

The Role of Performance Measures in the Intertemporal Decisions of Business Unit Managers*

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1. Introduction

Dealing with problems of intertemporal choice is a fact of life for business unit managers. Some actions satisfy long-run imperatives (e.g., building competencies, developing new products) but might harm short-term objectives (e.g., meeting profit targets, paying dividends to owners, maintaining liquidity). In short, the intertemporal-choice problem is that “the course of action that is best in the short term is not the same course of action that is best over the long run” (Laverty 1996). Performance measures can help to provide incentives to managers to make optimal intertemporal decisions. To do so, these measures need to reflect fully both the short-term *and* the long-term impact of managerial actions on firm value (Lambert 2001). We examine the impact of specific performance measures, used in contracting with business unit managers, on the allocation of effort between actions with a short-term and with a long-term time horizon.¹ In order to motivate managers to expend effort on actions with a payoff that will not be reflected until future periods, some performance measures are better suited to the task inasmuch as they “bring the future forward”² more fully than others. Despite considerable research examining comprehensive performance measurement system design (Lillis 2002; Lipe and Salterio 2000; Ittner, Larcker, and Meyer 2003), it is not well understood how using different performance measures will affect the intertemporal action choices of managers.

The importance of properly incentivizing managers to make decisions that benefit the firm in the long run (even at the cost of forgoing some short-term profits) can hardly be

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1. Thus, we do not examine the relation between the use of performance measures and over- or underinvestment. Rather, we are concerned more directly with the allocation of managerial effort over actions with short-term and longer-term impact. Longer-term actions can include effort expended to improve customer satisfaction, train the workforce, engage in fundamental research, or explore new markets. Short-term actions include managing the current operations, production scheduling, and dealing with personnel issues.
2. We borrow this phrase from Lundholm and Myers 2002, although we are aware that these authors use it in a different context.

overstated. Indeed, a vast literature in management, finance, and accounting has explored the causes and consequences of “short-termism” and managerial myopia.³ Accounting researchers have usually concluded that all accounting-based measures distort the attention of managers by overweighting the short run (Merchant 1989, 1990; Chow, Kato, and Merchant 1996; Van der Stede 2000). This conclusion is puzzling, however, in view of strong evidence from theory, which suggests that accounting return measures (e.g., return-on-assets, residual income) can provide managers with incentives to choose the optimal level of investments when this decision is delegated to them (Reichelstein 1997; Rogerson 1997, 2008; Dutta 2003; Dutta and Reichelstein 2003). More broadly speaking, it is hard to understand, as Zimmerman (2003) points out, why accounting performance measures continue to be used in contracting if they do not provide business unit managers with incentives to make value-maximizing decisions and to refrain from making intertemporal choices that dissipate wealth.

Surprisingly little direct evidence exists on the incentive effects of different types of performance measures. We follow recent practice in the managerial economics literature (Bandiera, Guiso, Prat and Sadun 2010) and gather survey data on the actual time allocation of managers over activities that affect performance on the short (quarter), medium (annual), and long (more than one year) horizons. We also obtain data on the incentive weights placed on each of the performance measures when used in the evaluation of business managers. Together, this data enables us to follow an identification strategy in which we can isolate the sensitivity of each performance measure to the action choices of managers by estimating regressions of the time allocation onto the weights placed on each measure in evaluating managerial performance.

We consider quarterly, annual, and multiple year horizons, respectively, for the following reasons. Much of the literature on short-termism discusses capital market pressures to meet quarterly targets (e.g., analyst forecasts) as a first-order cause of managerial myopia (Bhojraj and Libby 2005; Marginson and McAulay 2008). Recent theoretical evidence supports that short-termism is an equilibrium response to mandated high-frequency reporting (Gigler, Kanodia, Sapiro, and Venugopalan 2009). There is substantial empirical evidence that managers consider quarterly targets when making operating and accounting decisions (Beatty, Ke, and Petroni 2002; Matsumoto 2002). Indeed, managers face an increased chance of being dismissed if they fall short of quarterly market expectations (Mergenthaler, Rajgopal, and Srinivasan 2011). Cash bonus and promotion decisions are usually made in annual evaluation rounds tied to the firm’s budgetary cycle. Thus, we use the one-year horizon as our proxy for medium-term actions, whereas the quarter captures short-term actions. Any action which is expected to have performance consequences more than one year ahead is considered long-term.

We consider an encompassing set of performance measures including accounting return and profit measures, as well as nonfinancial measures. We include nonfinancial measures because prior work suggests that some nonfinancial measures are forward-looking.⁴ As such, these measures should also be useful in providing incentives to managers to consider the long run in their decision making.⁵ Theory suggests that accounting return

3. See, for example, Narayanan 1985, Holmstrom and Ricart I Costa 1986, Rumelt 1987, Stein 1988, Thakor 1990, Murphy and Zimmerman 1993, Song and Thakor 2006, and Marginson and McAulay 2008.

4. The balanced scorecard is an example of a comprehensive performance measurement system that includes nonfinancial measures argued to be leading indicators of financial outcomes (Banker, Chang, and Pizzini 2004; Lipe and Salterio 2000; Ittner et al. 2003).

5. We follow the advice in Demski and Sappington 1999 who warn empirical researchers who examine agency models to be as complete as possible in their characterization of the incentive contract. For this reason, we also obtain data on the incentive weight on disaggregated accounting measures such as costs and revenues and include these variables as additional controls in our empirical model.

measures and nonfinancial measures are used to supplement profit measures in evaluating business unit managers when profits induce too-costly myopic behavior (Lambert 2001). The rationale is that these alternative measures counterbalance myopic actions by motivating managers to direct attention to activities that have an effect beyond the next quarterly earnings report.

To conduct the above analyses, we use survey data collected from a sample of 105 business unit managers with profit responsibility. Our data collection and empirical testing of our model address methodological problems associated with using survey data and with testing relations motivated by agency theory (Ittner and Larcker 2001; Demski and Sappington 1999). Our findings indicate that accounting return measures are associated with a longer-term managerial focus. We also find that nonfinancial measures result in a longer-term orientation. While both types of measures can be used to supplement profit measures if managers act too myopically, we show that accounting return measures are more capable of directing the attention of managers away from the short run than nonfinancial measures. Indeed, increasing the weight on accounting return measures on average increases the time allocated to long-horizon activities from a minimum of 32 percent to a maximum of 41 percent of their total available time. Our findings are particularly important in highlighting the versatility of accounting return measures in focusing the attention of managers on activities that have longer-term consequences on firm performance.

The paper is structured as follows. Section 2 reviews the relevant literature leading to the hypotheses. Section 3 describes the sample, data, and method of analysis. Section 4 presents the results of the empirical model, with section 5 providing additional analysis to evaluate the robustness of our model. Conclusions and discussion of the results are included in section 6.

2. Hypothesis development

Intertemporal decisions and performance measure congruity

We base our hypotheses on recent work in multi-action agency models (Lambert 2001). These models lend themselves to interpretations of intertemporal choice and emphasize the role of performance measures. The agent (business unit manager) can be thought of as allocating effort between activities that affect firm value immediately and those that affect firm value in the long term. The problem for senior management is to pick performance measures that minimize intertemporal decision problems, motivate the desired total level of effort, and direct business unit managers to allocate the desired amount of effort to activities that affect both short- and long-term value.

Two aspects of performance measures matter in equilibrium: congruity and sensitivity/precision (Banker and Datar 1989; Datar, Kulp, and Lambert 2001; Feltham and Xie 1994). *Congruity* is the degree to which a performance measure captures the value impact of an agent's actions. A performance measure will have low congruity if managerial decisions improve the performance measure but hurt firm value (e.g., a profit measure that does not reflect the potential benefits of capital investments or of investing in new markets). *Sensitivity* refers to the degree to which the mean of a performance measure moves in response to an action by the manager, and *precision* reflects the noise or variance associated with the performance measure. Sensitivity and precision capture the intensity of the incentives provided to the agent. The (relative) weight on a performance measure, therefore, is a function of congruity and sensitivity/precision.

In the context of intertemporal decisions, we are interested in congruity problems that arise because a performance measure does not immediately reflect the long-term impact of the actions of business unit managers (or, conversely, overly emphasize the long run at the expense of the short run). Lambert (2001) argues that one solution to congruity problems in a performance measure is to supplement the existing "incomplete" measure with

another performance metric that is more sensitive to the business unit manager's desired action. This requires measures that are incongruent in the opposite direction to the existing measures so that performance measurement on balance is as congruent as possible. However, little is known about the direction of performance measures' congruity, particularly when it concerns motivating or deterring myopic behavior (Lambert 2001: 39).

Our objective is to explore the direction of performance measure congruity in an effort to help explain the choices senior management make when designing the performance measurement system. In a typical multitask agency problem, the agent's allocation of effort over short- and long-run activities follows directly from the compensation contract design choice of incentive weights placed on different performance measures. One critical assumption in deriving this solution is that it is *known* to what extent a performance measure captures short- and long-run activities. This practice assumes away an important problem in managerial practice: How do specific measures capture managerial activity? Our empirical strategy is to infer from the contract design (i.e., the weight placed on different performance measures) and from the equilibrium effort choice by the agent the extent to which different types of performance measures capture short- and long-run activities. In the context of our setting, all business unit managers are evaluated on profit measures which we know may lack congruity as they do not reflect the potential benefits of investments where benefits occur over a period of time. Consistent with prior research, we document that firms often use a combination of measures (i.e., a performance measure "package") when assessing managerial performance. We investigate whether alternative measures can balance out any potential incongruity problems associated with the profit measure by directing managerial attention to activities that have longer-term consequences on firm performance. Note that we are not arguing that profit measures are problematic *per se* or that attention to the short horizon is suboptimal. In equilibrium, however, we expect that other performance measures are introduced to supplement the profit measure in those cases, in which it overemphasizes the short run.

Accounting return measures

Accounting return measures are believed to be highly congruous because they provide a measure of economic value generated from specified resources and are thus a reasonable proxy for firm value creation (Zimmerman 1997; Scapens 1979; Anthony and Govindarajan 2004). The beneficial effects of accounting return measures derive from two sources. First, they combine financial statement information and thus explicitly relate earnings to the assets needed to generate them. Second, accounting return measures are used *in practice* in conjunction with estimates of the firm's cost of capital (McKinnon and Bruns 1992; Chenhall and Langfield-Smith 1998). These estimates manifest themselves as "hurdle rates" and their inclusion in accounting return measures reinforces incentives for business unit managers to consider the longer-term effect of their actions. Managers know these "hurdle rates" apply now and in the future and this prompts them to consider how their decisions affect future measured performance. Indeed, prior literature has argued that whenever managers affect the value of resources (even without having formal decision rights), accounting return measures are useful in contracting (Bouwens and van Lent 2007).⁶

Much of the extant (theoretical) literature is concerned with the question of how accounting return measures motivate long-term investments. While this literature, which we discuss in more detail next, is relevant to our study, we emphasize that our focus is

6. Athey and Roberts (2001) formally show that the tension between rewarding agents on precise measures of their effort and motivating them to make decisions that increase firm value might result in the use of measures that are not consistent with the assigned decision rights.

more broadly on *any* kind of managerial action with long-term impact. We argue that the use of accounting return measures signals to the manager that senior management cares about investment returns. This signal, in turn, will not only draw the manager's attention to selecting investments per se, but also to those actions that could potentially increase the returns earned. Thus, we consider effort expended to improve competencies of employees, the brand reputation of the firm, or to explore strategic alliances with suppliers, as examples of actions with long-term impact. The multi-action agency models discussed before provide a good way to frame our argument. Consider an agent who can improve current operations and/or exert costly effort in selecting future investment projects.⁷ A congruous performance measure ("package") should motivate effort on both actions optimally (Feltham and Xie 1994). As accounting return measures make managers explicitly consider both the resources they have available and the cost of capital that they need to earn with these resources, we conjecture that these performance measures can be used to achieve behavior consistent with the firm's objective function.

There is strong theoretical support for the use of such measures in motivating long-term investments (Rogerson 1997, 2008; Garvey and Milbourn 2000; Reichelstein 1997; Dutta 2003; Dutta and Reichelstein 2002). Note that these models are about the optimal choice of investment projects and not about the effort expended in the selection process, which is our focus. Thus, this literature is primarily concerned with allocation of costs in creating a periodic performance measure that creates incentives for managers to make goal-congruent decisions about using and acquiring assets. The upshot is that when firms make sunk investments in long-lived assets to produce output, a cost allocation scheme that incorporates the cost of capital into a performance measure can achieve this objective. Drawing on these studies, Lambert (2001) argues that measures that incorporate a firm's cost of capital (e.g., by using a hurdle rate) can motivate agents to invest optimally regardless of the agent's time preferences or utility function. The hurdle rate component of accounting return measures may also work more indirectly, as business unit managers will be successful in the competition for corporate funding only if their investments meet the cost of capital in the long run. Managers derive reputation benefits associated with investment projects that meet or exceed the hurdle rate. Thus, using accounting return measures that implicitly or explicitly use a hurdle rate in the evaluation of managers emphasizes the longer-term consequences of current decisions (Rogerson 2008).

