Peer Group Composition, Peer Performance Aggregation, and Detecting Relative Performance Evaluation*

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ABSTRACT

We find that 17.32% of S&P 500 firms explicitly disclose the use of relative performance evaluation (RPE) in their first proxy statement filed on or after December 15, 2006, the effective date of an SEC rule mandating expanded compensation disclosures. We provide evidence on the completeness of these explicit disclosures by conducting implicit tests for RPE to detect if RPE-disclosing firms indeed filter out systematic risk from CEO compensation and RPE-non-disclosers do not. Recent work suggests that inferences from implicit tests for RPE may be sensitive to empirical choices about (1) peer group composition and (2) peer performance aggregation. We incorporate variations in these empirical design choices into our implicit tests for RPE. For the subsample of RPE disclosers, we find consistent implicit evidence of RPE as long as the peer group is composed either of firms in the same industry/size quartile or of firms named as peers in the explicit RPE disclosures. However, we also detect implicit RPE in RPE-non-disclosers, using, for example, industry/size peer groups and weighting each peer’s performance by each peer’s correlation with systematic risk relative to each peer’s idiosyncratic risk. These results imply that relying on explicit disclosures of RPE may understate the prevalence of RPE in practice and that implicit tests for RPE remain important in detecting RPE. Moreover, researchers may need to (1) control for both industry and size when forming peer groups to implicitly test for RPE and (2) adopt more sophisticated peer performance aggregation methods if a researcher’s objective is to control for the systematic determinants of firm performance.

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1. INTRODUCTION

With a recent expansion in the regulation of executive compensation disclosures, there has been a renewed interest in understanding the extent to which a theoretical prediction of the widespread use of relative performance evaluation (RPE) is empirically valid in practice. Prior work is far from conclusive and recently studies have pointed to the possibility that empirical researchers' inability to observe the way in which a CEO's firm performance is compared to peer-firm performance (through the definition of peers and the aggregation of peer performance) may help explain the inconclusive results (e.g., Albuquerque, 2009 and Dikolli et. al, 2010). The purpose of this study is twofold: first, we revisit the broad question of how prevalent in business practice is the use of RPE to set CEO pay? Second, we investigate whether RPE inferences are affected by an empiricist's peer-related choices; specifically, are empirical inferences about the use of RPE affected by the way in which empirical researchers define (1) peer firms and (2) the weights on the performance of each peer firm?

In order to detect firms' use of RPE in setting executive pay, researchers typically use one of two methods, which we define as "explicit" and "implicit" methods. When using the explicit method, researchers use firm regulatory filings and subjective coding criteria to ascertain whether a given firm uses RPE in setting pay.¹ The application of the explicit method has recently been improved by more expansive compensation disclosure requirements for firms required to file annual reports with the SEC. These relatively new disclosures provide researchers with an opportunity to observe the compensation

¹ Recent examples of this technique include Carter, Ittner, and Zechman (2009) and Gong, Li, and Shin (2010).
practices of firms in greater detail, particularly in the "Compensation Discussion and Analysis" section of annual reports. At the same time, however, analysts, stakeholders, and researchers must exercise judgment in determining whether the firm truly uses RPE because the regulations do not require a standardized response to the question of whether the firm actually uses RPE.

When using the implicit method, researchers regress executive pay on firm performance and aggregated peer performance. A positive coefficient on firm performance indicates that firm performance is positively correlated with the level of executive pay, and a negative coefficient on peer performance indicates that the impact of the systematic, or common, component of firm performance on the level of executive compensation is reduced, implying RPE use. The difficulty of applying the implicit method to detect RPE is that even if a firm uses RPE, the researcher does not typically know the peer firms used by the firm for RPE purposes, nor the weights (if any) applied to peer firm performance.

Likely because of the obstacles in detecting the use of RPE applying either the

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2 Per SEC Final Rule 33-8732A, p.11-12, "Much like the overview we have encouraged companies to provide with their Management's Discussion and Analysis of Financial Condition and Results of Options (MD&A), the new Compensation Discussion and Analysis calls for a discussion and analysis of the material factors underlying compensation policies and decisions reflected in the data presented in the tables. This overview addresses in one place these factors with respect to both the separate elements of executive compensation and executive compensation as a whole."

3 Researchers and financial statement users may have difficulty in ascertaining whether or not a firm uses RPE because some firms benchmark components of pay against similar components of pay from peer firms (a.k.a., benchmarking) in addition to or instead of evaluating firm performance relative to peer performance when setting pay (a.k.a., RPE). Empirical studies examining compensation benchmarking include Bizjak, Lemmon, and Naveen (2008), Albuquerque, De Franco, and Verdi (2009), Bizjak, Lemmon, and Nguyen (2009), Cadman and Carter (2009), and Faulkender and Yang (2010).

4 Recent examples of this technique include Albuquerque (2009) and Gong et al. (2010). A shortcoming of the implicit method is that no "percentage number" results from the implicit RPE tests. But, Antle and Smith (1986) use the implicit method to perform firm-specific RPE tests and find that 16 out of 39 sample firms exhibit evidence of RPE.
explicit or implicit method, recent research is inconclusive about the extent of RPE use in practice. Carter et al. (2009) use an explicit approach and document that 51.19% of sample firms selected from the Financial Times Stock Exchange (FTSE) 350 use RPE in at least some of their performance-vested equity plans, while 33.73% of sample firms use RPE in all of their performance-vested equity plans. Gong et al. (2010), however, find that only 25.44% of S&P 1500 firms explicitly disclose the use of RPE in firm proxy statements.

Albuquerque (2009) uses the implicit method on a pooled sample of firms from the S&P 1500. She detects RPE when peer performance is based on peer groups formed from industry/size quartiles. She detects weaker evidence of RPE use when peer performance is based on peer groups formed from two-digit SIC codes or S&P 500 index membership. On the other hand, when Gong et al. (2010) employ the implicit method for detecting RPE, industry-size peer groups, and a cross-sectional sample selected from the S&P 1500, they find no evidence of RPE. However, they do find evidence of RPE when using the implicit test for RPE and a peer group composed of explicitly-disclosed peers (hand collected from proxy statements).

Given the difference in explicit RPE usage between Carter et al. (2009) and Gong et al. (2010) and the conflicting implicit method findings of Albuquerque (2009) and Gong et al. (2010), a further examination of RPE use is important. Using a sample of S&P 500 firms in their first year of expanded proxy statement disclosures, we conduct both explicit and implicit empirical investigations of whether the sample firms use RPE.

Our investigations proceed in three main phases. First, we hand-code proxy statements for a sample selected from the S&P 500. Applying a coding methodology similar to Gong et al. (2010), we find that 17.32% of sample firms explicitly disclose RPE use in
setting CEO pay. In addition, using cross-sectional tests with two-digit SIC peers and industry/size quartile peers, we find implicit evidence of RPE use for the full sample. These results are consistent with Albuquerque (2009) and inconsistent with Gong et al. (2010).

In the second phase of our investigations, we partition the full sample into Non-RPE firms and RPE firms, based on our coding of firm proxy statements, and perform implicit tests for RPE using two-digit SIC peers and industry/size quartile peers. Non-RPE firms are those that do not explicitly disclose RPE use, while RPE firms explicitly disclose RPE use. These tests are designed to examine whether inferences about the use of RPE are affected by the way in which empirical researchers define peer firms.

