# Relative Performance Evaluation: A Review of Managerial Accounting Research

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#### Abstract

Relative performance evaluation (RPE) involves using information about the performance of a group of peers when evaluating the performance of specific individuals, teams, or organizational units. RPE within and across organizations has drawn much attention from both academics and practitioners. Despite its theoretical appeal, empirical research on evidence for RPE usage has reported mixed results. This paper describes a sample of managerial accounting research that theoretically and empirically addresses RPE within and across firms, and suggests further managerial accounting research on RPE.

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## 1. Introduction

Relative performance evaluation (RPE) within and across organizations has drawn much attention from both academics and practitioners. RPE entails using information about the performance of a group of peers when evaluating the performance of specific individuals, teams, or organizational units. In principal-agent settings where the principal cannot observe multiple agents' efforts directly and there is uncertainty in the operating environment, economic theory promotes a risk-reduction benefit of RPE in optimal incentive contracting when there is commonality in the uncertainty (Holmstrom 1982). In such settings, the performance measures across agents are correlated due to commonality in the uncertainty that the agents face. RPE can provide incentives while partially insulating the agent from uncertainty that is common across the agents, consequently reducing the risk that would be imposed on the agent if compensation depended only on individual performance. For example, salespersons face similar challenges in selling a firm's products, and executives within an industry face similar industry-specific challenges and general economic conditions. To reduce the compensation risk imposed on these individuals, salespersons' pay may be based on sales relative to the firm's other salespersons in the same territory and executives whose pay is tied to their firm's share prices may be evaluated relative to a peer group of firms.

In optimal-contracting analyses of principal-agent settings with multiple agents facing common uncertainty, theory predicts not only that RPE will be used, but also that the benefits to RPE increase with the degree of common uncertainty (Mookherjee 1984; Janakiraman et al. 1992; Prendergast 1999). It is important to note that without common uncertainty, principal-agent theory finds no benefit to relative performance evaluation (Holmstrom 1982). In contrast, behavioral theories contend that agents may interpret RPE as signaling that competition is desirable behavior, and therefore increase their effort (Seta 1982; Frederickson 1992).

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Although RPE is theoretically and intuitively appealing, it can be difficult for principals to identify peer groups with a sufficiently high degree of commonality in uncertainty. For example, store managers may operate in areas with very different customer demographics. Firm executives may manage a very diverse set of operations, making it difficult to identify a group of peer firms for evaluation of executive performance. Further, it may be difficult to obtain detailed information on internal measures of how other firms are performing (Brickley et al. 2009). Basing pay on RPE can generate adverse incentives for agents to suggest an inappropriate peer group within or across organizations (Gibbons and Murphy 1990; Gong et al. 2011). Within organizations, agents may sabotage the performance of peers, collude with peers, or punish peers who perform too far above the accepted average (Gibbons and Murphy 1990; Murphy 2001;Brickley et al. 2009), or exert lower effort than their peers because of perceived unfairness of comparison to their peer group (Matsumura and Shin 2006).

The remainder of this paper describes a sample of managerial accounting research that theoretically and empirically addresses RPE within and across firms. Section II describes research on RPE across organizations, and Section III turns to RPE within organizations. Section IV suggests further managerial accounting research on RPE.

## 2. RPE across Organizations: Executive Compensation

#### 2.1 Early Evidence Using an Implicit Approach: RPE Puzzle

Because of the difficulty of obtaining data on incentives linked to internal performance measures, much of the research on RPE uses publicly available executive compensation data. However, until recently, most firms did not disclose whether they use RPE in executive compensation. Therefore, much of the extant empirical literature on RPE has used an *implicit approach* of testing for the presence of RPE by investigating whether top executives are compensated *as if* their performance is evaluated relative to peer firms' performance. The resulting findings provide mixed results (Antle and Smith 1986; Gibbons and Murphy 1990; Janakiraman et al. 1992; Kren 1992; Sloan 1993; Aggarwal and Samwick 1999). Antle and Smith (1986) use data from 1947 to 1977 for 39 firms and find weak evidence that the executives' compensation falls as other firms perform better, holding own performance fixed. Using comprehensive compensation survey data, Gibbons and Murphy (1990) find that executives are penalized when a competitor group performs better. They provide evidence supporting that CEOs are more likely to be evaluated relative to overall market movements than relative to industry movements, which is puzzling. However, Janakiraman et al. (1992) find little empirical evidence that the market and industry components of firm performance are completely removed in determining CEO compensation.