The empirical evidence is broadly consistent with these predictions. Balachandran (2006) and Wallace (1997) show that companies adopting an accounting return measure that incorporates a hurdle rate make investment decisions that are more aligned with the long-term interests of shareholders. Balachandran and Mohanram (2008) find that the hurdle rate information captured in accounting return measures is helpful in reducing problems in intertemporal decision making by focusing attention on sources of potentially problematic earnings growth. Although this prior work does not directly document that accounting return measures focus the attention of managers on longer-term activities, it does provide us with some empirical evidence that intertemporal decisions may be affected by return measures.

We do not distinguish either conceptually or empirically between residual income (RI) and return on investment-type (ROI) measures and combine both into one category of accounting return measures. Some accounting textbooks argue that ROI and RI may have very different incentive effects. This position seems to be the outcome of the heated debate between proponents of each of these measures in earlier decades (Reece and Cool 1978; Anthony 1965; Dearden 1987). In contrast to this mostly normative debate, recent empiri-

7. We use the term "project" generically to refer to any kind of decision that requires expenditure. That expenditure might relate to investments in tangible assets but it quite easily could be expenditure to build market share in, say, Asia.

cal work has not been able to show consistent differences in the incentive effects of either measure (see, e.g., Bouwens and van Lent 2007; Balachandran 2006).⁸ This is in line with recent work by Rogerson 2008 who argues that the key feature that distinguishes accounting return measures from other accounting-based performance measures is their incorporation of the time value of money. Our choice not to distinguish between RI and ROI is further validated by evidence provided in Balachandran 2006, who documents no significant change in investments for a sample of firms that switch from ROI to RI, but does find a significant decrease in investments for firms that switch from earnings to RI. Compared to the incentive effects of changing performance measures from earnings to RI, the change from ROI to RI seems minor.⁹

Based on the prior theoretical and empirical evidence, we expect that the use of accounting returns motivates business unit managers to spend more time on actions with impact on the long run than on those that impact the short term.

HYPOTHESIS 1. *The amount of time a business unit manager spends on activities with a longer horizon compared to the time spent on activities with a shorter horizon is positively associated with the weight placed on accounting return measures.*

Nonfinancial performance measures

The main benefit of nonfinancial measures is that they can be leading indicators of future performance¹⁰ and thus can improve contracting efficiency and motivate managers to undertake actions with longer-term consequences. Further, these measures can be tailored to measure *specific* activities of the firm that senior management knows to be important in the longer term. In fact, Nagar and Rajan (2005: 907) suggest that the “choice of measure should arise from a conceptualization of the underlying *process* that is being measured” (*italics in original*). For example, senior management can use metrics that reflect information about warranty returns to correct quality problems before they are allowed to affect firm value. Despite these potential benefits, Ittner and Larcker (2003) conclude that only a few companies realize these benefits because identifying, analyzing and acting on the right nonfinancial measures is not a trivial task. What’s more, as we will argue in more detail below, “self-serving managers are able to choose — and manipulate — measures solely for the purpose of making themselves look good” (Ittner and Larcker 2003: 89). Thus, it is unclear to what extent nonfinancial measures deliver improvements in practice; indeed, it is likely that the efficacy of these measures varies by type and by organizational setting.

The close tie between nonfinancial measures and business processes explains why there is so little broad-based empirical evidence on the details of their use in performance evaluation (Nagar and Rajan 2005). There is, however, case-based or single-industry evidence that demonstrates the causal chain that links nonfinancial measures to future performance.¹¹ For example, using a proprietary data set, Banker, Potter, and Srinivasan (2000) show how in a sample of hotel chain properties, customer satisfaction is linked via room occupancy rates to

8. We consider both to be imperfect proxies of “economic profit” as both are subject to conservatism.

9. Our definition of accounting return measures includes economic value added (EVA) and similar performance measures (such as cash flow return on investment, economic profit, and return on capital employed). Prior work documents that the information content of EVA and residual income is very similar (Biddle, Bowen, and Wallace 1997). This further justifies our decision to include all these measures in the accounting return measure category.

10. A substantial empirical literature documents the leading indicator property of nonfinancial and disaggregated measures (see, e.g., Hauser, Simester, and Wernerfelt 1994; Fairfield and Yohn 2001; Banker and Chen 2006; Zeithaml 2000; Fairfield, Sweeney, and Yohn 1996; Ittner, Larcker, and Rajan 1997; Banker et al. 2000; Ittner and Larcker 1998a; Ittner and Larcker 2005; Bryant, Jones, and Widener 2004; Sedatole 2003).

11. Note that not all studies have demonstrated a causal link (Malina, Nørreklit, and Selto 2007).

future revenues and operating profit. Similarly, in a sample of retail banks, Nagar and Rajan (2005) document how product pricing and service measures affect, via customer satisfaction, deposits, loans, and customer volume. Drawing on third-party data, Smith and Wright (2004) and Dikolli, Kinney, and Sedatole (2007) demonstrate causal relations between nonfinancial measures and financial performance. Specifically, Smith and Wright (2004) examine the relation between measures of product value attributes (brand image, post-sale service quality), product market attributes (average price, customer loyalty), and financial performance for the PC industry, and for a sample of online retailers Dikolli, Kinney, and Sedatole (2007) show a correlation between nonfinancial measures of switching costs, customer attitudes, and future financial performance. While this evidence indicates that these measures have implications for future performance, the limitations of third-party data imply that neither study is able to assess first-hand whether nonfinancial measures are in fact used in the sample firms or what their effect is on managerial behavior.

Nevertheless, together these findings suggest that the close link between nonfinancial measures and senior management's conceptualization of the underlying business process "brings the future forward". Activities with long-run consequences are thus more likely to receive the desired attention (Dikolli 2001), as their salience will be made more "tangible" to managers who are evaluated on nonfinancial measures.

HYPOTHESIS 2. *The amount of time a business unit manager spends on activities with a longer horizon compared to the time spent on activities with a short horizon is positively associated with the weight placed on nonfinancial measures.*

How sensitive are intertemporal decisions to accounting return and nonfinancial measures?

While some nonfinancial measures help to focus the attention of business managers on longer-term activities, we argue that intertemporal decisions are more sensitive to accounting return measures. We identify four potential problems with nonfinancial measures to support this argument: (a) incongruity, (b) lead times that do not extend beyond the one-year horizon, (c) nonlinearity, and (d) nonverifiability (see also Sedatole 2003; Ittner and Larcker 2005). The degree to which nonfinancial measures suffer from these problems will vary from firm to firm and, more importantly, from one nonfinancial measure to another. The more a specific nonfinancial measure is susceptible to these issues, the more its ability to promote longer-term horizons will be compromised. For example, customer satisfaction scores might be a leading indicator for store revenues by three months in retail shops with high-frequency repeat purchases; while a three-year leading indicator might be more appropriate in shops selling durable consumer goods that customers normally replace only every few years. Thus, we recognize that not all nonfinancial measures will, on average, have the same effect in promoting longer-term horizons. We expect that accounting return measures are less vulnerable to these problems.

Measure incongruity

Garvey and Milbourn (2000) use the correlation between a performance measure and stock prices to gauge the ability of the measure to align the interests of principals and agents.¹² While there is only mixed and weak evidence of a link between stock prices and nonfinancial measures (Ittner and Larcker 1998a; Ittner, Larcker, and Randall 2003), Garvey and Milbourn find a strong association between accounting return measures and excess returns,

12. It is not clear whether performance measures that are highly correlated with the firm's stock price are used more in performance evaluation (Ittner et al. 2003). There is an unfortunate disconnect between capital market studies that examine the value relevance of performance measures and managerial accounting studies that explore the contracting usefulness of the same measures.

consistent with the hypothesis that accounting return measures reflect the manager's contribution to firm value (Bouwens and van Lent 2007; Zimmerman 1997; Raith 2008b).¹³

Relatively short lead times

Baiman and Baldenius (2008) point out that “the observed lead times [of nonfinancial measures] can be quite short, with revenue effects...often materializing in less than one year” (5). Indeed, evidence in Banker et al. 2000, Dikolli et al. 2007, and Nagar and Rajan 2001 is consistent with this claim. In contrast, there is some evidence supporting the idea that accounting return measures have longer-term predictive value (Frankel and Lee 1998; Dechow, Hutton, and Sloan 1999). Thus, while the leading indicator property of nonfinancial measures has been firmly established, it appears that in some firms the actual lead times are relatively short, which reduces the ability of these measures to focus the attention of managers on horizons beyond one year.

Nonlinearity

There is considerable risk that managers will continue to expend effort on actions that do not produce the desired gain in firm value. For example, if improving employee quality is a strategic goal and the firm uses the number of hours engaged in training as a performance measure, then business unit managers may allocate too much effort to training employees, which in turn harms firm value. Ittner and Larcker (1998a) demonstrate that motivating managers to improve satisfaction scores is only value-increasing within a limited range. Sedatole (2003) discusses several plausible functional forms for the relation between nonfinancial measures and future performance, including dichotomous and quadratic forms, and shows how unduly assuming linearity harms the leading indicator property of these measures.

Nonverifiability

Budde (2007) argues that nonfinancial measures are often nonverifiable and thus using these measures for contracting purposes might be difficult (see also Ball 1989). Budde goes on to demonstrate that in such circumstances alignment of interests between the principal and agent might not be achieved. Accounting measures are based on accounting records and, thus, verifiable. We, therefore, expect nonfinancial measures to be less able to direct the attention of managers to longer horizons than accounting-based measures.

In sum, while nonfinancial measures can be useful in promoting actions with longer-term impact by providing a timely signal about the effect of an action on firm value, there is no guarantee that improving performance based on a particular measure benefits firm value (Smith 2002; Hemmer 1996; Thevaranjan, Joseph, and Srinivasan 2000). On average, such measures are not likely to be as congruous as accounting return measures, have lead times that do not extend beyond the one-year horizon, and may suffer from nonlinearity and nonverifiability.

In addition, nonfinancial measures are derived from a particular business model and thus their ability to provide signals about the long-run viability of the firm depends on the continued validity of the business model. As nonfinancial measures are tied to the existing business model, long-term considerations that might require a *new* business model with associated investments might only be highlighted by accounting (return) measures.¹⁴

13. Although the literature has found evidence of a correlation between nonfinancial and future earnings, sales, or accounting return measures (see Zeithaml 2000), the critical correlation is with stock prices, on which the record is decidedly mixed.

14. The balanced scorecard literature offers a different view. For example, Kaplan and Norton (2001) argue that without nonfinancial measures, firms might “miss the opportunity to create additional value by a longer-term revenue growth strategy through investments in customers, innovations, process enhancements, information technology, and employee capabilities” (379).

These properties make nonfinancial measures less desirable from the perspective of senior management and we thus do not expect them to balance out any “myopic” proclivities associated with profit measures as well as accounting return measures. If accounting return measures are so desirable — as we argue — one might wonder why firms do not use these measures exclusively. Recall, however, that the congruity of a performance measure is not the only determinant of its use. Indeed, while accounting return measures are highly congruous, they are also often thought to be relatively coarse and “too far removed” from the daily activities of managers. Nonfinancial measures, on the other hand, are more “actionable” and controllable by the business unit manager. In other words, nonfinancial measures might be worse in terms of congruity compared to accounting return measures but they are likely better with respect to sensitivity or noise. In addition, as Raith (2008a) argues, nonfinancial measures provide managers with “insurance” against consumption risk even when used in the presence of more congruous accounting return measures. This leads to the following prediction,

HYPOTHESIS 3. *The effect of changing the weight on accounting return measures on long-horizon decisions will be larger than the effect of changing the weight on nonfinancial measures.*

3. Data and method

Sample selection and data collection

We use a survey questionnaire to gather our data because no publicly available archival data exists on the time allocation of managers at the business unit level or on the performance measures used to evaluate these managers. Indeed, even at the *firm level*, data on both performance measures used to evaluate executives and on the way they spend their time is sparse and too coarse for testing our research questions (Graham, Harvey, and Rajgopal 2005).