In each subsample, we detect RPE. For the full sample (composed of both Non-RPE and RPE firms), the industry/size quartile peer group is the most powerful peer group to use to detect RPE. Implicit test results for the Non-RPE sample are similar to, though slightly weaker than, those for the full sample. The evidence of RPE in Non-RPE firms implies that relying on explicit disclosures of RPE may understate the prevalence of RPE in practice and that implicit tests for RPE remain important in detecting RPE. Implicit test results for the RPE sample are similar to, and stronger than, those for the Non-RPE sample and full sample. Specifically, the coefficient on peer performance for RPE firms is consistently more negative and more statistically significant than that for Non-RPE firms and that for the full sample when considering the specifications for the two-digit SIC peer group and the industry/size quartile peer group.

This comparison suggests that even though the RPE firm estimations have lower

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5 An alternative explanation is that Non-RPE firms set CEO compensation based on variables that are different than, and correlated with, those considered in our specifications. We acknowledge this possibility as a limitation of our study.
statistical power due to lower sample size, we detect implicit RPE use in RPE firms, even when the explicitly-disclosed peer group for the RPE firms is not used. In addition, the results highlight the importance of controlling for industry and size when constructing peer groups to implicitly test for RPE. When we perform implicit tests for RPE on a subsample of firms that explicitly disclose RPE peers, we find that the industry/size quartile peer group and the explicitly-disclosed peer group are the most powerful peer groups to use to detect RPE. The relative consistency between our implicit test results using industry/size quartile peers and explicitly-disclosed peers for the RPE firms is inconsistent with Gong et al. (2010).

In the third phase of our investigations, we examine whether using different peer performance aggregation methods results in different conclusions about RPE use. Dikolli, Hofmann, and Pfeiffer (2010) provide analytical and simulation evidence that when researcher-defined peer groups differ from board-defined peer groups, empirical results can be biased toward finding no evidence of RPE. Dikolli et al. (2010) also propose an optimal peer performance aggregation method (the optimally-weighted peer stock return) that is based on weighting each peer's performance by each peer's correlation with systematic risk relative to each peer's idiosyncratic risk. We examine mean peer stock returns and optimally-weighted mean peer stock returns. We find that, on average, if industry/size quartiles are used to define peer groups, each peer performance aggregation method provides implicit evidence of RPE use. This finding extends to the subsample of firms that do not explicitly disclose use of RPE in their proxy statements. Moreover, the optimally-weighted measure of aggregated peer performance is the most statistically significant measure of peer performance in several specifications.
Several implications arise from these results. First, a comparison of our explicit method results to those in Carter et al. (2009) and Gong et al. (2010) implies that the largest firms in the U.S. economy are less likely to disclose RPE use than firms composing the S&P 1500 or the FTSE 350. An alternative implication is that S&P 500 firms are less likely to use RPE than S&P 1500 firms or FTSE 350 firms. In addition, we cannot rule out data coding differences driving the differences in explicitly-detected RPE, even though we use a coding methodology similar to Gong et al. (2010).

Second, the inconsistency of our implicit RPE test results with Gong et al. (2010) implies that S&P 500 firms are more likely to use RPE than S&P 1500 firms. This finding, along with the fact that our results are consistent with Albuquerque (2009), who uses a pooled sample of S&P 1500 firms, implies that the results in Albuquerque (2009) may be driven by the largest firms in the U.S. economy: the S&P 500 firms. Taken together, the full sample explicit and implicit results suggest that S&P 500 firms are less likely to disclose RPE use than S&P 1500 firms, but more likely to actually use RPE based on implicit tests.

Third, our investigations suggest that while expanded compensation disclosures provide direct evidence of RPE, implicit methods are able to detect RPE even in firms that do not disclose RPE use explicitly. This suggests that either (1) the compensation disclosures for some firms may be incomplete, or (2) explicit methods may lead to a failure to reject the null hypothesis that RPE does not exist when in fact RPE does exist.

The remainder of the paper is organized in the following manner. Section 2 discusses prior work and presents the motivation for the empirical tests. Section 3 addresses the empirical method, including data collection and research design. Section 4 presents the results. Section 5 concludes.
2 PRIOR WORK

Prior work in detecting relative performance evaluation has yielded mixed results. In this section we describe recent prior work that most closely relates to our study, and then build on these studies to motivate and highlight the incremental contribution of our study.

2.1 Implicit Tests of RPE

The basic model we use to implicitly test for RPE was proposed by Holmstrom and Milgrom (1987):

\[ \text{Compensation}_i = \beta_0 + \beta_1 \text{FocalFirmPerformance}_i + \beta_2 \text{PeerPerformance}_i + \epsilon_i \]  

(1)

where \( i \) represents a focal firm. In our tests, \( \text{PeerPerformance}_i \) represents an aggregated peer performance measure constructed using the peer firms for focal firm \( i \). The coefficient indicating the use of RPE is \( \beta_2 \). If \( \beta_2 \) is negative, the impact of systematic risk, or common risk between the peer firms and the focal firm relevant to pay, is reduced when establishing the contract. Thus, a negative \( \beta_2 \) indicates RPE. An attractive feature of this model is that it enables the researcher to observe focal firm performance and peer firm performance separately, whereas a model including only the difference between focal firm and peer firm performance would not.

2.2 Peer Group Composition, Implicit RPE Tests, and Explicit RPE Tests

Albuquerque (2009) uses equation (1) to test the effectiveness of different types of

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peer groups in detecting RPE. Using Execucomp, CRSP, and Compustat data for S&P 1500 firms from 1992-2005 to perform pooled regression analyses, she considers three peer groups: 1) the S&P 500 index, 2) Two-digit SIC peers, and 3) Two-digit SIC peers from the same size quartile in a given year (i.e., industry/size quartile peers). Using the equal-weighted peer stock return (excluding the focal firm return), she finds that industry/size quartile peers are consistently the most powerful peer group to use when testing for RPE. In addition, she does not find evidence of RPE using equal-weighted accounting returns (ROA).

Gong et al. (2010) use equation (1) above to examine whether obtaining the explicitly-disclosed peers from firm proxy statements yields more powerful tests for RPE. The authors take advantage of the recently issued SEC Final Rule 33-8732A, which requires firms to provide more explicit disclosures over executive pay. The rule affects all firm fiscal years ending on or after December 15, 2006. The authors collect, for each S&P 1500 firm, the firm’s first proxy statement following the effective date of the SEC rule. Thus, the analyses the authors perform are cross-sectional. The authors read each proxy statement; if the proxy statement indicates that at least one (no) component of pay is determined based on a relative performance evaluation, the firm is coded as an “RPE firm” (“Non-RPE firm”). Their final sample consists of 1,128 firms, with 837 Non-RPE firms and 291 RPE firms. Using industry/size quartile peers and the median stock return for the peer group, Gong et al. (2010) find no evidence of RPE for their full sample, the Non-RPE firms, or the RPE firms, contrary to Albuquerque (2009).

However, when using explicitly-disclosed peers for the RPE firms and the median stock return for these peers, the authors find evidence of RPE use. The implication is that
when researchers obtain the actual peers that firms explicitly disclose in proxy statements, implicit tests for RPE are more powerful.

Gong et al. (2010) also provide evidence on RPE use through the explicit method discussed above. Through an analysis of S&P 1500 firm proxy statements, the authors document that 25.44% of the firms in the S&P 1500 use RPE in setting pay (based on a slightly larger sample of 1,419 firms). Carter et al. (2009) examine Financial Times Stock Exchange (FTSE) 350 firms and find that 51.19% of sample firms use RPE in at least some of their performance-vested equity plans, while 33.73% of sample firms use RPE in all of their performance-vested equity plans.