Thus, despite the theoretical appeal of the prediction that RPE can help filter out the common uncertainty across agents' performance, much of the literature on RPE in executive compensation finds weak and mixed empirical support that firms use RPE for executive compensation. This lack of empirical support has long puzzled researchers (Prendergast 1999). Note, however, that the implicit approach described above tests for RPE use by regressing executive pay on industry performance across a population of firms, and thus relies on simplified assumptions concerning RPE contract details (such as RPE peer group composition, performance metrics used in RPE, and components of pay covered by RPE). For example, the implicit approach uses either a market index, such as the S&P 500 index, or industry peer performance, such as average performance of peers belonging to the same two-digit code in the Standard Industrial Classification (SIC) system. These assumptions unavoidably introduce measurement errors into the implicit tests (Murphy 1999; Bannister and Newman 2003). Consequently, some recent theoretical and empirical studies, described below, attempt to determine whether the limited empirical support for RPE in early studies is due to inappropriate specifications of peer groups. Other recent studies take advantage of newly expanded executive compensation disclosure rules to take an *explicit approach* to analyzing RPE.

#### 2.2 New Theory and Empirical Tests of RPE

Dikolli et al. (2013) theoretically show how measurement error in peer group selection can introduce a bias that can cloud empirical detection of RPE and conclude that "[e]mpiricists should take steps to choose peers and aggregation methods that better reflect the choices made by firms". Consistent with this theory, Albuquerque (2009) argues that firms of different sizes are exposed to different shocks and have different abilities to react to these shocks. She finds support for RPE in executive compensation after determining peer firms by matching on both industry and size. Thus, this study reduces measurement error in peer group selection as compared to previous implicit approaches. Wu (2013) extends RPE theory by showing that even without measurement error in peer group selection, the usefulness of RPE to the principal in a principal-agent relationship depends on whether the peers' specific risks that enter into the compensation contract are lower than the common risk that the contract helps filter out. This tradeoff defines a "boundary condition" that can guide the choice of peer firms for contracting.

Papers that study explicit RPE contracts include Murphy (1999), Bannister and Newman (2003) Carter et al. (2009), and Gong et al. (2011). Using data from a compensation consulting firm's proprietary survey, Murphy (1999) reports that 28.8 percent of 177 large companies surveyed use RPE in their annual incentive plans. Bannister and Newman (2003) examine proxy disclosures of 160 firms in the 1992 *Fortune* 250 and provide a descriptive analysis of RPE plans used by 45 firms. Taken together, these studies on explicit RPE suggest that a lack of support for RPE could be attributable to incorrect assumptions and model misspecifications underlying the implicit RPE studies, consistent with Dikolli et al. (2013). Using a small sample of UK firms, Carter et al. (2009) focus on one component of executive compensation, namely, performance-vested equity grants. Many large British firms not only use RPE to determine whether vesting of equity grants will occur, but also publicly disclose the conditions under which vesting occurs. The study finds virtually no support for the theoretical economic determinant (i.e., common uncertainty) of RPE use in this context, but does find an association between common uncertainty and decisions to incorporate specific structures of RPE.

Gong et al. (2011) study firms' *explicit* use of RPE in executive compensation contracts. They use a rich dataset from the proxy statements of all S&P 1500 companies for fiscal year 2006. Until late 2006, the SEC did not require detailed proxy disclosures on executive compensation (Byrd et al. 1998; Carter et al. 2009). Under the new SEC rules (effective for filings on or after December 15, 2006), each publicly listed company must provide a "Compensation Disclosure and Analysis" (CD&A) report in its proxy statement.<sup>1</sup> The new disclosure requirements include two key changes that provide researchers with an ideal setting to investigate explicit RPE contracts from firms' proxy disclosure. First, firms must provide detailed disclosure on (1) the process used to select performance targets and (2) how performance targets translate into objective determination of compensation. Second, firms must disclose whether they benchmarks compensation to a peer group or use other market comparison data, and provide detailed information on the peer group used for compensation purposes.