We collect data by randomly selecting from a database that contains the addresses of firms domiciled in a West European country. Our unit of analysis is the lowest-level manager with full *profit* responsibilities. Regardless of firm structure, we refer to these managers as “business unit managers”. Note that by restricting our sample to managers with “bottom line” responsibility, we further reduce sample heterogeneity with respect to decision-making authority. We use an intensive, personal approach to obtain the firm’s commitment to participate in the study. Specifically, we sent an introduction letter to the target firms with information about the study and the investigators. One of the authors then conducted a follow-up telephone call with a top-level manager in the company, sometimes followed by a site visit. In many cases, multiple calls were necessary to obtain sponsorship from top management. We then asked the firm to identify three profit-responsible managers, from which we randomly chose one to be visited by our student team. Participating firms were invited to a workshop in which the authors presented the results of the study. Respondents received a small gift in acknowledgment of their time (in most cases, a practitioner-oriented book on management). From our initial sample of 160 firms, 105 managers agreed to participate in the study (a response rate of 65 percent). We made appointments with the business unit managers and used student teams to collect the data using a structured questionnaire format. We used student teams to ensure that we had data from managers at the appropriate level (i.e., the business unit manager) and to

increase the response rate.¹⁵ The students were carefully briefed to ensure that there was minimal opportunity for interviewer bias to occur. We test for nonresponse bias by using financial statement data from both sample firms and firms that did not agree to participate. Untabulated results indicate that there is no significant difference between the participants and nonparticipants in terms of firm size (measured by total sales) and industry.¹⁶

Common-method bias is a concern in survey-based research. We used both procedural and statistical remedies to mitigate its potential adverse effects. With regard to procedural remedies, we follow Podsakoff, MacKenzie, Lee, and Podsakoff's 2003 recommendation to methodologically separate the measurement of dependent and independent variables by placing the questionnaire items at maximum distance from each other and by using different response formats. We also protect respondent anonymity and reduce evaluation apprehension by assuring respondents that there are no right or wrong answers and that they should answer questions honestly. Finally, we avoid as much as possible the use of Likert scales with similar end points and formats, as these commonalities are likely to cause common method bias and anchoring effects. As part of the statistical remedies we conduct Harman's 1967 single-factor test to evaluate the extent to which common-method variance exists in the data. If there is a substantial amount of common-method variance, then either a single factor will emerge or one factor will account for the majority of covariance among the variables (see also Abernethy, Bouwens, and van Lent 2004).

Variable measurement

We discuss the measurement of the variables in turn. Appendix 1 reproduces the items in the questionnaire instrument used to measure the variables included in this study. Where multiple items are used to measure a variable, we use latent variable techniques to take into consideration the fact that the underlying theoretical constructs (i.e., latent variables) are imperfectly measured by their observable indicators. We use the latent variable scores in our empirical tests.

Time horizon

For the dependent variable, time horizon, we use an instrument originally developed by Lawrence and Lorch 1967 and adapted by Merchant 1990 to measure time horizon. Respondents are given six time periods and asked to indicate how much time, in percentage terms, they devote to activities within each time period, with the total equaling 100 percent. The time periods include the following categories: (a) one month or less, (b) one month to three months, (c) three months to a year, (d) one to two years, (e) two to three years, and (f) three to five years. We group the responses into three relevant accounting time periods: within the first quarterly reporting period (the sum of categories 1 and 2), within the annual reporting period (category 3), and beyond the annual reporting period (the sum of categories 4, 5, and 6). We label these short, medium, and long horizons, respectively. This distinction allows us to test our hypothesis that accounting return measures are more sensitive than nonfinancial measures in changing the time horizon of managers. Thus, if a performance measure is

15. Compared to mail surveys, face-to-face interviews have several advantages (Dillman 1991). Interviews increase the willingness of respondents to take the survey seriously, they provide assurance that the intended respondent answers the questions (instead of a junior employee or secretary), and they offer the possibility of clarifying questions that confuse the respondent. However, interviews have their own set of drawbacks, which include an increased likelihood of the interviewer (unwittingly) guiding the respondent's answers, the respondent's reluctance to be truthful about questions involving social taboos or sensitive topics, and higher costs of administering the survey.

16. In many cases, we had to guarantee anonymity to participating firms. The student teams returned the completed questionnaires without any firm-identifying information. The drawback of this procedure is that we cannot combine survey data with publicly available information. We judged the benefit of having a high response rate to outweigh these costs.

positively associated with a long horizon and not with a medium horizon, we call that measure “more sensitive” with respect to the manager’s time horizon.

We test for convergent validity of our time allocation variable by computing correlations between our three horizon constructs and the respondents’ answers to an alternative item in the questionnaire. Following Merchant 1990, we ask respondents to indicate how they allocate their time over six different categories of activities: (a) new product development, (b) improvement of existing products and services, (c) adjusting or improving production processes, (d) employee development, (e) the execution of current production processes, and (f) advertising and sales promotion. We find strong, positive correlations ($p < 0.01$) between activities that typically represent short-horizon concerns (i.e., categories 5 and 6) and short-term time allocation measures. We also find strong, positive correlations ($p < 0.01$) between our long-horizon construct and categories 1 through 4. These findings support the validity of our time horizon construct.¹⁷

Our instrument measures time horizon as a proportion of total available time, which implies that the proportions are subject to the obvious constraint that they have to sum to 100 percent. Statistical analysis of this type of “compositional” data is not without complications. We follow the recommendations in Aitchison 1986 and compute two log-ratios: $\text{Log}(\text{long}/\text{short})$ and $\text{Log}(\text{medium}/\text{short})$, which measure the time spent on long-term relative to short-term activities and the time spent on medium-term relative to short-term activities, respectively. These two log ratios completely specify the composition of the vector of time horizon components and are used as the dependent variables in our empirical tests. Using log ratios provides a further reason to combine the original six categories of our time allocation instrument into three horizons. Respondents frequently report no weight on a specific category, which is problematic when computing log ratios because division by zero and the logarithm of zero are both unspecified. Thus, we need to reduce the number of zeros as values of the time allocation variable. Amalgamation (combining categories) is a preferred way to do this (Aitchison 1986; Fry, Fry, and McLaren 1996). Remaining cases of zeros after amalgamation are treated according to the zero replacement procedure outlined in Aitchison 1986.¹⁸

Weight placed on type of performance measure

Our primary independent variable of interest is measured based on prior research (Bouwens and van Lent 2007; Abernethy et al. 2004). Our survey provides respondents with a list of performance measures and asks them to indicate the weight, in percentage terms, placed by their superior on each measure in evaluating their performance. While the focus of this study is on the use of accounting return and nonfinancial measures, we include a comprehensive set of measurement options (e.g., profit, disaggregated accounting measures, qualitative measures). Note that this measure is not strictly “compositional” as we include an “other performance measures” category in our instrument and thus the total percentage weight assigned to each category does not sum to a constant across respondents. We discuss how this issue affects the interpretation of our regressions further below. We combine efficiency, quality, and project measures to form the nonfinancial measure because the use of each specific nonfinancial metric varies considerably over firms (and many firms do not use each measure). This is expected because nonfinancial measures are

17. We obtain very similar results if we define the short horizon as category 1, the medium horizon as category 3, and the long horizon as category 6 (and drop observations that do not fall into these categories).

18. Aitchison (1986) suggests zero replacement which involves replacing any composition of D parts with C zero and D minus C nonzero components by another composition in which the zeros become $\delta(C + 1)(D - C)/D^2$ and the positive components are each reduced by $\delta C(C + 1)/D^2$, where δ is the maximum rounding-off error. In other words, the zero weights are replaced by a small positive number, whereas the original positive weights are decreased slightly so as to make sure that the weights continue to add to unity.

largely based on the unique process and/or circumstances a business unit faces. We thus include many categories of possible nonfinancial measures in an effort to provide relevant performance measure descriptions to all respondents. However, to the extent that the different types of nonfinancial measures have different effects on managerial time horizon, our variable will contain measurement error, which may cause a bias. In additional analyses, we consider the relation between time horizon and the different nonfinancial measure categories separately.

Our instrument avoids several known psychometric problems compared with instruments based on Likert scales (Ittner and Larcker 2001). For example, we specify the decision context in which a measure is used (periodic performance evaluation); we ask for the actual weight placed on a measure in the performance evaluation rather than determining its use by Likert scales; and we do not force managers to rank measures that are equally important. As a further validity check, we ask managers to provide us with details of the use of a performance measure in their bonus contract (if available). We then compute correlations between the weight of the measure for bonus purposes and its weight for periodic performance evaluation. We find that the two uses are highly correlated (correlations range between 0.35 for profit measures and 0.87 for accounting return measures; $p < 0.01$), which may alleviate potential concerns about the validity of our construct.¹⁹

Control variables

We treat the weight placed on the profit measure and the disaggregated accounting measures as control variables. Based on prior research we control for a number of variables known to influence the weight on performance measures, namely decentralization, pay-for-performance sensitivity, and information asymmetry (Keating 1997; Ittner et al. 1997; Bushman, Indjejikian, and Smith 1995; Abernethy et al. 2004; Bouwens and van Lent 2007). These control variables are measured using multi-item scales from prior literature. Summary statistics on the manifest indicators of each of the variables are provided in Appendix 2.²⁰

We are especially concerned that the differences in performance measures used reflect (in part) the manager's decision-making authority. For this reason, controlling for the authority of the business unit manager (i.e., *centralization*) is crucial. We use an instrument described in Abernethy et al. 2004 as a proxy for *centralization*. This instrument measures the relative influence of the respondents compared to their superiors over key decision areas, including investment decisions.

Pay-for-performance sensitivity is an adapted version of the Shields, Deng, and Kato 2000 instrument. We correlate this measure with the respondent's approximate bonus as a percentage of annual salary averaged over three years. We find that the correlation between the two measures is 0.39 ($p < 0.01$). *Size* is captured using the natural log of the number of business unit employees; *information asymmetry* is measured based on Dunk's 1993 six-item measure. *Current performance* is measured using a three-item instrument that asks respondents to rate their performance relative to their targets and the performance of their peers at comparable units. *Growth opportunities* of the business unit are measured using the two-item instrument described in Abernethy et al. 2004. *Competition* is measured by taking the six-item Khandwalla 1972 instrument to describe the competitive environment of the business unit. The *age of the manager* and the respondent's *tenure in current position* are included to

19. Consistent with earlier research (e.g., Bouwens and van Lent 2007), we observe that firms tend to rely more on accounting-based measures for bonus purposes. In addition, in our sample, only 79 firms use cash bonus incentives and the median bonus paid for this subsample is approximately 15 percent of the respondent's salary. The correlations for the convergent validity test are based on 79 observations.

20. In a limited number of cases, the results from the measurement model suggest that we drop items before constructing the variables. We only reproduce those items that were used in the variable construction in Appendix 1.

control for potential managerial career horizon effects. As these two variables are highly correlated, we use the residuals from a regression of *age* onto *tenure* to examine the independent effects of these two measures. We include an indicator variable (equal to one when the unit is in the classification that best captures the services *industry*, namely “real estate and professional services”) to control for the possibility that service-oriented firms have different performance measurement practices and time horizons. We test for the sensitivity of the industry classification in our robustness checks.

Summary statistics

Table 1, panel A reports the industry classification of the sample of business units and panel B provides summary statistics on the characteristics of the respondents. The average size of the business units is 212 employees. However, approximately 20 percent of the units have fewer than 25 employees, while the maximum size is 2800 (reported in Table 2). Our findings are therefore representative of a broad range of managers.²¹ The respondents are drawn from a number of industries with greater representation in the service sector than in the manufacturing sector, reflecting the industry composition for the entire population of firms (population proportion of manufacturing firms is 34 percent). Business unit managers are between 27 and 60 years of age and have been in their current position for an average of 4.4 years, in their business unit for 6.4 years, and reporting to their current superior for 3.7 years on average. Almost 60 percent of respondents have a university education.

Our respondents report that they spend on average 46 percent of their time on short-horizon activities (median = 45 percent), although some managers spend *all* of their time on activities that affect the profit-and-loss statement within the quarterly reporting period (in Table 2, panel A). Median- and long-horizon activities receive an average of 24 percent and 29 percent of the manager’s time, respectively. Again, there is substantial variation in the way in which managers spend their time (standard deviation is about 20 percent for both medium- and long-horizon activities).

Accounting return measures are used in a substantial subset of business units, but as some firms do not use these measures the *average* weight is 3.65 percent; nonfinancial measures are used in 76 percent of the sample. Panel B of Table 2 provides descriptive statistics on the use of all the types of measures captured in the survey. Not surprisingly, given that these are all profit centers, profit measures are used by 82 percent of business units. Profits receive on average a 30.5 percent weight (median = 25 percent), while the mean respondent reports that nonfinancial measures obtain a 19.4 percent weight (median = 20 percent).

We collect information about the use of targets for each of the performance measures, which is especially important for accounting return measures as targets can be interpreted as hurdle rates in this context. We find (untabulated) that 17 (out of 20) respondents explicitly use a target in conjunction with accounting return measures.²²

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21. To test whether our findings are sensitive to the inclusion of small business units, we run all analyses on a subsample of units with at least 15 employees. This does not change our coefficient estimates in any meaningful way and significance generally improves, albeit marginally. Note that we control in all regressions for the size of the unit, computed as the natural logarithm of the number of employees to reduce the skewness in the distribution.
 22. As we consider the use of cost-of-capital information (together with balance sheet information about resources used) as the defining feature of accounting return measures, this finding is important to make our case. It also supports combining RI and ROI-type measures into one category of economic profit proxies. Note that our empirical findings remain unchanged when we control for the presence of a performance target in the regressions we report below. Although we cannot be sure that the target used is in fact the cost of capital, one further finding from our survey is consistent with this interpretation: 15 of the 17 respondents who use targets for the accounting return measure report that the target never or rarely changes. We believe that this time-constant target is consistent with these firms employing a cost-of-capital benchmark (as opposed to last year’s accounting return).