Given that Albuquerque (2009) and Gong et al. (2010) find differing results using the implicit method, a further examination of implicit method tests is warranted. In addition, the percentage of RPE users among the largest firms in the U.S. economy and the largest firms listed on the FTSE varies substantially, prompting the need for further investigation.

2.3 Peer Performance Aggregation and Implicit RPE Tests

Another important issue in the RPE debate is whether researchers aggregate peer performance in ways that, on average, mirror the aggregation methods of boards of directors. Dikolli et al. (2010) analytically demonstrate and provide simulation evidence that when the researchers' peer groups differ from boards' peer groups, bias is introduced that increases the magnitude of the coefficient on the systematic component of firm performance. If the bias is sufficiently large, the coefficient on systematic performance can become statistically significant. Accordingly, the empirical researcher will make a Type-II error and incorrectly reject the strong-form relative performance evaluation hypothesis,
i.e., the empiricist infers that no RPE exists even when RPE exists by construction.

In addition, Dikolli et al. (2010) propose an optimal weight for each peer firm in a given peer group to be used when aggregating peer performance. We present the optimal weighting scheme below:

$$\delta_{ij} = \frac{\mu_j \tau_j}{\sum_{k=1, k \neq i}^n \mu_k \tau_k} \quad \text{and} \quad \delta_{ii} = 0, \ j = 1, ..., n \ \text{and} \ j \neq i.$$  \hspace{1cm} (2)

$\delta_{ij}$ is the weight applied to each peer's performance in a given peer group, where $i$ represents each focal firm and $j$ represents each peer firm in a focal firm's peer group. $\mu_j$ represents the correlation between systematic risk and peer firm $j$'s performance. $\tau_j$ represents the precision of the idiosyncratic risk for peer firm $j$. Requiring $\delta_{ii} = 0$ and $j \neq i$ ensures that a focal firm cannot be in its own peer group. The weighting methodology proposed above assigns greater weight to peer firms that are strongly correlated with systematic risk, and lower weight to peer firms that are weakly correlated with systematic risk, enabling the board of directors to reduce the impact of systematic risk on the CEO's contract. No study to date of which we are aware assesses the power of this optimal weighting scheme to detect RPE use. We perform tests to assess the power of this optimal weighting scheme in this paper, which we describe in Section 3.

3 \hspace{1cm} EMPIRICAL METHOD

In this section, we describe this study's empirical method, which makes use of hand-collected data, several publicly available databases, and statistical tests. More specifically, we discuss the study's RPE coding procedures, data sources, and sample selection. We then describe three variations in peer group composition and four variations in peer performance aggregation. Finally, we present the empirical model for the statistical tests.
3.1 RPE Coding Procedures

We examine RPE use for S&P 500 firms using both the explicit and implicit methods. In order to employ the explicit method, excerpts are hand-collected from proxy statements from www.sec.gov for S&P 500 firms using the following key words: 1) Peer, 2) Benchmark, 3) Comparison, and 4) Competitive. We read the proxy statement excerpt and determine if at least one component of pay is determined based on relative performance evaluation. If at least one (no) component of pay is determined by relative performance evaluation, we code the firm as an RPE firm (Non-RPE firm). Firms using peer firms simply to benchmark pay, rather than evaluate firm performance relative to peer performance in setting pay, are coded as Non-RPE firms.

We also collect the name of each explicitly-disclosed peer from each RPE firm’s proxy statement excerpt. As proxy statements do not contain unique identifiers, other than company names, for peer firms, we perform a search for each peer firm’s unique identifier (GVKEY) using Compustat. Where GVKEY’s are not available, the peer firms are dropped from the focal firm’s peer group. If a peer firm has been acquired, we include the acquiring firm as the explicitly-named peer in our tests.

At times, focal firms will disclose RPE use, but will not indicate which firms are used as RPE peers. Some of these focal firms, however, do disclose benchmarking peers. In these infrequent cases, we assume that the benchmarking peers are the same peers used for RPE purposes. In cases where RPE firms do not disclose any peers, benchmarking or RPE, we include these firms in our implicit tests using two-digit SIC peers and industry/size quartile peers, but cannot include them in our implicit tests using explicitly-disclosed peers.
Finally, we also record the fiscal year, disclosed by the firm, for which RPE was used in setting pay. This practice is important as firm-defined fiscal years can differ from the Compustat definition, and because firms often disclose compensation practices for more than one fiscal year in proxy statements.

3.2 Other Data Sources

We use the following sources to obtain data for the implicit tests for RPE:

1) Execucomp, which provides data for total compensation, CEO hire date and termination date, whether the CEO is chairman of the board, and CEO stock holdings;

2) CRSP and Compustat, which provide data for firm and peer stock returns, market value of equity, common shares outstanding, industry classification, total assets, and sales;

3) Compustat Index Constituents, which provides data indicating firm S&P 1500 membership and sub-index membership (Largecap, Midcap, Smallcap).

3.3 Sample Selection

We begin with a sample of 662 observations from 630 proxy statement excerpts (some proxy statement excerpts address more than one fiscal period). As shown in Table 1, 99 (14.95%) of these 662 observations are coded as RPE firm observations. Next, we eliminate observations from our sample that are not collected from proxy statements immediately following December 15, 2006, the effective date of SEC rule 33-8732A, resulting in 521 observations, 95 (18.23%) of which are classified as RPE. We then eliminate observations pertaining to firm-years ending prior to December 15, 2006,
resulting in 442 observations, 79 (17.87%) of which are classified as RPE. These two data screening procedures ensure that only one observation per firm is included in our sample, and that each observation in our sample is subject to SEC rule 33-8732A. In addition, we can now perform cross-sectional analyses similar to Gong et al. (2010).

Per Table 1, requiring full data for total compensation, focal firm returns, two-digit SIC peer returns, and industry/size quartile peer returns results in a sample of 401 observations, 69 (17.21%) of which are RPE firms. Requiring sufficient data to calculate optimally-weighted two-digit SIC peer returns and optimally-weighted industry/size quartile peer returns results in a sample of 381 observations, 66 (17.32%) of which are RPE firms, and 315 (82.68%) of which are Non-RPE firms (see Table 2, Panel A). Thus, we find a lower percentage of RPE firms in our sample than either Gong et al. (2010) or Carter et al. (2009) when using the explicit method to test for RPE. This difference could be due to S&P 500 firms actually using RPE less often than S&P 1500 firms or FTSE 350 firms, S&P 500 firms disclosing RPE use less often or less clearly than either S&P 1500 firms or FTSE 350 firms, or coding differences between researchers, which we attempt to rule out by using the same coding methodology as Gong et al. (2010).

When we require that RPE firms explicitly disclose the peer firms used in relative performance evaluation, and that the peer firms explicitly-disclosed must be covered by Compustat and CRSP, we retain 50 RPE firm observations.

3.4 Peer Group Composition

We construct three different peers groups in this paper. Each peer group excludes the focal firm. The first peer group is based on two-digit SIC codes. For each focal firm in our sample of 381, we collect peer firms having the same two-digit SIC code as the focal
firm. The second peer group, industry/size quartile peers, was introduced by Albuquerque (2009) and used by Gong et al. (2010). Within each two-digit SIC code, we rank firms into quartiles based on beginning of the year market value of equity. Each focal firm’s peer group contains firms from the same industry/size quartile as the focal firm. The third peer group is composed of peers that are explicitly-disclosed in firms’ proxy statements.