Under these requirements, firms bear a cost of claiming to use RPE without actually using it,<sup>2</sup> making it unlikely that firms claiming to use RPE in proxy statements do not actually use it. Therefore, Gong et al. (2011) are able to create unbiased and detailed data on firms' explicit use of RPE, including the specific peer groups used for RPE for a large sample of U.S. companies. They find that about 25 percent of S&P 1500 firms explicitly use RPE in setting executive compensation. When using the implicit approach (such as Albuquerque [2009]), where RPE peers are matched on both industry and size, they do not find evidence of RPE use in S&P

<sup>&</sup>lt;sup>1</sup> This new SEC rule on proxy disclosure enables compensation researchers to examine the issues that previously could not be addressed due to data unavailability. For example, using newly available data on firms' use of compensation consultants, Cadman et al. (2010) and Murphy and Sandino (2010) examine the effect of compensation consultants on executive pay. Faulkender and Yang (2010) study the role and composition of compensation-level benchmarking peer groups from proxy disclosure.

<sup>2</sup> The cost includes resources to develop the information on RPE that is disclosed in the proxy statement, as well as the reputation cost if the firm is found to have lied to stakeholders.

1500 firms in their 2006 sample. They further show that this implicit approach is unable to detect RPE use even among firms that claim to use RPE in setting executive pay. However, after incorporating disclosed peer group composition, they find a significantly negative association between CEO pay and stock performance for disclosed peers, supporting the theorized use of RPE. Combined, Gong et al. (2011) provide new evidence that the implicit test is likely to produce misleading results due to inaccurate identification of RPE peers used in the pay-setting process.

#### 2.3 Factors Influencing RPE Use

The earlier lack of clear empirical support for the existence of RPE in executive compensation has stimulated research examining contextual factors influencing the effectiveness of RPE. A large body of research documents how the use of RPE can vary with executive, firm, and industry characteristics. We discuss a sample of research on each of these aspects below.

One stream of RPE research highlights the role of executives' characteristics as key factors influencing the usefulness of RPE. For example, Garvey and Milbourn (2003) argue that executives' hedging activity of market-wide risk can substitute for RPE use. Hence, as executives' private cost of hedging falls and hedging increases, firms are less likely to use RPE. Garvey and Milbourn (2003) use CEO age and firm-specific wealth as proxies for executives' ability to hedge the market and find that firms use less RPE for older and wealthier CEOs. Rajgopal et al. (2006) posit that outside opportunities may explain the apparent scarcity of RPE in executive compensation. They predict and find that firms are less likely to filter out industry and market-wide performance for more talented CEOs so that a favorable exogenous shock positively affects their pay.

A second stream of research examines the effect of firm characteristics on RPE. Firm size, given its significance in many empirical studies on firm performance, is a natural feature to examine in relation to RPE use. Theory is silent on this possible relationship, but firm size could capture CEO talent (Himmelberg and Hubbard 2000) or the cost of measuring peer performance (Murphy 2001), suggesting less use of RPE for larger firms. Alternatively, firm size could serve as a crude proxy for shareholder concerns about executive pay practices, suggesting more use of RPE for larger firms as a way to placate shareholder activists (Bannister and Newman 2003). Consistent with this reasoning, Carter et al. (2009) find that firm size is positively associated with the extent of using RPE in performance-vested equity grants.