TABLE 1
Descriptive statistics on sample business units and survey respondents (*n* = 105)

Panel A: Industry classification of sample business units					
Industry	Frequency			Cumulative frequency	
Mining	2			2%	
Production and distribution of gas, electricity and water	1			3%	
Construction and building	9			11%	
Repair of consumer goods	2			13%	
Hotels, restaurants and bars	2			15%	
Transportation, logistics, warehousing	3			18%	
Financial institutions	14			31%	
Real estate and professional services	42			71%	
Public government and social security	4			75%	
Health	2			77%	
Environment, culture, recreation	4			81%	
Manufacturing	20			100%	
Panel B: Respondent characteristics					
Variable	Mean	Std. dev.	Min.	Median	Max.
Longevity in unit	6.4	6.7	1.0	4.0	33.0
Tenure in current job	4.4	4.7	0.5	3.0	29.0
Reporting relationship with current superior (in years)	3.7	3.5	0.4	2.0	15.0
Age (in years)	44.3	7.7	27.0	43.5	60.0
Education (1 = high school only, 2 = some college, 3 = university degree)	2.5	0.6	1.0	3.0	3.0

Econometric issues

Ittner and Larcker (2001) advocate the use of latent variables estimation models that explicitly recognize the potential for measurement error, test for its existence, and correct the parameter estimates of interest for its undue influence. Several recent studies have successfully followed this advice (e.g., Ittner et al. 1997; Bouwens and van Lent 2007; Chenhall 2005; Anderson, Hesford, and Young 2002). Given our sample size, we use partial least squares (PLS) estimation, which has better finite-sample properties than comparable covariance-based full information estimation procedures (such as LISREL) (Chin and Newsted 1999).

PLS simultaneously models the structural paths (i.e., the theoretical relations among latent variables) and measurement paths (i.e., the relation between a latent variable and its indicators). Rather than assume equal weights for all indicators of a scale, the PLS algorithm allows each indicator to vary in how much it contributes to the composite score of the latent variable. Indicators with weaker relations to related indicators and the latent variable are given lower weightings (Chin, Marcolin, and Newsted 2003). PLS estimation segments models into separate subsets of latent variables and measures related to the latent variable of interest or adjacent latent variables. Estimation then proceeds in an iterative manner whereby a set of model parameters is estimated by ordinary least squares, with the values of parameters in other subsets taken as given.

TABLE 2

Summary statistics on time horizons of business unit manager, weight on performance measures, and size of the business unit ($n = 105$)

Panel A: Summary statistics					
Variables of interest:	Mean	Std. dev.	Min.	Median	Max.
Time spent on activities with <i>short</i> horizons (within the quarterly reporting period) in%	46.11	30.33	0	45.00	100.00
Time spent on activities with <i>medium</i> horizons (within the yearly reporting period) in%	24.33	17.60	0	20.00	80.00
Time spent on activities with <i>long</i> horizons (1–5 years) in%	29.18	22.70	0	22.50	90.00
Weight on accounting return measures	3.65	8.74	0	0	40.00
Weight on nonfinancial measures	19.40	16.63	0	20.00	70.00
<i>Control variables:</i>					
Weight on profit measures	30.50	25.71	0	25.00	100.00
Weight on cost measures	7.49	8.79	0	0	25.00
Weight on sales measures	12.10	15.34	0	5.00	70.00
Weight on other measures	21.72	16.08	0	20.00	60.00
Size of the business unit (measured in number of full-time employees)	212.80	384.14	3.00	75.00	2800.00
Panel B: Use of individual measures for performance evaluation by sample business units					
<i>Performance measure:</i>	# (%) of business units with weight placed on measure > 0	Average weight (standard deviation) on performance measure conditional on its use by the business unit			
Accounting return measures	20 (19%)	19.0 (10.3)			
Nonfinancial measures	80 (76%)	23.7 (15.4)			
Profit measures	86 (82%)	37.2 (23.6)			
Cost measures	52 (50%)	15.1 (6.3)			
Sales measures	55 (52%)	23.1 (14.0)			
Other measures	90 (86%)	25.3 (14.5)			

Owing to the compositional nature of our (log ratio) dependent variables, however, Aitchison (1986) suggests estimating seemingly unrelated regressions (SURs) to account for the distributional dependence between the log ratios. SUR explicitly allows for the residuals of the two log ratio regression equations to be correlated. We follow this suggestion, but compute standard errors using a bootstrapping procedure (1,000 samples with replacement where all samples have the same size as the original sample).²³

Thus, we estimate the following structural model to examine the relation between the weight placed on different types of performance measures and the decision horizon of

23. As a robustness check, we also estimate our model using variables constructed from summated scales (instead of using the output from the PLS measurement model). We then estimate the model using iterated seemingly unrelated regressions with bootstrapped standard errors. The sign and significance of none of the variables is affected by this alternative estimation method.

managers:

$$\log\left(\frac{\text{long}}{\text{short}}\right) = \beta_0 + \beta_1 \text{weight on accounting return measures} + \beta_2 \text{weight on non financial measures} + \sum_j \beta_j \text{controls}_j + \zeta_1 \quad (1),$$

$$\log\left(\frac{\text{medium}}{\text{short}}\right) = \gamma_0 + \gamma_1 \text{weight on accounting return measures} + \gamma_2 \text{weight on non financial measures} + \sum_j \gamma_j \text{controls}_j + \zeta_2 \quad (2),$$

where ζ_i is the error term of equation i ($i = 1, 2$) and *Controls* represents a vector of control variables as described in the previous section.

Hypothesis 1 implies $\beta_1, \gamma_1 \geq 0$

Hypothesis H2 implies $\beta_2, \gamma_2 \geq 0$.

We examine how changing the weight on each performance measure changes the time spent on activities with a short-, medium-, and long-term horizon, respectively. We use simulations of the first differences (i.e., the difference between two expected values of the percentage time a business unit manager spends on each horizon) when the weight on a type of performance measure is set at its sample minimum and maximum, respectively (King, Tomz, and Wittenberg 2000). Hypothesis 3 predicts that the effect of changing the weight on accounting return measures on long-horizon decisions will be larger than the effect of changing the weight on nonfinancial measures.

Specifically, the simulation procedure recognizes that parameters are estimated with uncertainty. We therefore draw 1,000 simulated sets of parameters from their sampling distribution defined as a multivariate normal distribution with mean equal to the parameter estimates $\begin{pmatrix} \hat{\beta} \\ \hat{\gamma} \end{pmatrix}$ from the seemingly unrelated regression model and variances equal to the estimated variance – covariance matrix $v\left(\begin{pmatrix} \hat{\beta} \\ \hat{\gamma} \end{pmatrix}\right)$ of these estimates.

For each of the 1,000 simulated sets of coefficients, we then generate two expected values of the outcome variables (i.e., the log ratios). Setting the value for the focal performance measure to its sample minimum and holding all other variables constant at their mean, we generate the expected value of the outcome variable (the log ratio) conditional on these starting values for the explanatory variables (i.e., we calculate the expected value of the log ratio when the weight placed on a specific performance measure, say *sales*, equals the sample minimum). Next, we set the value for the focal performance measure to its sample maximum, keeping all other variables at their mean. We generate the expected value of the log ratio conditional on these ending values for the explanatory variables (i.e., we calculate the expected value of the log ratio when *sales* equals the sample maximum). The first difference is simply the difference between these two expected values of the log ratio, that is, the estimated difference in the time allocation between a firm in which a particular performance measure receives minimum weight and a firm in which the same performance measure receives maximum weight. For ease of interpretation, we take the inverse log of the log ratios to obtain the proportion of time spent on the short, medium, and long horizons. We compute this difference 1,000 times to approximate the distribution of first differences and use the mean of the distribution and its standard error to construct confidence intervals around the mean (see Zellner 2009; King et al. 2000).

4. Results

We first discuss the measurement model results as reported in Table 3 together with the Pearson correlations among our variables. We then proceed to the empirical tests of Hypotheses 1 and 2 in Table 4 and present evidence on Hypothesis 3 in Table 5. Finally, Table 6 presents additional analyses of nonfinancial performance measures. We first reject the hypothesis that common-method bias is driving our results by showing that in our data no single factor explains the majority of covariance among the variables (chi-squared = 318.49; $df = 135$, $p < 1$ percent) (Podsakoff et al. 2003).

Measurement model results and correlations

Table 3 reports statistics on internal consistency, measurement error, and discriminant validity. We assess internal consistency (i.e., the extent to which all items used to construct a latent variable measure the same construct) using the composite reliability index described in Fornell and Larcker 1981 and Cronbach's alpha (Nunnally and Bernstein 1994). Composite reliability (alpha) varies between 0.81 and 0.91 (0.63–0.90), which exceeds the suggested minimum levels. We use the average variance extracted (AVE) to evaluate the discriminant validity (i.e., the extent to which the constructs are empirically distinct) of our latent variables. If the square root of the AVE of a latent variable is larger than that variable's correlation with other constructs then the variable has discriminant validity. This condition is met for all latent variables (see diagonals of Table 3). We further assess discriminant validity by computing the "cross loadings" between manifest and latent variables to check whether our manifest variables load properly on the associated latent variable and not on other latent variables. Untabulated results show that this is the case in our sample.²⁴ The results of these analyses validate the inclusion of the variables in the subsequent regression models.

Table 3 also presents the Pearson correlations among the latent variables in our study. We find that the weight on accounting return measures is positively (but not significantly) associated with both the long/short log ratios and the medium/short log ratios. Nonfinancial measures are positively correlated with the long/short log ratios and medium/short log ratios, suggesting more time being allocated to longer-horizon activities, when these measures receive more weight. We also note that profit measures (used in our model as a control variable) are negatively associated with both these ratios, which indicates the inverse association (i.e., relatively more time is spent on short-horizon activities). These correlations should not be used to assess initial support for our hypotheses, however. Theory predicts that senior management supplements profit with other measures if profit unduly emphasizes the short run. Thus, we expect and find that the weight on profit measures is significantly and negatively associated with most other measures.²⁵

In these circumstances, examining bivariate relations between any one performance measure and time horizon is misleading inasmuch as these correlations do not properly account for the fact that it is the complete performance measurement package which determines the time horizon of managers (Demski and Sappington 1999). Our multivariate analyses below address the complexity of performance measurement choices.

Full model results

Hypothesis 1 addresses the influence of accounting return measures on time horizon. We find support for the prediction that accounting return measures are associated with

24. Details are available upon request.

25. Note that the weights assigned to the performance measures need to sum to 100 percent. Profit measures are used by almost all firms in the sample. Assigning weight to any alternative measure reduces the weight on profit and a negative relation between profit and the remaining measures is likely to ensue.

TABLE 3
Pearson correlations among all variables included in this study: Reliability index, average variance extracted and Cronbach's alpha for all latent variables ($n = 105$)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Internal consistency measures																	
Long/short log ratio	—																
Medium/short log ratio	0.87	—															
Accounting return measures	0.14	0.11	—														
Nonfinancial measures	0.20	0.24	-0.16	—													
Profit measures	-0.27	-0.30	-0.07	-0.61	—												
Cost measures	0.30	0.41	-0.12	0.02	-0.17	—											
Sales measures	-0.17	-0.15	0.01	-0.25	-0.14	-0.23	—										
Centralization	0.10	0.11	0.09	0.18	-0.27	-0.00	0.18	0.78									
Task design	0.18	0.18	-0.04	-0.02	0.03	0.18	-0.07	0.18	0.73								
Information asymmetry	0.12	0.12	-0.00	-0.05	0.10	0.06	-0.09	-0.44	-0.13	0.69							
Pay-for-performance sensitivity	-0.19	-0.06	0.15	-0.08	0.10	-0.12	0.10	-0.05	-0.06	-0.05	0.77						
Growth opportunities	-0.03	-0.06	-0.18	0.05	-0.08	-0.01	0.07	-0.02	0.10	-0.23	0.05	0.85					
Competition	0.22	0.20	0.03	0.11	-0.14	-0.23	0.11	0.06	0.07	0.14	0.15	0.17	0.65				
Current performance	-0.24	-0.16	0.04	-0.07	-0.05	-0.06	0.22	0.20	0.05	-0.24	0.18	0.22	-0.13	0.87			
Size	0.09	0.09	0.03	-0.10	0.08	0.09	-0.12	0.01	0.20	0.17	-0.02	-0.22	0.01	-0.01	—		
Age of respondent	0.14	0.15	0.03	0.06	-0.08	0.17	-0.17	-0.14	0.15	0.37	-0.07	-0.12	0.09	-0.26	0.38	—	
Tenure	0.00	-0.05	0.10	-0.01	0.12	0.02	-0.06	-0.15	0.09	0.24	-0.24	-0.12	-0.04	0.02	0.03	-0.00	—
Industry	-0.35	-0.33	-0.02	-0.03	0.11	-0.37	0.11	0.03	-0.36	-0.09	0.09	-0.08	-0.10	0.05	-0.12	-0.21	0.05

Notes:

Size is the natural logarithm of the number of employees working in the business unit. *Industry* is an indicator variable that takes the value of one if the unit operates in the real estate and professional services industry. *Age of respondent* is the respondent's age in years orthogonalized with respect to tenure. *Tenure* is the longevity of the respondent in his or her current managerial position. All other variables are defined in Appendix 1. Diagonal entries (in bold) are the square root of the average variance extracted (AVE) and are given for (multi-indicator) latent variables only. The column "Internal consistency measures" reports the composite reliability for latent variables as described in Fornell and Larcker 1981 as well as Cronbach's alpha (Nunnally and Bernstein 1994), in parentheses. Correlations (in absolute value) above 0.16 (0.19) are significant at the 10 (5) percent level.