A simple hypothetical example illustrates the construction of the three peer groups. Suppose Wal-Mart is the focal firm, and further suppose that there are eleven other firms sharing Wal-Mart’s two-digit SIC code. For the first peer group, Wal-Mart is matched with all eleven firms in its two-digit SIC group. For the second peer group, suppose that Wal-Mart, Costco, and Target compose the top quartile of market value of equity after ranking the twelve firms in Wal-Mart’s two-digit SIC group by beginning of the year (Wal-Mart’s fiscal year) market-value of equity. Wal-Mart is matched with only Costco and Target in this industry/size quartile peer group. Now suppose that Wal-Mart discloses the use of RPE in its proxy statement and names Costco, Target, Alcoa, and JPMorgan Chase as its RPE peers. These four firms are Wal-Mart’s explicitly-disclosed peers.

Table 2 provides descriptive statistics for the explicitly named RPE peers, the third peer group described above. This table is provided to enable the reader to compare RPE peers for the RPE firms in this study to those in Gong et al. (2010). In our sample, each RPE firm (N=50) that explicitly discloses the names of its peer firms has approximately 15 peers, on average, consistent with Gong et al. (2010).

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7 This hypothetical example is provided for expository clarity only and is designed to enhance the reader’s understanding of: (1) The different types of peer groups used in this study and, (2) The optimal-weighting method for aggregating peer performance described in Appendix B. In actuality, Wal-Mart has 24 two-digit SIC peers with returns data, 5 industry/size quartile peers with returns and market value of equity data, and zero explicitly-disclosed peers, as Wal-Mart is classified as a Non-RPE firm in our sample.
On average, 69.82% (57.33%) of the RPE peers in our sample are in the same two-digit (three-digit) SIC industry classifications as their focal firms. These percentages are slightly higher than those reported in Table 1, Panel F of Gong et al. (2010). On average, 72.36% and 87.32% of the RPE peers in our sample are in the S&P 500 and S&P 1500 indexes. Gong et al. (2010) do not report the percentage of the RPE peers in their sample that are in the S&P 500 index, but report that 70.37% of the RPE peers in their sample are in the S&P 1500 index, which is lower than the percentage we report in Table 1, Panel F, suggesting that the peer firms in our sample are larger than those in Gong et al. (2010). Finally, 71.60% of the peer firms in our sample are in the same S&P 1500 sub-index (Largecap, Midcap, or Smallcap) as their focal firm. Gong et al. (2010) report 45.11%. The difference in these results suggests that S&P 500 firms choose peers that are closer in size to themselves than S&P 1500 firms.

3.5 Peer Performance Aggregation

We use four methods of peer performance aggregation in our analyses. We obtain the mean peer stock return, consistent with Albuquerque (2009). In addition, we construct the optimally-weighted median peer stock return and the optimally-weighted mean peer stock return as discussed in Section 2.3 above. As the procedure for obtaining optimally-weighted peer returns is new to the literature, we provide a specific discussion of how we construct the optimally-weighted measures in Appendix B.

3.6 Empirical Model

We follow Albuquerque (2009) and Gong et al. (2010) and employ the following model to implicitly test for RPE:

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8 In unreported tests, we instead use median peer stock return, consistent with Gong et al. (2010). Inferences from the results are the same as those reported here.
\[ LNTOTAL_i = \beta_0 + \beta_1 MKTRO R_i + \beta_2 PEERMKTRO R_i + \sum_k \beta_k CONTROL_i^k \]  \hspace{1cm} (3)

In this model, \( LNTOTAL_i \) proxies for the level of CEO total compensation and is equal to the natural logarithm of \( TDC1 \) from Execucomp, plus one. \( MKTRO R_i \) is the focal firm annual return over its fiscal period. \( PEERMKTRO R_i \) is the aggregated peer firm return over the focal firm’s fiscal period and can take one of six values, depending on the definition of the peer group and the aggregation method used to aggregate peer performance. We describe the construction of the six possible values of \( PEERMKTRO R_i \) in Appendix A.

The vector of controls we use is similar to those used in Albuquerque (2009) and Gong et al. (2010) when estimating equation (3). Specifically, we control for firm size \( (LNSALE_1)_i \), growth opportunities \( (GROWTHOPTION)_i \), CEO tenure \( (LNTENURE)_i \), regulated industry membership \( (REG\_IND)_i \), idiosyncratic variance in the focal firm’s stock \( (IDIOVAR)_i \), whether the CEO is chairman of the board \( (CEO\_CHAIR)_i \), low/high CEO ownership of focal firm stock \( (CEO\_OWNERSHIP)_i \), and definitional differences of fiscal years between proxy statements and Compustat \( (FIRMYEARMATCH)_i \). Consistent with prior literature, we predict that firm size, growth opportunities, CEO tenure, idiosyncratic variance, CEO chairmanship, and low CEO ownership of focal firm stock will be positively associated with the level of CEO total compensation. We also predict that regulated industry membership will be negatively associated with the level of CEO total compensation. We make no prediction for \( FIRMYEARMATCH \). All variable definitions are contained in Appendix A.
4 RESULTS

In Table 3 we first present descriptive statistics and univariate correlations for all variables used in our empirical tests for the full sample, for Non-RPE firms, and for RPE firms. In Tables 4, 5, and 6, we then present ordinary least squares estimations of equation (3) with White (1980) standard errors. Where we make specific predictions for the signs of the variables presented in the tables, the stars on the coefficients indicate statistical significance using one-tailed t-tests; otherwise, the stars on the coefficients indicate statistical significance using two-tailed t-tests.

4.1 Descriptive Statistics and Univariate Correlations

In Table 3 we document that 66 (17.32%) of the focal firms in our sample explicitly-disclose RPE use in their proxy statements. The distributions of the variables of interest are similar throughout the three subsamples. In addition, the signs of the statistics for each variable in all of the panels are the same at each point in the distribution. This consistency across subsamples enables comparisons of results between subsamples.

The full sample mean and median measures of peer stock return performance for the two-digit SIC code peers (IND_MKTROR) and the industry/size quartile peers (INDSIZE_MKTROR) are higher than the equal-weighted peer returns measures for each peer group in Albuquerque (2009). Focal firm stock returns (MKTROR) in our sample are higher than those reported in Albuquerque (2009). These differences imply that S&P 500 firms and their peers are possibly more profitable than S&P 1500 firms and their peers, or that the fiscal periods described in the focal firms’ proxy statements immediately following the SEC rule date of December 15, 2006 were generally more profitable for focal firms and peer firms in our sample than the sample period examined (1992-2005) for focal firms and

We present correlations for all variables used in our empirical tests in Table 3, Panel B. In this panel, we provide full sample correlation statistics, with the exception of two variables, $PEER\_MKTROR$ and $PEER\_MKTROR\_WEIGHT\_STD$, which are available only for the subsample of firms that explicitly disclose RPE use and provide the names of their peer firms.\(^9\)

4.2 Results Using Two-Digit SIC Peers

In Table 4, we present estimations of equation (3) using the two-digit SIC peers as the relevant peer group. More specifically, we present results for the full sample, the Non-RPE firms, and the RPE firms using $IND\_MKTROR$ and $IND\_MKTROR\_WEIGHT\_STD$ as the measures of $PEERMKTROR$ from equation (3). For the full sample and the RPE firms, we find that $IND\_MKTROR$ exhibits a significant negative association with the level of CEO total compensation, implying RPE use. We find no significant relation between optimally-weighted mean peer stock returns, $IND\_MKTROR\_WEIGHT\_STD$, and the level of CEO total compensation. We find that the coefficient on $IND\_MKTROR$ for RPE firms is more negative and more statistically significant than the coefficient on $IND\_MKTROR$ for Non-RPE firms.

