mislopen. Van de persoonlijkheidskarakteristiek *Consideration of Future Consequences*

(CFC), die aangeeft in hoeverre men geneigd is rekening te houden met toekomstige gevolgen bij het nemen van beslissingen, werd een positieve invloed op MTO voorspeld.

Hoofdstuk 4 beschrijft het vragenlijst-onderzoek dat uitgevoerd is onder financieel managers. Het doel van dit empirische onderzoek was het theoretische model aan een eerste, generaliseerbare, empirische test te onderwerpen. De resultaten bevestigen de hypothesen t.a.v. de interactie van *degree of lead* en de lengte van de evaluatieperiode, subjectiviteit en CFC. Voor de overige voorspelde directe effecten op MTO wordt geen ondersteuning gevonden. Niettemin geven de resultaten duidelijk aan dat zowel het ontwerp van het PMS (result control) als het aannemen van managers met een CFC die bij de gewenste MTO past (personnel control) van belang zijn voor het bereiken van de gewenste MTO.

Hoofdstuk 5 bevat een beschrijving van het experiment dat ontworpen is om nader onderzoek te doen naar het in de eerste drie hypothesen voorspelde interactie-effect. Dit experiment heeft als voordelen dat het [1] additioneel bewijs oplevert t.a.v. causale effecten; [2] een toets vrij van complicerende factoren, zoals industrie-effecten, mogelijk maakt; [3] de mogelijkheid biedt te testen of *degree of lead* werkelijk de planningshorizon van de manager verlengt, in plaats van alleen de lange-termijn investeringen vergroot omdat dat de evaluatie gunstig beïnvloedt. Dit laatste kan niet definitief vastgesteld worden op basis van de analyse van de verkregen gegevens uit het vragenlijst-onderzoek.

Het experiment is uitgevoerd met studenten uit een accounting-cursus als subjecten. De resultaten van het experiment laten zien dat de lengte van de evaluatieperiode een positief effect heeft op MTO, vooral in geval van een eindige werkhorizon (afloop contract). Een langere evaluatie-periode lijkt subjecten te helpen om ook toekomstige opbrengsten in ogenschouw te nemen bij hun investeringsbeslissingen. De variabele *degree of lead* had niet het voorspelde effect op de planningshorizon, en had geen significant effect op de genomen investeringsbeslissingen.

Het zesde en laatste hoofdstuk bevat een samenvatting en de conclusies van dit proefschrift. Hierin worden de resultaten van de twee empirische studies integraal besproken. Tevens wordt er aandacht besteed aan de implicaties en contributies, de beperkingen van de studies en worden er aanbevelingen voor verder onderzoek gedaan.

*Degree of lead* vertoont in de door middel van het vragenlijst-onderzoek verkregen data een interactie-effect met evaluatieperiode. In het experiment had *degree of lead* echter geen significant effect op MTO. Samen suggereren deze resultaten dat *degree of lead* niet de horizon van managers verlengt, maar mogelijk wel de lange-termijn investeringen verhoogt. Dit omdat door te investeren in de lange termijn ook de prestatie

uitgedrukt in de *leading indicator* toeneemt, hetgeen in het belang van de manager is gezien het gunstige effect op de evaluatie. De implicaties van deze resultaten zijn dat [1] bij het ontwerp van een Balanced Scorecard niet alleen de keuze van leading indicators van belang is, maar ook het vaststellen van een geschikte evaluatieperiode voor het financiële perspectief; [2] dat voorzichtigheid in acht moet worden genomen bij het bepalen van het gewicht op een leading indicator, aangezien niet kon worden vastgesteld dat deze effect sorteert op de planningshorizon, en het gevaar bestaat dat slechts de gemeten prestatiedimensie wordt gemaximaliseerd.

Verdere implicaties van deze studie zijn ten eerste dat MTO middels subjectiviteit beïnvloed kan worden. Vooraf vastgestelde objectieve evaluatie-criteria lijken eerder een korte-termijn oriëntatie in managers teweeg te brengen, terwijl subjectievere evaluaties MTO juist kunnen verlengen. Ook is gevonden dat (mogelijkheden tot) manipulatie van accounting data geen effect hebben op MTO. Tenslotte spelen variabelen op individueel niveau, zoals contractshorizon (experiment) en CFC (vragenlijst) een rol van betekenis voor de totstandkoming van de tijdsoriëntatie van managers, hetgeen het belang van personnel controls benadrukt.