TABLE 4

Partial least squares regressions examining the association between the time horizon of business unit managers and the weight on different types of performance measures ($n = 105$)

		Managerial time horizon		Managerial time horizon	
		$Log\left(\frac{long}{short}\right)$	$Log\left(\frac{medium}{short}\right)$	$Log\left(\frac{long}{short}\right)$	$Log\left(\frac{medium}{short}\right)$
	Predicted sign	(1)	(2)	(3)	(4)
<i>Test variables:</i>					
Weight on accounting return measures	+,+	0.177** (0.089)	0.181** (0.080)	0.199*** (0.085)	0.182*** (0.079)
Weight on nonfinancial measures	+,+	0.097 (0.109)	0.192** (0.117)	0.095 (0.114)	0.194** (0.118)
<i>Control variables:</i>					
Weight on profit measures		-0.171 (0.133)	-0.102 (0.120)	-0.116 (0.141)	-0.058 (0.134)
Weight on cost measures		0.264** (0.111)	0.401*** (0.107)	0.234** (0.118)	0.405*** (0.121)
Weight on sales measures		-0.109 (0.099)	-0.023 (0.098)	-0.075 (0.109)	-0.012 (0.102)
Centralization				0.078 (0.109)	0.054 (0.110)
Task design				0.078 (0.091)	0.090 (0.096)
Information asymmetry				0.111 (0.110)	0.119 (0.110)
Pay-for-performance sensitivity				-0.154 (0.110)	-0.036 (0.111)
Growth opportunities				0.004 (0.109)	-0.062 (0.111)
Competition				0.217** (0.103)	0.231** (0.106)
Current performance				-0.169 (0.124)	-0.081 (0.125)
Size				0.051 (0.116)	0.030 (0.107)
Age of the respondent				-0.107 (0.132)	-0.080 (0.116)
Tenure in current position				-0.048 (0.136)	-0.0101 (0.102)
Real estate and professional services				-0.172 (0.105)	-0.105 (0.102)
Intercept				-0.000 (0.091)	-0.000 (0.088)
R^2		0.189	0.262	0.365	0.382
χ^2		17.75	17.75	53.11	53.11
p -value		0.00	0.00	0.00	0.00

(The table is continued on the next page.)

TABLE 4 (Continued)

Notes:

The table presents partial least squares estimates of the following seemingly unrelated regressions.

Dependent variables are log ratios of the percentage of time spent on long-run vs. short-run

activities and medium-run vs. short-run activities, respectively. We analyze log ratios consistent with Aitchison 1986 to account for the compositional nature of our time horizon measure. The log ratio of long-run vs. short-run activities measures the percentage time allocation from short-run *relative* to long-run actions. A similar interpretation follows for the other log ratio.

We compute standard errors based on a bootstrapping procedure, which are reported in parentheses. *, **, *** denote significance at the 10 percent, 5 percent, and 1 percent level, respectively. Reported *p*-values are one-tailed for variables with a directional prediction and two-tailed otherwise. Variable definitions are in Appendix 1.

longer horizons. Table 4 provides the details. Columns 1–2 (2–4) display the estimates for equations 1 and 2 without (with) control variables included. Note that we include in all columns the full set of performance measures (although we drop the category “other measures”). As the weights placed on all performance measures together have to add to unity (by design of our survey instrument), the individual variables are perfectly linearly correlated. To overcome this issue, we drop one category (weight on other measures), and interpret the regression coefficients as the incremental effect of a performance measure on time horizon (compared to the effect of the omitted category “other measures” on time horizon). Alternatively, we could have considered the effect of each performance measure on time horizon separately (i.e., dropping all non-focal measures), but this would have caused a correlated omitted variable problem (as the weights on performance measures are by construction perfectly linearly correlated).²⁶

As the inclusion of control variables does not affect the relation of interest, we limit our discussion to the full specification. The estimated coefficient on the path between the weight on accounting return measures and the medium/short log ratio is 0.182, with a *p*-value equal to 0.01. We also find a positive estimated coefficient on the path between accounting return measures and the long/short log ratio, which indicates that these measures do not just incrementally direct attention of managers to the medium term, but also to horizons beyond one year (coefficient = 0.199, *p* = 0.00).

Hypothesis 2 predicts that nonfinancial measures are positively associated with the time managers spend on activities with a longer horizon. Table 4 shows that nonfinancial measures are indeed incrementally associated with the medium/short log ratio which measures the time spent on medium-horizon activities relative to short-horizon activities. The coefficient on the path connecting the two constructs is 0.194 (*p* = 0.05). Nonfinancial measures are, however, not significantly associated with the long/short log ratio (coefficient = 0.095, *p* > 0.10).

We include the weight on profit measures and disaggregated accounting measures as control variables as they are correlated with the weight on the other performance measure categories and their omission would bias our estimation. Of particular interest is the finding for cost measures. The coefficient on disaggregated cost measures is significant at the 5 percent level or better in both equations. This suggests an incremental role for disaggregated

26. Untabulated results show that we find very similar results when we consider each performance measure separately and examine its effect on time horizon. However, we also find in this specification a negative relation between the weight on profit measures and both the long/short and medium/short log ratios, consistent with the idea that profit measures increase the attention to the short-run horizon.

cost measures in the time allocation decisions of managers. We further find a significantly positive coefficient on *competition*, which implies that managers in a more dynamic competitive environment spend relatively less time on short horizon activities.²⁷ Overall, the model has good explanatory power: the multiple R^2 is about 37 percent in both equations.

Together, the results on Hypotheses 1 and 2 are suggestive of a possible answer to Hypothesis 3: which of the two performance measures will affect intertemporal decision-making more. As only accounting return measures are associated with the relative amount of time spent on the long horizon compared with the short horizon, it would seem that these measures have a stronger effect than nonfinancial measures. We more fully explore this question by supplementing our regression results with simulations of the first differences (i.e., the difference between two expected values of the percentage time a business unit manager spends on each horizon) when the weight on a type of performance measure is set at its sample minimum and maximum, respectively (King et al. 2000) while holding the weight of all remaining performance measures equal to zero.²⁸ All other explanatory variables are evaluated at their mean.

Intuitively, this method allows us to simulate what happens to the manager's intertemporal decision making when (keeping everything else equal) the weight placed on a certain performance measure is increased substantially. The results of our simulations are presented in Table 5. Rows labeled "minimum" report the proportion of time allocated to short, medium, and long horizons when the weight on a performance measure is held constant at the sample minimum. Specifically, cell entries are the average over 1,000 simulations of the expected value of the time allocated to each horizon (short, medium, and long, respectively). Similarly, rows labeled "maximum" report the time allocation when the weight on a performance measure is set at the sample maximum. "Diff." is the simulated first difference in expected value of the time allocation. We assess the significance of the first difference using its empirical distribution from the simulation.

We find that the first difference for the long horizon is 0.09 ($p < 0.05$) for accounting return measures, while for nonfinancial measures this first difference is -0.01 (n.s.). Thus, while increasing the weight on accounting return measures can change the time allocation of managers to spend more attention to the long horizon (from 0.32 to 0.41), the same does not hold true for nonfinancial measures. Turning now to the medium horizon, we find that the first difference for accounting return measures is 0.06 ($p = 0.12$); the first difference for nonfinancial measures, however, is 0.13 ($p < 0.01$). It would seem that the time allocation to the medium horizon is more sensitive to changes in nonfinancial measures than to accounting return measures. At the same time, the effect derived from accounting return measures is still economically significant (as it amounts to a change in time spent on the medium-term horizon of 6 percent).

Taking the results for the medium and long horizons together, we conclude that consistent with Hypothesis 3, intertemporal decisions are more sensitive to accounting return measures than to nonfinancial measures inasmuch as more weight on accounting return

27. Note that many of the control variables are not significant at conventional levels; this is not unexpected because in the context of a simple agency model, effort allocation is, in equilibrium, *fully* determined by the relative sensitivity of each of the performance measures to the long-, medium-, and short-run activities. We nevertheless include our set of control variables to heed Demski and Sappington's 1999 warning that empirical investigations of agency relations are sensitive to correlated omitted variable problems.

28. We do this to ensure that the summed weight of all performance measures does not exceed 100 percent. The attendant assumption in this procedure is that the omitted category of "other performance measures" can assure that the all weights sum to unity when implementing a change on the weight of the focal measure from its minimum to its maximum value. Table 2 suggests that the category of other measures is economically significant and should in most cases be able to fulfill this requirement. Nonetheless, it is possible that in some individual cases the other performance measure category is not sufficiently large. If so, then the results need to be interpreted with some care.

TABLE 5

First differences of percentage of time allocated to short, medium, and long horizons computed using sample minimum and maximum values of weight on different performance measures

Weight on performance measure:		Allocation of time to decision horizon		
		Short	Medium	Long
Accounting return measures	Minimum	0.36	0.32	0.32
	Maximum	0.21	0.38	0.41
	Diff.	−0.15***	0.06	0.09**
Nonfinancial measures	Minimum	0.38	0.29	0.32
	Maximum	0.26	0.42	0.31
	Diff.	−0.12**	0.13***	−0.01
Profit measures	Minimum	0.33	0.33	0.35
	Maximum	0.39	0.33	0.28
	Diff.	0.07	0.00	−0.07
Cost measures	Minimum	0.40	0.28	0.32
	Maximum	0.23	0.44	0.32
	Diff.	−0.17***	0.17***	0.00
Sales measures	Minimum	0.34	0.32	0.34
	Maximum	0.38	0.35	0.28
	Diff.	0.04	0.02	−0.06*

Notes:

Cell entries represent the average (over 1,000 simulations) proportion of total time spent on activities with a short, medium, or long horizon. As the time spent has to sum to unity, the findings for the short horizon follow immediately once the medium and long horizons are determined. Rows marked “Diff.” present the simulated first difference. Significance is evaluated from the empirical distribution of first differences. *, **, *** denote significance at the 10 percent, 5 percent, and 1 percent level, respectively.

measures increases the time allocated to both long horizons and medium horizons, whereas increasing the weight on nonfinancial measures increases the time devoted to medium horizons only.

Results on model with refined categories of nonfinancial measures

Some authors (see, e.g., Bouwens and van Lent 2007; Horngren 2004) suggest a closer analysis of the broad category of nonfinancial measures as this category may contain performance metrics with very different measurement properties and with potentially different effects on managerial time horizon. Without taking these properties into account, any conclusions with regard to the use of nonfinancial measures can only be preliminary. The major obstacle to this kind of analysis is the lack of theory about how to classify the huge variation in nonfinancial measures implemented by firms in practice. Without theoretical guidance, any finer categorization is by necessity ad hoc.²⁹ In addition, as firms tailor the use of nonfinancial measures to their operating context, their use of these measures is unlikely to cover all categories, which implies that the weight on more refined nonfinancial

29. Potentially, the balanced scorecard literature provides a categorization of nonfinancial measures into (a) learning and growth, (b) customer, and (c) internal business processes. We did not use these categories in the survey to avoid a possible “demand effect”. We were concerned that respondents (aware of the claims made by many consulting firms of the successes of the scorecard) would be tempted to report the usage of these categories even if they did not place weight on nonfinancial measures.