Overall the results from Table 4 using two-digit SIC peers to test for RPE are consistent with those presented in Albuquerque (2009).

4.3 Results Using Industry-Size Quartile Peers

In Table 5, we present estimations of equation (3) using the industry/size quartile peers as the relevant peer group. We present results for the full sample, the Non-RPE

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\(^9\) Correlation statistics are similar across all subsamples. Thus, providing correlation statistics for only the full sample, with the four exceptions noted above, excludes no important information from the tables.
firms, and the RPE firms using INDSIZE_MKTROR and INDSIZE_MKTROR_WEIGHT_STD as the measures of PEERMKTROR from equation (3). For the full sample, the Non-RPE firms, and the RPE firms, we find that INDSIZE_MKTROR and INDSIZE_MKTROR_WEIGHT_STD exhibit a significant negative association with the level of CEO total compensation, implying RPE use. Again we find that the coefficients on INDSIZE_MKTROR and INDSIZE_MKTROR_WEIGHT_STD for RPE firms are more negative and more statistically significant than the coefficients on INDSIZE_MKTROR and INDSIZE_MKTROR_WEIGHT_STD for Non-RPE firms.

The results we document in Table 5 are similar to those documented in Albuquerque (2009). Gong et al. (2010), however, fail to find evidence of RPE for their full sample, Non-RPE firms, and RPE firms using industry/size quartile peers and median peer stock returns. Thus, our results from Table 5 stand in strong contrast to theirs for each subsample.\textsuperscript{10} Our results documenting RPE in Non-RPE firms are particularly striking in this regard, since the Non-RPE subsample yields the weakest results for RPE in Gong et al. (2010). The significant results for the Non-RPE firms in our sample illustrate the continued usefulness of implicit tests in the literature. In particular, we detect RPE in these firms even when they do not explicitly disclose RPE use. Therefore, researchers should exercise caution when basing inferences on the frequency of RPE use solely on the disclosures made in firms’ proxy statements.

The results from Tables 4 and 5 also imply that controlling for both industry and size when forming peer groups to test for RPE provides for more powerful implicit tests for

\textsuperscript{10} In untabulated sensitivity analysis, we estimate all of our regressions using median peer stock returns and the respective aggregation approaches. The conclusions we draw from this analysis are identical to those we draw from the reported results.
RPE than simply controlling for industry. This finding is consistent with Albuquerque (2009).

In untabulated results, we find that the t-statistic for the optimally-weighted measure of peer performance is larger than that for the simple mean measure of peer performance for all of the subsamples examined in Table 5, suggesting the importance of applying optimal-weights to peer performance when performing implicit tests for RPE.

In further untabulated tests, we explore which aggregation method is more powerful in implicitly detecting RPE by, for example, including both INDSIZE_MKTRO and INDSIZE_MKTRO_WEIGHT_STD in the same regression and observing which coefficient is more significant within the same peer group. Thus, we are holding peer group composition constant and allowing the peer performance aggregation method to vary. We perform analyses using both types of peer groups analyzed in Tables 4 and 5 (two-digit SIC peers and industry/size quartile peers) and find that the optimally-weighted measure of peer performance is the most powerful aggregation method to use in some specifications when implicitly testing for RPE. When we include all four mean-based measures of peer performance from Tables 4 and 5 in the same regression (i.e., when we allow both peer group composition and peer performance aggregation method to vary), we find that the industry/size quartile peer group and the optimally-weighted peer performance measures are the most powerful tools to use in implicit RPE tests for the full sample and for Non-RPE firms.

4.4 Results Using Explicitly Disclosed Peers

In Table 6, we present results for the RPE firms that explicitly disclose the names of their RPE peers in proxy statements (N=50). Models 1 and 2 correspond to Models 5 and 6
from Table 4. Models 3 and 4 from Table 6 correspond to Models 5 and 6 from Table 5. In Models 5 and 6 of Table 6 we present results for the RPE firms and their explicitly-disclosed peers using \textit{PEER}_\textit{MKTROR} and \textit{PEER}_\textit{MKTROR}_\textit{WEIGHT}_\textit{STD} as the measures of \textit{PEER}_\textit{MKTROR} from equation (3).

The results for the RPE firms presented in Table 6 in Models 1, 2, 3, and 4 are similar to those presented for the larger sample of RPE firms in Models 5 and 6 from Table 4 and Models 5 and 6 from Table 5 except that the focal firm return variable, \textit{MKTROR}, is not significantly different from zero for the estimations presented in Table 6. In Model 5 of Table 6, the coefficient on \textit{PEER}_\textit{MKTROR} is not statistically significant at traditional levels. In Model 6 of Table 6, the coefficient on \textit{PEER}_\textit{MKTROR}_\textit{WEIGHT}_\textit{STD} is significantly negative in its relation with the level of CEO total compensation, implying RPE use. In fact, of the six estimations presented in Table 6, Model 6, which employs explicitly-disclosed peers and optimally-weighted mean peer stock returns, provides the strongest evidence of RPE.\textsuperscript{11}

These results suggest that researchers should carefully consider peer group composition and peer performance aggregation when performing implicit tests for RPE. Specifically, using industry/size quartile peers, explicitly-disclosed peers, and optimally-weighted peer performance measures appear to be useful tools for researchers to use in implicit tests for RPE.

\textsuperscript{11} In untabulated tests, we include all six mean-based measures of peer performance from Table 6 in the same regression (i.e., we allow both peer group composition and peer performance aggregation method to vary). We find that the industry/size quartile peer group and the explicitly-disclosed peer group, along with optimally-weighted peer performance measures, are the most powerful tools to use in implicit RPE tests for RPE firms that explicitly disclose the names of their RPE peers.
5 CONCLUSION

We examine the prevalence in business practice of the use of relative performance evaluation (RPE) in setting CEO pay. In addition, we examine whether empirical choices about peer group composition and peer performance aggregation affect the detection of RPE using methods common to the literature. We find that 17.32% of S&P 500 firms explicitly disclose the use of relative performance evaluation (RPE) in their first proxy statement filed on or after December 15, 2006, the effective date of an SEC rule mandating more expansive compensation disclosures in annual reports.

We provide evidence on the completeness of these explicit disclosures by conducting implicit tests for RPE to detect if RPE-disclosing firms filter out systematic risk from CEO compensation and RPE-non-disclosers do not. Prior work suggests that implicit tests for RPE may be sensitive to empirical choices about (1) peer group composition and (2) peer performance aggregation. We incorporate variations in these empirical choices into our implicit tests for RPE. For the subsample of RPE disclosers, we find consistent implicit evidence of RPE as long as the peer group is composed either of firms in the same industry/size quartile or of firms named as peers in the explicit RPE disclosures.