Firm performance may also be a motivating factor underlying firms' choice to use RPE. To the extent that firms exhibit stronger performance as compared to their peers, RPE may be used as a justification for higher CEO pay. RPE helps to distinguish between situations where a firm and its peers all show strong performance due to "luck" (a strong economy) and situations where a firm shows stronger performance than its peers. Intuitively, good governance ideally rewards CEOs in the latter, but not the former situation. Bertrand and Mullainathan (2001) document that CEO pay increases in response to a luck component and there is less pay for luck for CEOs in better-governed firms. Garvey and Milbourn (2006) document that executive pay is more sensitive to good luck than to bad luck and this asymmetry is more pronounced in firms with weaker governance. Indeed, Bebchuk and Fried (2004) sum up the situation in the title of their influential book, *Pay without Performance*. They describe how compensation practices allow windfalls in equity-based compensation for U.S. CEOs and stress the usefulness of RPE (i.e., filtering out the effect of market or industry movements) to create a tighter link between performance and compensation. Taken together, these studies suggest that the quality of corporate governance is related to RPE usage and that RPE can be used to good advantage (e.g., use RPE in bad-luck times but not in good-luck times).

Albuquerque (2013) argues that growth options affect a firm's risk exposure and hence the informativeness of peer performance about the firm's common uncertainty. She posits that the ability to find a peer group whose performance is subject to the same external shocks is limited in the case of high growth-option firms because peer performance is not informative about common shocks facing the firm. Consistent with her prediction, she

finds that a firm's level of RPE use is negatively related to its level of growth options.

The third stream of research documents that RPE is more or less useful for contracting depending on competitive environments (Aggarwal and Samwick 1999; DeFond and Park 1999; Joh 1999). Specifically, Aggarwal and Samwick (1999) argue that strategic competition that takes place among firms in imperfectly competitive settings offers an explanation for the lack of evidence in support of the RPE use. Both Aggarwal and Samwick (1999) and Joh (1999) find that firms facing a more competitive environment are less likely to use RPE due to the concern that RPE may encourage destructive competition. DeFond and Park (1999), however, argue that a more competitive environment is characterized by a higher degree of common risk. They find that RPE-based accounting measures are more closely associated with CEO turnover in high competitive industries than in low competition industries, suggesting stronger evidence of RPE use in more competitive industries. A recent study (Vrettos 2013) provides insight into weak and mixed support for RPE in CEO compensation by analyzing data from the U.S. airline industry. He finds that RPE is used differently depending on whether the firms compete in strategic substitutes or complements. The result is a net canceling out of the effect of peer-group performance on CEO pay.

Drawing on these prior studies on factors that affect firms' decisions to use RPE in executive compensation contracts, Gong et al. (2011) employ firms' explicit proxy disclosures on RPE use to simultaneously examine multiple factors that influence the decision to incorporate RPE into executive compensation contracts. They find that firms exposed to higher common risk, operating in less concentrated industries, having fewer growth opportunities, and hiring less wealthy CEOs are more likely to use RPE. Moreover, they document that firms that are larger, have more independent and larger boards, and hire compensation consultants are more likely to use RPE. These results reveal the importance of board structure and compensation consultants in facilitating the use of RPE. Overall, empirical evidence supports the view that firms consider both costs and benefits of RPE as an incentive mechanism when deciding to use RPE.

## 3. RPE within organizations: Lower-level managers and Employees

While a substantial body of research has examined whether RPE is used for evaluating and compensating top executives, academic research on RPE use with for lower-level managers and employees is relatively sparse. This is largely because firms do not generally make internal performance evaluation information available to the public. Nevertheless, research on RPE for lower-level managers and employees is important because their performance can be measured against others in their firm—that is, common uncertainty includes firm-specific elements. Research on within-firm RPE can also provide empirical evidence on the form of RPE contracts, the peer selection process, and resulting employee motivation and performance (Matsumura and Shin 2006),<sup>3</sup> as well as ways to deal with heterogeneity among agents (Casas-Arce and Martínez-Jerez 2009).