TABLE 6

Partial least squares regressions examining the association between the time horizon of business unit managers and the weight on different types of nonfinancial performance measures ($n = 105$)

Managerial time horizon			
		$Log\left(\frac{long}{short}\right)$	$Log\left(\frac{medium}{short}\right)$
	Predicted sign	(1)	(2)
<i>Test variables:</i>			
Weight on accounting return measures	+,+	0.194** (0.090)	0.176** (0.082)
Weight on efficiency measures	+,+	0.145* (0.100)	0.197** (0.096)
Weight on quality measures	+,+	−0.000 (0.096)	0.075 (0.103)
Weight on project measures	+,+	0.100 (0.105)	0.127 (0.105)
<i>Control variables:</i>			
Weight on profit measures		−0.091 (0.144)	−0.037 (0.135)
Weight on cost measures		0.256** (0.120)	0.423*** (0.124)
Weight on sales measures		−0.068 (0.112)	−0.004 (0.106)
Centralization		0.067 (0.113)	0.048 (0.112)
Task design		0.066 (0.095)	0.074 (0.101)
Information asymmetry		0.132 (0.113)	0.139 (0.112)
Pay-for-performance sensitivity		−0.152 (0.110)	−0.033 (0.111)
Growth opportunities		−0.004 (0.114)	−0.069 (0.115)
Competition		0.218** (0.104)	0.229** (0.107)
Current performance		−0.150 (0.125)	−0.068 (0.127)
Size		0.037 (0.122)	0.022 (0.115)
Age of the respondent		−0.100 (0.132)	−0.074 (0.118)
Tenure in current position		−0.053 (0.141)	−0.104 (0.138)
Real estate and professional services		−0.192* (0.108)	−0.127 (0.105)
Intercept		−0.000 (0.092)	−0.000 (0.089)

(The table is continued on the next page.)

TABLE 6 (Continued)

	$\text{Log}\left(\frac{\text{long}}{\text{short}}\right)$	$\text{Log}\left(\frac{\text{medium}}{\text{short}}\right)$
Predicted sign	(1)	(2)
R^2	0.374	0.390
χ^2	52.40	52.40
p -value	0.00	0.00

Notes:

The table presents partial least squares estimates of the following seemingly unrelated regressions. Dependent variables are log ratios of the percentage of time spent on long-run vs. short-run activities and medium-run vs. short-run activities, respectively. We analyze log ratios consistent with Aitchison 1986 to account for the compositional nature of our time horizon measure. The log ratio of long-run vs. short-run activities measures the percentage time allocation from short-run *relative* to long-run actions. A similar interpretation follows for the other log ratio. We compute standard errors based on a bootstrapping procedure, which are reported in parentheses. *, **, *** denote significance at the 10 percent, 5 percent, and 1 percent level, respectively. Reported p -values are one-tailed for variables with a directional prediction and two-tailed otherwise. Variable definitions are in Appendix 1.

categories will be zero. This zero-inflation complicates the empirical analysis further. Notwithstanding these problems, we change our regression specification by replacing the weight on nonfinancial measure variable by our three original nonfinancial measures categories: efficiency, quality, and project measures. Details are reported in Table 6.

We find that efficiency measures are incrementally positively associated with both the long/short and medium/short log ratios, which suggests that these measures focus attention to longer-term horizons. Recall that we reported before that disaggregated cost measures also are associated with longer-term horizons. In a sense, efficiency measures can be thought of as nonfinancial “cost” measures. Indeed, both efficiency and costs measures have very similar properties. One possible interpretation is that efficiency and cost measures both signal to the manager the need to rethink the design of production processes and/or other vital parts of the business model. In contrast, quality and project measures are not significantly associated with any of our time horizon variables.

In sum, reclassifying the weight on nonfinancial measures into efficiency, quality, and project categories does not materially affect the estimates of the remaining variables in the regression, but slightly improves the multiple R^2 .

5. Sensitivity analysis

We report two additional analyses in an effort to evaluate the robustness of our findings. In our main findings, we report a simple industry control based on whether the respondent’s unit is in the real estate or professional services industry. We use only one variable to capture industry effects, as we control for other industry characteristics (*competition, growth opportunities*) using more precise proxies. In addition, a priori we expect the service industry to be different from other industries, as tangible assets may play a less significant role, which in turn reduces the need for accounting return measures (which are based on assets) and the need for long-horizon investment planning. Nevertheless, it is possible that

between-industry variation affects our relation of interest and we therefore define a more refined industry classification using six groups (real estate and professional services, financial institutions, high-tech manufacturing, traditional manufacturing, construction and building, and other industries). We then redo all empirical analyses using separate indicators for these groups (dropping the other industries) and including these indicator variables simultaneously in the regressions. Untabulated results show that none of the industry indicators obtain significance and our inferences on the variables of interest are unchanged.

Our sample contains both respondents who have an explicit cash bonus plan and those who do not have such a plan. It is possible that bonus plans go hand in hand with decision-making authority (especially over investments) and with the use of accounting return measures. If so, failing to properly account for the presence of cash bonus plans might compromise our interpretation of the relation between the use of performance measures and decision horizons. To address this concern, we first compare the influence respondents have over investment decisions when a bonus plan is present and when it is absent. We use a question from our *centralization* instrument about the influence of a respondent compared with his or her superior over investment decisions (1 = I have all the influence, 7 = my superior has all the influence). We find that in the group of 79 firms with bonus plans, the average score is 4.2, while in the group without bonus plans the average score is 4.1; the median score in both groups equals 4. The difference in means between the two groups is not significant. Thus, it appears that sorting on the presence of a cash bonus plan in our sample is not the same as sorting on investment authority. In addition, we add an indicator variable which equals one if a cash bonus plan is present and zero otherwise. We augment our regressions with this variable (while at the same time dropping *pay-for-performance sensitivity* as these variables overlap). The bonus plan indicator (not reported in the tables) is not significant and our results are unaffected by this change. Together, we conclude that our findings are not confounded by differences between respondents with and without cash bonus plans.

The measurement scales employed in this study require the use of more advanced econometric techniques. This raises the concern to what extent our results are “technique-driven” or reflecting true economic relations in the data. In partial answer to this concern, we note that the simulations we report take into account model uncertainty (King et al. 2000). Nevertheless, we simplify our method in two ways. We ignore the compositional nature of the time allocation variable and just use two alternative dependent variables.³⁰ We use (a) the time spent on activities with a 1–5 year horizon and (b) the weighted average of all horizon categories using the midpoint of the corresponding time spans. We conduct separate ordinary least squares regressions of these two alternative dependent variables onto the weight on accounting return measures, the weight on nonfinancial measures and a full set of control variables. Our (unreported) results are consistent with the hypothesis that accounting return measures, but not nonfinancial measures, are positively associated with longer decision horizons.

A similar concern arises with the compositional nature of our independent variables that capture the weight placed on performance measures. In our analyses so far, we have solved this problem by dropping one category (“weight on other measures”) and interpreting the regression coefficients as incremental effects (over the effect of “weight on other measures”). An alternative approach ignores the linear relation between the weights placed on the different types of performance measures (i.e., these weights have to sum to unity).

30. Note that as the dependent variable is no longer the time allocation *relative* to the short horizon, these additional findings cannot be directly compared to those reported in the main analysis.

We regress time horizon onto each type of performance measure separately (dropping all the other performance measures). This regression specification suffers from a correlated omitted variable problem and its results should be interpreted with care. Nevertheless, we find very similar relations between each type of performance measure and the time horizon as reported before and our inferences remain unchanged.³¹

6. Discussion, limitations, and conclusion

This paper sheds light on the widely held view that the use of traditional accounting performance measures “motivate dysfunctional behavior by causing managers to pay attention to the ‘wrong’ things” (Lambert 2001: 201). Problems of myopia in intertemporal decisions dominate the rationale for the inclusion of nonfinancial measures in the design of performance measurement systems (Merchant and Bruns 1986; Ittner and Larcker 1998b; Thevaranjan et al. 2000). In this paper, we question whether accounting measures result in managerial myopia and argue that it depends on the choice of measure. We draw on Lambert’s 2001 idea that senior management can “correct” for the incompleteness in one performance measure by adding another measure. The trick is to know the direction of bias of the first performance measure so that the “right” combination of measures can be selected. By examining how accounting return and nonfinancial measures influence the time horizon of managers, our results provide some insight into the direction associated with these measures. If the profit measure, for example, results in overly costly myopia (i.e., a short-term focus), senior management can select an alternative measure that directs managers’ attention to the longer term.

Contrary to the conventional wisdom that all accounting measures focus attention on short-run activities, we find that accounting return measures (e.g., return on investment, residual income) are associated with a longer-term focus. This result supports prior theoretical and empirical research demonstrating the value of including more complete measures of managerial decisions. Accounting returns not only yield a summary of all pertinent actions, but they also implicitly or explicitly incorporate the firm’s cost of capital and as such better align the manager’s actions with the long-term interest of the firm. We also find that nonfinancial measures direct managers’ attention away from the short term towards longer-term activities, although not to the same extent as accounting return measures do.

The study is subject to two primary limitations. First, there is always a concern with the use of survey data to test hypotheses. However, given the importance of matching theory with the level of analysis, we cannot use archival firm-level data to test our hypotheses (Luft and Shields 2003). We require information at the business unit level and there is thus little alternative to using survey data to answer questions associated with managerial decision making. The reliance on findings based on analysis of survey data depends on the care taken in the design of the study to ensure that the measures are valid and reliable. We have taken a number of precautions: our method of data collection ensures that we capture data from the relevant source; we use measures that are as “objective” as possible; we test, where possible, the construct validity of measures using an alternative measure; and we use previously tested instruments where possible and provide the test results for the psychometric properties associated with each measure. We use various procedures to reduce common method bias. In addition, the use of partial least squares allows for potential measurement error in the reported relations with the test variables.

31. The only significant difference is that *weight on profit measures* is significantly negatively related with time horizon. This is consistent with the correlation evidence reported earlier (see also footnote 26).

Second, we do not have details on the specific measure definitions that firms use. We combine measures into categories based on survey pretesting, prior studies, and theory. While the huge variety of measures employed in practice and other methodological concerns will inevitably require researchers to analyze similar measures together, it is possible that our categorizations are too crude and consequently attenuate our regression results. This might be especially true in the case of accounting return measures because theory on their incentive effects concentrates on residual income. However, this problem is likely to work against finding support for our hypotheses.

Notwithstanding these limitations, this study adds to our understanding of the effects of performance measures on managerial decision making. We provide a more nuanced view compared with prior work that examines the use of accounting measures and managerial myopia (Merchant 1990; Chow et al. 1996; Van der Stede 2000). Our findings suggest that concerns over the use of accounting measures in evaluating managerial performance and designing compensation contracts might be overstated. What is important is getting the “balance” right in the choice of control. Given our findings, there is every reason to expect that accounting numbers will continue to play an important role in the design of performance measurement systems and in the writing of compensation contracts.

Appendix 1

Measurement instrument

The items associated with each variable used in the study and a description of how they are measured are provided below.

Test variables

Time horizon

Managers are asked to indicate in percentage terms how much time they devote to working on matters that will show up in the profit-and-loss statement in the following time periods. They are asked to ensure that the total time allocated to each activity sums to 100 percent.

1. 1 month or less
2. 1 month to 3 months
3. 3 months to 1 year
4. 1 to 2 years
5. 2 to 3 years
6. 3–5 years

Performance measures

Managers are asked to “consider the way in which your supervisor evaluates your annual performance. We would like to know the performance measures your supervisor uses in this performance evaluation.” We provide the following list of performance measures and ask the manager to select the five most important measures (with the rest being included as a sixth category “all other measures”). They are asked to “indicate your assessment of the weight each measure receives when your supervisor evaluates your annual performance”. The sum of the weights (including “all other measures”) should equal 100 percent.

1. Profit measures (e.g., business unit profit, profit margin, firm-level profit)
2. Return measures (e.g., residual income, return-on-assets, economic profit, cash flow-return-on-investment)
3. Cost measures (e.g., unit cost of a profit, cost budget of a department, average variable costs)

4. Sales measures (e.g., sales growth in a region, actual sales compared to budget)
5. Efficiency measures (lead-time, percent waste reduction, productivity growth, input-output ratios)
6. Quality measures (e.g., percent on-time completion, percent warranty returns, percent inspection failures, score on customer satisfaction surveys)
7. Project measures (e.g., project failure rate, project progress, achievement of project targets)
8. Leadership measures (e.g., scores on 360-degree reviews, subjective assessment of leadership/coaching, employee satisfaction survey scores)
9. Personal measures (e.g., subjective assessment of achievement in personal objectives, managerial development progress reports)

Types of activities

Managers are asked “how do you divide your time over the following activities?” We provide the following seven items and ask managers to indicate the percentage of time devoted to each type of activity with the total equalling 100 percent.

1. New product development
2. Improvement of existing products/services
3. Improving/adjusting production processes
4. Employee development
5. Execution current production processes
6. Advertising and sales promotion (acquiring new orders)
7. Other activities (not mentioned, please specify)

Control variables

Centralization

We ask respondents to compare their influence with the influence of their superior on each of three areas of decision making. If the respondent and/or any of his/her subordinates makes decisions without prior knowledge or approval from their superior, the respondent is considered to have all influence. We use a seven-point Likert-type scale with 1 = I have all the influence, 4 = my superior and I share influence equally, 7 = my superior has all the influence.