However, we also detect implicit RPE in RPE-non-disclosers, using, for example, industry/size peer groups and weighting each peer's performance by each peer's correlation with systematic risk relative to each peer's idiosyncratic risk. These results imply that relying on explicit disclosures of RPE may understate the prevalence of RPE in business practice and that implicit tests of RPE remain important in detecting RPE use. Researchers may need to (1) control for both industry and size when forming peer groups to implicitly test for RPE use and (2) adopt more sophisticated peer performance aggregation methods if a researcher's objective is to control for the systematic determinants of firm performance.
### Appendix A – Variable Definitions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNNTOTAL</td>
<td>The natural logarithm of 1 plus TDC1 from Execucomp.</td>
</tr>
<tr>
<td>MKTROR</td>
<td>Focal firm annual stock returns, calculated using monthly CRSP data.</td>
</tr>
<tr>
<td>IND_MKTROR</td>
<td>Mean two-digit SIC peer stock returns over the focal firm’s fiscal year period, calculated using monthly CRSP data. Peer group excludes focal firm.</td>
</tr>
<tr>
<td>IND_MKTROR_WEIGHT_STD</td>
<td>Optimally-weighted two-digit SIC peer stock returns over the focal firm’s fiscal year period, calculated using monthly CRSP data. Peer group excludes the focal firm.</td>
</tr>
<tr>
<td>INDSIZE_MKTROR</td>
<td>Mean industry/size quartile peer stock returns over the focal firm’s fiscal year period, calculated using monthly CRSP data. Peer group excludes the focal firm. Industry/size quartiles are formed by grouping firms by two-digit SIC codes, and then ranking firms within each two-digit SIC code by beginning of the year market value of equity calculated using ( PRC^*(SHROUT/1000) ) from CRSP, supplemented by ( PRCC_F^*CHS0 ) from Compustat when missing.</td>
</tr>
<tr>
<td>INDSIZE_MKTROR_WEIGHT_STD</td>
<td>Optimally-weighted industry/size quartile peer stock returns over the focal firm’s fiscal year period, calculated using monthly CRSP data. Peer group excludes the focal firm. Industry/size quartiles are formed using the same method as described for ( \text{INDSIZE}_\text{MKTROR} ) above.</td>
</tr>
<tr>
<td>PEER_MKTROR</td>
<td>Mean explicitly-disclosed peer stock returns, calculated using monthly CRSP data. Peer group excludes the focal firm. Explicitly-disclosed peers are hand-collected from focal firm proxy statements.</td>
</tr>
<tr>
<td>PEER_MKTROR_WEIGHT_STD</td>
<td>Optimally-weighted explicitly-disclosed peer stock returns over the focal firm’s fiscal year period, calculated using monthly CRSP data. Peer group excludes the focal firm. Explicitly-disclosed peers are hand-collected from focal firm proxy statements.</td>
</tr>
<tr>
<td>LNSALE_1</td>
<td>The natural logarithm of 1 plus SALE from Compustat, lagged 1 period.</td>
</tr>
<tr>
<td>GROWTHOPTION</td>
<td>Beginning-of-the-year market value of equity ( (PRC^*(SHROUT/1000)) ) from CRSP, supplemented by ( PRCC_F^*CHS0 ) from Compustat when missing, divided by beginning-of-the-year total assets.</td>
</tr>
<tr>
<td>LNTENURE</td>
<td>The natural logarithm of 1 plus the number of years that the CEO has held office. The CEO is determined using Execucomp hire ( (\text{BECAMECEO}) ) and termination ( (LEFTOPC) ) dates and fiscal-year ends calculated using FYR and FYEAR from Compustat. This method is similar to the CEO-determination method from Milbourn (2003).</td>
</tr>
<tr>
<td>REG_IND</td>
<td>Indicator variable equal to 1 if the focal firm has a SIC code ranging from 4900 to 4939, zero otherwise.</td>
</tr>
<tr>
<td>IDIOVAR</td>
<td>The standard deviation of focal firm monthly stocks returns minus the mean standard deviation of monthly stock returns of the two-digit SIC peers over the 36 months ending at the focal firm’s fiscal year end date.</td>
</tr>
<tr>
<td>CEO_CHAIR</td>
<td>Indicator variable equal to 1 if the CEO is chairman of the board. We hand-code this variable using ( \text{TITLEANN} ) from Execucomp.</td>
</tr>
<tr>
<td>CEO_OWNERSHIP</td>
<td>Indicator variable equal to 1 if the CEO's stock ownership percentage is less than the sample median CEO stock ownership percentage, zero otherwise. The CEO's stock ownership percentage is equal to ( (\text{SHROWN EXCL_OPTS/1000})/\text{CHS0} ), from Execucomp and Compustat, supplemented by ( \text{SHROWN EXCL_OPTS_PCT} ) from Execucomp where missing.</td>
</tr>
<tr>
<td>FIRMYEARMATCH</td>
<td>Indicator equal to 1 if the fiscal year described in the focal firm’s proxy statement is equal to the Compustat fiscal year, zero otherwise. This variable controls for differences in fiscal year definitions between focal firm managers and Compustat.</td>
</tr>
</tbody>
</table>
Appendix B – Optimal Weight Construction: A Hypothetical Example

Since the optimally-weighted measure is designed to remove systematic risk when setting pay, we use two-digit SIC code groups to calculate the numerator of the optimal weight, as the two-digit SIC code grouping is the broadest of the three peer groups we construct. The denominator of the optimal weight varies with the composition of the peer group. Recall that the optimal weight is characterized by equation (2) from Section 2.3:

\[ \delta_{ij} = \frac{\mu_{ij}}{\sum_{k=1, k \neq i}^{n} \mu_{kk}} \quad \text{and} \quad \delta_{ii} = 0, \ j = 1, \ldots, \ n \ \text{and} \ j \neq i. \quad (2) \]

We continue the hypothetical Wal-Mart example used in section 3.4 above to illustrate the calculation of the optimal weight.

Consider Wal-Mart as the focal firm and the eleven hypothetical peer firms from its two-digit SIC peer group. We obtain the numerator for the optimal weight for peer stock returns as follows:

1) For each of the eleven peer firms in Wal-Mart’s two-digit SIC industry classification, we regress the peer firm’s monthly stock returns (over Wal-Mart’s fiscal year period) on the monthly mean stock returns of the ten other peer firms in the peer group and Wal-Mart.\(^{12}\)

\[ \text{Peer}_{i} \text{Returns}_{ijt} = \beta_{0} + \beta_{1} \text{Mean(OtherPeer}_{i} \text{Returns}_{it}) + \epsilon_{ijt} \quad (4) \]

Equation (4) above shows the estimation in this step, where \( i \) indicates the focal firm to which a given peer, \( j \), “belongs,” \( l \) represents all other firms in the two-digit SIC code group, including the focal firm, \( i \), and \( t \) represents a given month in the focal firm’s fiscal year. Thus, in equation (4), \( i \neq j, j \neq l \), and \( i \) can be equal to \( l \) on the right hand side of the equation.

2) For each of the eleven peer firm estimations of equation (4) in Step 1, we save \( \beta_{1} \), which proxies for the peer firm’s correlation with systematic risk, \( \mu_{j} \), in equation (2).

3) For each of the eleven peer firm estimations of equation (4) in Step 1, we calculate the standard deviation of the residuals. The reciprocal of the standard deviation for

\(^{12}\) The calculation is the same for the optimally-weighted median peer stock return, except that monthly median stock returns are used instead of monthly mean stock returns. We discuss only the construction of the optimally-weighted mean peer stock return for expositional brevity.
each peer firm proxies for the precision of idiosyncratic risk, \( \tau_j \), in equation (2).