Matsumura and Shin (2006) provide some of the first empirical evidence in the accounting literature on RPE-based incentive contracts using data from annual performance evaluation data for 214 post offices (postal stores) in Korea. Their research site is unique in that store performance is largely driven by "uncontrollable" exogenous factors and stores exhibit greater cross-sectional variation than in other contexts,<sup>4</sup> in terms of exogenous store characteristics. The firm designed and implemented a new RPE-based incentive plan, which classified all 214 stores into nine reference groups determined primarily through cluster analysis. Therefore, stores within a reference group were viewed as sharing a similar business environment. The new plan also introduced a performance measure that placed comparatively large weights on profitability (i.e., store revenue divided by store operating cost) relative to average reference-group profitability, and on productivity (i.e., mail

<sup>&</sup>lt;sup>3</sup> Carter et al. (2009) provide details on the forms of RPE contracts used in performance-vested equity grants for CEOs.

<sup>&</sup>lt;sup>4</sup> This greater cross-sectional variation relative to other contexts occurs because the postal service must provide stores even in unprofitable regions.

volume per store employee) relative to average reference-group productivity.

Matsumura and Shin (2006) first find that financial performance improves following the implementation of an incentive plan that includes relative performance measures. They further find that under this incentive plan, the degree of common uncertainty is positively associated with store profitability, suggesting that the extent to which a store is sorted into a more or less homogeneous reference group has a significant impact on store performance. Moreover, they find evidence that the incentive effect of the plan is mitigated in stores at which the employees' perceived unfairness is likely to be high, indicating that dysfunctional responses such as decreased morale or skepticism brought on by employees' perceived unfairness of benchmarked targets may significantly affect employee performance. Finally, they find that the perceived unfairness is higher when a store is in a less homogeneous reference group.

Some of the research on RPE with lower-level managers and employees draws on tournament theory, which addresses settings where rewards are based on performance rank instead of absolute performance (Prendergast 1999). Rewards may be monetary or may involve promotion or retention. In this vein, using data from Texas banks, Blackwell et al. (1994) find evidence consistent with RPE in turnover of subsidiary bank managers. Heterogeneity among agents can dilute the benefits of RPE in a standard tournament or "contest" (Lazear and Rosen 1981). If agents have unequal chances to win the prize given the same level of effort, a tournament can induce disadvantaged agents to shirk (O'Keeffe et al. 1984) and might distort agents' risk choices (e.g., Rosen 1986; Knoeber and Thurman 1994; Hvide 2002).

Casas-Arce and Martinez-Jerez (2009) use data from a contest among the retailers of a commodities manufacturer. to examine the performance impact of an introduction of the contest-based incentive schemes. Consistent with Matsumura and Shin (2006), they find that the implementation of a contest among retailers within the firm is associated with increased sales performance. They also provide evidence that performance improvement is negatively related to the number of participants in the contest, suggesting weaker incentives for contests with a larger number of participants. Interestingly, the results also suggest that retailers that take the lead in the tournament decrease their effort while those that follow increase their effort to catch up. Retailers, however, decrease their effort when the performance gap with winners is too large.

The Matsumura and Shin (2006) and Casas-Arce and Martínez-Jerez (2009) findings underscore the importance of selection of RPE peers in designing a RPE-based incentive scheme. To better shield agents from common exogenous shocks (Lazear and Rosen 1981; Holmstrom 1982; Green and Stokey 1983), selected peers should bear a high degree of common uncertainty with the focal unit or firm. Moreover, in a tournament, selecting agents with similar ability can reduce potential inefficiencies induced by unequal contests, such as shirking and dysfunctional behavioral responses such as resentment, frustration, and feelings of inequity.

## 4. Research Opportunities in RPE

We now discuss some future managerial accounting research opportunities in RPE. First, as noted earlier, prior empirical research on RPE has mostly focused on testing for the existence of RPE and examining factors influencing the use of RPE in executive compensation contracts; the focus is mainly due to data availability. This line of research has provided important insights, but studies that rely on the regression-based implicit approach are unable to examine the execution of RPE contracts (i.e., how RPE plans have been implemented in practice), and therefore are unable to shed light on the design and implementation of RPE as an incentive mechanism (Matsumura and Shin 2006; Carter et al. 2009; Gong et al. 2011). In the domain of executive compensation, firms' proxy disclosures under the new disclosure rules on RPE in executive compensation contracts are likely to provide rich data for researchers to address new research questions. Gong et al. (2011) is a useful starting point in this line of research.