1. Strategy
2. Investments
3. Personnel

Task design

We ask respondents to evaluate the following statements on a seven-point Likert scale with 1 = not at all, 4 = to some extent, 7 = to a very large extent.

1. How repetitious are the duties of those in your unit?
2. To what extent would you say the work of your unit is routine?
3. Basically, unit members perform repetitive activities in doing their jobs.
4. How many of the tasks in your unit are the same from day to day?
5. People in my unit do about the same job in the same way most of the time.
6. To what extent is there an understandable sequence of steps that can be followed in doing the work of your unit?
7. To what extent is there a clearly known way to do major types of work normally encountered in your unit?

8. To what extent is there a clearly defined body of knowledge of subject matter which can guide the work done in your unit?
9. To do the work of your unit, to what extent can personnel actually rely on established procedures and practices?

Information asymmetry

We ask managers to assess knowledge distribution within the business unit. Respondents are asked to indicate, compared to their superior, who is most familiar on the following five items measured on a 7-point Likert-type scale with 1 = my superior; 4 = my superior and I equally, seven = I am.

1. In possession of better information regarding the activities undertaken in your unit?
2. More familiar with the input-output relationships inherent in the internal operations of your unit?
3. More certain about the performance potential of your unit?
4. Better able to assess the potential impact of your activities of factors internal to your unit?
5. Better understanding of what can be achieved in your unit?

Pay-for-performance sensitivity

Managers are asked to rate on a seven-point Likert-type scale the following items, where 1 = extremely low and 7 = extremely high.

1. The degree to which your valued rewards (compensation, bonus, career advancements) increase with your measured performance.
2. The degree to which your valued rewards are totally determined by measured performance relative to performance standards.
3. Consider the unit managers whose performance relative to the performance standards are in the top 25 percent of all unit managers' performance. The extent to which these managers receive larger valued rewards than do those managers whose performance in relation to standards are not in the top 25 percent.

Growth opportunities

Managers were asked to indicate their expectations about the following two items using a seven-point Likert-type scale where 1 = vast decline, 4 = no growth, 7 = significant growth.

1. The growth opportunities that exist within the *industry* in which you compete
2. The growth opportunities *your unit* faces

Competition

Respondents were asked to indicate the rate of change on the following two items measured as a seven-point Likert-type scale where 1 = highly stable, infrequent change, 4 = some change, 7 = highly volatile, constant change.

1. Buying patterns and requirements of customers
2. Competitors' strategies
3. Technical developments relevant to your unit's business
4. Changes in production processes
5. Industry buying patterns

Current performance

Managers are asked to rate on a seven-point Likert-type scale the level of their performance where 1 = extremely low and 7 = extremely high.

1. The level of my measured performance relative to my performance standards
2. The level of my measured performance relative to other unit managers' measured performance

Age of the manager

What is your age? Years

Tenure in current position

How long have you held your current position? years

Size

Number of employees in your unit (in full-time equivalents)

Industry

Managers are given the following set of industry codes and asked to indicate the main industry in which they compete.

<i>Code</i>	<i>Description</i>
1	Agriculture, hunting, fishing
2	Mining
3A	Traditional manufacturing
3B	High-tech manufacturing
4	Production, distribution and sale of gas, electricity, water or steam
5	Construction and building
6	Repair of consumer products and retail
7	Hotels, restaurants and bars
8	Transportation, logistics, warehousing and communication
9	Financial institutions
10	Real estate and professional services
11	Public government and social security
12	Education
13	Health
14	Environment, culture, recreation and other services

Appendix 2

Summary Statistics and Standardized Loadings for Questionnaire Items Used to Construct the Latent Variables of Centralization, Task Design, Information Asymmetry, Pay-for-Performance Sensitivity, Growth Opportunities, Competition, and Current Performance ($n = 105$)

Survey items	Standardized loading	Mean	Std. dev.	Min.	Median	Max.
<i>Centralization:</i>						
Compare your influence with the influence of your superior on each area of decision making mentioned below. If you and/or any of your subordinates make decisions without prior knowledge or approval from your superior, you are considered to have <i>all</i> influence.						
Strategy	0.81***	4.10	1.52	1.00	4.00	7.00
Investments	0.65**	4.18	1.70	1.00	4.00	7.00
Personnel	0.86***	2.62	1.47	1.00	2.00	6.00
<i>Task design:</i>						
Please evaluate the following statements.						
How repetitious are the duties of those in your unit?	0.62***	4.40	1.40	1.00	5.00	7.00
To what extent would you say the work of your unit is routine?	0.75***	3.83	1.32	1.00	4.00	6.00
Basically, unit members perform repetitive activities in doing their jobs.	0.71***	4.12	1.37	1.00	4.00	7.00
How many of the tasks in your unit are the same from day to day?	0.85***	4.00	1.43	1.00	4.00	7.00
People in my unit do about the same job in the same way most of the time.	0.80***	3.95	1.52	1.00	4.00	7.00
To what extent is there an understandable sequence of steps that can be followed in doing the work of your unit?	0.83***	4.85	1.24	2.00	5.00	7.00
To what extent is there a clearly known way to do major types of work normally encountered in your unit?	0.71***	4.87	1.30	2.00	5.00	7.00
To what extent is there a clearly defined body of knowledge of subject matter which can guide the work done in your unit?	0.52**	4.80	1.27	1.00	5.00	7.00
To do the work of your unit, to what extent can personnel actually rely on established procedures and practices?	0.68***	5.06	1.13	2.00	5.00	7.00
<i>Information asymmetry:</i>						
Please compare the amount of information you have relative to your superior.						
How much better informed are you about the type of activities undertaken in your unit?	0.58**	6.00	1.11	2.00	6.00	7.00

(The table is continued on the next page.)

Appendix 2 (Continued)

Survey items	Standardized loading	Mean	Std. dev.	Min.	Median	Max.
How much more familiar are you with the type of input output relations inherent in the internal operations of your unit?	0.72***	5.71	1.11	2.00	6.00	7.00
How much more certain are you about the performance potential of your unit?	0.54**	5.72	1.07	3.00	6.00	7.00
How much better are you able to assess the potential impact on your activities of factors internal to your unit?	0.85***	4.74	1.08	2.00	5.00	7.00
How much better do you understand what can be achieved in your unit?	0.75***	5.26	1.27	1.00	5.00	7.00
<i>Pay-for-performance sensitivity:</i>						
Please rate the following.						
The degree to which your valued rewards (compensation, bonus, career advancements) increase with your measured performance.	0.67***	4.08	1.68	1.00	4.00	7.00
The degree to which your valued rewards are totally determined by measured performance relative to performance standards.	0.75***	3.84	1.64	1.00	4.00	7.00
Consider the unit managers whose performance relative to the performance standards are in the top 25 percent of all unit managers' performance. The extent to which these managers receive larger valued rewards than do those managers whose performance in relation to standards are not in the top 25 percent.	0.89***	4.00	0.16	1.00	4.00	7.00
<i>Growth opportunities:</i>						
Please indicate your expectations about the following.						
The growth opportunities that exist within the industry in which you compete.	0.81**	4.81	1.22	2.00	5.00	7.00
The growth opportunities your unit faces.	0.90***	5.23	1.24	1.00	6.00	7.00
<i>Competition:</i>						
Please indicate the rate of change in each of the following categories.						
Buying patterns and the requirements of customers.	0.44	4.44	1.52	1.00	5.00	7.00
Industry buying patterns.	0.42	4.37	1.37	1.00	5.00	7.00
Technical developments relevant to your unit's business.	0.79***	4.29	1.57	1.00	4.00	7.00
Changes in production processes.	0.96***	3.98	1.56	1.00	4.00	7.00
Competitor strategies.	0.40	4.42	1.26	2.00	5.00	7.00
<i>Current Performance:</i>						
Please indicate:						
The level of my measured performance relative to my performance standards.	0.87***	4.68	1.25	1.00	5.00	7.00

(The table is continued on the next page.)

Appendix 2 (Continued)

Survey items	Standardized loading	Mean	Std. dev.	Min.	Median	Max.
The level of my measured performance relative to other unit managers' measured performance.	0.89***	4.51	1.36	1.00	5.00	7.00

Notes:

Parameter estimates for the measurement equations are in the standardized loadings column.

*, **, *** denote significance at the 10 percent, 5 percent, and 1 percent level, two-tailed, respectively.

References

- Abernethy, M. A., J. Bouwens, and L. van Lent. 2004. Determinants of control system design in divisionalized firms. *The Accounting Review* 79 (3): 545–70.
- Aitchison, J. 1986. *The statistical analysis of compositional data*. London: Chapman and Hall.
- Anderson, S. W., J. W. Hesford, and S. M. Young. 2002. Factors influencing the performance of activity based costing teams: A field study of ABC model development time in the automobile industry. *Accounting, Organizations and Society* 27 (3): 195–212.
- Anthony, R. N. 1965. Accounting for capital costs. In *Management control systems: Cases and readings*, ed. R. N. Anthony, J. Dearden, and R. F. Vangil, Homewood, IL: Richard D. Irwin.
- Anthony, R. N., and V. Govindarajan. 2004. *Management control systems*, 11th ed. New York: McGraw-Hill/Irwin.
- Athey, S., and J. Roberts. 2001. Organizational design: Decision rights and incentive contracts. *American Economic Review* 91 (2): 200–05.
- Baiman, S., and T. Baldenius. 2008. Non-financial performance measures as coordination devices. Working paper, University of Pennsylvania and Columbia University.
- Balachandran, S. V. 2006. How does residual income affect investment? The role of prior performance measures. *Management Science* 52 (3): 383–94.
- Balachandran, S. V., and P. Mohanram. 2008. Can residual income distinguish between earnings growth derived from productivity improvements and investment-driven growth? Working paper, Columbia University.
- Ball, R. 1989. The firm as a specialist contracting intermediary: Application to accounting and auditing. Working paper, William E. Simon Graduate School of Business Administration, University of Rochester.
- Bandiera, O., L. Guiso, A. Prat, and R. Sadun. 2010. What do CEOs do? Working paper, London School of Economics.
- Banker, R., and L. Chen. 2006. Predicting earnings using a model based on cost variability and cost stickiness. *The Accounting Review* 81 (2): 285–307.
- Banker, R., and S. Datar. 1989. Sensitivity, precision and the linear aggregation of signals for performance evaluation. *Journal of Accounting Research* 27 (1): 21–39.
- Banker, R., G. Potter, and D. Srinivasan. 2000. An empirical investigation of an incentive plan that includes nonfinancial performance measures. *The Accounting Review* 75 (1): 65–92.
- Banker, R. D., H. Chang, and M. J. Pizzini. 2004. The balanced scorecard: Judgmental effects of performance measures linked to strategy. *The Accounting Review* 79 (1): 1–23.
- Beatty, A. L., B. Ke, and K. R. Petroni. 2002. Earnings management to avoid earnings declines across publicly and privately held banks. *The Accounting Review* 77 (3): 547–70.
- Bhojraj, S., and R. Libby. 2005. Capital market pressure, disclosure frequency-induced earnings/cash flow conflict, and managerial myopia. *The Accounting Review* 80 (1): 1–20.