4) For each of the eleven peer firms, we multiply \( \beta_1 \) from Step 2, or \( \mu_j \), by the reciprocal of the standard deviation of residuals calculated in Step 3, \( \tau_j \), to obtain the numerator of the optimal weight, as represented by \( \mu_j \tau_j \) in equation (2). The numerator of the optimal weight for each peer firm, \( j \), is constant across the three different peer groups used in this study to ensure that the optimal amount of systematic risk is excluded from the determination of CEO pay.

Continuing the Wal-Mart example noted above, we obtain the denominator of the optimal weight as follows for each of the three peers groups:

1) For the two-digit SIC peer group, we sum the numerators for all eleven firms in the peer group to obtain the denominator for the optimal peer performance weight. Using the notation from equation (2), the denominator is equal to \( \sum_{k=1, k \neq i}^{n} \mu_k \tau_k \) with \( n=11 \).

2) For the industry/size quartile peer group, we sum the numerators for Costco and Target to obtain the denominator for the optimal peer performance weight. Using the notation from equation (2), the denominator is equal to \( \sum_{k=1, k \neq i}^{n} \mu_k \tau_k \) with \( n=2 \).

3) For the explicitly-disclosed peer group, we sum the numerators for Costco, Target, Alcoa, and JPMorgan Chase to obtain the denominator for the optimal peer performance weight. Using the notation from equation (2), the denominator is equal to \( \sum_{k=1, k \neq i}^{n} \mu_k \tau_k \) with \( n=4 \).

We obtain the optimal weights for each peer firm, \( \delta_{ij} \), by dividing the numerator of the optimal weight for each peer firm by the appropriate denominator, depending on the peer group. Calculating the denominator as noted in the three steps above ensures that weights always sum to one for each of the three peer groups, even though the composition of each peer group varies. In order to obtain optimally-weighted stock returns for each peer group, we perform the following steps (continuing the hypothetical example noted above):

1) For the two-digit SIC peer group, we multiply each of the eleven optimal weights, \( \delta_{ij} \) with \( \delta_{ii} = 0 \) and \( j \neq i \), by the annual return for each peer firm, \( j \) (cumulated over the focal firm's fiscal year), then sum the weighted peers returns for each focal firm, \( i \), to
obtain an aggregated, optimally-weighted peer return for each focal firm.

2) For the industry/size quartile peer group, we multiply each of the two optimal weights, $\delta_{ij}$ with $\delta_{ii} = 0$ and $j \neq i$, by the annual return for each peer firm, $j$ (cumulated over the focal firm's fiscal year), then sum the weighted returns for each focal firm, $i$, to obtain an aggregated, optimally-weighted peer return for each focal firm.

3) For the explicitly-disclosed peer group, we multiply each of the four optimal weights, $\delta_{ij}$ with $\delta_{ii} = 0$ and $j \neq i$, by the annual return for each peer firm, $j$ (cumulated over the focal firm’s fiscal year), then sum the weighted returns for each focal firm, $i$, to obtain an aggregated, optimally-weighted peer return for each focal firm.
Table 1

Sample Selection

This table presents the sample selection criteria for this study. The data are collected from firm proxy statements and from the Execucomp, CRSP, Compustat, and Compustat Index Constituents databases. An observation is coded as an "RPE" observation if the firm discloses the use of RPE in setting executive pay in its first proxy statement filed on or after December 15, 2006, the effective date of SEC Rule 33-8732A. Variable definitions are included in Appendix A.

<table>
<thead>
<tr>
<th>Sample Description</th>
<th># of Obs.</th>
<th># of RPE Obs</th>
<th>% RPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations hand-coded from proxy statement excerpts (DEF14A)</td>
<td>662</td>
<td>99</td>
<td>14.95%</td>
</tr>
<tr>
<td>Observations with proxy statement date immediately preceding fiscal year-end date</td>
<td>521</td>
<td>95</td>
<td>18.23%</td>
</tr>
<tr>
<td>Observations with fiscal year-end on or after SEC Rule Date - December 15, 2006</td>
<td>442</td>
<td>79</td>
<td>17.87%</td>
</tr>
<tr>
<td>Observations with Execucomp data for CEO pay, and CRSP data for focal firm returns, two-digit SIC peer returns, and industry/size quartile peer returns</td>
<td>401</td>
<td>69</td>
<td>17.21%</td>
</tr>
<tr>
<td>Observations with CRSP data for optimally-weighted two-digit SIC peer returns, optimally-weighted industry/size peer returns, and full controls vectors</td>
<td>381</td>
<td>66</td>
<td>17.32%</td>
</tr>
<tr>
<td>&quot;NON RPE&quot; observations</td>
<td>315</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>&quot;RPE&quot; observations</td>
<td>66</td>
<td>66</td>
<td>100.00%</td>
</tr>
<tr>
<td>&quot;RPE&quot; observations with CRSP data for explicitly-disclosed peer returns and optimally-weighted explicitly-disclosed peer returns</td>
<td>50</td>
<td>50</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
Table 2

Sample Firm Classification and Descriptive Statistics for Explicitly-disclosed RPE Peers

Panel A: Relative Performance Evaluation Use

This panel presents the frequency of RPE in the sample of firms analyzed in the empirical tests. A firm is classified as a "RPE" firm if the firm discloses the use of RPE in setting executive pay in its first proxy statement filed on or after December 15, 2006, the effective date of SEC Rule 33-8732A, and is classified as a "Non-RPE" firm otherwise.

<table>
<thead>
<tr>
<th>FIRM CLASSIFICATION</th>
<th># of Firms</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPE Firms</td>
<td>66</td>
<td>17.32%</td>
</tr>
<tr>
<td>Non-RPE Firms</td>
<td>315</td>
<td>82.68%</td>
</tr>
<tr>
<td>Total</td>
<td>381</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Panel B: Descriptive Statistics for Explicitly-disclosed RPE Peers

This panel presents descriptive statistics for explicitly-disclosed RPE peer firms for the subsample of focal firms that explicitly disclose the names of their RPE peers in firm proxy statements. Index membership and sub-index membership are obtained from the Compustat Index Constituents database.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MEAN</th>
<th>STD</th>
<th>P25</th>
<th>P50</th>
<th>P75</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of RPE peers</td>
<td>14.520</td>
<td>8.605</td>
<td>9.000</td>
<td>12.500</td>
<td>19.000</td>
<td>50</td>
</tr>
<tr>
<td>% of RPE peers in the same two-digit SIC industry as the RPE firms</td>
<td>69.820</td>
<td>31.411</td>
<td>44.444</td>
<td>80.000</td>
<td>100.000</td>
<td>50</td>
</tr>
<tr>
<td>% of RPE peers in the same three-digit SIC industry as the RPE firms</td>
<td>57.330</td>
<td>34.220</td>
<td>27.273</td>
<td>57.780</td>
<td>90.000</td>
<td>50</td>
</tr>
<tr>
<td>% of RPE peers in the S&amp;P 500 Index</td>
<td>72.360</td>
<td>23.437</td>
<td>57.143</td>
<td>75.000</td>
<td>95.450</td>
<td>50</td>
</tr>
<tr>
<td>% of RPE peers in the S&amp;P 1500 index</td>
<td>87.320</td>
<td>17.080</td>
<td>80.952</td>
<td>94.590</td>
<td>100.000</td>
<td>50</td>
</tr>
<tr>
<td>% of RPE peers in the same S&amp;P 1500 sub-index as the RPE firms</td>
<td>71.600</td>
<td>23.970</td>
<td>55.556</td>
<td>75.000</td>
<td>94.440</td>
<td>50</td>
</tr>
</tbody>
</table>
### Table 3: Descriptive Statistics

#### Panel A: Univariate Statistics by Subsample

This table presents univariate statistics for the variables used in the implicit tests for RPE. Variable definitions are included in Appendix A.