Dit proefschrift draagt op de volgende manieren bij aan de bestaande accounting literatuur. In tegenstelling tot de meeste voorgaande studies, beschouwt het specifieke kenmerken van het PMS in plaats van brede, algemene categorieën prestatiemaatstaven. Het ontwikkelt een theoretisch model, waarin rekening wordt gehouden met de effecten op MTO van veel variabelen tegelijkertijd, alsmede met de interrelaties tussen deze variabelen. Verder werden ook variabelen op individueel niveau in de analyse betrokken. Tenslotte benadert dit proefschrift de centrale vraag interdisciplinair, hetgeen een completer beeld oplevert van een complex praktisch vraagstuk.

Zoals elk empirisch onderzoek zijn de twee beschreven studies onderhevig aan beperkingen. Het vragenlijst-onderzoek geeft bewijs over correlaties tussen variabelen, maar is niet in staat causaliteit aan te tonen. Meer longitudinaal of experimenteel onderzoek naar causale effecten tussen alle variabelen is daarvoor vereist. Verder waren de verkregen data afkomstig uit verschillende sectoren. Hoewel hiermee in de analyses rekening werd gehouden middels een industrie-variabele, is toekomstig onderzoek gebaseerd op gegevens uit slechts één sector aanbevelenswaardig om industrie-effecten geheel uit te sluiten. Verder is de generaliseerbaarheid van de resultaten beperkt tot de populatie van financieel managers.

In het experiment waren studenten degenen die de investeringsbeslissingen namen, hetgeen mogelijk de generaliseerbaarheid van de resultaten naar andere groepen vermindert. Ook kan het feit dat de experimentele taak (noodzakelijkerwijs) eenvoudig

van opzet was, en in een relatief kort tijdsbestek uitgevoerd werd, mogelijk de toepasbaarheid beperken voor de in de praktijk heersende complexere omstandigheden.

Het proefschrift eindigt met enkele verdere aanbevelingen voor toekomstig onderzoek, waarvan hier de voornaamste nog eens genoemd worden. Aanvullende studies naar het relatieve belang van variabelen op individueel niveau, alsmede de wijze waarop deze interacties vertonen met variabelen uit het PMS, zijn gewenst. Verder was de focus van dit proefschrift niet gericht op de effecten van verschillende beloningsvormen en prikkels op MTO, zoals bijvoorbeeld beloningen in de vorm van opties of aandelen en carrière-overwegingen. Ook hier liggen tal van verdere mogelijkheden voor toekomstig onderzoek.

# CURRICULUM VITAE

Marcel van Rinsum (May 3rd, 1973) obtained his Atheneum diploma in 1991. Subsequently, he studied Management, Economics, and Law, with a specialization in Banking and Insurance, at the HES Amsterdam from 1991 to 1995. Thereafter, he studied Business Economics at the University of Amsterdam. He graduated Cum Laude (with distinction), with a specialization in Financial Management, in 1999. Afterwards, he was employed as a Ph.D. student and a lecturer in Management Accounting & Control at the University of Amsterdam and Nijmegen University, respectively. He finalized his dissertation at the RSM Erasmus University, Rotterdam.

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## Performance Measurement and Managerial Time Orientation

Scandals involving managers that have quickly cashed in, leaving their company in distress, regularly come to light. These managers have undertaken actions oriented towards short-term gains, such as lowering service or quality and decreasing long-term investments. These actions are taken to boost current financial performance, which commonly forms the basis for managers' evaluation and rewards. Although such actions are often dysfunctional, a short-term orientation is not always bad. For example, in case of liquidity problems, a fast increase in current financial results is required. Clearly, the adoption of a managerial time orientation that is appropriate for the circumstances is essential to a company's success.

This dissertation demonstrates how the design of the performance measurement system affects the time orientation of managers. It also shows that managerial time orientation depends on individual characteristics. The results can be used as guidelines for the use of performance measures in companies, as well as for the selection of managers, dependent on the desired managerial time orientation.

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