We, however, would like to emphasize that implicit and explicit approaches to studying RPE should

complement each other. While explicit proxy disclosures on RPE provide richer details of RPE-based executive compensation plans, firms can use RPE implicitly through boards' discretion or subjective evaluation (e.g., ex-post RPE via subjectivity), rather than pre-committing to a formulaic explicit RPE contract (Ferri 2009; Gong et al. 2011). Alternatively, firms could incorporate information about peer performance ex-ante when setting performance targets at the beginning of the contracting period (Aranda et al. 2010; Tsui 2013). Explicit proxy disclosures that only focus on a formulaic explicit RPE contract are unable to detect the use of RPE in such cases. Consequently, recent empirical studies on RPE use both implicit and explicit approaches to examine their research questions (e.g., Black et al. 2011; Albuquerque 2013; Vrettos 2013). Researchers should consider employing both approaches when collecting data and designing empirical tests concerning RPE in executive compensation contracts.

Second, we call for more empirical research on RPE within organizations, especially for lower-level managers and rank-and-file employees. While RPE has intuitive appeal for evaluating and rewarding lower-level employees, there exists only scant evidence on how RPE plans are designed and implemented within organizations. For example, theoretical research suggests that RPE-based target setting could circumvent the problem associated with target ratcheting which occurs when current-period target setting relies on past performance (Milgrom and Roberts 1992). However, there has been little evidence on whether and how supervisors incorporate peer performance when setting current-period targets. As an example of this kind of research, Aranda et al. (2010) study the budgeted and actual performance of 432 branches of a travel agency and document that supervisors consider both a business unit manager's past performance and the performance of comparable peers. Further, there is a substitutive relation between a manager's own past performance and peer performance as a source of setting current-period targets (also see Bol and Lill [2012]).

Third, there is a rich history of managerial accounting research insights based on experiments. Experiments allow researchers to carefully control the environment and generate data to answer research questions that can be difficult to obtain from organizations. In particular, researchers can accurately track subjects' decisions in response to various forms of RPE, providing insight for the design of incentive mechanisms and more broadly, organizational management accounting and control systems. For example, Frederickson (1992) used experiments to examine subjects' effort under contracts that were or were not based on RPE and found that with the RPE contract, agents' effort increased as the degree of common uncertainty increased. In a related study, Hannan et al. (2008) used experiments to examine subjects' performance under a tournament (a form of RPE) and a scheme based on individual performance only, and also studied the effects of providing relative performance information to subjects under both contracts (also see Tafkov [2013]). Future experiments might address RPE in situations where agents can collude (Feltham and Hoffman 2012), a situation that is often assumed away.

Last, the majority of RPE literature in accounting has been motivated and informed by agency theory, with an emphasis on the risk-reduction benefits of RPE (Lambert 2001). Industrial organization literature, however, has highlighted a role of managerial incentives to motivate managers to take strategic actions. Aggarwal and Samwick (1999), for example, show that whether executive pay will become an increasing or decreasing function of peer performance depends on the type of strategic competition in an oligopoly. Using the U.S. airline industry, recent work by Vrettos (2013) extends Aggarwal and Samwick (1999) and empirically documents that CEO pay is negatively (positively) associated with peer group performance when firms compete in strategic substitutes (complements), which may explain the lack of RPE use in "on-average" tests. We believe that the literature on RPE in accounting would benefit from incorporating insights from theories other than agency theory, which has dominated a theoretical framework of empirical RPE literature to date.

In sum, we are confident that the topic of RPE will continue to be of great interest to both academics and practitioners. RPE, as a construct in analytical agency models, has received a great deal of attention, but there is much room for further insights from theory and empirical analysis. Innovative research with recently available

data has the potential to make a significant contribution to the area of management accounting. Experiments can also provide data to address the design and effects of providing feedback on relative performance and various RPE contract types, as well as features of the relative-performance information. Field research can provide insights on how organizations are using RPE and what the consequences are. We believe that a number of interesting research questions remain unanswered and call for research that advances our current understanding of RPE.

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