<table>
<thead>
<tr>
<th>NAME</th>
<th>FULL SAMPLE</th>
<th>NON RPE FIRMS</th>
<th>RPE FIRMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNTOTAL</td>
<td>381</td>
<td>9.024</td>
<td>0.790</td>
</tr>
<tr>
<td>MKTROR</td>
<td>381</td>
<td>0.172</td>
<td>0.228</td>
</tr>
<tr>
<td>IND_MKTROR</td>
<td>381</td>
<td>0.178</td>
<td>0.089</td>
</tr>
<tr>
<td>IND_MKTROR_WEIGHT_STD</td>
<td>381</td>
<td>0.004</td>
<td>0.534</td>
</tr>
<tr>
<td>INDSIZE_MKTROR</td>
<td>381</td>
<td>0.161</td>
<td>0.106</td>
</tr>
<tr>
<td>INDSIZE_MKTROR_WEIGHT_STD</td>
<td>381</td>
<td>0.116</td>
<td>0.137</td>
</tr>
<tr>
<td>LNSALE_1</td>
<td>381</td>
<td>8.918</td>
<td>1.179</td>
</tr>
<tr>
<td>GROWTHOPTION</td>
<td>381</td>
<td>1.429</td>
<td>1.418</td>
</tr>
<tr>
<td>LNTENURE</td>
<td>381</td>
<td>1.788</td>
<td>0.698</td>
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<tr>
<td>REG_IND</td>
<td>381</td>
<td>0.071</td>
<td>0.257</td>
</tr>
<tr>
<td>IDOVAR</td>
<td>381</td>
<td>0.048</td>
<td>0.033</td>
</tr>
<tr>
<td>CEO_CHAIR</td>
<td>381</td>
<td>0.654</td>
<td>0.476</td>
</tr>
<tr>
<td>CEO_OWNERSHIP</td>
<td>381</td>
<td>0.499</td>
<td>0.501</td>
</tr>
<tr>
<td>FIRMYEARMATCH</td>
<td>381</td>
<td>0.885</td>
<td>0.320</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>NAME</th>
<th>RPE FIRMS</th>
<th>N</th>
<th>MEAN</th>
<th>STD</th>
<th>P1</th>
<th>P25</th>
<th>P50</th>
<th>P75</th>
<th>P99</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNTOTAL</td>
<td>66</td>
<td>9.054</td>
<td>0.797</td>
<td>7.139</td>
<td>8.538</td>
<td>9.004</td>
<td>9.533</td>
<td>10.995</td>
<td></td>
</tr>
<tr>
<td>MKTROR</td>
<td>66</td>
<td>0.147</td>
<td>0.221</td>
<td>-0.335</td>
<td>0.021</td>
<td>0.129</td>
<td>0.261</td>
<td>0.706</td>
<td></td>
</tr>
<tr>
<td>IND_MKTROR</td>
<td>66</td>
<td>0.181</td>
<td>0.105</td>
<td>-0.272</td>
<td>0.129</td>
<td>0.172</td>
<td>0.250</td>
<td>0.446</td>
<td></td>
</tr>
<tr>
<td>IND_MKTROR_WEIGHT_STD</td>
<td>66</td>
<td>0.058</td>
<td>0.419</td>
<td>-2.866</td>
<td>0.043</td>
<td>0.099</td>
<td>0.136</td>
<td>0.731</td>
<td></td>
</tr>
<tr>
<td>INDSIZE_MKTROR</td>
<td>66</td>
<td>0.163</td>
<td>0.106</td>
<td>-0.169</td>
<td>0.105</td>
<td>0.133</td>
<td>0.199</td>
<td>0.557</td>
<td></td>
</tr>
<tr>
<td>INDSIZE_MKTROR_WEIGHT_STD</td>
<td>66</td>
<td>0.112</td>
<td>0.133</td>
<td>-0.275</td>
<td>0.017</td>
<td>0.085</td>
<td>0.175</td>
<td>0.661</td>
<td></td>
</tr>
<tr>
<td>PEER_MKTROR</td>
<td>50</td>
<td>0.159</td>
<td>0.129</td>
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Table 3 (continued)

Descriptive Statistics

Panel B: Pearson and Spearman Correlations

This panel presents Pearson (upper right) and Spearman (lower left) bivariate correlations for the variables used in the implicit tests for RPE. Variable definitions are included in Appendix A. * indicates statistical significance at the 0.05 level.

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### Implicit Tests for RPE Using Two-Digit SIC Fruits

**Table 4**

*Note: The table presents results of estimating equation (3).*
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</table>

Implicit Tests for RPE using Industry/Size Quartile Pairs

This table presents results of estimating equation (3):

$$\text{TOTAL} = \beta_0 + \beta_1 \text{MARKET} + \beta_2 \text{RETURN} + \beta_3 \text{CONTRMKT}$$

Table 5
Table 6

Implicit Tests for RPE for the Subsample of RPE Firms that Disclose RPE Peers

This table presents results of estimating equation (3):

\[ \ln(TOTAL)_i = \beta_0 + \beta_1 MKTROR_i + \beta_2 PEERMKTROR_1 + \sum_k \beta_k CONTROL_k \]

(3)

The estimations of equation (3) are for the subsample of RPE firms that disclose RPE peers. Model 1 uses two-digit SIC peers (2DSIC) and mean peer stock returns (\(IND\_MKTROR = PEERMKTROR\)). Model 2 uses two-digit SIC peers (2DSIC) and optimally-weighted mean peer stock returns (\(IND\_MKTROR\_WEIGHT\_STD = PEERMKTROR\)). Model 3 uses industry/size quartile peers (ISQ) and mean peer stock returns (\(INDSIZE\_MKTROR = PEERMKTROR\)). Model 4 uses industry/size quartile peers (ISQ) and optimally-weighted mean peer stock returns (\(INDSIZE\_MKTROR\_WEIGHT\_STD = PEERMKTROR\)). Model 5 uses explicitly-disclosed peers (EDISC) and mean peer stock returns \(PEER\_MKTROR = PEERMKTROR\). Model 6 uses explicitly-disclosed peers (EDISC) and optimally-weighted mean peer stock returns \(PEER\_MKTROR\_WEIGHT\_STD = PEERMKTROR\). A firm is classified as a "RPE" firm if the firm discloses the use of RPE in setting executive pay in its first proxy statement filed on or after December 15, 2006, the effective date of SEC Rule 33-8732A, and is classified as a "Non-RPE" firm otherwise. The dependent variable for Models 1-6 is \(LN\_TOTAL\). Variable definitions are included in Appendix A. Results are generated using ordinary least squares estimations. White (1980) standard errors are presented below the regression coefficients. One-tailed t-tests are performed on predicted coefficients, two-tailed t-tests otherwise. ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels.
References