- Biddle, G. C., R. M. Bowen, and J. S. Wallace. 1997. Does EVA[®] beat earnings? Evidence on associations with stock returns and firm values. *Journal of Accounting and Economics* 24 (3): 301–36.
- Bouwens, J., and L. van Lent. 2007. Assessing the performance of business unit managers. *Journal of Accounting Research* 45 (4): 667–97.
- Bryant, L., D. A. Jones, and S. K. Widener. 2004. Managing value creation within the firm: An examination of multiple performance measures. *Journal of Management Accounting Research* 16 (1): 107–31.
- Budde, J. 2007. Performance measure congruity and the balanced scorecard. *Journal of Accounting Research* 45 (3): 515–39.
- Bushman, R. M., R. J. Indjejikian, and A. Smith. 1995. Aggregate performance measures in business unit manager compensation: The role of intrafirm interdependencies. *Journal of Accounting Research* 33 (Supplement): 101–27.
- Chenhall, R. H. 2005. Integrative strategic performance measurement systems, strategic alignment of manufacturing, learning and strategic outcomes: an exploratory study. *Accounting, Organizations and Society* 30 (5): 395–422.
- Chenhall, R. H., and K. Langfield-Smith. 1998. Adoption and benefits of management accounting practices: An Australian study. *Management Accounting Research* 9 (1): 1–19.
- Chin, W. W., B. L. Marcolin, and P. R. Newsted. 2003. A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Information Systems Research* 14 (2): 189–209.
- Chin, W. W., and P. R. Newsted. 1999. Structural equation modeling analysis with small samples using partial least squares. In *Statistical strategies for small sample research*, ed. R. H. Hoyle, 307–41. Thousand Oaks, CA: Sage.
- Chow, C. W., Y. Kato, and K. A. Merchant. 1996. The use of organizational controls and their effects on data manipulation and management myopia: A Japan vs U.S. comparison. *Accounting, Organizations and Society* 21 (2–3): 175–92.
- Datar, S., S. L. Kulp, and R. A. Lambert. 2001. Balancing performance measures. *Journal of Accounting Research* 39 (1): 75–92.
- Dearden, J. 1987. Measuring profit center managers. *Harvard Business Review* (September/October): 84–88.
- Dechow, P. M., A. P. Hutton, and R. G. Sloan. 1999. An empirical assessment of the residual income valuation model. *Journal of Accounting & Economics* 26 (1–3): 1–34.
- Demski, J. S., and D. E. M. Sappington. 1999. Summarization with errors: A perspective on empirical investigations of agency relationships. *Management Accounting Research* 10 (1): 21–37.
- Dikolli, S. S. 2001. Agent employment horizons and contracting demand for forward-looking performance measures. *Journal of Accounting Research* 39 (3): 481–94.
- Dikolli, S. S., W. R. Kinney, Jr., and K. L. Sedatole. 2007. Measuring customer relationship value: The role of switching cost. *Contemporary Accounting Research* 24 (1): 93–132.
- Dillman, D. A. 1991. The design and administration of mail surveys. *Annual Review of Sociology* 17: 225–49.
- Dunk, A. 1993. The effects of budget emphasis and information asymmetry on the relation between budgetary participation and slack. *The Accounting Review* 68 (2): 400–10.
- Dutta, S. 2003. Capital budgeting and managerial compensation: Incentive and retention effects. *Accounting Review* 78 (1): 71–93.
- Dutta, S., and S. Reichelstein. 2002. Controlling investment decisions: Depreciation and capital charges. *Review of Accounting Studies* 7 (2–3): 253–81.
- Dutta, S., and S. Reichelstein. 2003. Leading indicator variables, performance measurement, and long-term versus short-term contracts. *Journal of Accounting Research* 41 (5): 837–66.
- Fairfield, P. M., R. J. Sweeney, and T. L. Yohn. 1996. Accounting classification and the predictive content of earnings. *The Accounting Review* 71 (3): 337–55.

- Fairfield, P. M., and T. L. Yohn. 2001. Using asset turnover and profit margin to forecast changes in profitability. *Review of Accounting Studies* 6 (4): 371–85.
- Feltham, G., and J. Xie. 1994. Performance measure congruity and diversity in multi-task principal agent relations. *The Accounting Review* 69 (3): 429–53.
- Fornell, C., and D. F. Larcker. 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* 18 (1): 39–50.
- Frankel, R., and C. M. C. Lee. 1998. Accounting valuation, market expectation, and cross-sectional stock returns. *Journal of Accounting and Economics* 25 (3): 283–319.
- Fry, J. M., T. R. L. Fry, and K. R. McLaren. 1996. Compositional data analysis and zeros in micro data. Working paper, Monash University.
- Garvey, G., and T. Milbourn. 2000. EVA versus earnings: Does it matter which is more highly correlated with stock returns? *Journal of Accounting Research* 38 (Supplement): 209–45.
- Gigler, F., C. Kanodia, H. Sapra, and R. Venugopalan. 2009. Increasing the frequency of financial reporting: An equilibrium analysis of costs and benefits. Working paper, University of Minnesota.
- Graham, J. R., C. R. Harvey, and S. Rajgopal. 2005. The economic implications of corporate financial reporting. *Journal of Accounting and Economics* 40 (1–3): 3–73.
- Harman, H. H. 1967. *Modern factor analysis*, 2nd ed. Chicago: University of Chicago Press.
- Hauser, J. R., D. I. Simester, and B. Wernerfelt. 1994. Customer satisfaction incentives. *Marketing Science* 13 (4): 327–50.
- Hemmer, T. 1996. On the design and choice of “modern” management accounting measures. *Journal of Management Accounting Research* 8: 87–116.
- Holmstrom, B., and J. Ricart I Costa. 1986. Managerial incentives and capital management. *Quarterly Journal of Economics* 101 (4): 835–60.
- Horngren, C. T. 2004. Management accounting: Some comments. *Journal of Management Accounting Research* 16: 207–11.
- Ittner, C. D., and D. F. Larcker. 1998a. Are nonfinancial measures leading indicators of financial performance? An analysis of customer satisfaction. *Journal of Accounting Research* 36 (1): 1–35.
- Ittner, C. D., and D. F. Larcker. 1998b. Innovations in performance measurement: Trends and research implications. *Journal of Management Accounting Research* 10: 205–38.
- Ittner, C. D., and D. F. Larcker. 2001. Assessing empirical research in managerial accounting: A value-based management perspective. *Journal of Accounting and Economics* 32 (1–3): 349–410.
- Ittner, C. D., and D. F. Larcker. 2003. Coming up short on nonfinancial performance measurement. *Harvard Business Review* 81 (11): 88–95.
- Ittner, C. D., and D. F. Larcker. 2005. Moving from strategic measurement to strategic data analysis. In *Controlling strategy: Management, accounting, and performance measurement*, ed. C. S. Chapman, Oxford, UK: Oxford University Press.
- Ittner, C. D., D. F. Larcker, and M. W. Meyer. 2003a. Subjectivity and the weighting of performance measures: Evidence from a balanced scorecard. *The Accounting Review* 78 (3): 725–58.
- Ittner, C. D., D. F. Larcker, and M. V. Rajan. 1997. The choice of performance measures in annual bonus contracts. *The Accounting Review* 72 (2): 231–56.
- Ittner, C. D., D. F. Larcker, and T. Randall. 2003b. Performance implications of strategic performance measurement in financial services firms. *Accounting, Organizations and Society* 28 (7–8): 715–41.
- Kaplan, R. S., and D. P. Norton. 2001. *The strategy-focused organization: How balanced scorecard companies thrive in the new business environment*. Boston: Harvard Business School Press.
- Keating, A. S. 1997. Determinants of divisional performance evaluation practices. *Journal of Accounting and Economics* 24 (3): 243–74.
- Khandwalla, P. 1972. The effect of different types of competition on the use of management controls. *Journal of Accounting Research* 10 (2): 275–85.

- King, G., M. Tomz, and J. Wittenberg. 2000. Making the most of statistical analysis: Improving interpretation and presentation. *American Journal of Political Science* 44 (2): 341–55.
- Lambert, R. A. 2001. Contracting theory and accounting. *Journal of Accounting and Economics* 32 (1–3): 3–87.
- Laverty, K. J. 1996. Economic “short-termism”: The debate, the unresolved issues, and the implications for management practice and research. *Academy of Management Review* 21 (3): 825–60.
- Lawrence, P., and J. Lorch. 1967. *Organizations and environment*. Homewood, IL: Richard D. Irwin.
- Lillis, A. M. 2002. Managing multiple dimensions of manufacturing performance: An exploratory study. *Accounting, Organizations and Society* 27 (6): 497–529.
- Lipe, M. G., and S. E. Salterio. 2000. The balanced scorecard: Judgmental effects of common and unique performance measures. *The Accounting Review* 75 (3): 283–98.
- Luft, J., and M. Shields. 2003. Mapping management accounting research: Graphics and guidelines for theory-consistent empirical research. *Accounting, Organizations and Society* 28 (2–3): 169–250.
- Lundholm, R., and L. A. Myers. 2002. Bringing the future forward: The effect of disclosure on the returns-earnings relation. *Journal of Accounting Research* 40 (3): 809–39.
- Malina, M. A., H. S. O. Nørreklit, and F. H. Selto. 2007. Relations among measures, climate of control, and performance measurement models. *Contemporary Accounting Research* 24 (3): 935–82.
- Marginson, D., and L. McAulay. 2008. Exploring the debate on short-termism: A theoretical and empirical analysis. *Strategic Management Journal* 29 (3): 273–92.
- Matsumoto, D. A. 2002. Management’s incentives to avoid negative earnings surprises. *Accounting Review* 77 (3): 483–514.
- McKinnon, S., and W. J. Bruns. 1992. Management information and accounting information: What do managers want? *Advances in Management Accounting* 1: 55–80.
- Merchant, K. 1989. *Rewarding results: Motivating profit center managers*. Boston: Harvard Business School Press.
- Merchant, K. 1990. The effects of financial controls on data manipulation and management myopia. *Accounting Organizations and Society* 15 (4): 297–313.
- Merchant, K. A., and W. J. Bruns. 1986. Measurements to cure management myopia. *Business Horizons* 29 (3): 56–64.
- Mergenthaler, R. D., Jr., S. Rajgopal, and S. Srinivasan. 2011. CEO and CFO career penalties to missing quarterly analysts forecasts. Working paper, University of Iowa, Emory University, and Harvard Business School.
- Murphy, K. J., and J. L. Zimmerman. 1993. Financial performance surrounding CEO turnover. *Journal of Accounting and Economics* 16 (1–3): 273–315.
- Nagar, V., and M. V. Rajan. 2001. The revenue implications of financial and operational measures of product quality. *Accounting Review* 76 (4): 495–513.
- Nagar, V., and M. V. Rajan. 2005. Measuring customer relationships: The case of the retail banking industry. *Management Science* 51 (6): 904–19.
- Narayanan, M. P. 1985. Managerial incentives for short term results. *The Journal of Finance* 40 (5): 1469–484.
- Nunnally, J. C., and I. H. Bernstein. 1994. *Psychometric theory*. New York: McGraw-Hill.
- Podsakoff, P. M., S. B. MacKenzie, J. Y. Lee, and N. P. Podsakoff. 2003. Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology* 88 (5): 879–903.
- Raith, M. 2008a. Optimal incentives and the time dimension of performance measurement. Working paper, Simon Graduate School of Business.
- Raith, M. 2008b. Specific knowledge and performance measurement. *RAND Journal of Economics* 39 (4): 1059–079.
- Reece, J. S., and W. R. Cool. 1978. Measuring investment center performance. *Harvard Business Review* (May/June): 28–49.

- Reichelstein, S. 1997. Investment decisions and managerial performance evaluation. *Review of Accounting Studies* 2 (2): 157–80.
- Rogerson, W. 1997. Intertemporal cost allocation and managerial investment incentives: A theory explaining the use of economic value added as a performance measure. *Journal of Political Economy* 105 (4): 770–95.
- Rogerson, W. 2008. Intertemporal cost allocation and investment decisions. *Journal of Political Economy* 116 (5): 931–50.
- Rumelt, R. P. 1987. Theory, strategy, and entrepreneurship. In *The competitive challenge*, ed. D. J. Teece, 137–58. New York: Harper & Row.
- Scapens, R. W. 1979. Profit measurement in divisionalized companies. *Journal of Business Finance and Accounting* 6 (3): 281–305.
- Sedatole, K. L. 2003. The effect of measurement alternatives on a nonfinancial quality measure's forward-looking properties. *The Accounting Review* 78 (2): 555–80.
- Shields, M. D., F. J. Deng, and Y. Kato. . 2000. The design and effects of control systems: Tests of direct- and indirect-effects models. *Accounting, Organizations and Society* 25 (2): 185–202.
- Smith, M. J. 2002. Gaming nonfinancial performance measures. *Journal of Management Accounting Research* 14: 119–33.
- Smith, R. E., and W. F. Wright. 2004. Determinants of customer loyalty and financial performance. *Journal of Management Accounting Research* 16 (1): 183–205.
- Song, F. H., and A. V. Thakor. 2006. Information control, career concerns, and corporate governance. *Journal of Finance* 61 (4): 1845–896.
- Stein, J. C. 1988. Takeover threats and managerial myopia. *Journal of Political Economy* 96 (1): 61–80.
- Thakor, A. V. 1990. Investment “myopia” and the internal organization of capital allocation decisions. *Journal of Law, Economics and Organization* 6 (1): 129–54.
- Thevaranjan, A., K. Joseph, and D. Srinivasan. 2000. Managerial myopia and non-financial measures: The case of customer satisfaction mitigating hard-selling. Working paper, Syracuse University, University of Kansas, and University of Pittsburgh.
- Van der Stede, W. A. 2000. The relationship between two consequences of budgetary controls: Budgetary slack creation and managerial short-term orientation. *Accounting, Organizations and Society* 25 (6): 609–22.
- Wallace, J. C. 1997. Adopting residual income-based compensation plans: Do you get what you pay for? *Journal of Accounting and Economics* 24 (3): 275–300.
- Zeithaml, V. 2000. Service quality, profitability, and the economic worth of customers: What we know and what we need to learn. *Journal of the Academy of Marketing Science* 28 (1): 67–85.
- Zelner, B. A. 2009. Using simulation to interpret results from logit, probit, and other nonlinear models. *Strategic Management Journal* 30 (12): 1335–348.
- Zimmerman, J. L. 1997. EVA and divisional performance measurement: Capturing synergies and other issues. *Journal of Applied Corporate Finance* 10 (2): 98–109.
- Zimmerman, J. L. 2003. *Accounting for decision making and control*, 4th ed. Homewood, IL: Richard D. Irwin.